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Vindmålinger i Drøbaksundet April 1990—Juni 1990

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SAMMENDRAG

Norsk institutt for luftforskning (NILU) har på oppdrag fra Statens Vegvesen, Buskerud Vegkontor, målt vind og turbulens i Drøbaksundet i Oslofjorden. Målingene ble startet 12. desember 1989, og avsluttet 30. juni 1990. Denne rapporten omhandler målinger fra 1. april 1990 til 30. juni 1990. På bakgrunn av 3 måneders målinger kan følgende konklusjoner trekkes:

- I måleperioden har sterk vind forekommet vesentlig oftere enn normalt for området, spesielt i april måned.
- Fremherskende vindretning i Drøbaksundet under måleperioden var fra sør. Forekomsten av vindretning innenfor en 10 graders sektor rundt 170 grader var 13,4% av totalt antall observasjoner i 36 m nivå.
- De høyeste middelvindstyrkene forekom ved vind fra sør. Midlere vindstyrke for 10 graders sektor rundt 170 grader var 6,8 m/s. Middelvindstyrken for perioden var 4,1 m/s.
- Vind fra vest var mer turbulent enn vind fra øvrige retninger. Maksimal vindstyrke for 10-min middelvei var 14,9 m/s (5. april kl 0450). Største vindkast (1,5 sekunders middelvind) var 20,3 m/s (22. juni kl 2250).

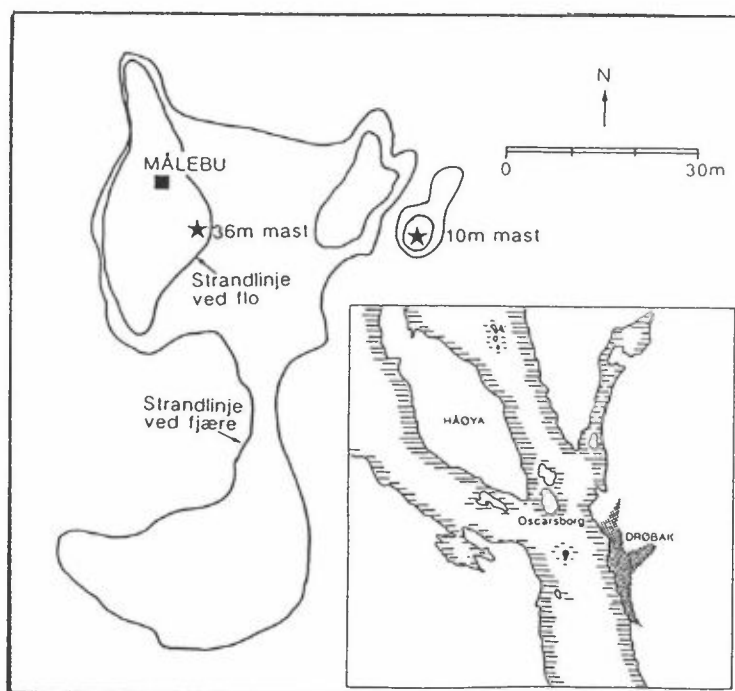
VINDMÅLINGER I DRØBAKSUNDET DESEMBER 1989-MARS 1990

1 INNLEDNING

Norsk institutt for luftforskning (NILU) har på oppdrag fra Statens Vegvesen, Buskerud Vegkontor, utført målinger av vind og turbulens i Drøbaksundet i Oslofjorden. Målingene er igangsatt i forbindelse med utredning om veiforbindelse fra Drøbak til Hurum. Målingene startet i desember 1989. Denne rapporten omhandler data samlet inn fra april til juni 1990.

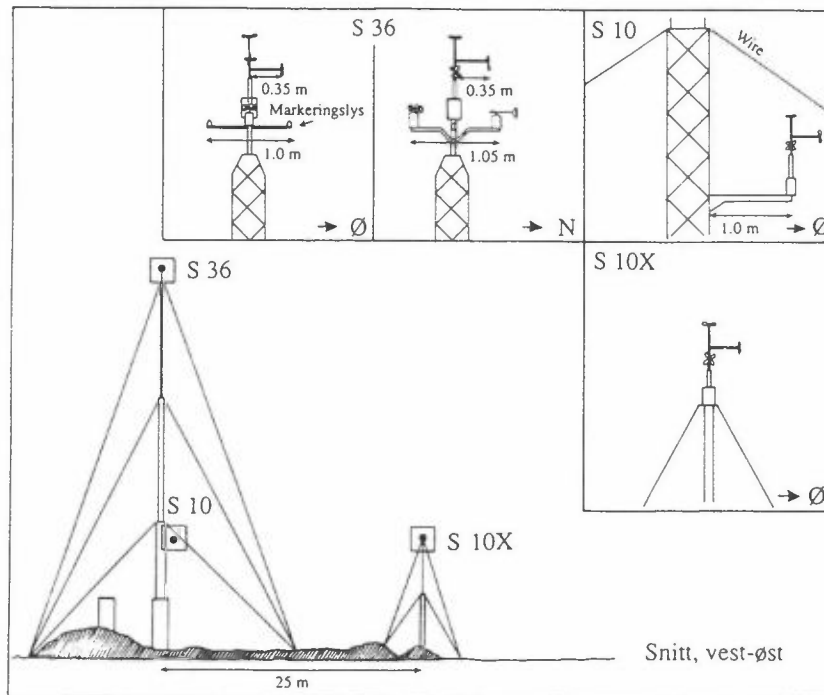
2 STASJONSBEKRIVELSE

Målestasjonen er plassert på Småskjær i Drøbaksundet, ca. 700 m sør for Oscarsborg festning. En av de alternative brutraseene går over målestasjonen. Det høyeste punktet på Småskjær er ca. 3 m over normalt havnivå. Målestasjonens beliggenhet er vist på figur 1a.



Figur 1a: Skisse av Småskjær med plassering av målestasjon.

Figur 1b viser en skisse av målestasjonen og sensorplasseringen i de tre målepunktene. En beskrivelse av sensorene er gitt i kapittel 3.



Figur 1b: Skisse av målestasjonen og sensorplasseringen i mastene.

3 INSTRUMENTERING

På målestasjonen er det to instrumentmaster, henholdsvis 36 m og 10 m høye. Mastene er utstyrt med sensorer for vindmåling i 10 m høyde og i 36 m høyde. I tillegg måles temperaturen i 36 m høyde og temperaturdifferansen mellom 36 m og 2 m høyde. To typer vindmålere er installert i mastene, en Aanderaalogger i 36 m og tre Gillanemometre, ett i 36 m, og ett i hver mast i 10 m høyde.

Aanderaamåleren består av et skålkors og en retningsfløy. Den registrerer middelvindstyrke hvert 10. minutt, sterkeste vindkast midlet over 2 sekunder og vindretning hvert 10. minutt. Skålkorset har et måleområde på 0-60 m/s, en starthastighet på

0,3 m/s, og en avstandskonstant på 1,5 m. Målenøyaktigheten for vindstyrke er 2%.

Gillanemometrene består av propeller montert på 3 faste akser orientert i retninger øst, nord og loddrett. Armene er 35 cm. For hver av de ni sensorene logges antall propelleromdreininger hvert 1,17 sekund (512 registreringer på 600 sekunder). Instrumentet har et måleområde på 0-40 m/s, en starthastighet garantert til 0,4 m/s og en avstandskonstant på 2,1 m. Målenøyaktigheten er 3%. En mikroprosessor kontrollerer at logging av de ni sensorene foregår synkront. Dersom differansen i innlogging overstiger 1,17 millisekunder, resynkroniseres opptellingsperiodene. Slik resynkronisering har ikke vært nødvendig. Mikroprosessen beregner også middelvei og standardavvik for hver serie av 512 registreringer, samt registrerer maksimalt utslag for de vertikale sensorene og maksimal vektor for de tre horisontale komponentene. Mikroprosessen opererer med pulser fra sensorene som enhet.

Dataene overføres pr. telefon ca. 3 ganger i døgnet til en lokal lagringsenhet på NILU. Både 10 minutters statistisk bearbejdede data og sekund-seriene overføres. Dataene kontrolleres under oppringning på stikkprøvebasis og senere under bearbejding. De viktigste indikasjonene på feil er at det er dårlig sammenheng mellom målingen i ett målepunkt i forhold til de andre.

4 DATATILGJENGELIGHET

Aanderaamåleren har vært operativ nær 100% av tiden i måleperioden. I noen korte perioder med svært svak vind gir måleren konstant vindretning på grunn av den innebygde tregheten i rettingsfløya.

Gillanemometrene har også god datatilgjengelighet, men måleren i 36 m var ikke operativ fra 3. april til 6. april.

Manglende eller dårlige data i prosent av total tid er vist i tabell 1 for vertikale og horisontale sensorer.

Tabell 1: Manglende eller dårlige data i prosent av måletiden.

	36 m		10 m i 36 m mast		10 m i 10 m mast	
	Horisontal	Vertikal	Horisontal	Vertikal	Horisontal	Vertikal
April	9,8	0,2	0,4	0,3	0,4	0,3
Mai	0,2	0,4	0,0	0,2	0,0	0,2
Juni	0,1	0,1	0,0	0,0	0,0	0,0
Totalt	3,4	0,2	0,1	0,1	0,1	0,1

5 REPRESENTATIVITET

Representativiteten av måleperioden er vurdert fra sammenligning mellom måleperioden og 15 års vindstatistikk for Færder fyr. Færder fyr bør være representativ for ytre Oslofjord.

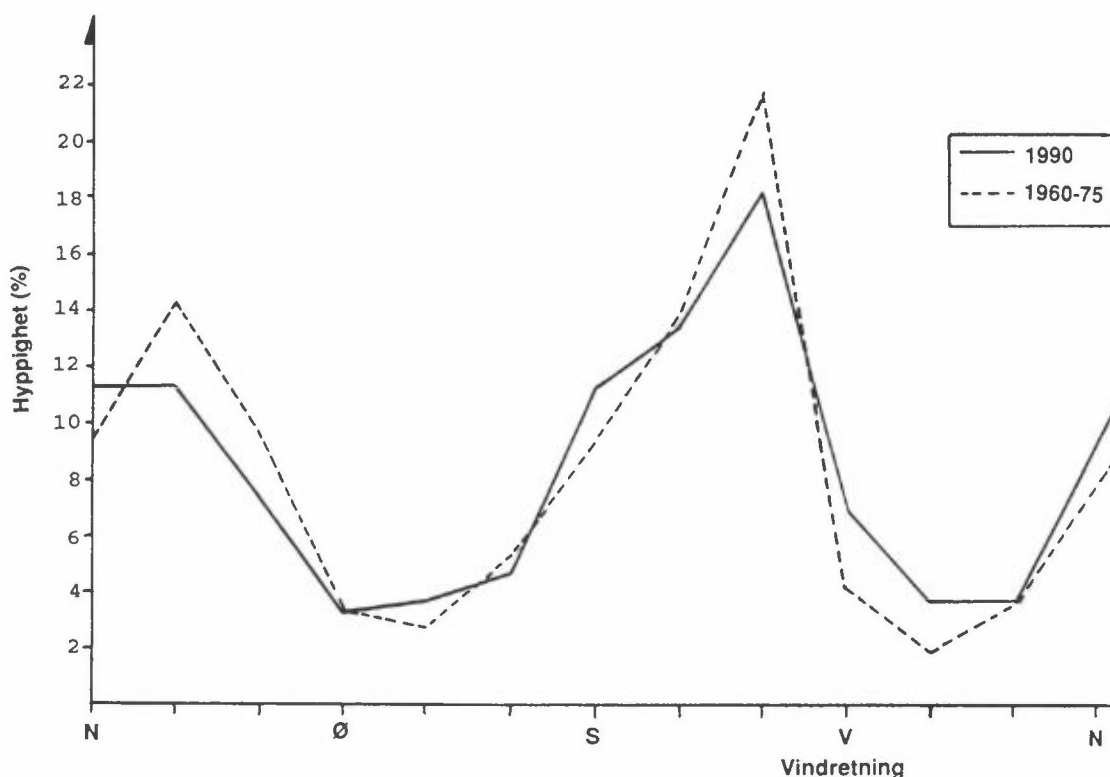
Under måleperioden har det vært høyere forekomst av sterk vind enn normalt for årstiden. Tabell 2 viser en sammenligning mellom 1990 og perioden 1960-1975 for Færder fyr. Tallene er hentet fra Meteorologisk institutts klimatiske månedsoversikter og fra statistisk bearbejdede vinddata fra 1960-1975.

Tabell 2: Sammenligning mellom 1990 og perioden 1960-1975 for Færder fyr.

Måned	1990				1960-1975		
	Temperaturavvik (grader)	Midlere vindstyrke (beaufort)	Prosent av døgn med maks. vind over 6 beauf. over 8 beauf.		Midlere vindstyrke (beaufort)	Prosent av døgn med maks. vind over 6 beauf. over 8 beauf.	
April	2,4	4,2	73	13	3,8	27	2
Mai	1,8	3,4	45	3	3,7	26	2
Juni	1,0	3,7	47	0	3,9	26	1

Vindstyrkeklasse 5 beaufort (frisk bris) svarer til vindstyrker fra 8,0 m/s til 10,7 m/s. Vindstyrkeklasse 4 beaufort (laber bris) svarer til vindstyrker fra 5,5 m/s til 7,9 m/s. Forekomsten av døgn med maksimal vind over 6 beaufort (liten kuling) var høyere enn normalt. Forekomsten av døgn med maksimal vind over 8 beaufort (sterk kuling) var høyere enn normalt i april, og nær normalt i mai og juni.

Figur 2 viser forekomst av vind delt i vindretningsklasser målt på Færder for perioden 1960-1975 og våren 1990 (april, mai, juni). Figuren viser at i måleperioden har vindretningsfordelingen vært nær det normale.



Figur 2: Vindretningsfordeling målt på Færder for måleperioden, og for tilsvarende måneder fra 1960 til 1975. Forekomsten av vind i en 30 graders sektor er delt inn i 4 vindstyrkeklasser.

6 MÅLERESULTATER

6.1 TIDSPLOTT

Tidsplott av vindretning og vindstyrke for hver sjette 10 min. middelvei på 4 sensorer er vist i vedlegg A. (Hver hele time).

6.2 DEKOMPONERING AV HORIZONTAL TURBULENS

Målingene langs de faste aksene øst-vest (u-akse) og nord-sør (v-akse) gir variansen av vindkomponenten langs aksene for en 10 minutters periode. Turbulensen langs og på tvers av vindvektoren, uttrykt ved målingene langs aksene og vinkelen α mellom vindvektoren og øst-vest-aksen er

$$(1) \quad \sigma_L^2 = \sigma_u^2 \cos^2 \alpha + \sigma_v^2 \sin^2 \alpha - 2 \cos \alpha \sin \alpha \operatorname{cov}(u^1, v^1)$$

$$(2) \quad \sigma_T^2 = \sigma_u^2 \sin^2 \alpha + \sigma_v^2 \cos^2 \alpha + 2 \cos \alpha \sin \alpha \operatorname{cov}(u^1, v^1)$$

- Der - σ_L^2 er variansen langs vindvektoren
 - σ_T^2 er variansen på tvers av vindvektoren
 - σ_u^2 er variansen i målingene langs øst-vest aksene
 - σ_v^2 er variansen i målingene langs nord-syd aksene
 - α er definert ved $\alpha = \arctg(-\frac{u}{v})$
 - cov er kovariansen
 - u^1 er måleserien langs u-aksene korrigert med \bar{u}
 - v^1 er måleserien langs v-aksene korrigert med \bar{v}

Da kovariansen mellom u og v ikke er lagret for 10 minutters seriene, er σ_L^2 og σ_T^2 beregnet etter formlene

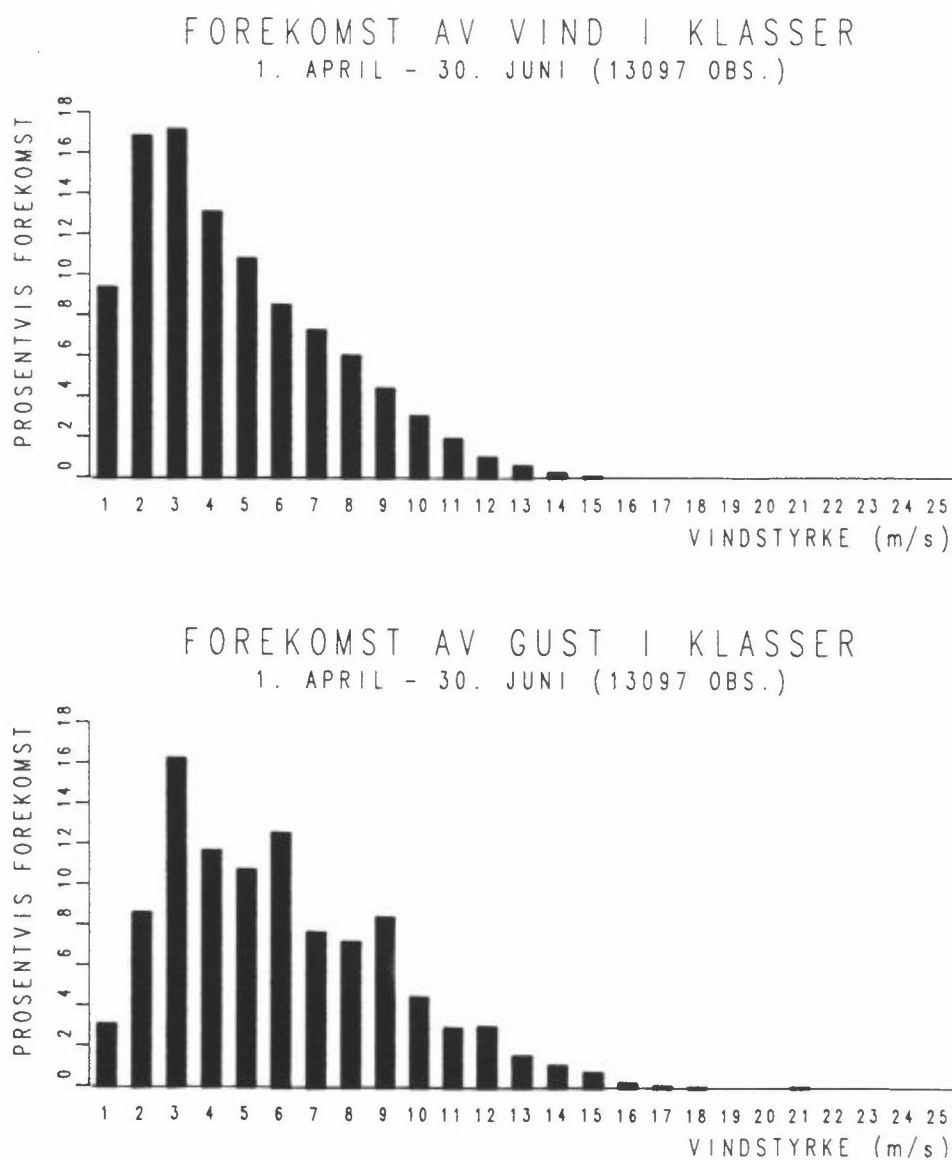
$$(3) \quad \sigma_L^2 = \sigma_u^2 \cos^2 \alpha + \sigma_v^2 \sin^2 \alpha$$

$$(4) \quad \sigma_T^2 = \sigma_u^2 \sin^2 \alpha + \sigma_v^2 \cos^2 \alpha$$

idet det forutsettes at $\operatorname{cov}(u^1, v^1)$ er liten, dvs. at σ_L^2 og σ_T^2 er av omtrent samme størrelse.

6.3 VINDSTYRKEFORDELING

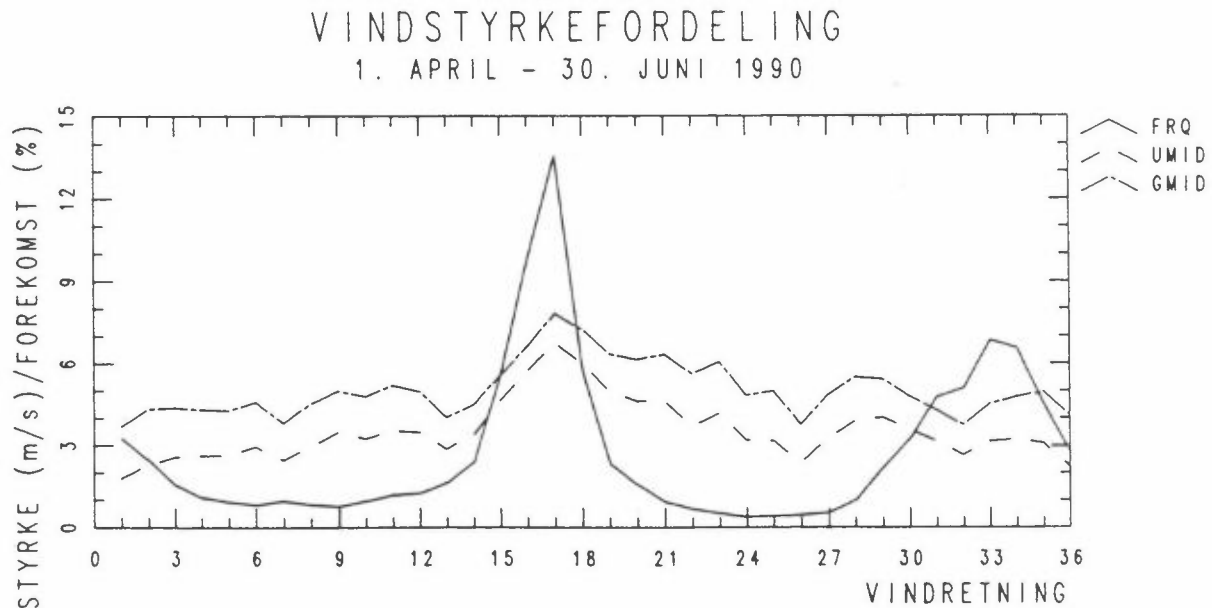
Vindstyrke og vindkast (gust) målt med Aanderaaloggeren er vist på figur 3. Figuren viser prosentvis forekomst i klasser for hver m/s. (Klasse 1: vind av styrke 0-1 m/s, klasse 2: vind av styrke 1-2 m/s etc.). Forekomsten i hver klasse er vist i tabell i vedlegg B. Maksimal observert 10 min. middelvindstyrke i perioden var 14.9 m/s (5. april kl. 1450). Vindretning var da 180 grader. Høyeste vindkast var 20.3 m/s (22. juni kl. 2250). Vindretningen var da 220 grader.



Figur 3: Fordeling av vindstyrker og vindkast målt med Aanderaaloggeren i 36 m høyde. Stolpen viser forekomst av vind fordelt på vindstyrkeklasser á 1 m/s.

6.4 VINDRETNINGSFORDELING OG RETNINGSFORDELTE MIDDELVERDIER

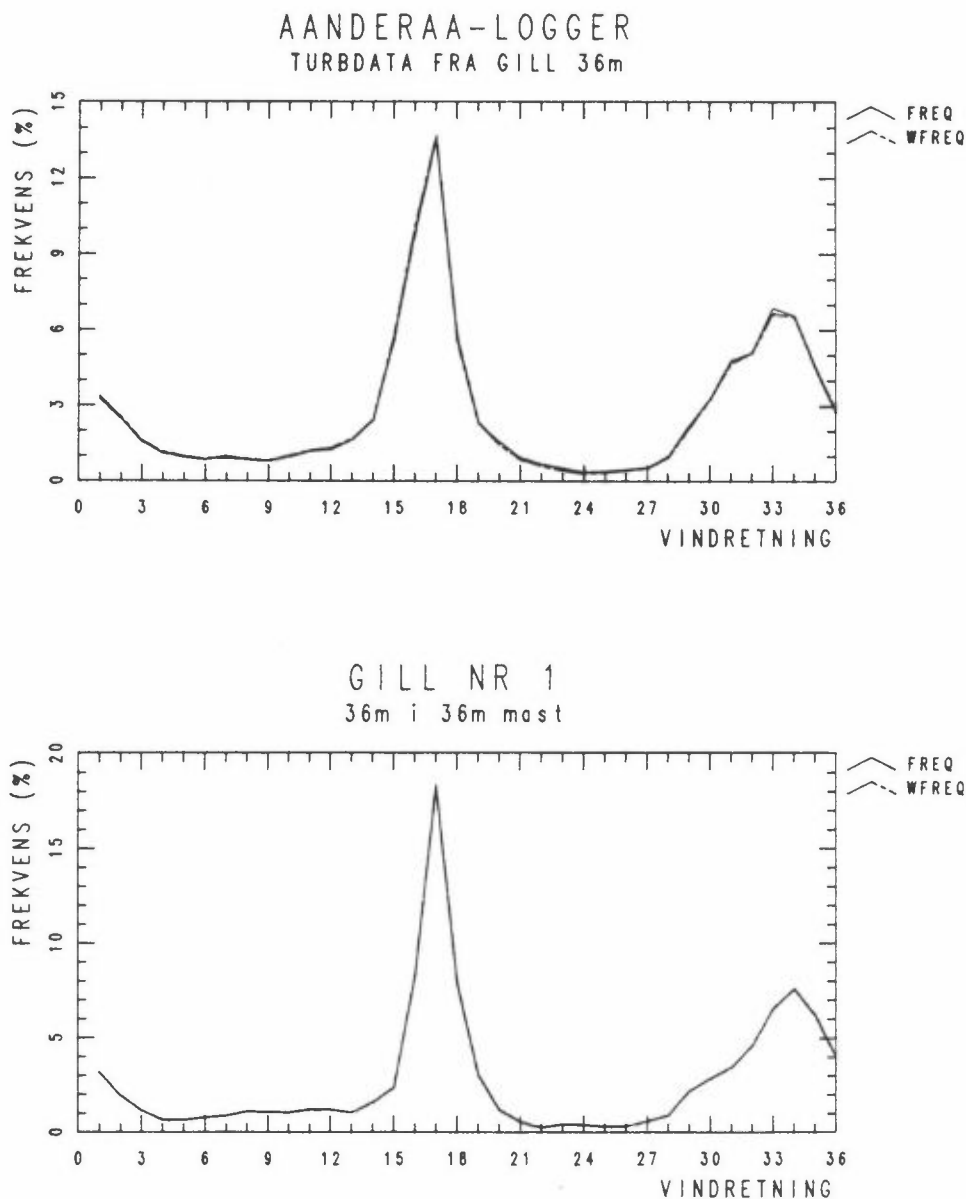
Innholdet i de etterfølgende figurer er gjengitt i tabellform i vedlegg B. Målepunktene med Gillsensorer er i figurene nummerert som følger: 36 m - Gill nr. 1, 10 m i 36 m mast - Gill nr. 2, 10 m i 10 m mast - Gill nr. 3. Vindretningsfordelingen på Aanderaaloggeren er vist i figur 4 sammen med midlere vindstyrke og midlere vindkast for hver 10 graders sektor.



Figur 4: Vindretningsfordeling (FRQ), midlere vindhastighet (UMID) og midlere vindkast (gmid) for 10 graders vindretningsklasser målt med Aanderaalogger i 36 m høyde.

Figuren viser at vindretninger omkring sør forekom hyppigst i perioden. Figuren viser også kanalisering fra nordvest, gjennom sundet på vestsiden av Håøya eller gjennom Drøbaksundet, men vest for Kaholmen. Både vindhastighet og vindkast hadde høyest middelerdi for sørlig vindretning. Forholdet mellom vindkast og middelvind varierte lite med vindretningen.

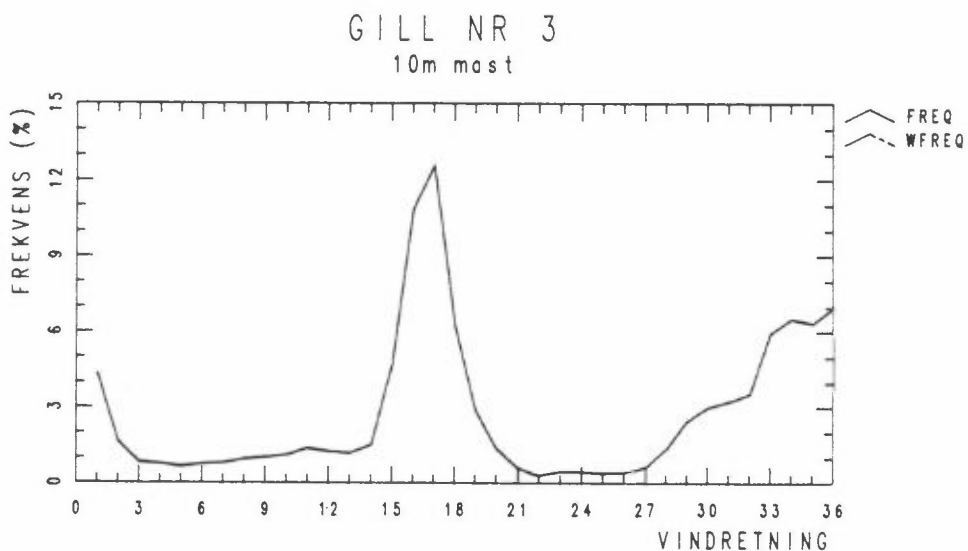
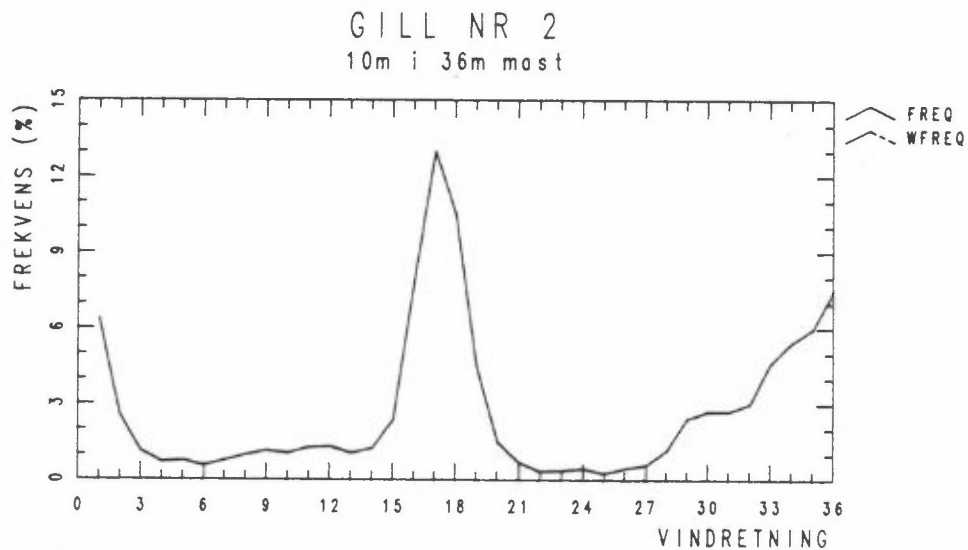
Figur 5 og figur 6 viser vindretningsfordeling på Aanderaaloggeren for de periodene det foreligger data også for Gill nr. 1 og vindretningsfordelingen på Gillmålerene.



Figur 5: Vindretningsfordeling for Gillmåler i 36 m og Aanderaamåler i 36 m fordelt på 36 vindretningsklasser.

FREQ: Fordeling basert på observasjoner med samtidige horisontale vindobservasjoner.

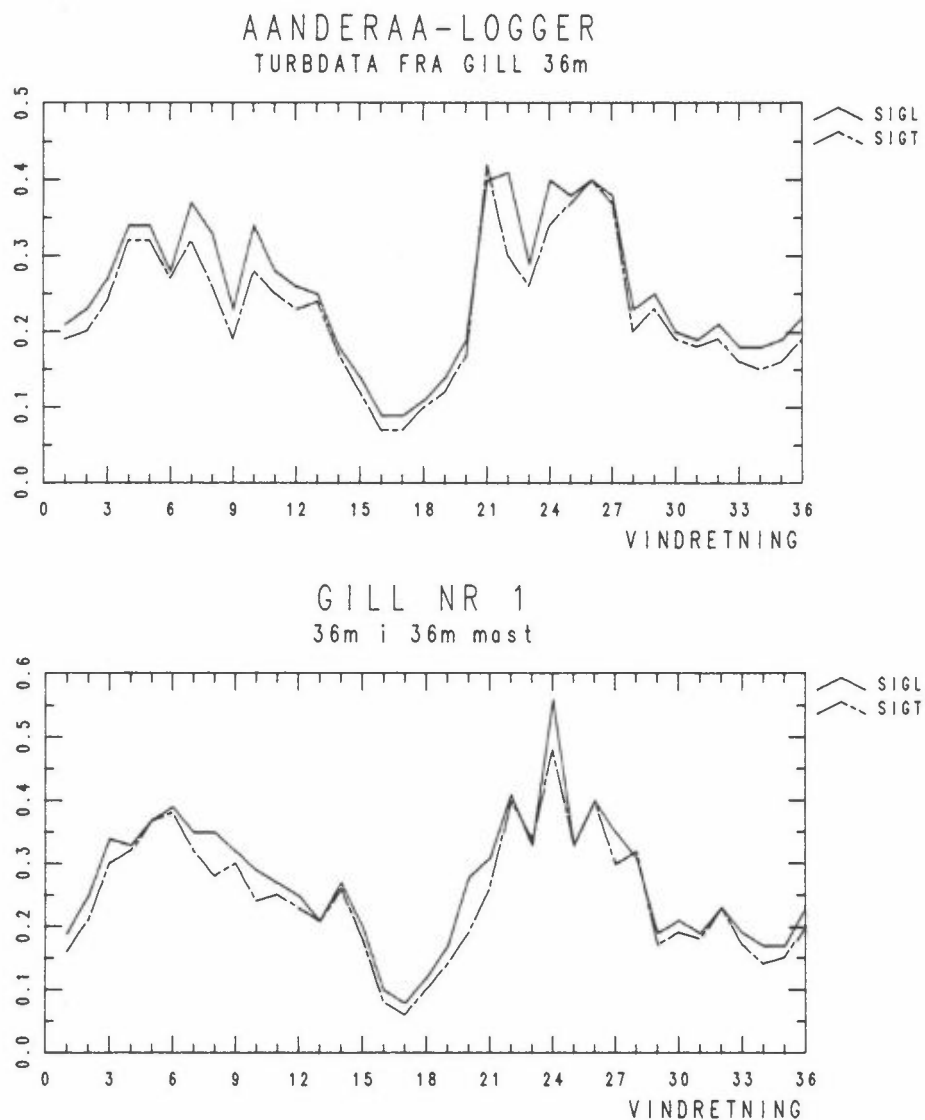
WFREQ: Fordeling basert på observasjoner med samtidige horisontale vindobservasjoner samt foreliggende data for vertikalhastighet.



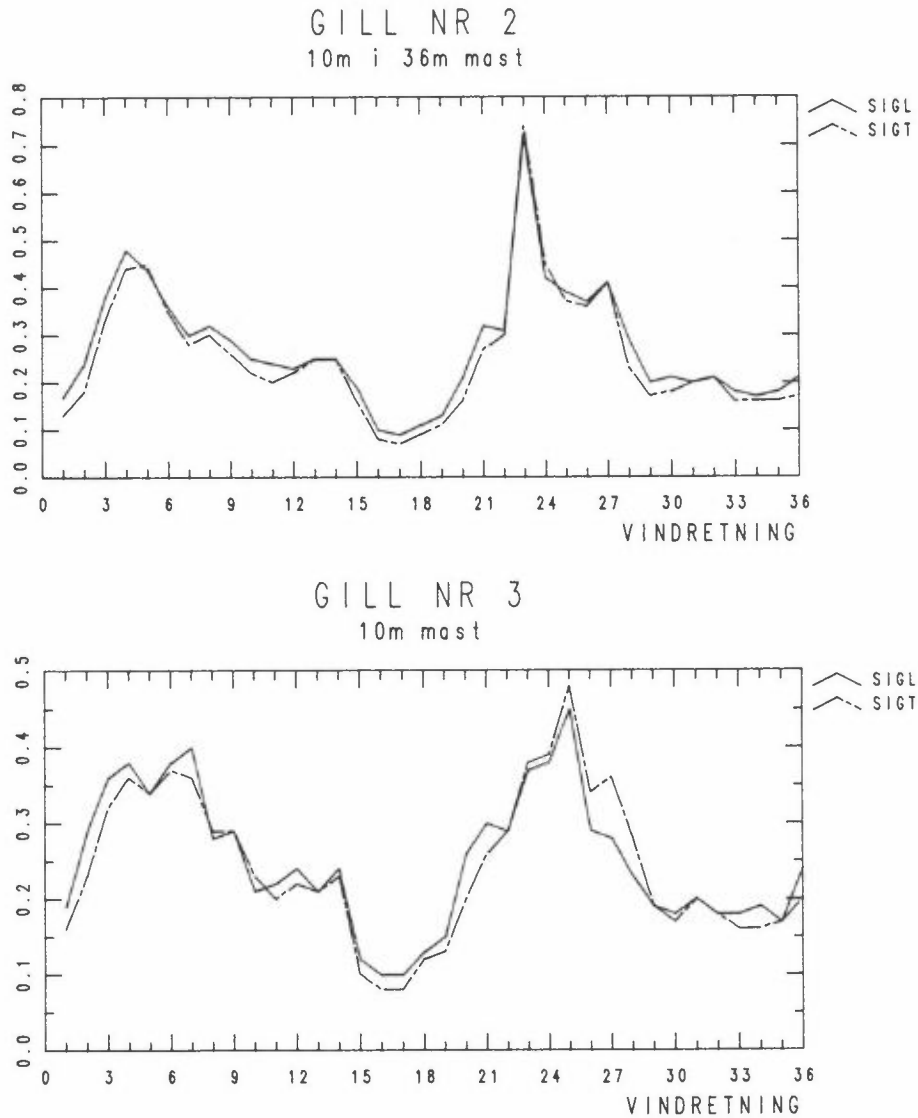
Figur 6: Vindretningsfordeling for Gill nr. 2 (i 36 m mast) og Gill nr. 3 (i 10 m mast) fordelt på 36 vindretningssektorer. Begge måleseriene er fra 10 m høyde. FREQ og WFREQ som i figur 5.

Gill nr. 1 viser en "skarpere" topp i retningsfordelingen rundt nordvest enn Aanderaaloggeren. Gill nr. 1 har også noe avvikende retningsfordeling fra Gill nr. 2 og Gill nr. 3, spesielt for sektoren vest til nord. I 10 m nivå er vind fra nord mer fremherskende enn vind fra nordvest.

Figur 7 og figur 8 viser midlere turbulensintensitet langs og på tvers av vindvektoren for 10 graders vindretningssektorer. Turbulensintensiteten er lavest for vindretning rundt sør, og høyest i sektorene nordøst og vest-sørvest.

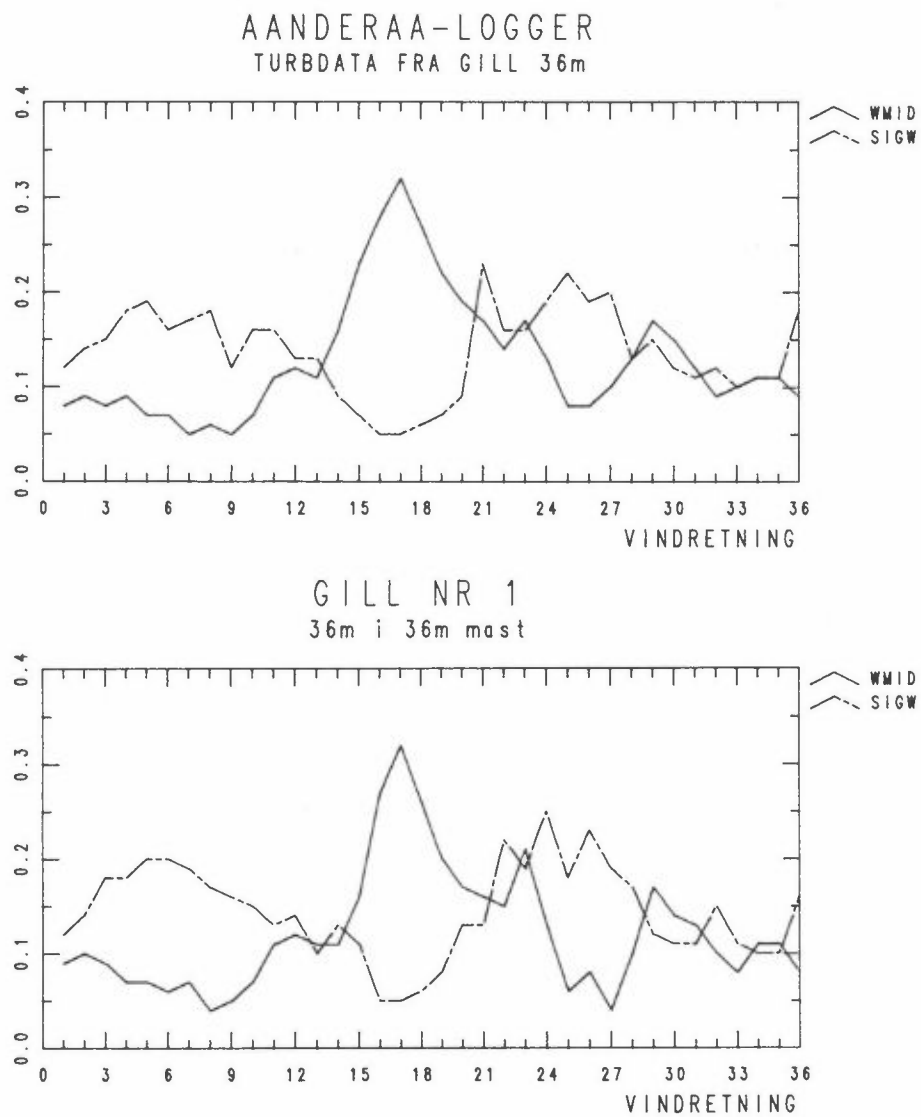


Figur 7: Midlere turbulensintensitet på tvers av (SIGT) og på langs av (SIGL) vindvektoren for Gill og Aanderaa i 36 m høyde, fordelt på 36 vindretningsklasser.

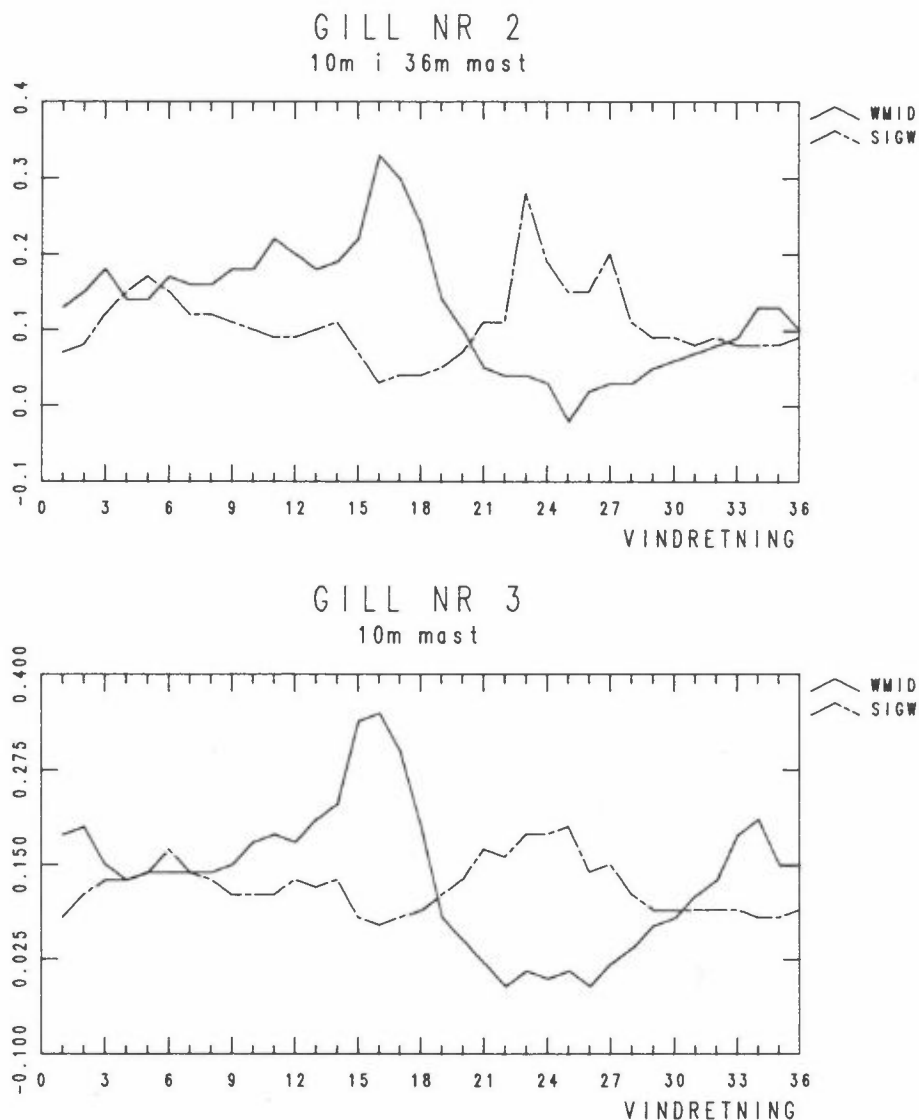


Figur 8: Midlere turbulensintensitet på tvers av (SIGT) og på langs av (SIGL) vindvektoren for Gillmålerne i 10 m høyde, fordelt på 36 vindretningsklasser.

Midlere vertikalhastighet og midlere vertikal turbulensintensitet er vist på figur 9 og figur 10. Fordelingen av den vertikale turbulensintensiteten ligner fordelingen av horisontal turbulensintensitet. Midlere vertikalbevegelse er oppoverrettet på samtlige sensorer. For alle målepunktene er den sterkeste for sørlig retning.

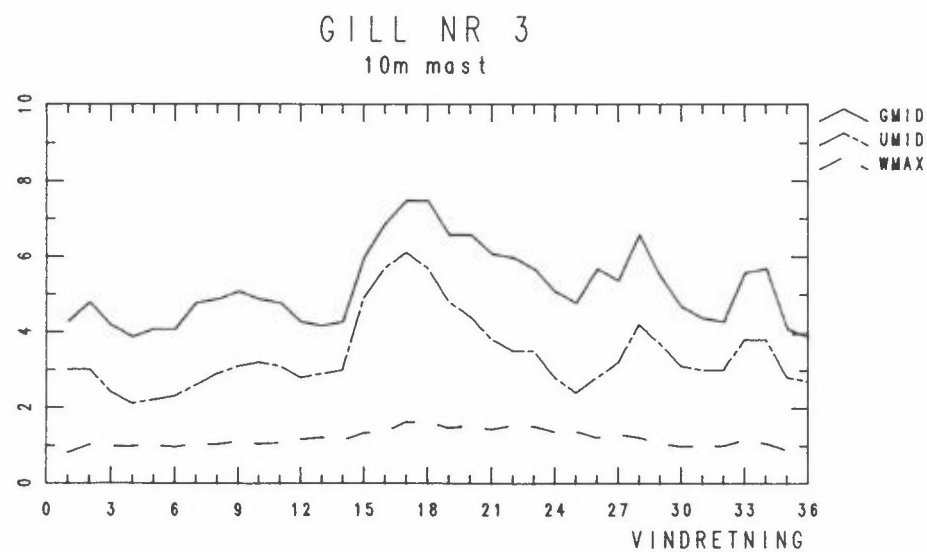
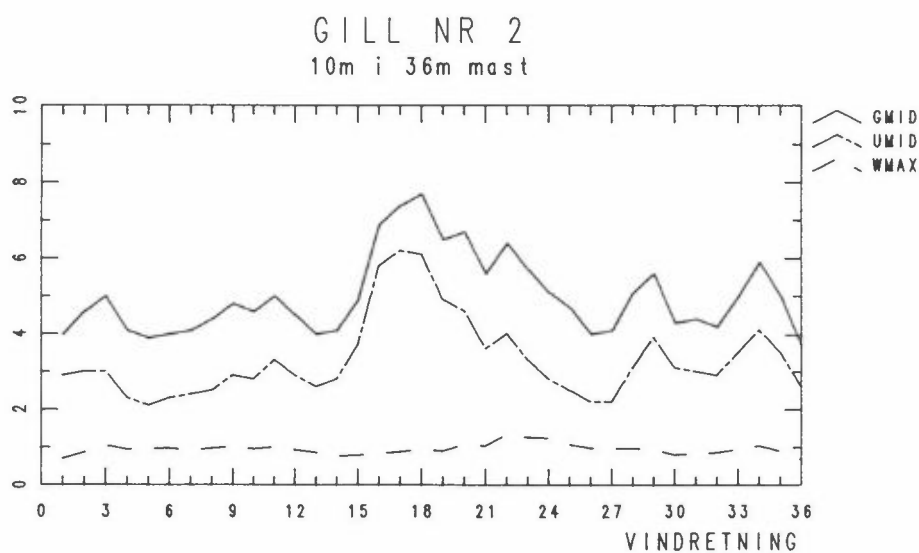
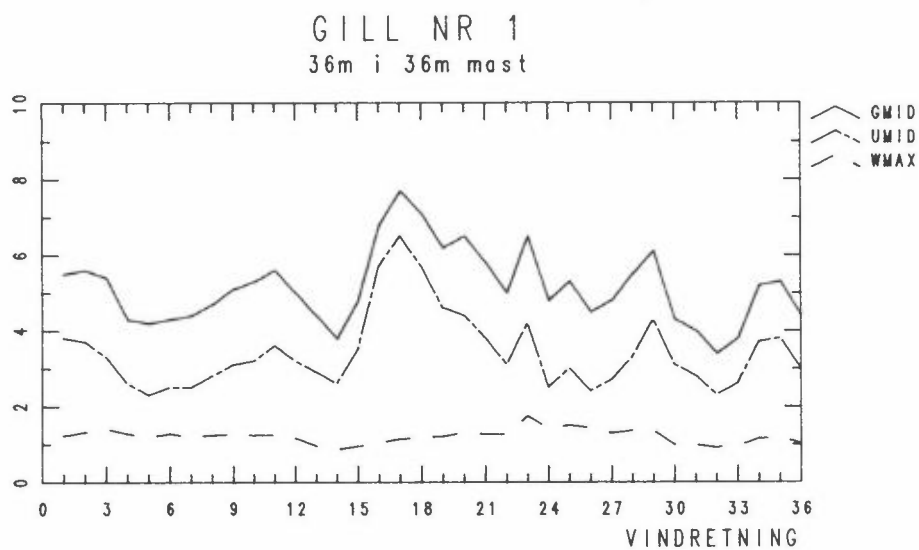


Figur 9: Midlere vertikalhastighet og midlere vertikal turbulensintensitet for 36 vindretningssektorer. Aanderaa-logger og Gill i 36 m høyde.



Figur 10: Midlere vertikalhastighet og midlere vertikal turbulensintensitet for 36 vindretningssektorer. Gillmålere i 10 m i 2 master.

Figur 11 viser midlere vindstyrke, midlere vindkast og midlere vertikale vindkast (tallverdi) for 36 vindretningssektorer. Figuren viser at midlere vindstyrke er størst for sørlig vindretning, og også har lokale maksima for vind fra 290 grader og 350 grader (alle) og 220 grader (36 m). Vertikale vindkast varierer lite med vindretningen.



Figur 11: Midlere vindstyrke (UMID), midlere vindkast (GMID), og tallverdi av midlere vertikale vindkast (WMAX) for 36 vindretningssektorer. Gillanemometer i 36 m høyde og 10 m høyde.

7 AUTOSPEKTRA

Autospektra er beregnet for et utvalg av 10-minutters perioder. Spektra er beregnet for vindkomponenten langs aksene og for horisontal vindvektor for de tre sensorene. Tabell 4 viser de utvalgte periodene sammen med de loggede 10-minutters verdiene.

Tabell 4: Utvalgte 10-minutters perioder for spektralanalyse og statistiske parametre fra disse periodene.

Periode		Aanderaa		Gill 1				
Dato	Kl.	Retn.	Hast.	Retn.	Hast.	w	σ_u	σ_v
06.04.90	1600	337	5,2	344	5,9	0,12	0,13	0,14
06.04.90	1610	329	6,1	336	6,9	-0,02	0,07	0,06
06.04.90	1620	318	5,1	334	5,9	-0,03	0,12	0,08
11.05.90	1310	94	5,9	75	5,4	0,22	0,32	0,30
11.05.90	1320	85	5,2	89	5,4	-0,13	0,18	0,14
11.05.90	1330	94	6,6	100	5,7	0,00	0,22	0,25
16.05.90	0730	13	3,5	15	6,5	0,30	0,10	0,08
16.05.90	0740	25	3,2	12	6,7	0,17	0,11	0,09
18.05.90	0530	28	2,9	6	6,9	-0,03	0,16	0,11
18.05.90	0540	10	3,4	6	6,7	0,10	0,13	0,15
18.05.90	0550	16	3,1	8	6,9	0,03	0,15	0,14
22.06.90	2250	219	9,0	105	6,9	0,28	0,32	0,35
22.06.90	2300	178	5,9	197	7,5	0,28	0,20	0,28
25.06.90	1440	169	10,1	177	10,0	0,42	0,06	0,06
25.06.90	1450	168	9,7	174	10,4	0,50	0,08	0,04

Periode		Gill 2					Gill 3				
Dato	Kl.	Retn.	Hast.	w	σ_u	σ_v	Retn.	Hast.	w	σ_u	σ_v
06.04.90	1600	345	5,7	0,22	0,16	0,15	343	5,8	0,38	0,16	0,15
06.04.90	1610	335	6,4	0,12	0,08	0,07	334	6,4	0,33	0,08	0,07
06.04.90	1620	330	5,4	0,08	0,13	0,09	331	5,5	0,30	0,13	0,10
11.05.90	1310	75	5,0	0,49	0,31	0,31	69	4,9	0,38	0,33	0,30
11.05.90	1320	89	4,9	0,25	0,21	0,18	82	4,8	0,22	0,22	0,18
11.05.90	1330	101	5,2	0,32	0,24	0,30	96	5,2	0,25	0,24	0,32
16.05.90	0730	13	6,4	0,35	0,12	0,10	6	6,5	0,47	0,12	0,10
16.05.90	0740	11	6,2	0,30	0,11	0,09	4	6,3	0,38	0,11	0,10
18.05.90	0530	3	6,4	0,22	0,19	0,13	351	6,6	0,32	0,17	0,17
18.05.90	0540	4	6,5	0,23	0,13	0,15	353	6,5	0,45	0,14	0,20
18.05.90	0550	8	6,7	0,25	0,18	0,16	357	6,8	0,47	0,19	0,22
22.06.90	2250	102	6,0	0,47	0,32	0,31	97	6,1	0,33	0,33	0,35
22.06.90	2300	201	7,0	0,23	0,22	0,35	195	6,9	0,28	0,23	0,33
25.06.90	1440	181	9,8	0,37	0,07	0,06	175	9,5	0,82	0,06	0,06
25.06.90	1450	178	10,2	0,47	0,08	0,05	173	10,2	0,89	0,07	0,05

*: Overrepresentasjon av 0 m/s på sensoren for vertikalhastighet i 36 m nivå.

Analysen er utført ved hjelp av statistikkpakken NAG Mk13, rutine G13CAF. Denne beregner et glattet spektrum med vindu. Vinduet som er anvendt er et Tukey-vindu med størrelse 60 tids-skritt.

Rutinen beregner $S^*(\omega)$ for $0 \leq \omega \leq \pi$ med skalering slik at

$$2 \int_0^{\pi} S^*(\omega) d\omega = \sigma_x^2$$

$S^*(\omega)$ blir beregnet for $\omega_i = \frac{2\pi}{L} i$, $i = 0, 1, \dots, \left[\frac{L}{2} \right]$ ved

$$S^*(\omega) = \frac{1}{2\pi} (C_0 + 2 \sum_{k=1}^M W_k C_k \cos(\omega k))$$

der C_k er autokovariansen, og

$$W_k = W \left[\frac{k}{M} \right], \quad K \leq M-1$$

er vinduet. For Tukey-vinduet er

$$W(\alpha) = \frac{1}{2} (1 + \cos(\pi\alpha))$$

For konvertering fra vinkelfrekvens til frekvens:

$$n(\omega) = \frac{\omega}{2\pi\Delta t}$$

$$S(n) = 2\pi\Delta t S(\omega); \text{ dvs. at } 2 \cdot \int_0^{\frac{1}{2\Delta t}} S(n) dn = \sigma^2$$

Da blir

$$n \cdot S(n) = \omega \cdot S^*(\omega)$$

Spektra er beregnet for 100 verdier av ω og skalert med $\frac{\omega}{\text{VAR}(\bar{U})}$. Frekvensaksen er så skalert med faktoren $\frac{Z}{\bar{U}}$ slik at "lengden" av definerte $nS(n)$ for enheten $\frac{nZ}{\bar{U}}$ varierer fra plott til plott.

De beregnede spektra er vist i vedlegg C.

Horisontale vindspektra for situasjoner med østlig vind viser en raskere demping av variansen med økende frekvens enn spektra for situasjoner med nordlig vind. Spektra for situasjoner med

sørlig vind viser den minste dempningen av variansen med økende frekvens. Spektra for vertikale vindkomponenter har større del av variansen knyttet til de høyeste frekvensene enn spektra for horisontal vind.

8 KORRELASJONSKOEFFISIENTER

Korrelasjonskoeffisienter for alle kombinasjoner av dekomponerte hastighetsvektorer og vindhastighetene er beregnet for de utvalgte periodene. Korrelasjonskoeffisientene er vist i tabeller i vedlegg D. Korrelasjonskoeffisientene for den enkelte sensor er diskutert nedenfor.

Følgende notasjon er brukt for vindkomponentene og vindhastigheten:

36U: Østlig vindkomponent i 36 m nivå
 36V: Nordlig vindkomponent i 36 m nivå
 36W: Vertikalhastighet i 36 m nivå
 36H: Horisontal vindvektor i 36 m nivå
 10U: Østlig vindkomponent i 10 m nivå i 36 m mast
 10V: Nordlig vindkomponent i 10 m nivå i 36 m mast
 10W: Vertikalhastighet i 10 m nivå i 36 m mast
 10H: Horisontal vindvektor i 10 m nivå i 36 m mast
 X10U: Østlig vindkomponent i 10 m nivå, tilleggs mast
 X10V: Nordlig vindkomponent i 10 m nivå, tilleggs mast
 X10W: Vertikalhastighet i 10 m nivå, tilleggs mast
 X10H: Horisontal vindvektor i 10 m nivå, tilleggs mast

36W: Komponenten var sterkest korrelert med 10W. Korrelasjonen var sterkere ved vind fra nord og øst enn ved vind fra sør. Den sterkeste negative korrelasjonen var oftest med X10U. Korrelasjonen med X10W var positiv, men svakere enn med 10W. Største positive korrelasjonskoeffisient var 0,529 (18. mai kl. 0540). Største negative korrelasjonskoeffisient var -0,496 med 36H (11. mai kl. 1310).

- 10W: Komponenten var sterkest korrelert med 36W. Korrelasjonen med X10W var sterkest ved østlig vindretning. Største positive korrelasjonskoeffisient var 0,529 (18. mai kl. 0540). Største negative korrelasjonskoeffisient var -0,358 med X10U (6. april kl. 1600).
- X10W: Komponenten hadde lavere korrelasjonskoeffisienter enn 36W og 10W. Korrelasjonen var mer avhengig av vindretningen enn for 36W og 10W. De største korrelasjonskoeffisientene var ved vind fra øst. Største positive korrelasjonskoeffisient var 0,461 med 36W (11. mai kl. 1320). Største negative korrelasjonskoeffisient var -0,401 med 36U (6. april kl. 1600).
- 36U: Komponenten var sterkest korrelert med 10U og X10U. Denne korrelasjonen var sterkest ved vind fra øst, og sterkere ved nordlig vind enn ved sørlig vind. Største positive korrelasjonskoeffisient 0,932 med X10U (22. juni kl. 2300). Største negative korrelasjonskoeffisient -0,996 med 36H (11. mai kl. 1320).
- 10U: Komponenten var sterkest korrelert med X10U. Korrelasjonen med X10U var ca. 0,7 ved sørlig og nordlig vind, og over 0,8 ved vind fra øst. Største positive korrelasjonskoeffisient var 0,968 med X10U (22. juni kl. 2300). Største negative korrelasjonskoeffisient var -0,993 med 10H (11. mai kl. 1320). Den laveste korrelasjonskoeffisienten med X10U var 0,642 (25. juni kl. 1450).
- X10U: Komponenten var sterkest korrelert med 10U. Korrelasjonen mellom 10U og X10U er beskrevet ovenfor. Største negative korrelasjonskoeffisient var -0,986 med X10H (11. mai kl. 1320).
- 36V: Komponenten var sterkest korrelert med 36H, for sørlig vindretning og sterkest negativt korrelert med 36H for nordlig vindretning. 10V og X10V var ganske like. Største

positive korrelasjonskoeffisient med andre komponenter enn 36H var 0,873 med 10V (11. mai 1330).

10V: Komponenten var sterkest korrelert med 10H, sørlig vindretning og sterkest negativt korrelert med 10H for nordlig vindretning. X10V var sterkere enn med 36V. Største positive korrelasjonskoeffisient med andre komponenter enn 10H var 0,943 med X10V (11. mai kl. 1330).

X10V: Komponenten var sterkest korrelert med X10H, for sørlig vindretning og sterkest negativt korrelert med 10H for nordlig vindretning. Korrelasjonen med 10V var sterkere enn med 36V. Største positive korrelasjonskoeffisient med andre komponenter enn X10H var 0,943 med 10V (11. mai kl. 1330).

Horisontale vindvektorer (36H, 10H og X10H):

Vindvektorene var sterkest korrelert med den sensoren som lå nærmest vindretningen. Innbyrdes korrelasjon mellom vindvektorene var noe større for vind fra øst og nord enn ved vind fra sør. Korrelasjonen var sterkest mellom 10H og X10H. De høyeste korrelasjonskoeffisientene var 0,915 mellom 10H og X10H, 0,839 mellom 36H og 10H og 0,841 mellom 36H og X10H (22. juni kl. 2300).

9 KOHERENSFUNKSJONER

Koherensfunksjoner (koherensspektrum og kryss-amplitude) er beregnet for et spesifisert sett av parametere, 36V-10V, 36H-10H, 10V-10W, 10H-10W, 36V-36W, 36H-36W, 36W-10W, 10V-X10V, 10H-X10H og 10W-X10W. Disse er vist i vedlegg E.

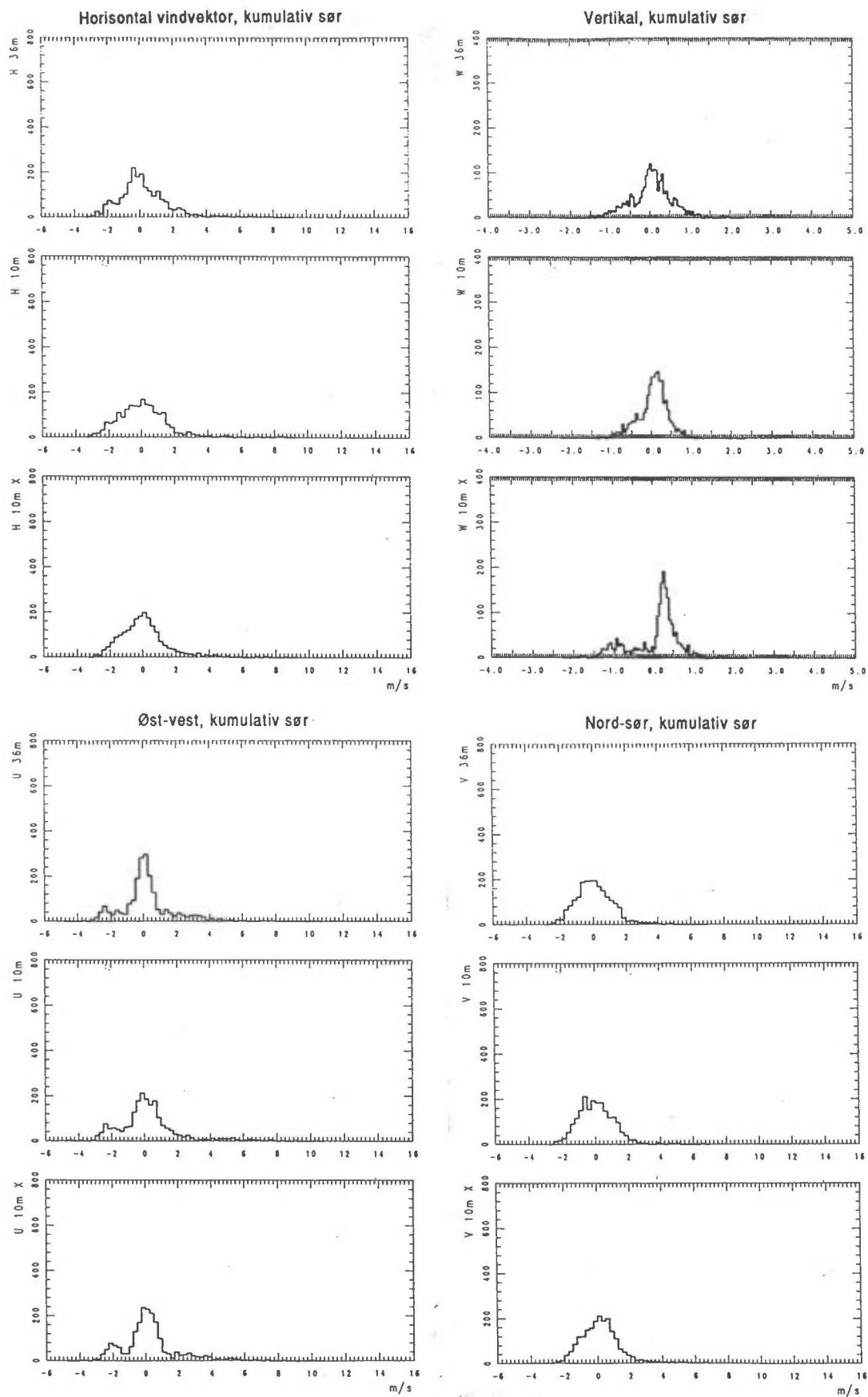
Generelt faller kryss-amplituden raskt med økende frekvens og koherensspektrumet er dermed insignifikant for den høyfrekvente delen. Kryss-amplituden faller raskest for parametersett som ikke inneholder vertikalhastigheter.

10 FORDELINGER FOR SEKUNDVERDIER

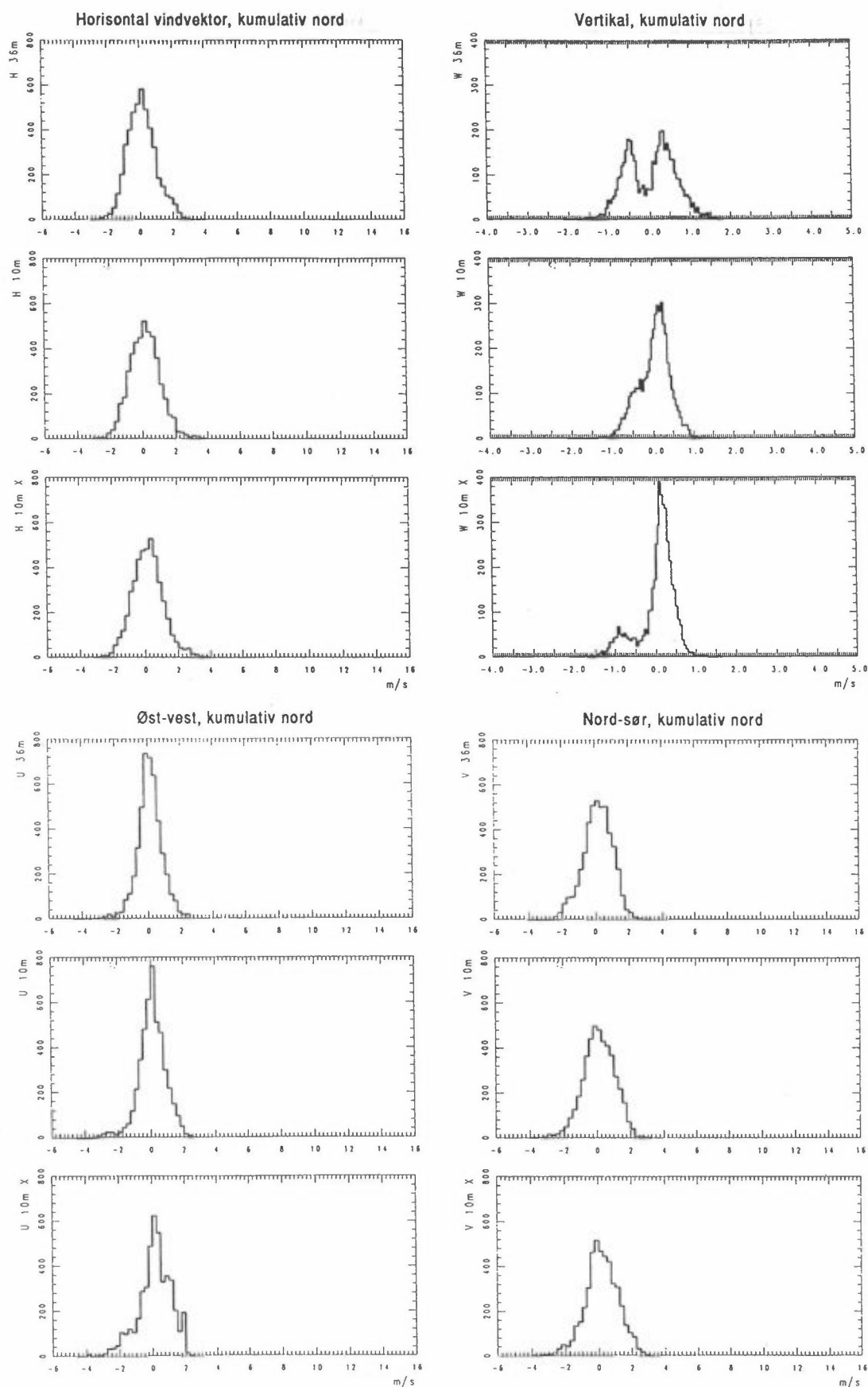
Individuelle fordelinger for dekomponerte vindhastigheter og horisontal vind er vist i vedlegg F.

Formen på fordelingene varierer fra periode til periode. De er generelt "flatere" for komponenten på tvers av hovedvindretningen. Figurene 12-14 viser gjennomsnittlige fordelinger av sekundverdier for vindkomponentene langs sundet (nord-sør), på tvers av sundet (øst-vest) for horisontal vindvektor, og for vertikalhastighet for tre grupper av vindretning (sør - nord og øst). Fordelingene er basert på forekomst av verdier i intervaller på 0,25 m/s horisontalt og 0,05 m/s vertikalt, og er normalisert med hensyn til middelvindstyrken i hver periode.

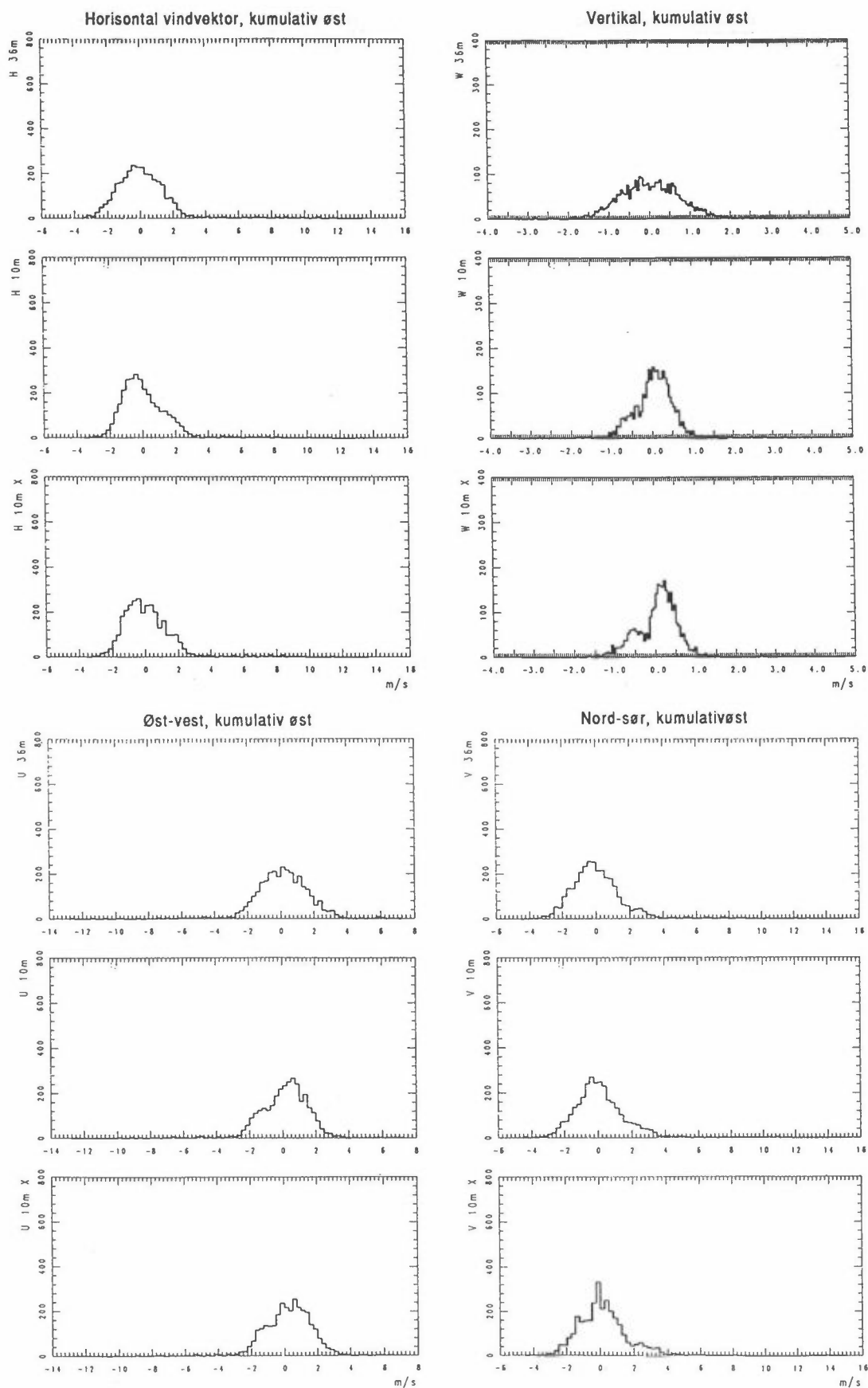
Fordelingene for horisontal vind er flatere ved sørlig og østlig vind enn ved nordlig vind. Dette gjelder også for vindkomponentene på langs og på tvers av sundet. Ved østlig vindretning har fordelingen for vind langs sundet (på tvers av vindretningen) to topper. De fleste fordelingene for vertikalhastighet har også to topper.



Figur 12: Fordeling av sekundverdier ved sørlig vindretning. Sum av forekomster etter normalisering til middelverdi for hver periode. Samlet observasjonsantall 1536.



Figur 13: Fordeling av sekundverdier ved nordlig vindretning. Sum av forekomster etter normalisering til middelveirdi for hver periode. Samlet observasjonsantall 4096.



Figur 14: Fordeling av sekundverdier ved østlig vindretning. Sum av forekomster etter normalisering til middelverdi for hver periode. Samlet observasjonsantall 2048.

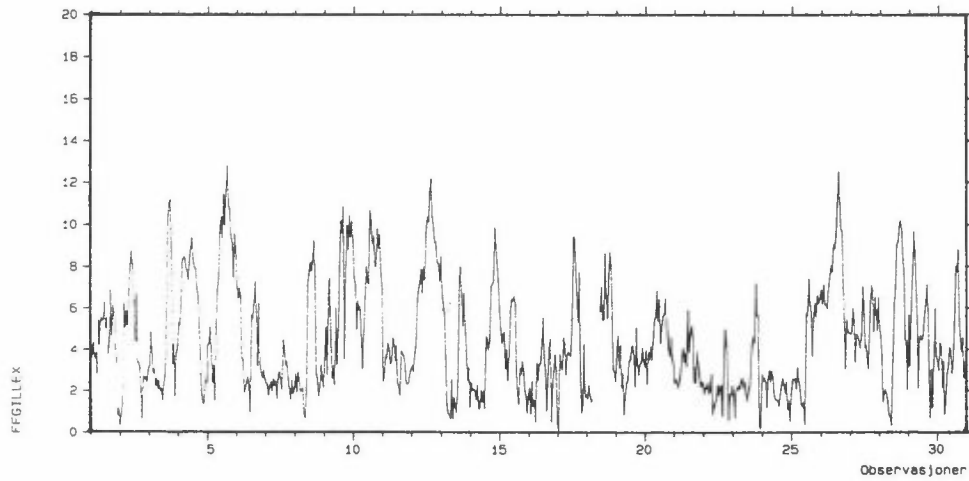
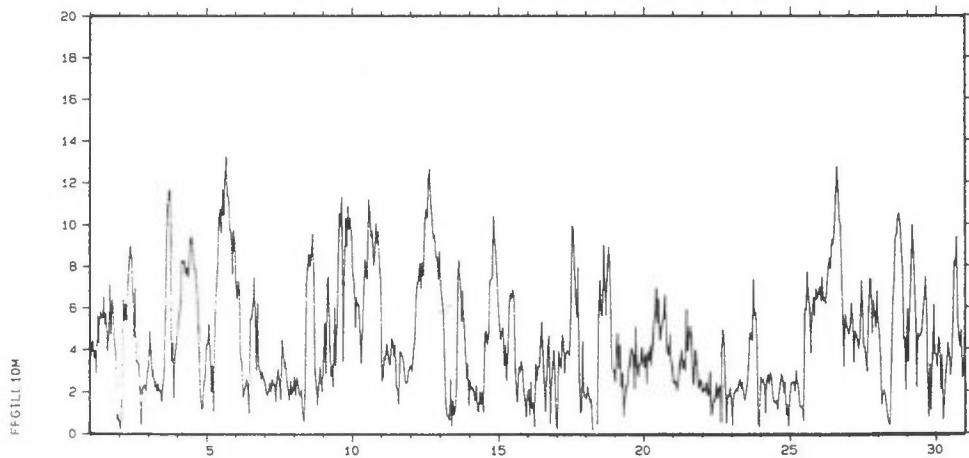
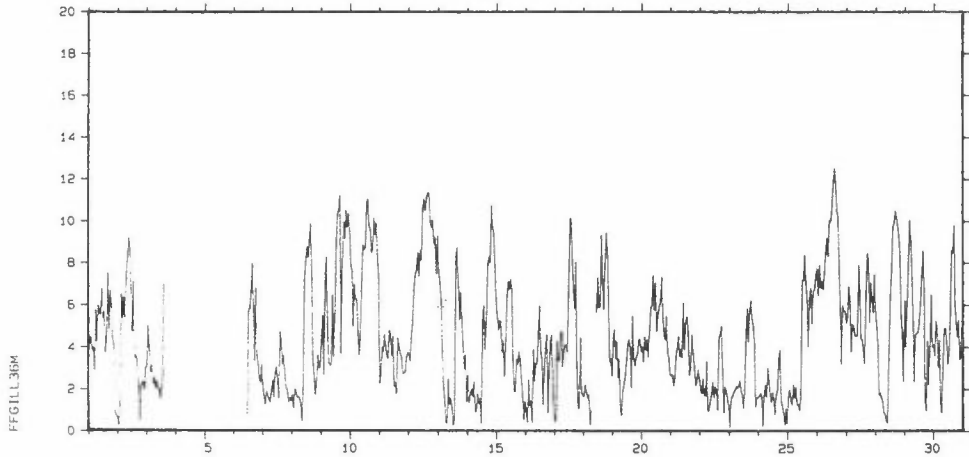
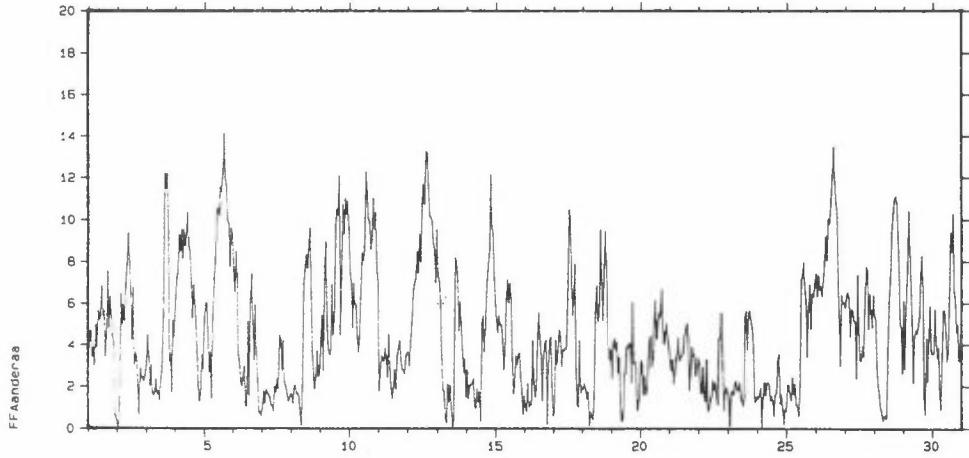
VEDLEGG A

Tidsplott for vindretning og vindstyrke

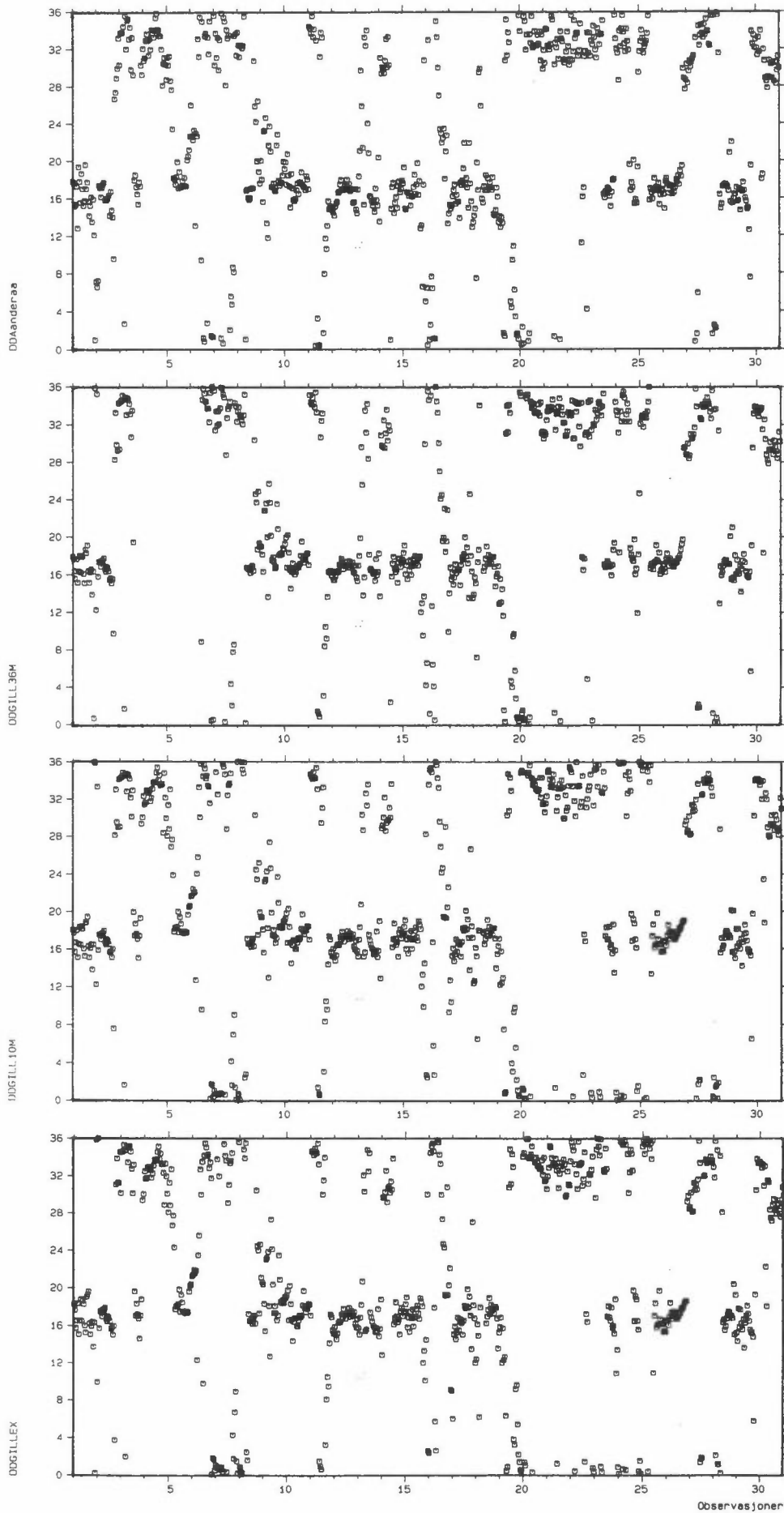
VEDLEGG A: Tidsplott av vindretning og vindstyrke.

Figurene viser tidsforløp av 10-minutters midlere vindretning og vindstyrke for hver måned for de fire målepunktene. Dårlige data er fjernet. Dårlige og manglende data fremkommer som brudd i plottene for vindstyrke og som åpne felter i plottene for vindretning. Plottene viser hver sjette 10-minutters verdi (hver hele time).

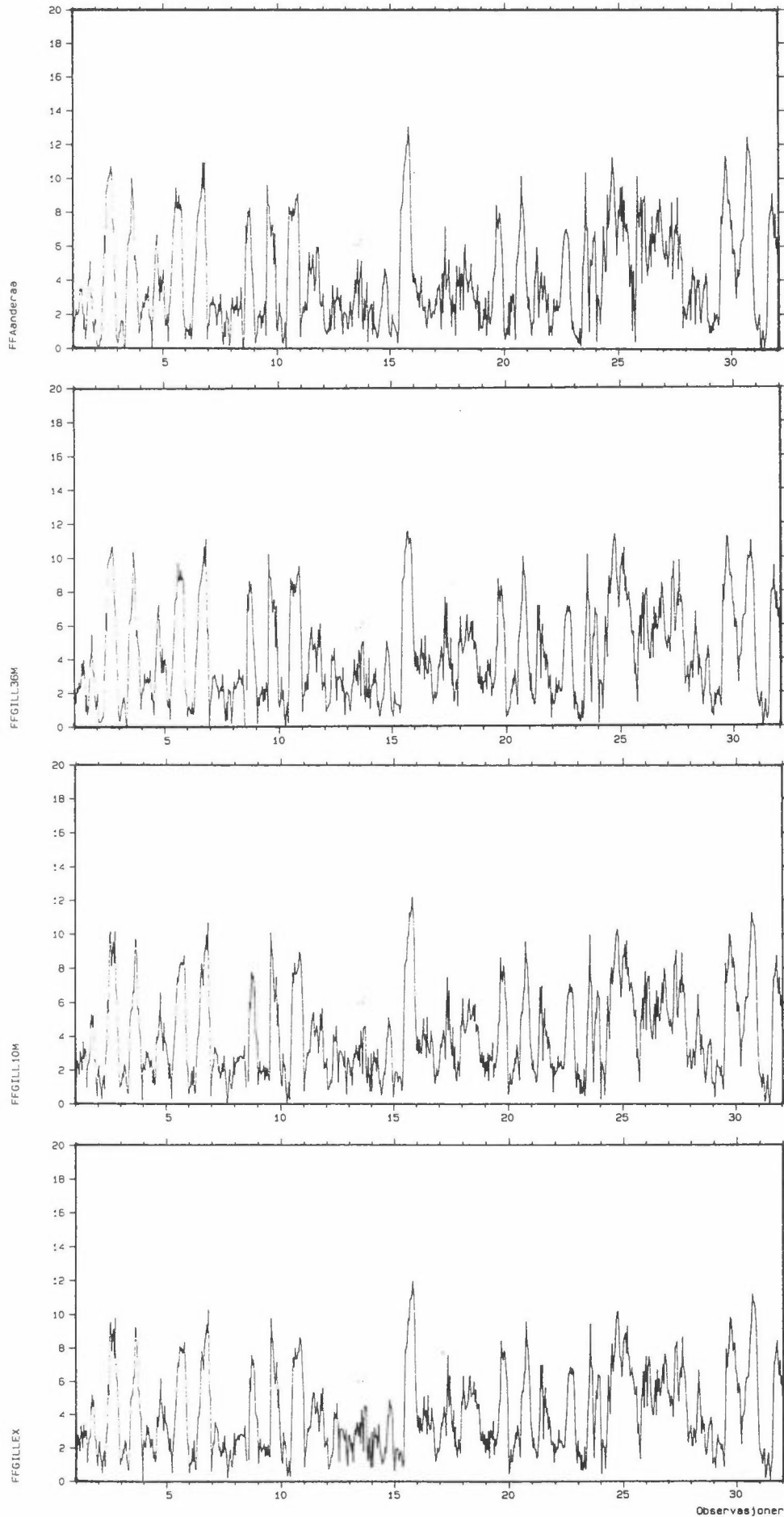
Stasjon: Smøskjer
Måned : apr. 90



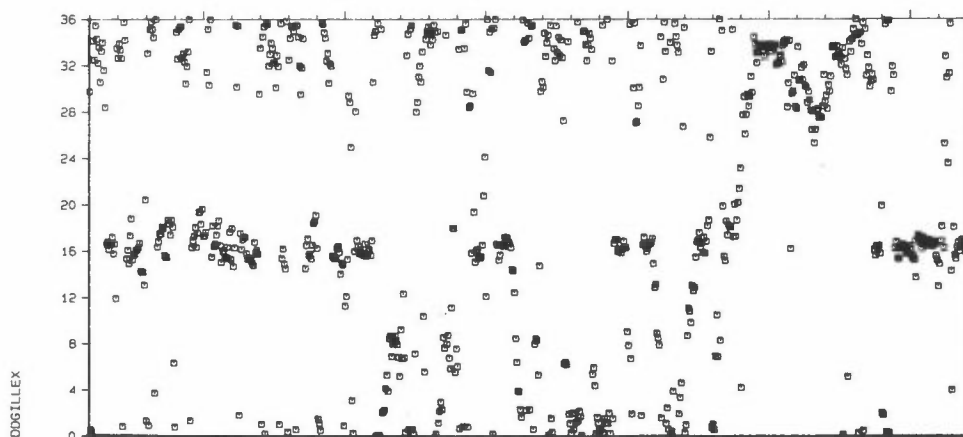
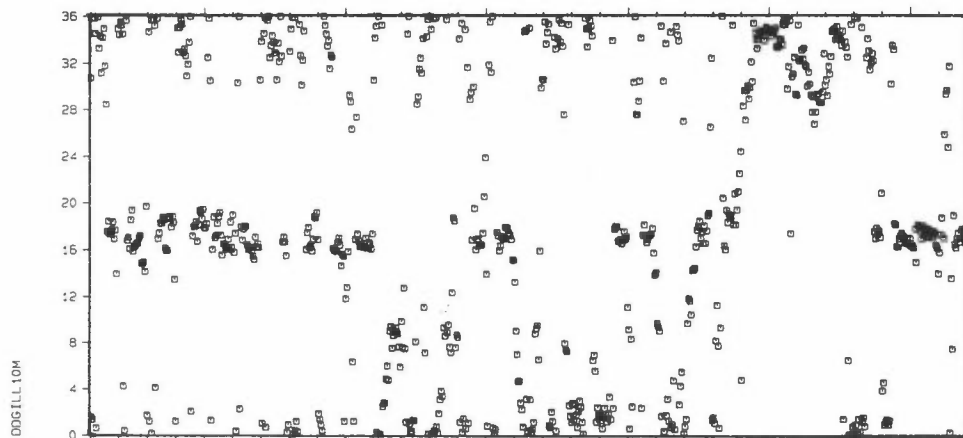
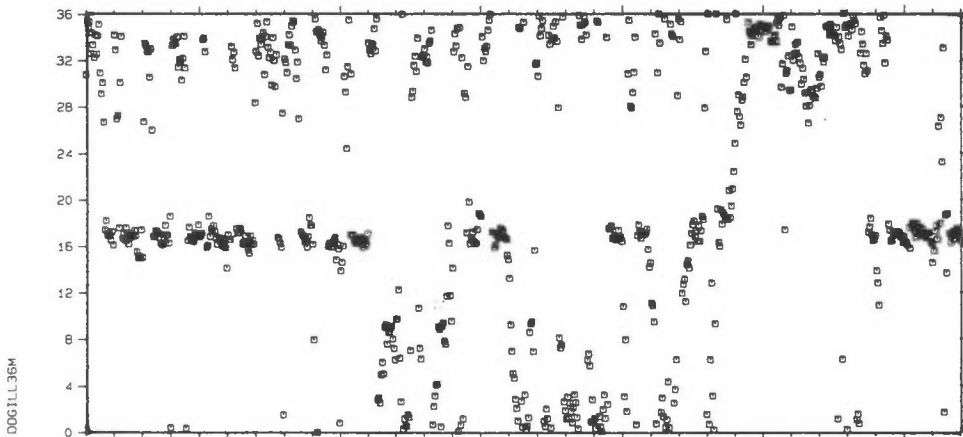
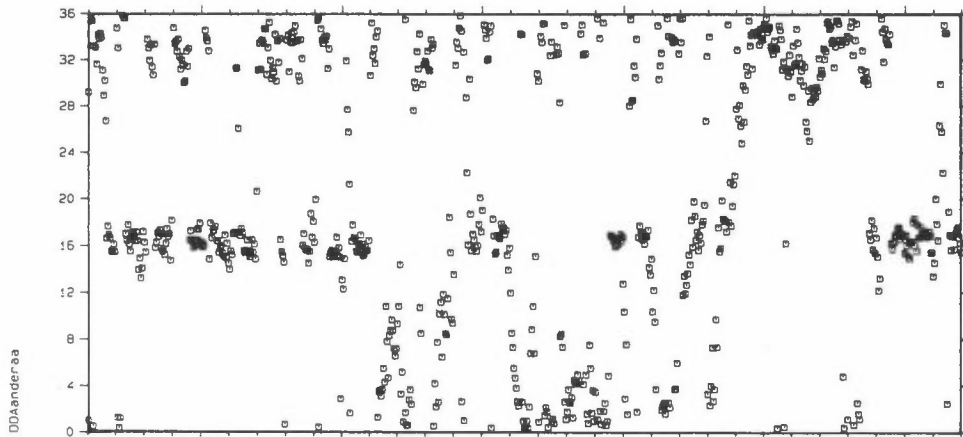
Stasjon: Småskjer
Måned : apr. 90



Stasjon: Småskjer
Måned : mai.90

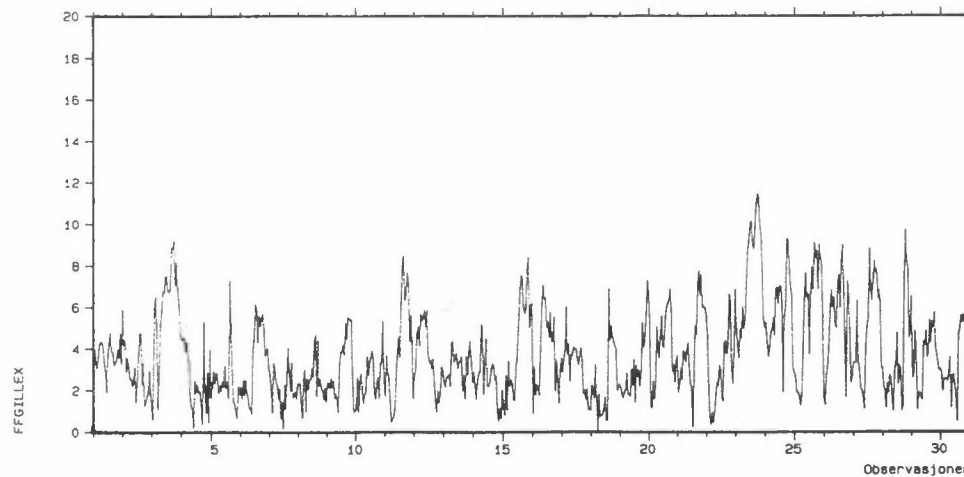
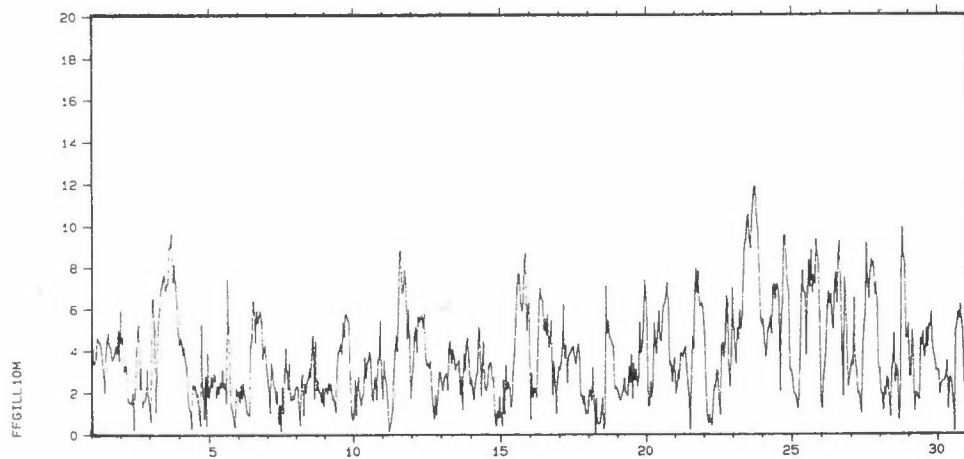
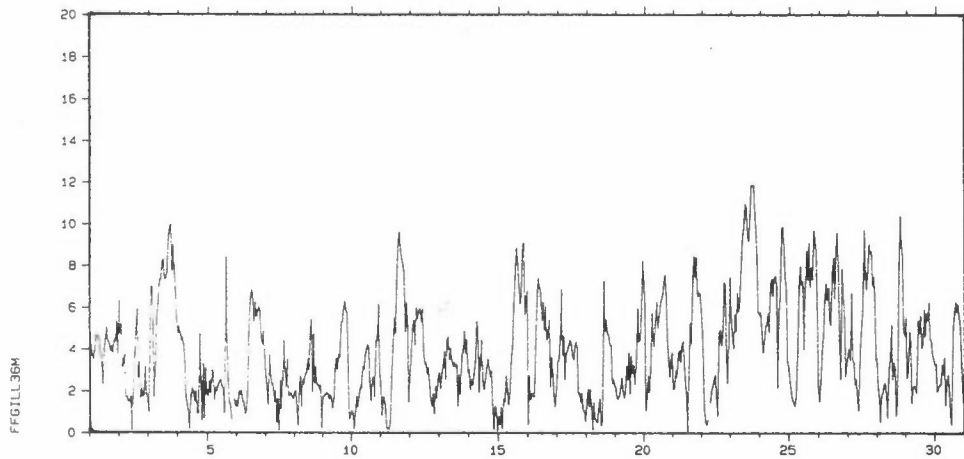
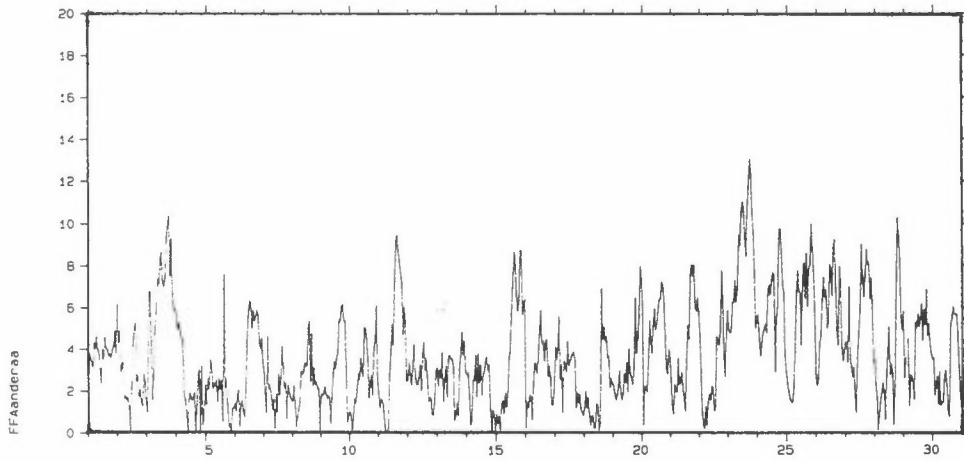


Stasjon: Smøskjer
Måned : mai.90

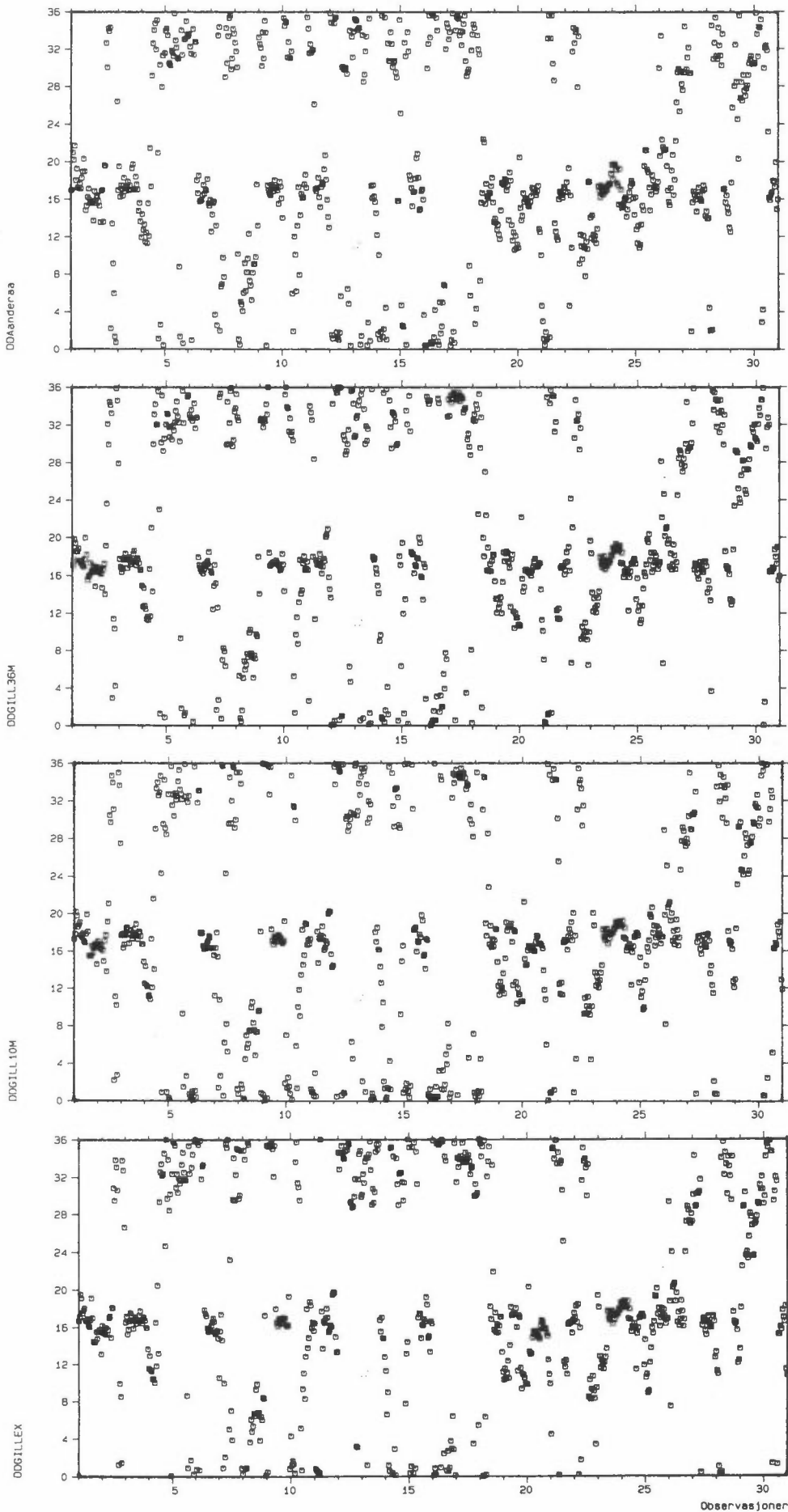


Observasjoner

Stasjon: Småskjer
Måned : JUN. 90



Stasjon: Småskjer
Måned : JUN. 90



VEDLEGG B

Tabeller over vindretningsfordelte middelveier

VEDLEGG B: Tabeller over vindretningsfordelte middelveier

Tabell B1: Prosentvis forekomst av vindstyrke og vindkast målt med Aanderaalogger 36 m høyde, fordelt på vindstyrkeklasser. Måleperiode 1.04.90-30.06.90. Antall observasjoner 13097.

Klasse m/s	Forekomst av vindstyrker (%)	Forekomst av vindkast (%)
0 - 1	9,35	3,05
1 - 2	16,81	8,57
2 - 3	17,13	16,20
3 - 4	13,09	11,66
4 - 5	10,78	10,70
5 - 6	8,48	12,54
6 - 7	7,26	7,64
7 - 8	6,00	7,16
8 - 9	4,38	8,41
9 - 10	3,02	4,45
10 - 11	1,90	2,92
11 - 12	0,99	2,99
12 - 13	0,57	1,57
13 - 14	0,21	1,08
14 - 15	0,02	0,74
15 - 16	0,00	0,22
16 - 17	0,00	0,07
17 - 18	0,00	0,01
18 - 19	0,00	0,00
19 - 20	0,00	0,00
20 - 21	0,00	0,01

Tabell B2: Retningsfordelinger fra Aanderaaloggeren i 36 m høyde. Måleperiode 1.4.90 - 30.6.90. Turbulensdata fra Gillmåler i 36 m høyde.

Vindretnings- klasse (dekagrader)	Retningsfordeling (%)	Midlere vind- styrke	Midlere vindkast	Midlere vertikal hastigh.	Midlere vertikal vindkast	$\frac{\sigma_L}{U}$	$\frac{\sigma_T}{U}$	$\frac{\sigma_W}{U}$
1	3,25	1,8	3,7	0,08	1,08	0,21	0,19	0,12
2	2,47	2,3	4,3	0,09	1,26	0,23	0,20	0,14
3	4,56	2,6	4,4	0,08	1,22	0,27	0,24	0,15
4	1,11	2,6	4,3	0,09	1,24	0,34	0,32	0,18
5	0,95	2,6	4,3	0,07	1,30	0,34	0,32	0,19
6	0,84	2,9	4,6	0,07	1,32	0,28	0,27	0,16
7	0,98	2,5	3,8	0,05	1,15	0,37	0,32	0,17
8	0,85	3,0	4,5	0,06	1,31	0,33	0,26	0,18
9	0,78	3,5	5,0	0,05	1,25	0,23	0,19	0,12
10	0,98	3,2	4,8	0,07	1,20	0,34	0,28	0,16
11	1,20	3,5	5,2	0,11	1,22	0,28	0,25	0,16
12	1,27	3,5	5,0	0,12	1,22	0,26	0,23	0,13
13	1,65	2,9	4,0	0,11	0,96	0,25	0,24	0,13
14	2,41	3,4	4,5	0,16	0,95	0,18	0,17	0,09
15	5,60	4,6	5,6	0,23	0,98	0,14	0,12	0,07
16	9,83	5,7	6,6	0,28	1,05	0,09	0,07	0,05
17	13,58	6,8	7,8	0,32	1,19	0,09	0,07	0,05
18	5,73	6,0	7,2	0,27	1,21	0,11	0,10	0,06
19	2,33	5,0	6,3	0,22	1,23	0,14	0,12	0,07
20	1,57	4,6	6,1	0,19	1,28	0,19	0,17	0,09
21	0,95	4,6	6,3	0,17	1,28	0,40	0,42	0,23
22	0,69	3,7	5,6	0,14	1,31	0,41	0,30	0,16
23	0,53	4,2	6,0	0,17	1,52	0,29	0,26	0,16
24	0,37	3,2	4,8	0,13	1,39	0,40	0,34	0,19
25	0,40	3,2	5,0	0,08	1,63	0,38	0,37	0,22
26	0,47	2,4	3,7	0,08	1,17	0,40	0,40	0,19
27	0,55	3,3	4,8	0,10	1,33	0,38	0,37	0,20
28	1,00	3,9	5,5	0,13	1,42	0,23	0,20	0,13
29	2,21	4,0	5,4	0,17	1,28	0,25	0,23	0,15
30	3,27	3,6	4,8	0,15	1,09	0,20	0,19	0,12
31	4,79	3,2	4,3	0,12	0,95	0,19	0,18	0,11
32	5,11	2,6	3,7	0,09	0,91	0,21	0,19	0,12
33	6,86	3,1	4,5	0,10	1,04	0,18	0,16	0,10
34	6,59	3,2	4,8	0,11	1,11	0,18	0,15	0,11
35	4,53	3,1	4,9	0,11	1,18	0,19	0,16	0,11
36	2,75	2,2	4,1	0,09	1,13	0,22	0,19	0,18

Tabell B3: Retningsfordeling fra Gillmåler i 36 m høyde. Måleperiode 1.4.90 - 30.6.90.

Vindretnings- klasse (dekagrader)	Retningsfordeling (%)	Midlere vind- styrke	Midlere vindkast	Midlere vertikal hastigh.	Midlere vertikal vindkast	$\frac{\sigma_L}{U}$	$\frac{\sigma_T}{U}$	$\frac{\sigma_W}{U}$
1	3,16	3,8	5,5	0,09	1,23	0,19	0,16	0,12
2	1,94	3,7	5,6	0,10	1,32	0,25	0,21	0,14
3	1,16	3,3	5,4	0,09	1,41	0,34	0,30	0,18
4	0,66	2,6	4,3	0,07	1,28	0,33	0,32	0,18
5	0,65	2,3	4,2	0,07	1,19	0,37	0,37	0,20
6	0,77	2,5	4,3	0,06	1,28	0,39	0,38	0,20
7	0,87	2,5	4,4	0,07	1,19	0,35	0,32	0,19
8	1,10	2,8	4,7	0,04	1,24	0,35	0,28	0,17
9	1,09	3,1	5,1	0,05	1,26	0,32	0,30	0,16
10	1,05	3,2	5,3	0,07	1,24	0,29	0,24	0,15
11	1,20	3,6	5,6	0,11	1,24	0,27	0,25	0,13
12	1,20	3,2	5,0	0,12	1,16	0,25	0,23	0,14
13	1,05	2,9	4,4	0,11	0,96	0,21	0,21	0,10
14	1,62	2,6	3,8	0,11	0,87	0,27	0,26	0,13
15	2,38	3,5	4,8	0,16	0,95	0,20	0,18	0,11
16	8,32	5,7	6,8	0,27	1,04	0,10	0,08	0,05
17	18,35	6,5	7,7	0,32	1,14	0,08	0,06	0,05
18	7,86	5,7	7,1	0,26	1,18	0,12	0,10	0,06
19	3,04	4,6	6,2	0,20	1,21	0,17	0,14	0,08
20	1,21	4,4	6,5	0,17	1,30	0,28	0,19	0,13
21	0,59	3,8	5,8	0,16	1,27	0,31	0,26	0,13
22	0,25	3,1	5,0	0,15	1,26	0,41	0,40	0,22
23	0,42	4,2	6,5	0,21	1,74	0,33	0,34	0,19
24	0,40	2,5	4,8	0,13	1,42	0,56	0,48	0,25
25	0,31	3,0	5,3	0,06	1,50	0,33	0,33	0,18
26	0,32	2,4	4,5	0,08	1,43	0,40	0,40	0,23
27	0,62	2,7	4,8	0,04	1,29	0,35	0,30	0,19
28	0,92	3,3	5,5	0,10	1,36	0,31	0,32	0,17
29	2,21	4,3	6,1	0,17	1,35	0,19	0,17	0,12
30	2,87	3,1	4,3	0,14	0,99	0,21	0,19	0,11
31	3,47	2,8	4,0	0,13	0,98	0,19	0,18	0,11
32	4,59	2,3	3,4	0,10	0,91	0,23	0,23	0,15
33	6,56	2,6	3,8	0,08	0,95	0,19	0,17	0,11
34	7,59	3,7	5,2	0,11	1,15	0,17	0,14	0,10
35	6,21	3,8	5,3	0,11	1,18	0,17	0,15	0,10
36	4,01	3,0	4,4	0,08	1,02	0,23	0,20	0,16

Tabell B4: Retningsfordeling fra Gillmåler i 10 m høyde i 36 m mast. Måleperiode 10.4.90 - 30.6.90.

Vindretnings- klasse (dekagrader)	Retningsfordeling (%)	Midlere vind- styrke	Midlere vindkast	Midlere vertikal hastigh.	Midlere vertikal vindkast	$\frac{\sigma_L}{U}$	$\frac{\sigma_T}{U}$	$\frac{\sigma_W}{U}$
1	6,35	2,9	4,0	0,13	0,70	0,17	0,13	0,07
2	2,55	3,0	4,6	0,15	0,86	0,24	0,18	0,08
3	1,13	3,0	5,0	0,18	1,05	0,38	0,33	0,12
4	0,72	2,3	4,1	0,14	0,94	0,48	0,44	0,15
5	0,77	2,1	3,9	0,14	0,96	0,44	0,45	0,17
6	0,57	2,3	4,0	0,17	0,97	0,36	0,35	0,15
7	0,79	2,4	4,1	0,16	0,92	0,30	0,28	0,12
8	1,00	2,5	4,4	0,16	0,97	0,32	0,30	0,12
9	1,16	2,9	4,8	0,18	1,02	0,29	0,26	0,11
10	1,07	2,8	4,6	0,18	0,95	0,25	0,22	0,10
11	1,30	3,3	5,0	0,22	1,00	0,24	0,20	0,09
12	1,33	2,9	4,5	0,20	0,93	0,23	0,22	0,09
13	1,08	2,6	4,0	0,18	0,86	0,25	0,25	0,10
14	1,27	2,8	4,1	0,19	0,76	0,25	0,25	0,11
15	2,39	3,7	4,9	0,22	0,79	0,19	0,16	0,07
16	7,87	5,8	6,9	0,33	0,83	0,10	0,08	0,03
17	13,02	6,2	7,4	0,30	0,88	0,09	0,07	0,04
18	10,49	6,1	7,7	0,24	0,94	0,11	0,09	0,04
19	4,50	4,9	6,5	0,14	0,90	0,13	0,11	0,05
20	1,51	4,6	6,7	0,10	1,06	0,21	0,16	0,07
21	0,72	3,6	5,6	0,05	1,04	0,32	0,27	0,11
22	0,35	4,0	6,4	0,04	1,33	0,31	0,30	0,11
23	0,39	3,3	5,7	0,04	1,26	0,72	0,74	0,28
24	0,48	2,8	5,1	0,03	1,24	0,42	0,45	0,19
25	0,28	2,5	4,7	0,02	1,07	0,39	0,37	0,15
26	0,48	2,2	4,0	0,02	0,98	0,37	0,36	0,15
27	0,61	2,2	4,1	0,03	0,97	0,41	0,41	0,20
28	1,19	3,1	5,1	0,03	0,97	0,29	0,23	0,11
29	2,45	3,9	5,6	0,05	0,94	0,20	0,17	0,09
30	2,74	3,1	4,3	0,06	0,80	0,21	0,18	0,09
31	2,74	3,0	4,4	0,07	0,82	0,20	0,20	0,08
32	3,04	2,9	4,2	0,08	0,86	0,21	0,21	0,09
33	4,66	3,5	5,0	0,09	0,94	0,18	0,16	0,08
34	5,47	4,1	5,9	0,13	1,04	0,17	0,16	0,08
35	6,00	3,5	5,0	0,13	0,90	0,18	0,16	0,08
36	7,52	2,6	3,7	0,10	0,67	0,21	0,17	0,09

Tabell B5: Retningsfordeling fra Gillmåler i 10 m mast. Måleperiode 1.4.89 - 30.6.90.

Vindretnings- klasse (dekagrader)	Retningsfordeling (%)	Midlere vind- styrke	Midlere vindkast	Midlere vertikal hastigh.	Midlere vertikal vindkast	$\frac{\sigma_L}{U}$	$\frac{\sigma_T}{U}$	$\frac{\sigma_W}{U}$
1	4,32	3,0	4,3	0,19	0,82	0,19	0,19	0,08
2	0,62	3,0	4,8	0,20	1,02	0,29	0,23	0,11
3	0,85	2,4	4,2	0,15	0,98	0,36	0,32	0,13
4	0,79	2,1	3,9	0,13	0,98	0,38	0,36	0,13
5	0,67	2,2	4,1	0,14	1,00	0,34	0,34	0,14
6	0,77	2,3	4,1	0,14	0,96	0,38	0,37	0,17
7	0,82	2,6	4,8	0,14	1,03	0,40	0,36	0,14
8	0,97	2,9	4,9	0,14	1,04	0,28	0,29	0,13
9	1,04	3,1	5,1	0,15	1,11	0,29	0,29	0,11
10	1,13	3,2	4,9	0,18	1,05	0,21	0,23	0,11
11	1,41	3,1	4,8	0,19	1,08	0,22	0,20	0,11
12	1,27	2,8	4,3	0,18	1,17	0,24	0,22	0,13
13	1,21	2,9	4,2	0,21	1,22	0,21	0,21	0,12
14	1,54	3,0	4,3	0,23	1,15	0,24	0,23	0,13
15	4,73	4,9	6,0	0,34	1,33	0,12	0,10	0,08
16	10,89	5,7	6,9	0,35	1,37	0,10	0,08	0,07
17	12,60	6,1	7,5	0,30	1,62	0,10	0,08	0,08
18	6,24	5,7	7,5	0,20	1,62	0,13	0,12	0,09
19	2,87	4,8	6,6	0,08	1,47	0,15	0,13	0,11
20	1,37	4,4	6,6	0,05	1,50	0,26	0,20	0,13
21	0,62	3,8	6,1	0,02	1,43	0,30	0,26	0,17
22	0,30	3,5	6,0	-0,01	1,54	0,29	0,29	0,16
23	0,45	3,5	5,7	0,01	1,51	0,37	0,38	0,19
24	0,45	2,8	5,1	0,00	1,37	0,38	0,39	0,19
25	0,39	2,5	4,8	0,01	1,38	0,45	0,48	0,20
26	0,41	2,8	5,7	-0,01	1,22	0,29	0,34	0,14
27	0,66	3,2	5,4	0,02	1,30	0,28	0,36	0,15
28	1,39	4,2	6,6	0,04	1,22	0,23	0,28	0,11
29	2,49	3,7	5,5	0,07	1,06	0,19	0,19	0,09
30	3,03	3,1	4,7	0,08	0,98	0,18	0,17	0,09
31	3,26	3,0	4,4	0,11	0,99	0,20	0,20	0,09
32	3,56	3,0	4,3	0,13	1,00	0,18	0,18	0,09
33	5,98	3,8	5,6	0,19	1,15	0,18	0,16	0,09
34	6,54	3,8	5,7	0,21	1,06	0,19	0,16	0,08
35	6,37	2,8	4,1	0,15	0,88	0,17	0,17	0,08
36	7,00	2,7	3,9	0,15	0,81	0,24	0,20	0,09

VEDLEGG C

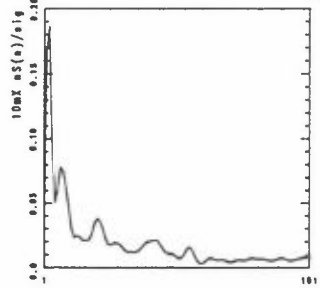
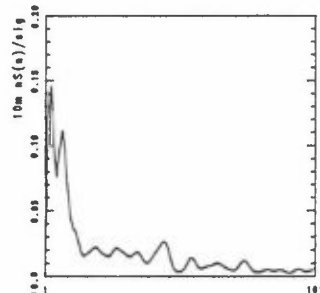
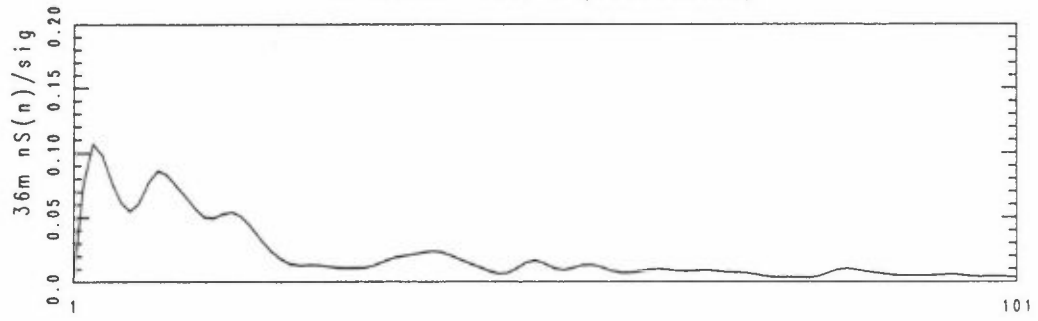
Plott av autospektra

Plottene viser $\frac{n}{\sigma_u^2} S\left(\frac{nz}{U}\right)$ der

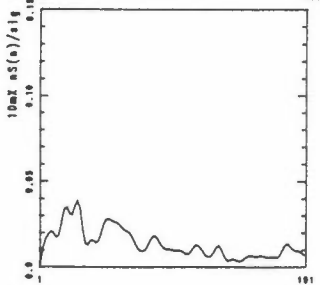
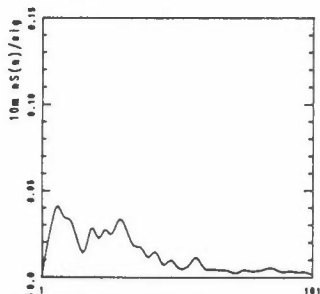
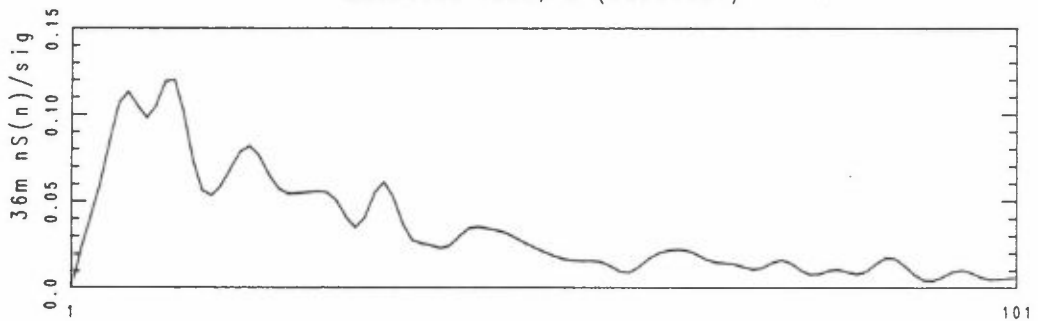
$$S(n) = 4 \sigma_u^2 \int_0^{\infty} R(\tau) \cos 2\pi \tau \, d\tau$$

- n : frekvens
- σ_u : Standardavvik av vindstyrke
- $R(\tau)$: Autokorrelasjon av vindstyrken for tidsforskjell τ
- U : Vindstyrke
- z : Målehøyde
- S : Spektraltetthetsfunksjonen

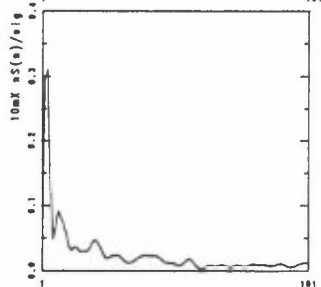
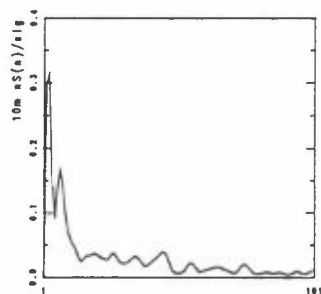
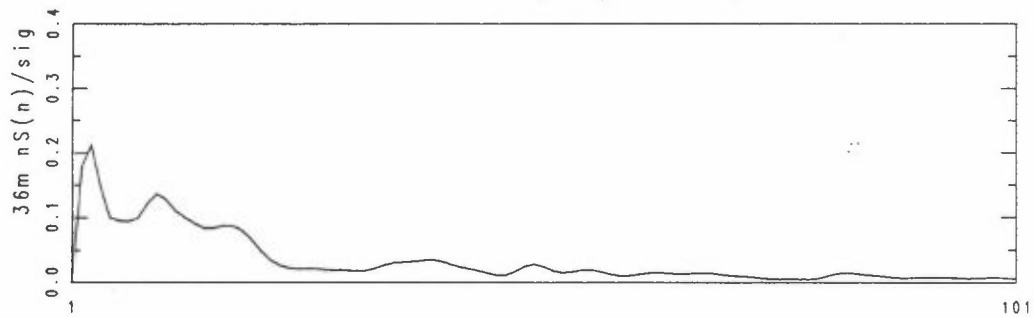
06.04.90 1600, H (Vindvektor)



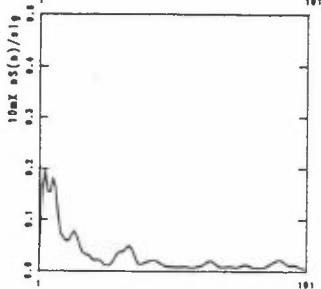
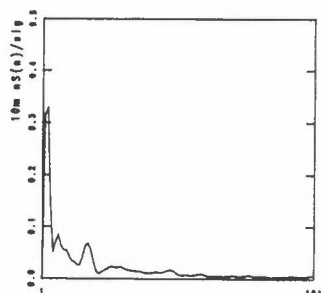
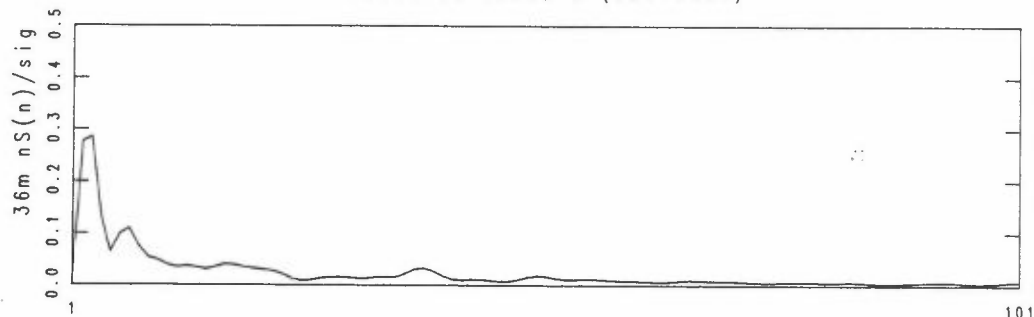
06.04.90 1600, W (Vertikal)



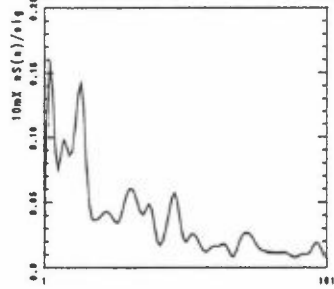
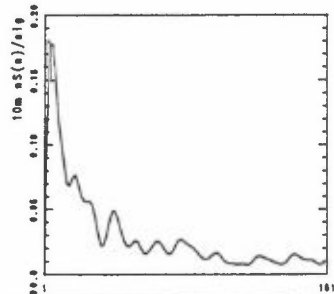
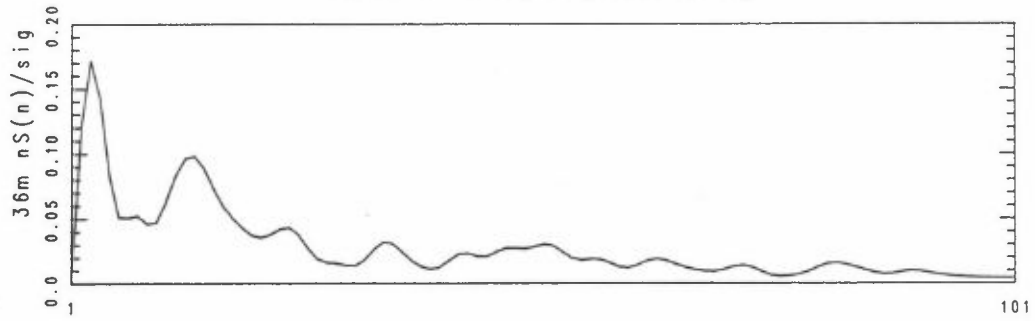
06.04.90 1600, V (Nord-sør)



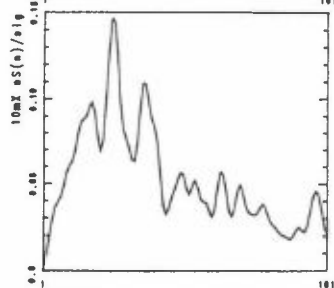
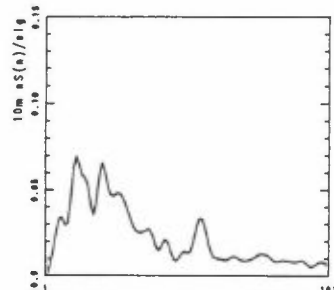
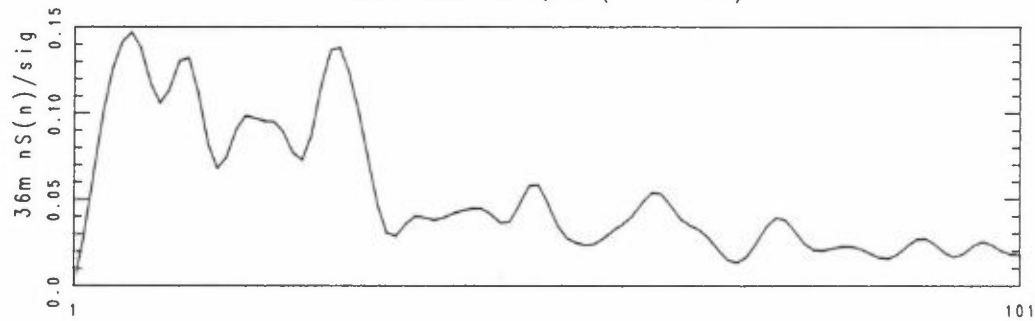
06.04.90 1600, U (Øst-vest)



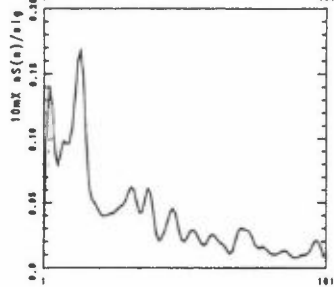
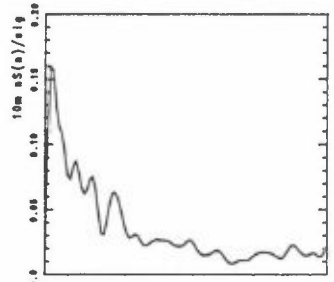
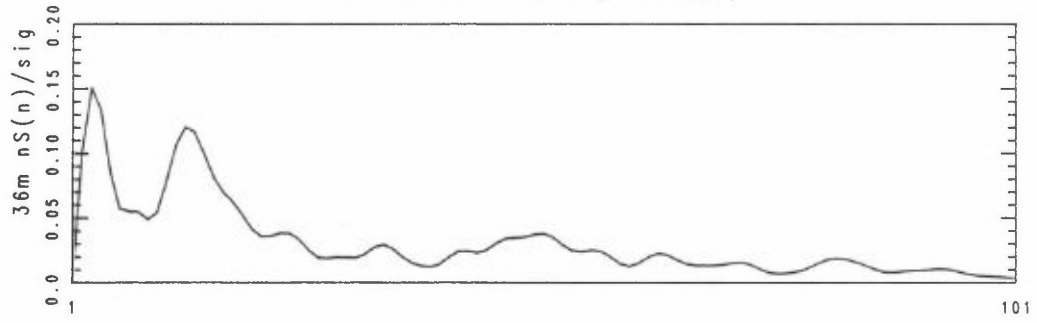
06.04.90 1610, H (Vindvektor)



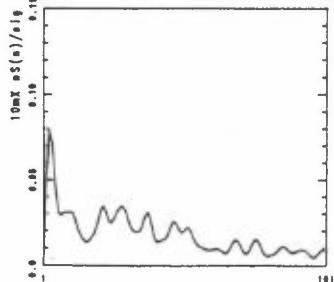
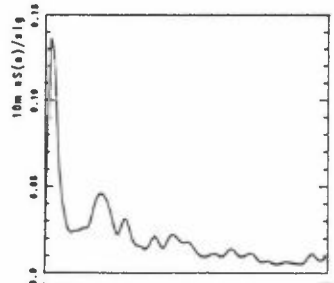
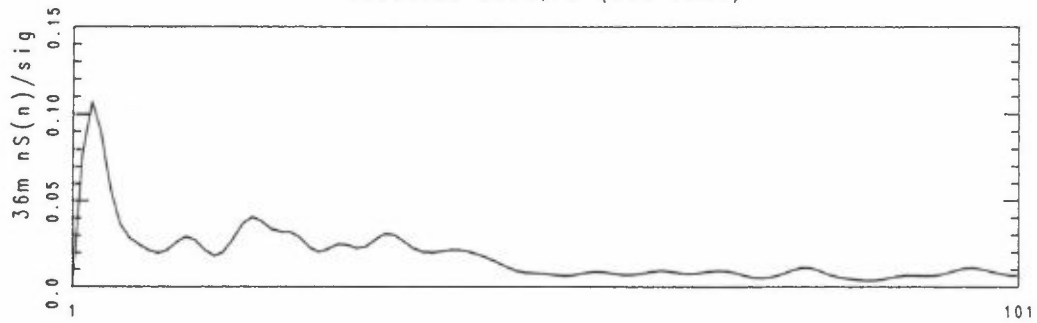
06.04.90 1610, W (Vertikal)



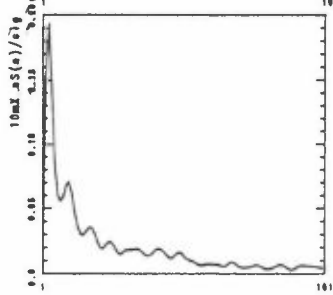
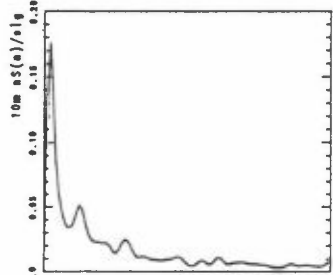
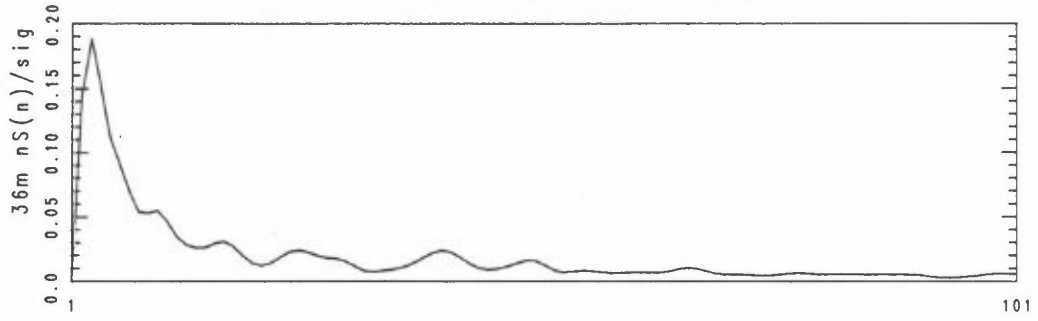
06.04.90 1610, V (Nord-sør)



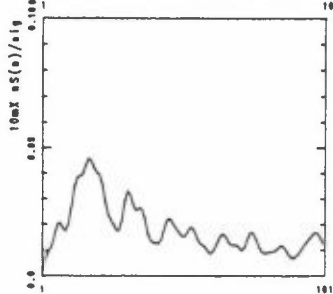
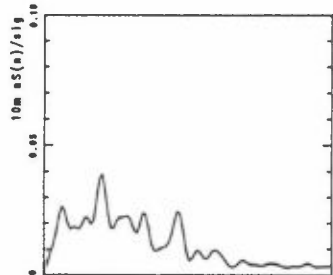
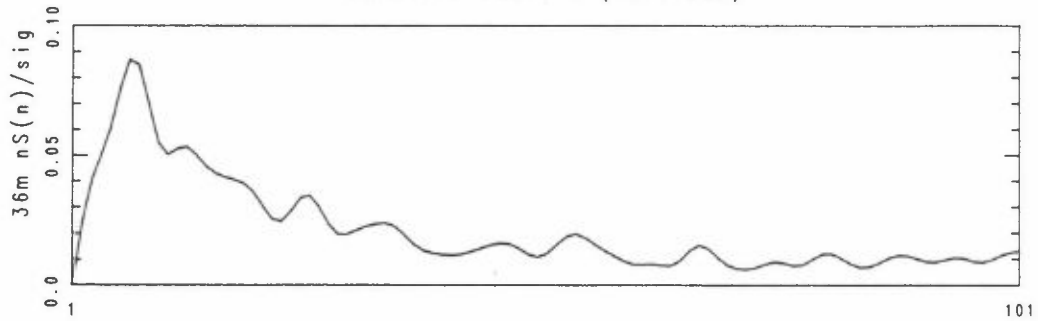
06.04.90 1610, U (Øst-vest)



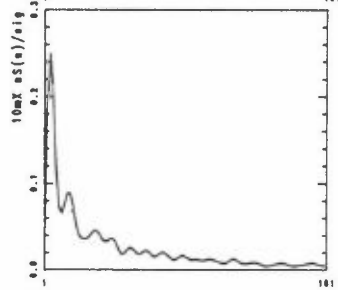
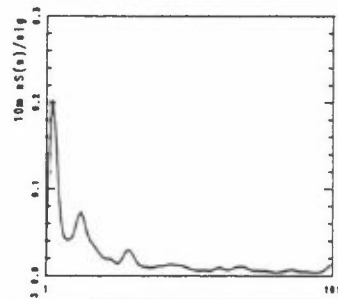
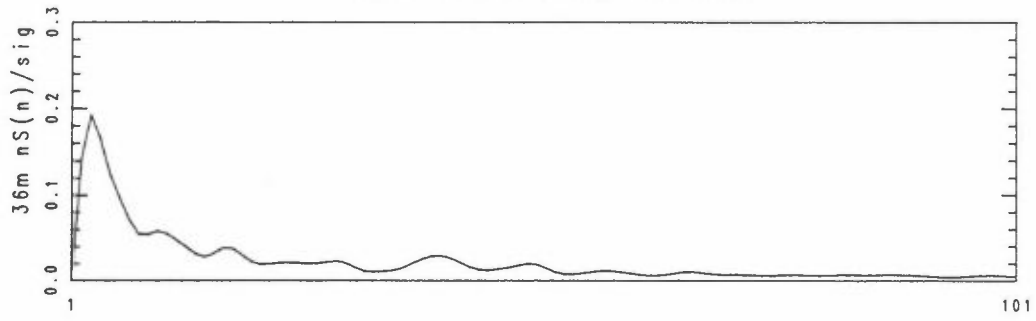
06.04.90 1620, H (Vindvektor)



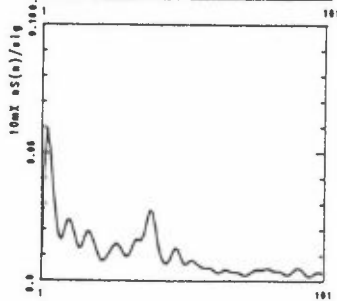
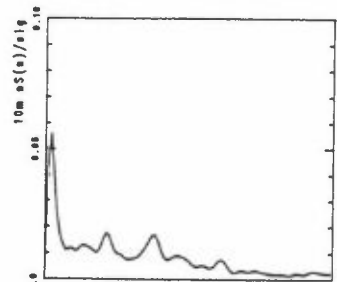
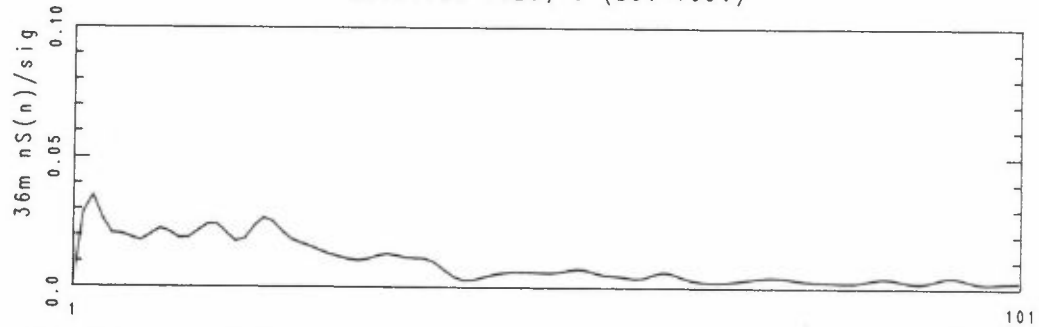
06.04.90 1620, W (Vertikal)



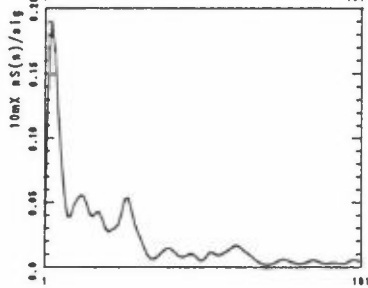
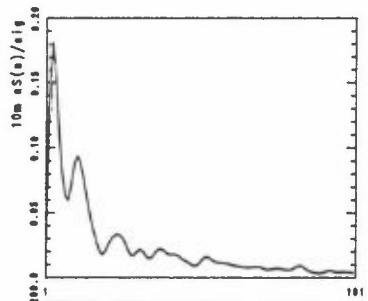
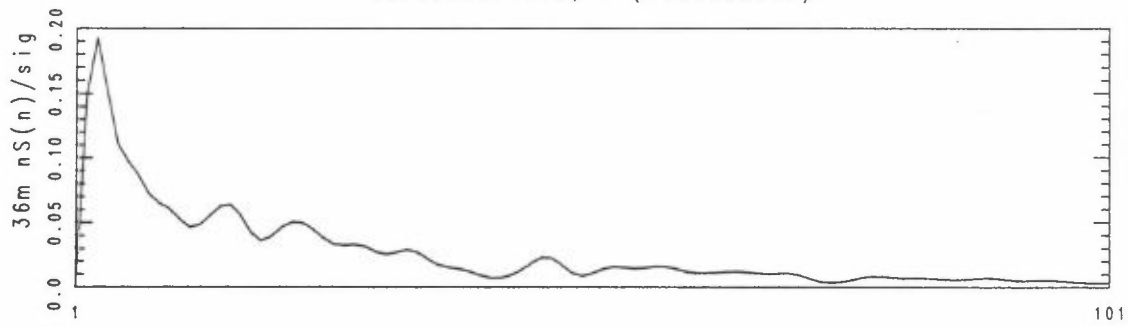
06.04.90 1620, V (Nord-sør)



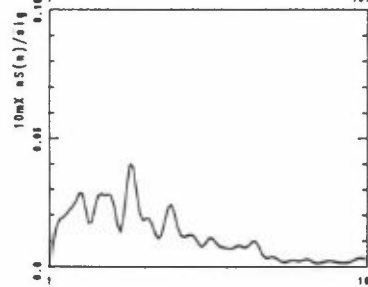
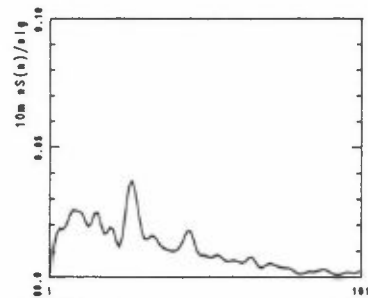
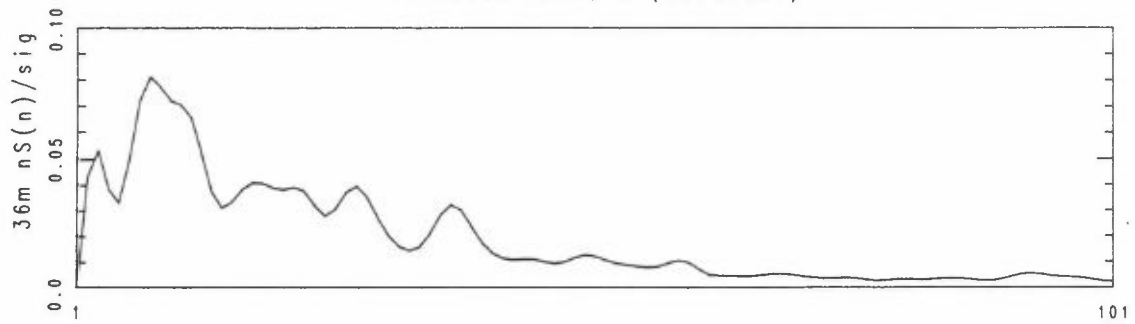
06.04.90 1620, U (Øst-vest)



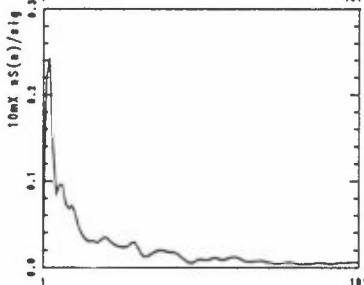
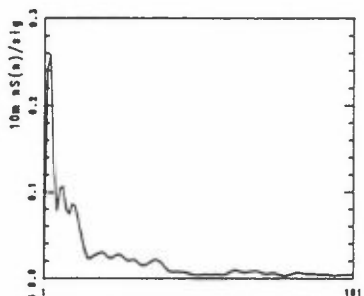
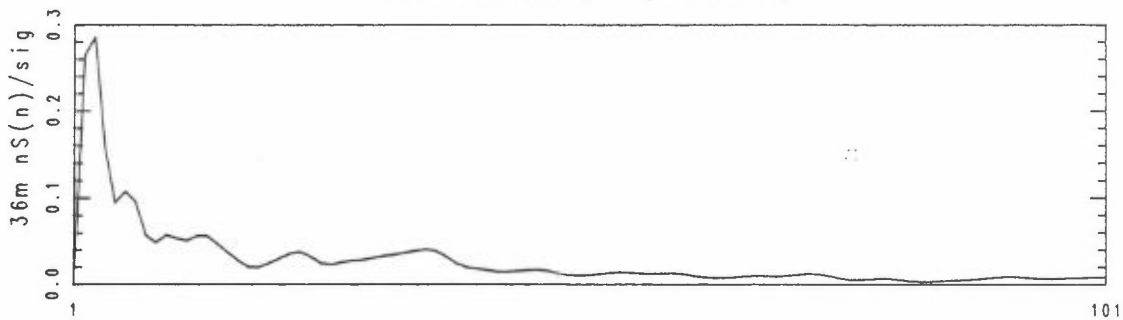
11.05.90 1310, H (Vindvektor)



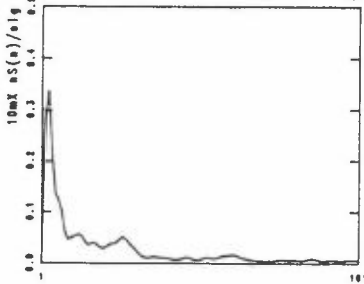
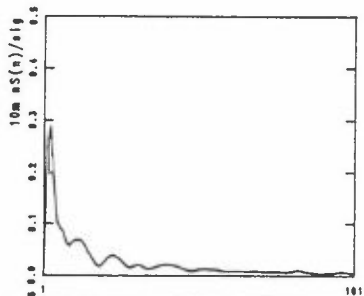
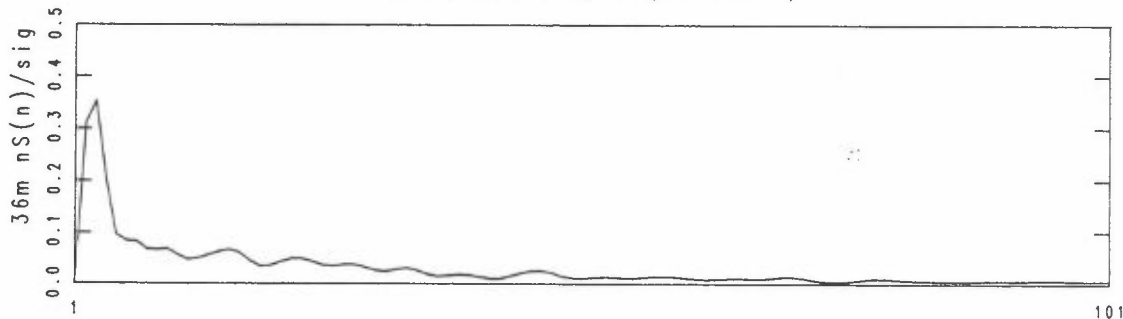
11.05.90 1310, W (Vertikal)



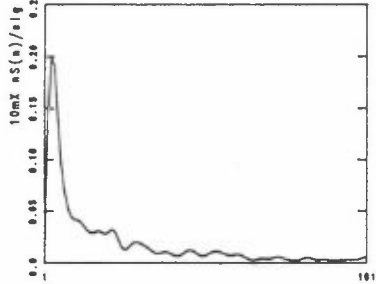
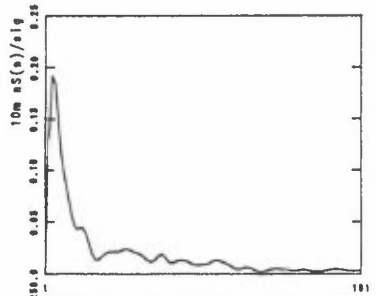
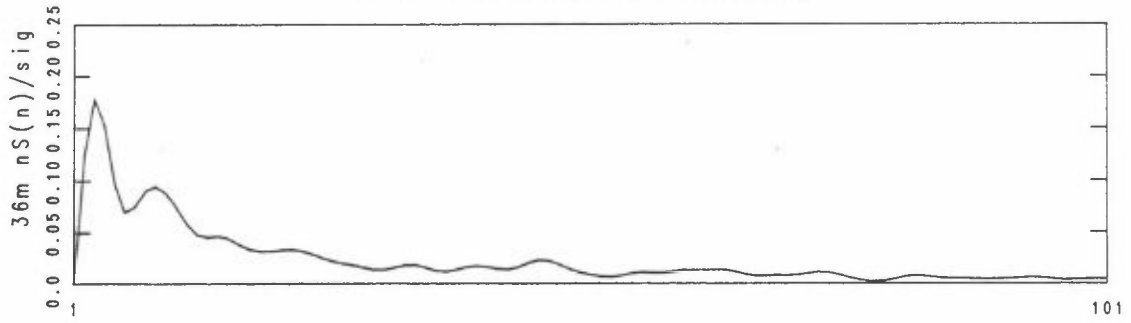
11.05.90 1310, V (Nord-sør)



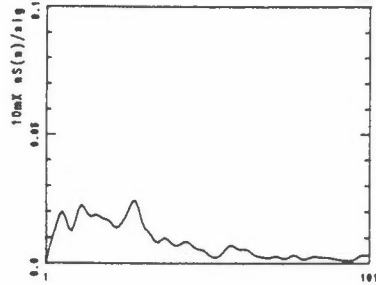
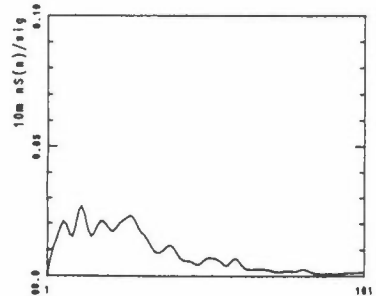
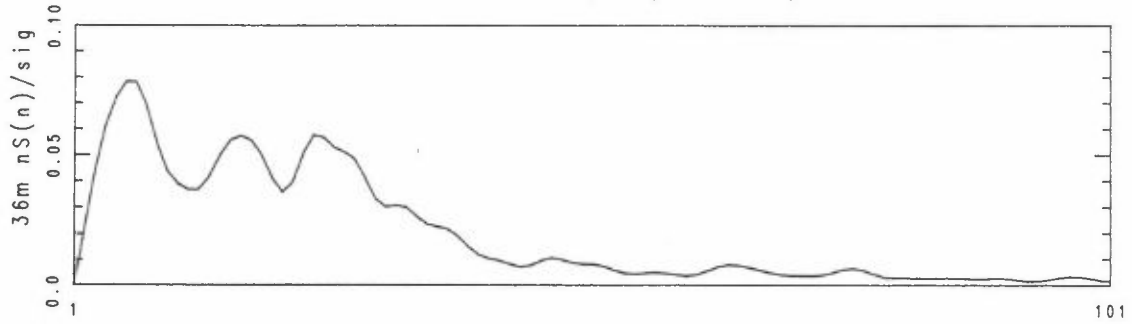
11.05.90 1310, U (Øst-vest)



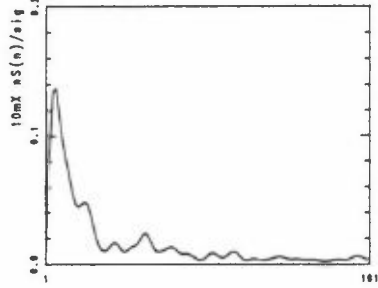
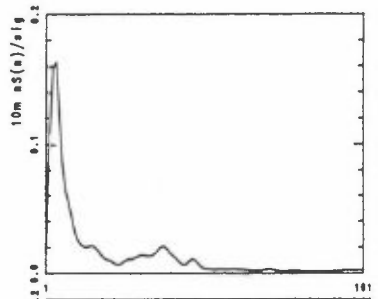
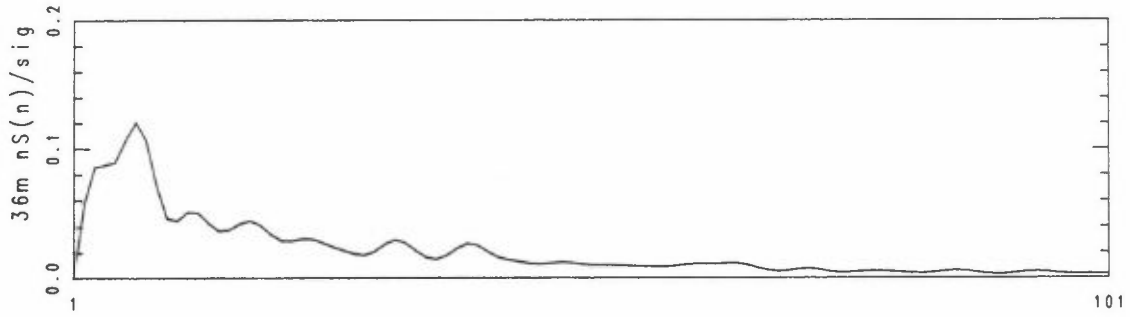
11.05.90 1320, H (Vindvektor)



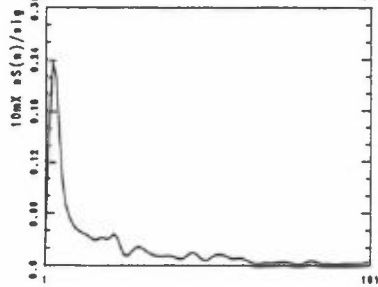
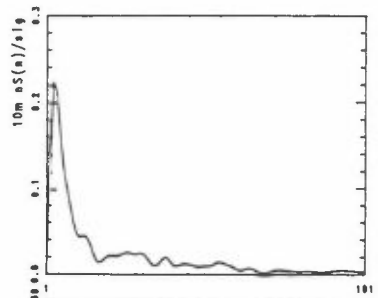
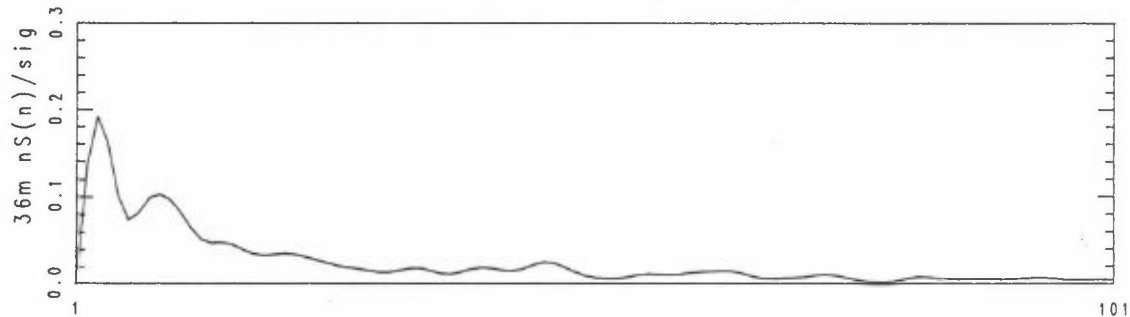
11.05.90 1320, W (Vertikal)



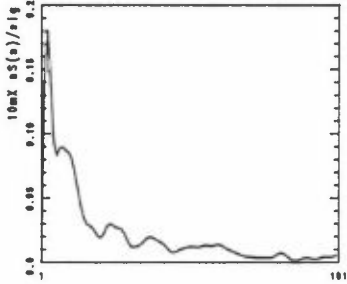
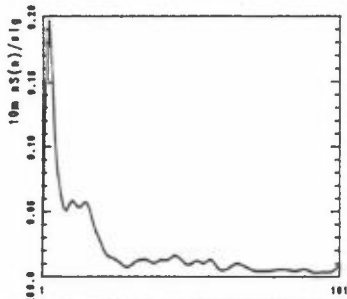
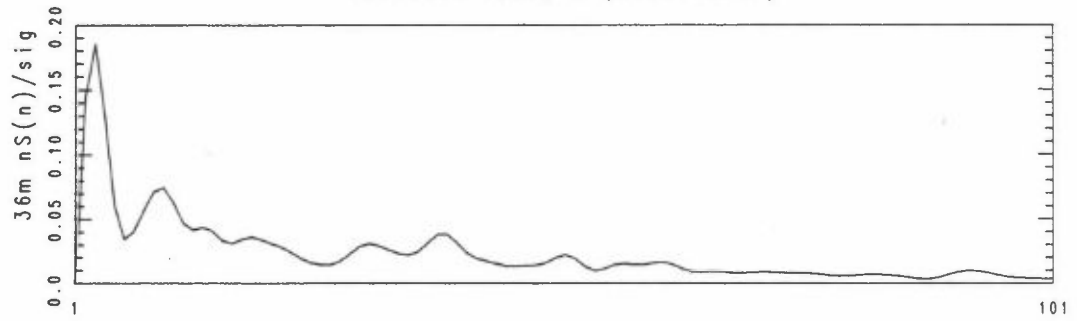
11.05.90 1320, V (Nord-sør)



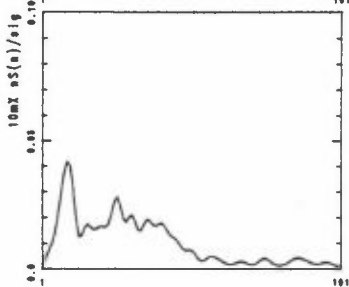
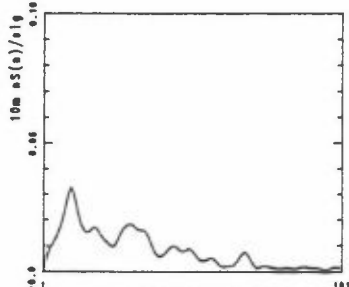
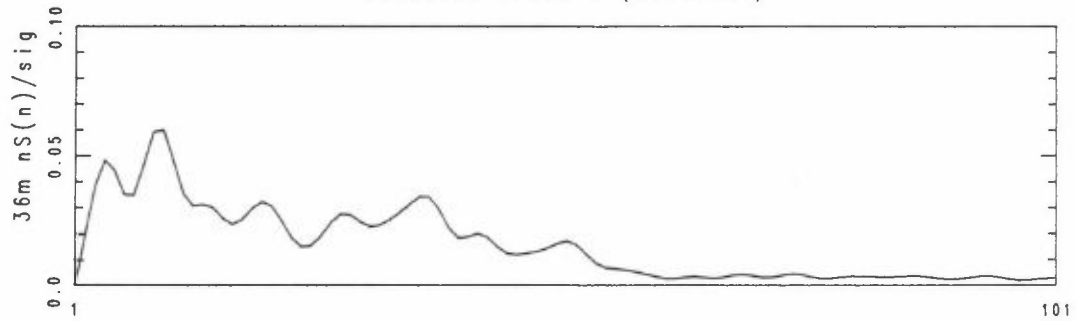
11.05.90 1320, U (Øst-vest)



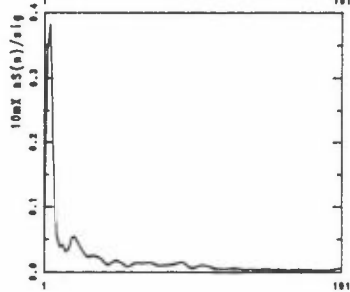
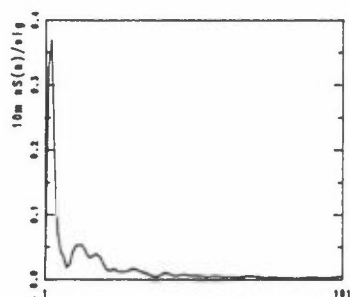
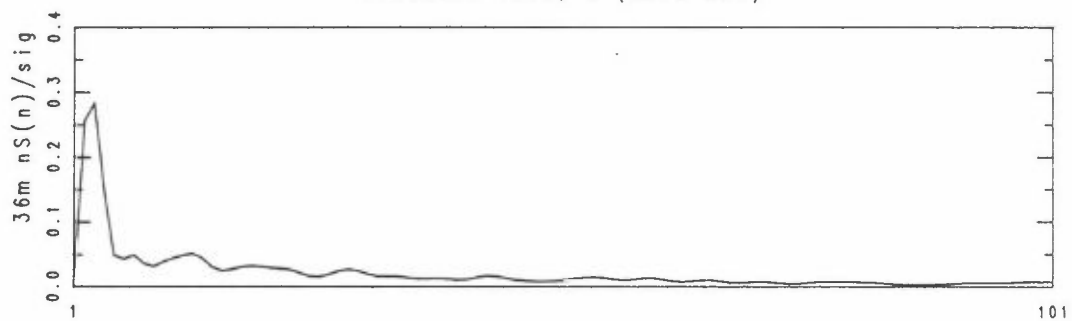
11.05.90 1330, H (Vindvektor)



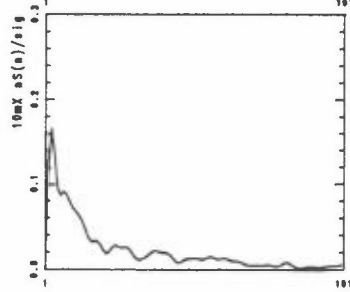
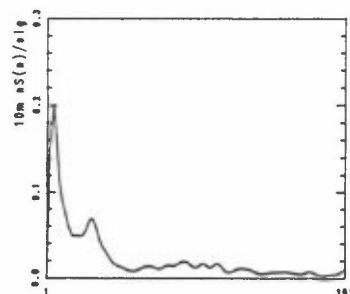
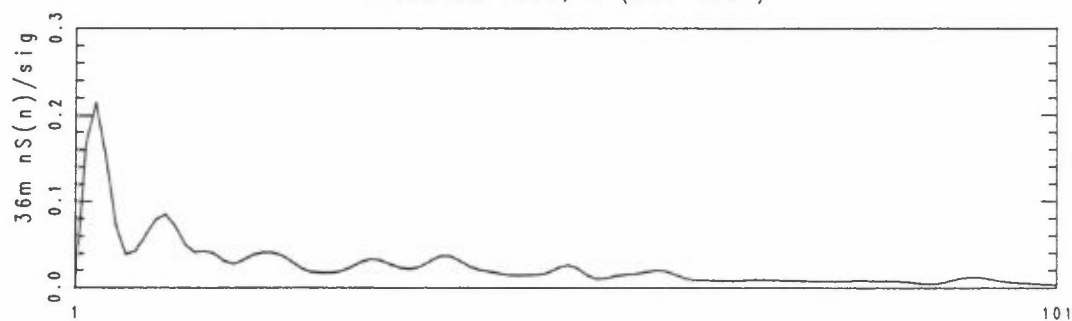
11.05.90 1330, W (Vertikal)



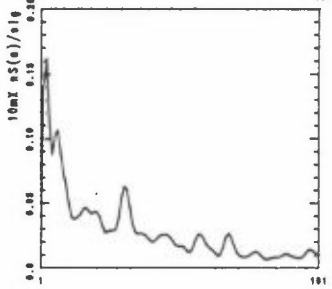
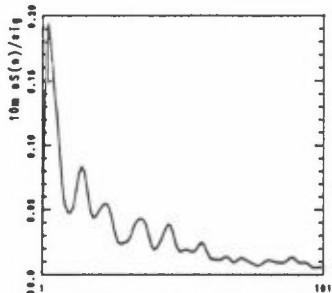
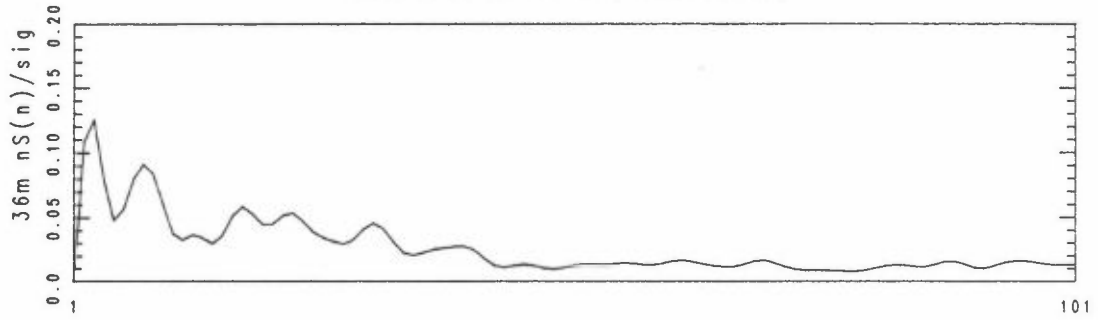
11.05.90 1330, V (Nord-sør)



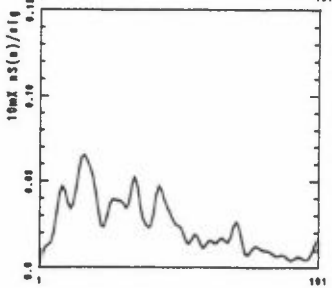
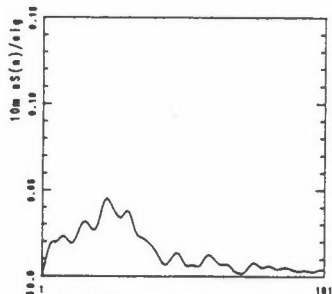
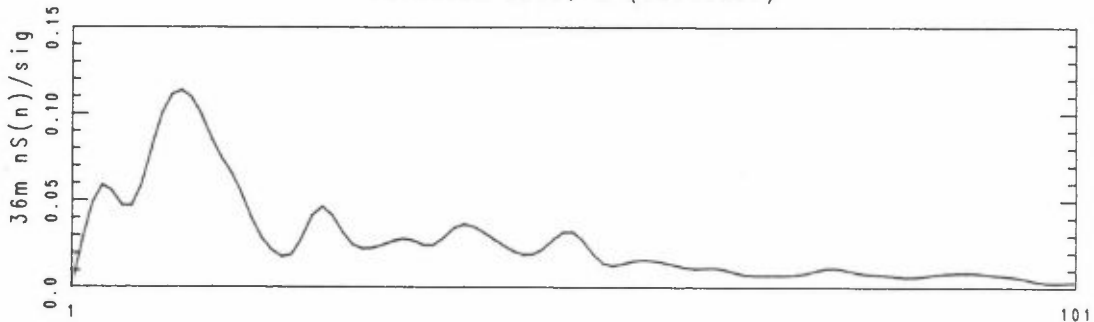
11.05.90 1330, U (Øst-vest)



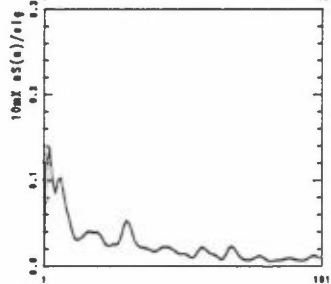
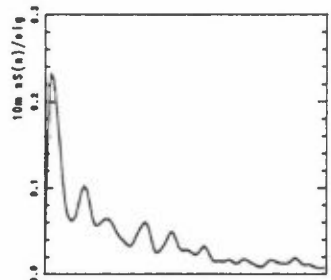
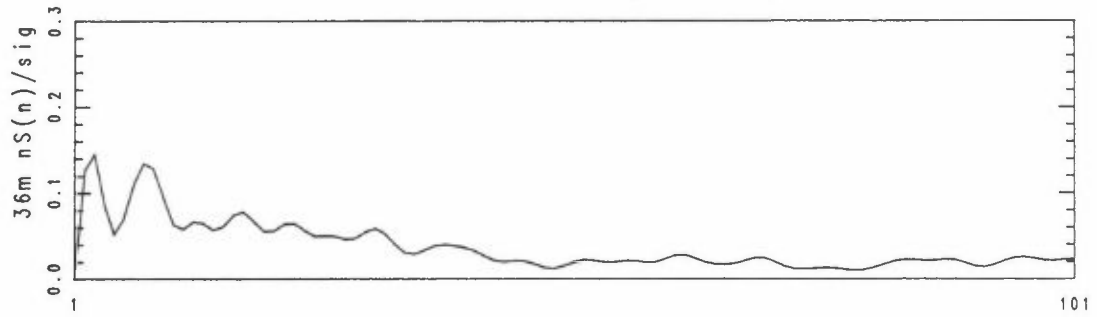
16.05.90 0730, H (Vindvektor)



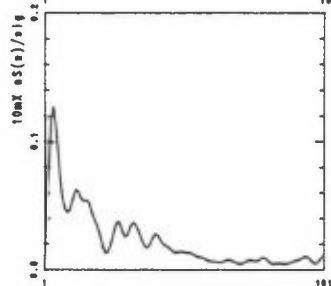
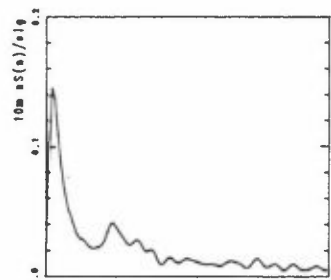
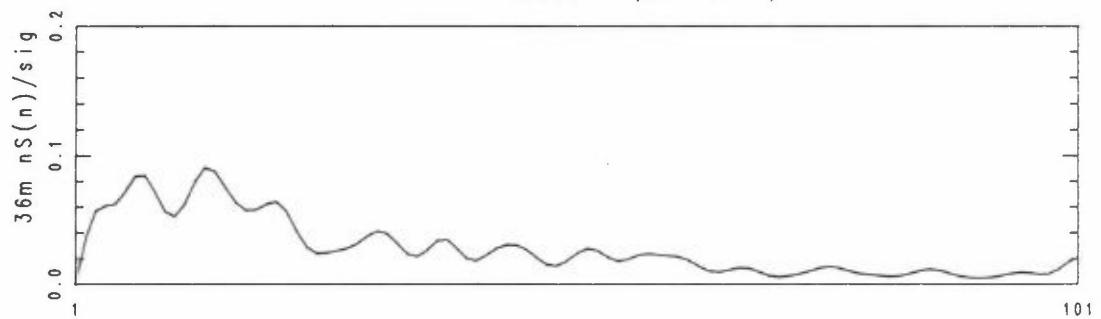
16.05.90 0730, W (Vertikal)



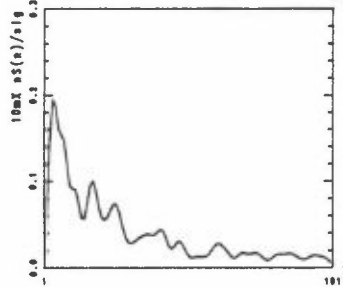
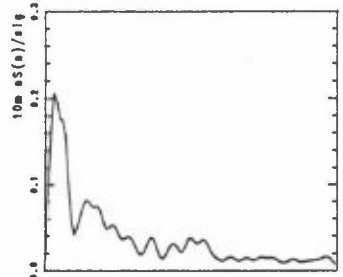
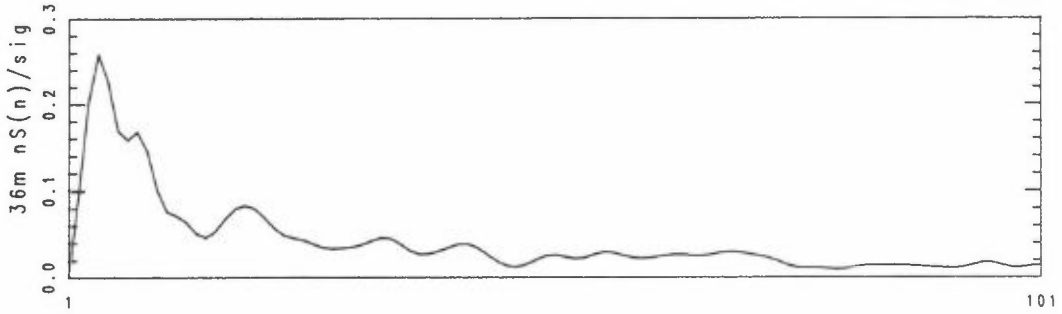
16.05.90 0730, V (Nord-sør)



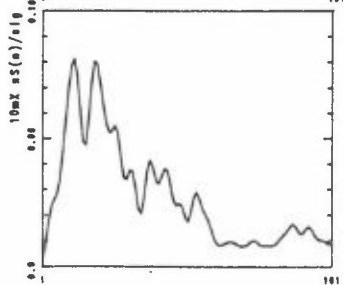
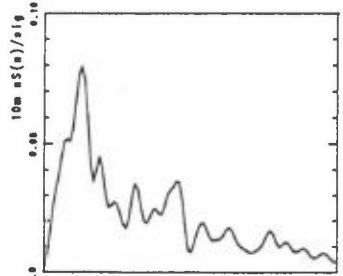
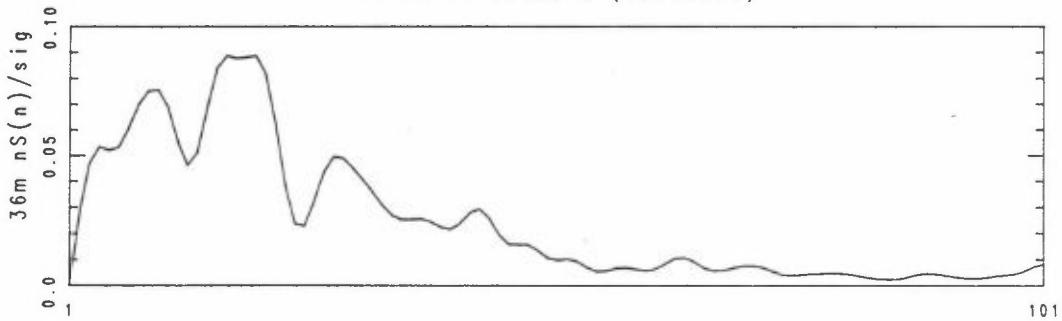
16.05.90 0730, U (Øst-vest)



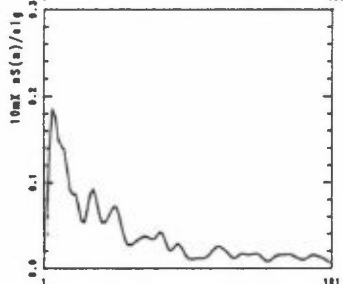
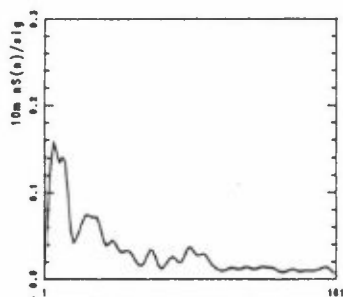
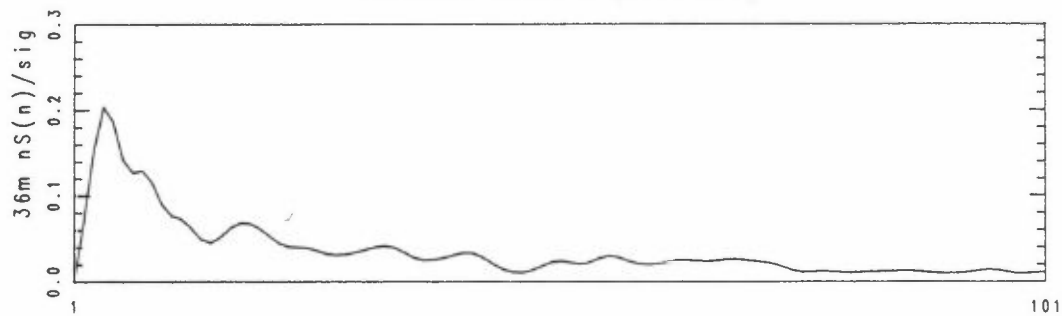
16.05.90 0740, H (Vindvektor)



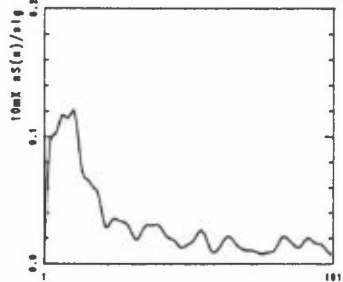
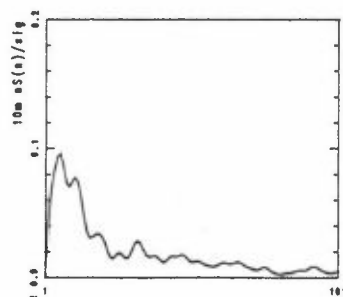
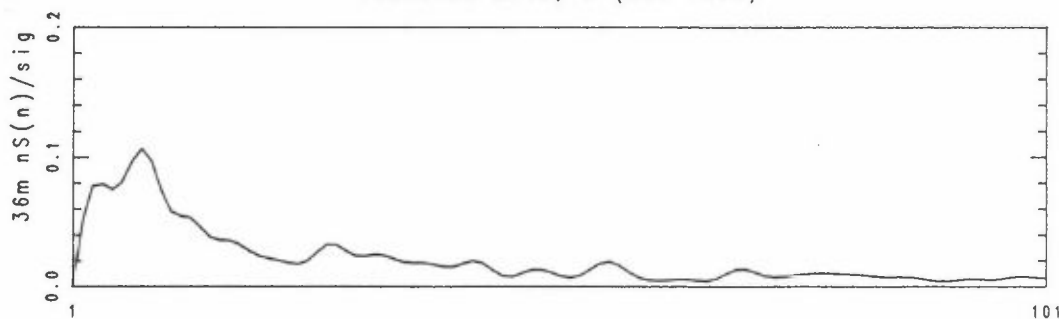
16.05.90 0740, W (Vertikal)



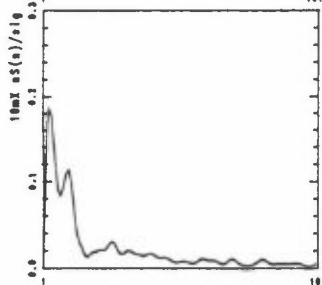
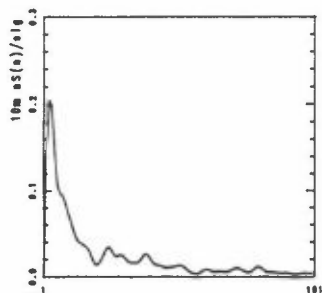
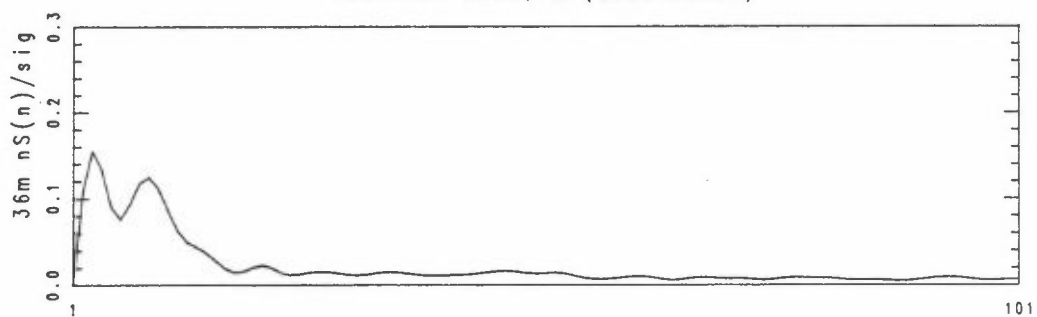
16.05.90 0740, V (Nord-sør)



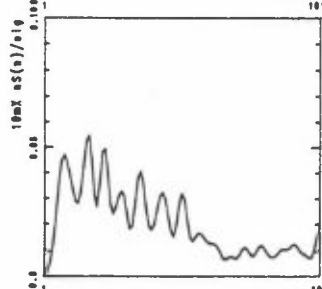
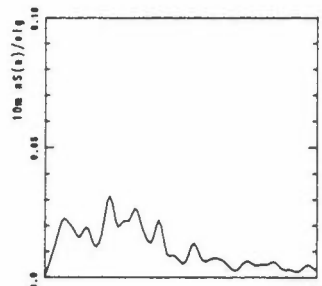
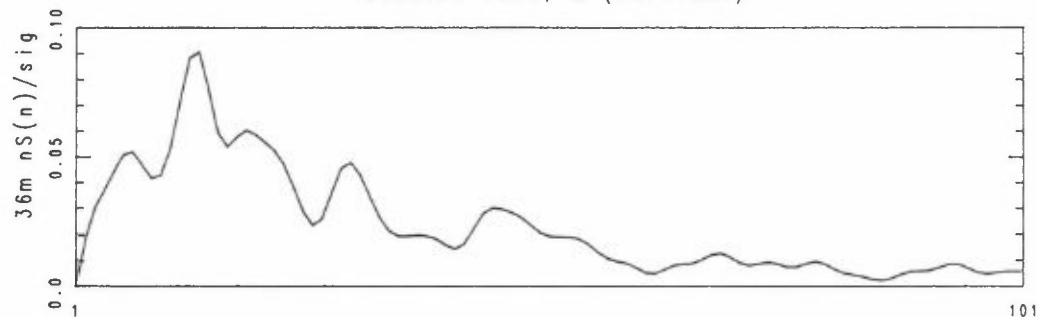
16.05.90 0740, U (Øst-vest)



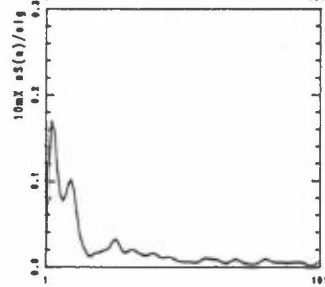
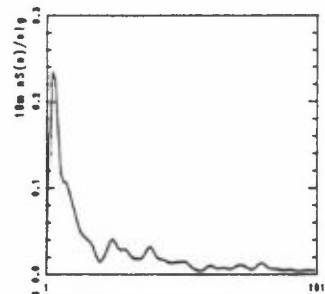
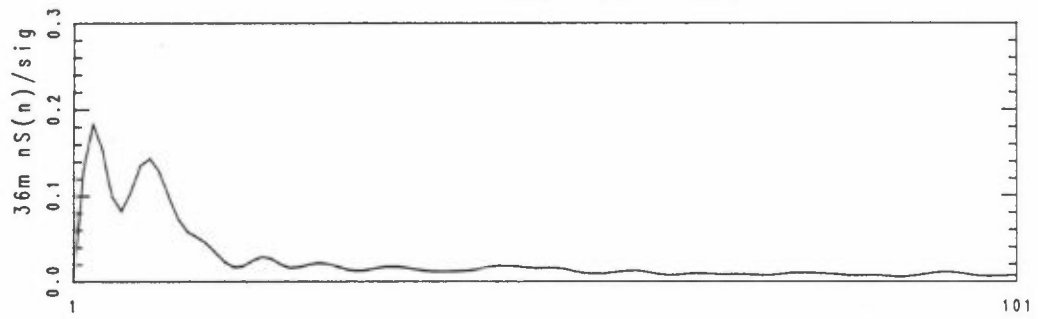
18.05.90 0530, H (Vindvektor)



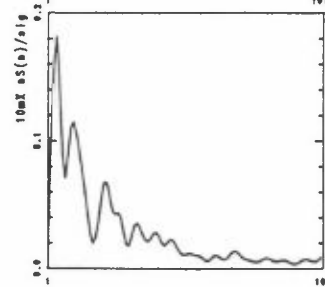
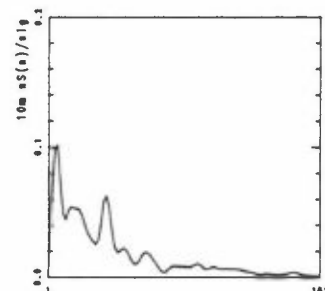
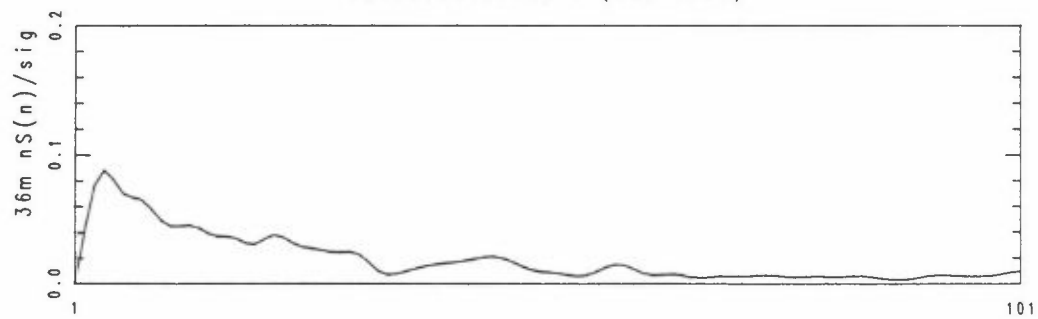
18.05.90 0530, W (Vertikal)



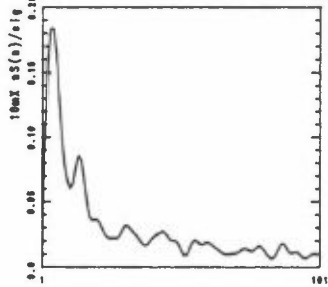
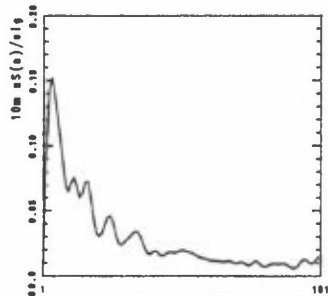
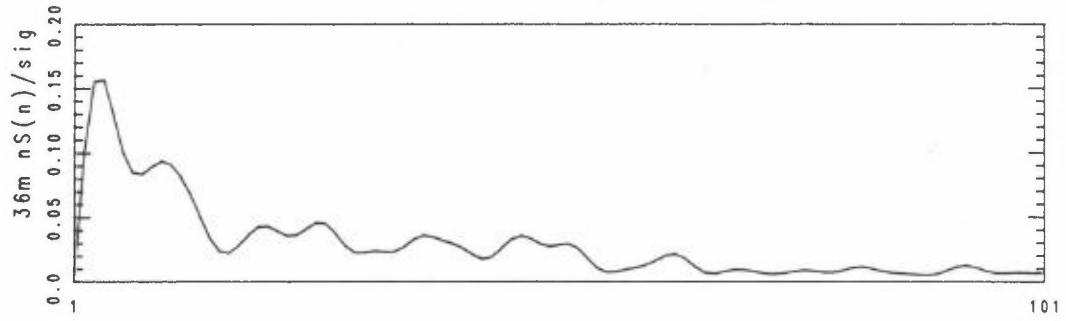
18.05.90 0530, V (Nord-sør)



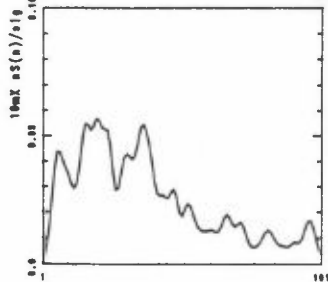
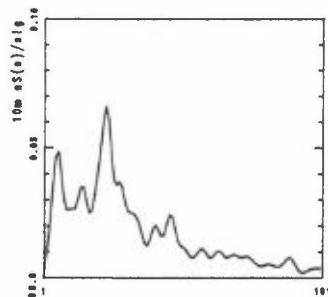
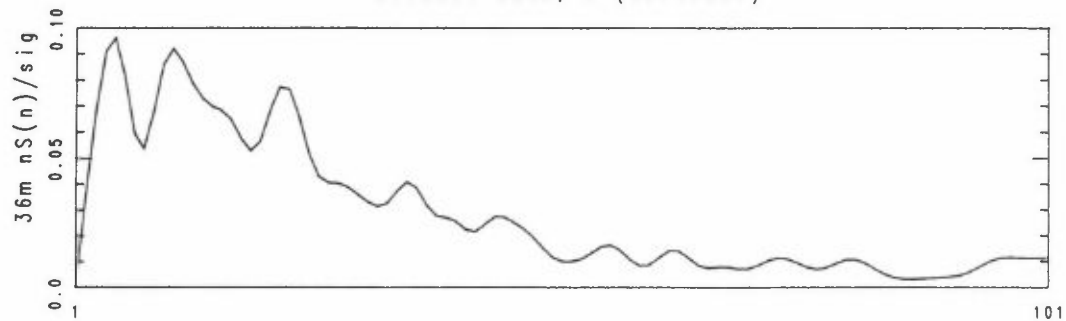
18.05.90 0530, U (Øst-vest)



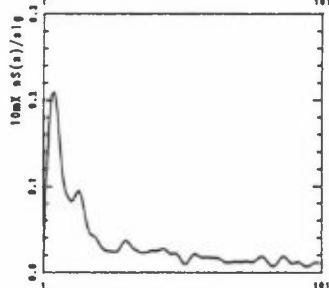
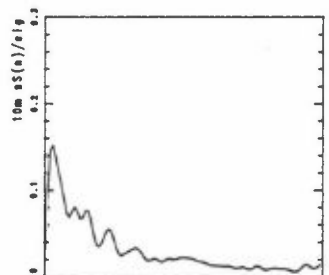
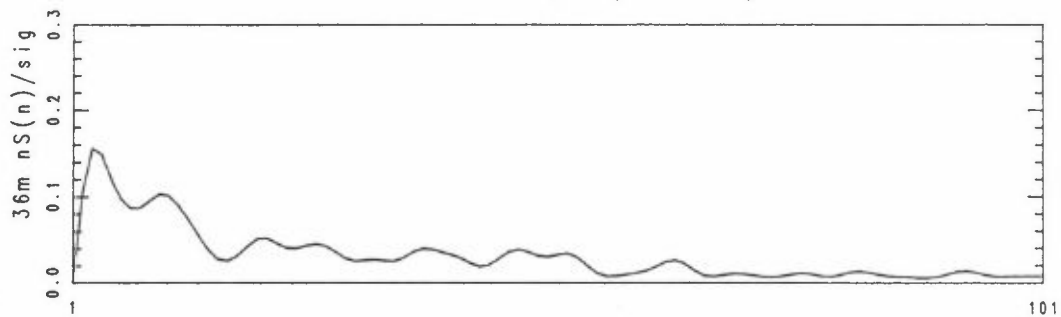
18.05.90 0540, H (Vindvektor)



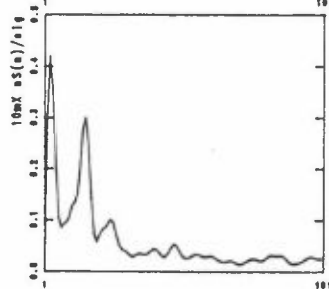
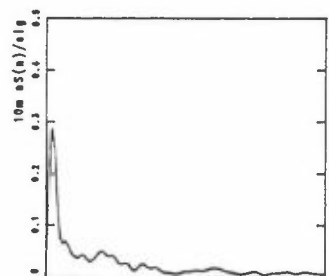
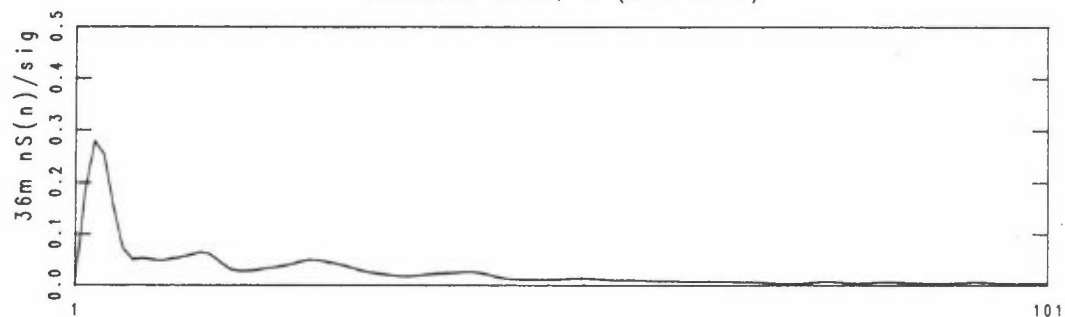
18.05.90 0540, W (Vertikal)



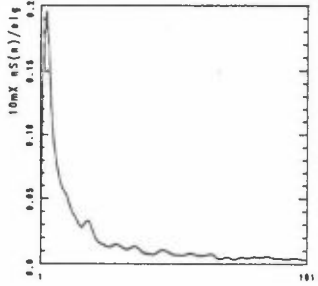
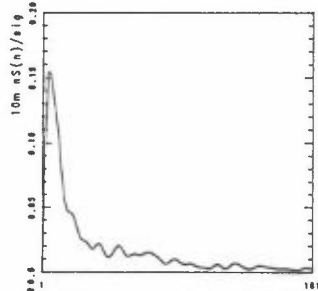
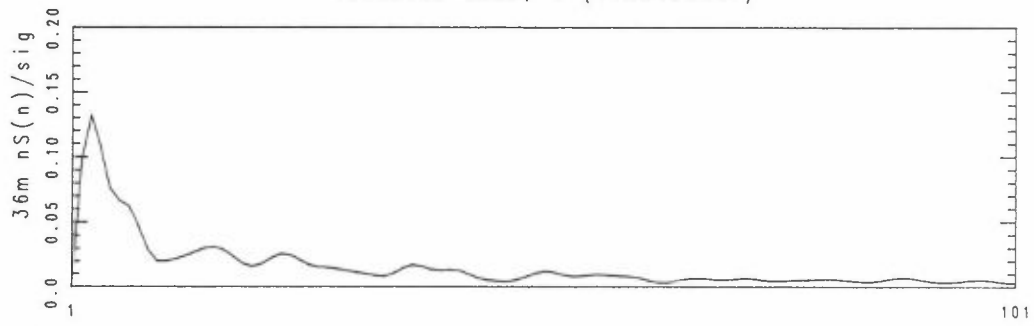
18.05.90 0540, V (Nord-sør)



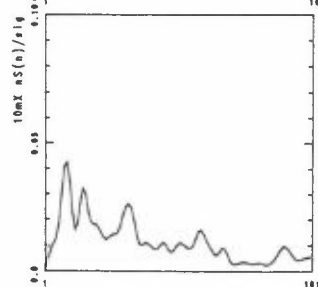
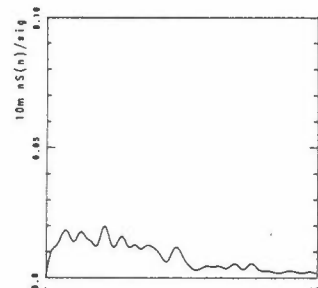
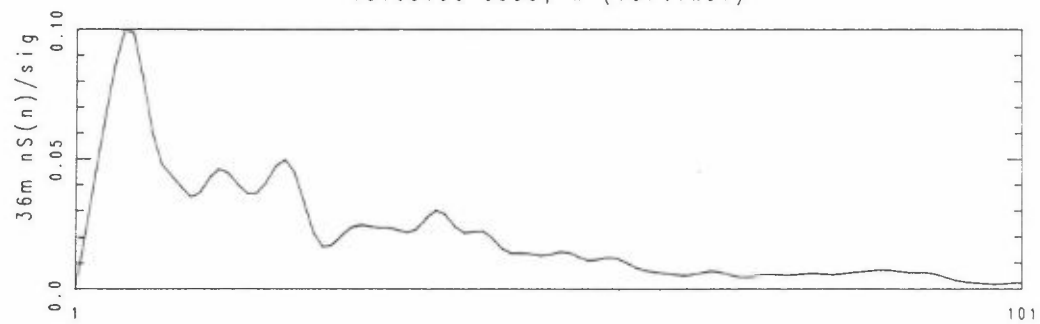
18.05.90 0540, U (Øst-vest)



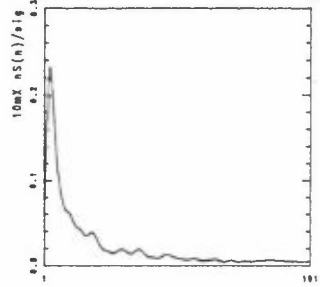
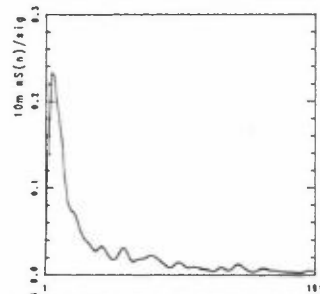
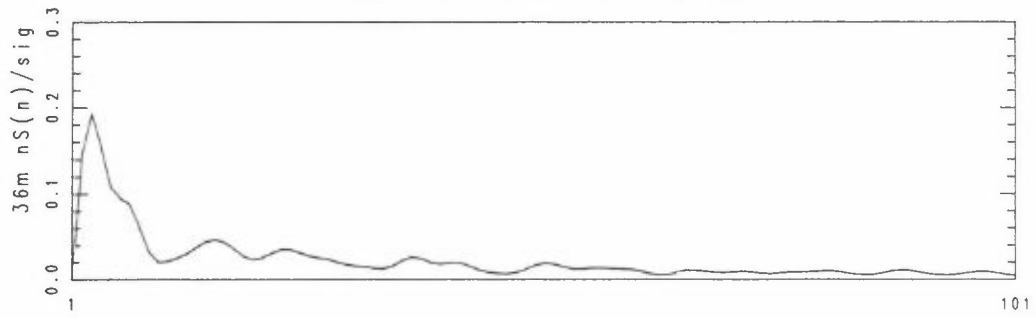
18.05.90 0550, H (Vindvektor)



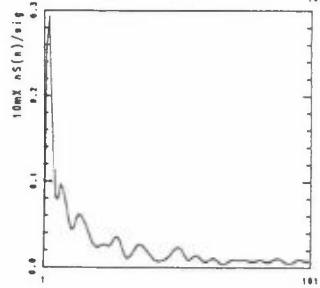
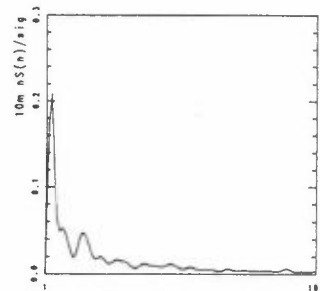
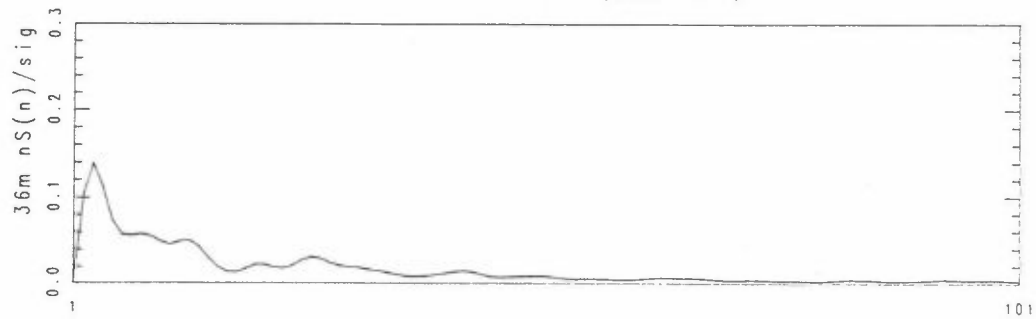
18.05.90 0550, W (Vertikal)



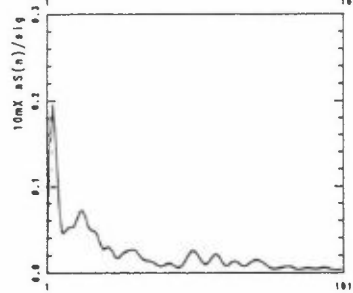
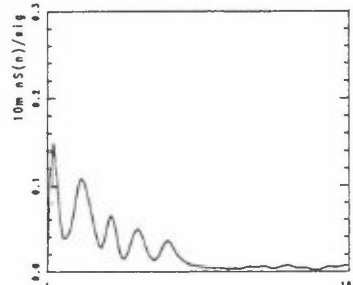
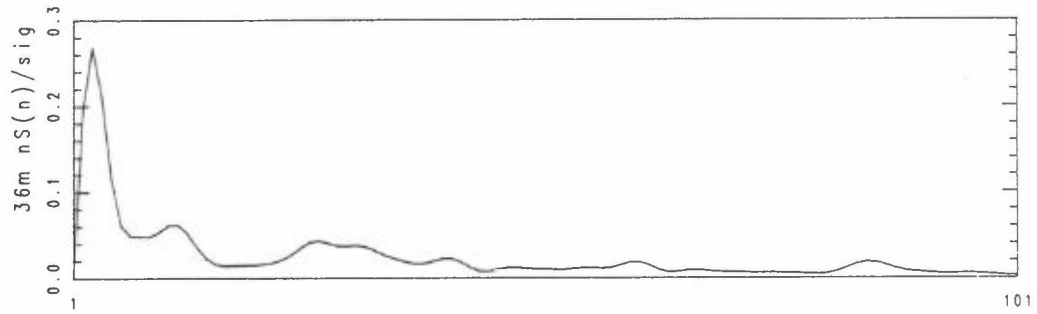
18.05.90 0550, V (Nord-sør)



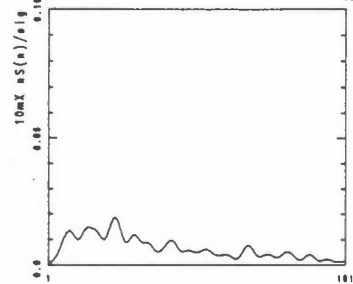
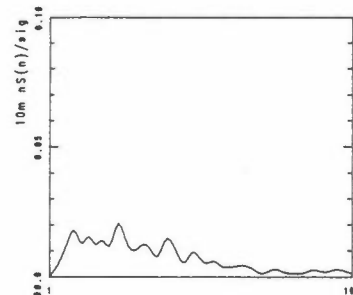
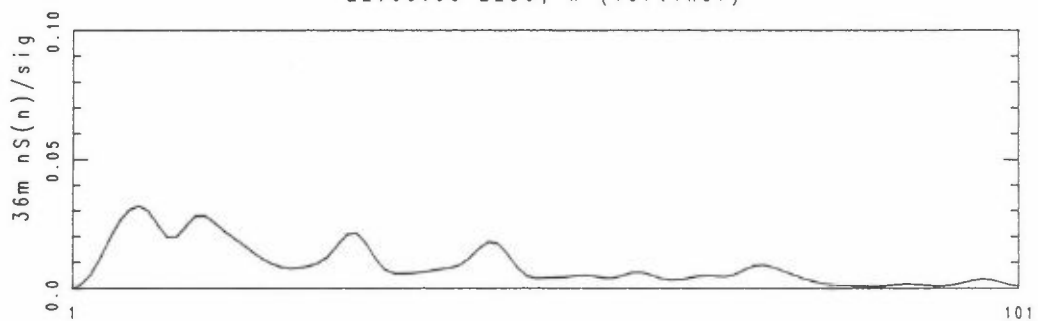
18.05.90 0550, U (Øst-vest)



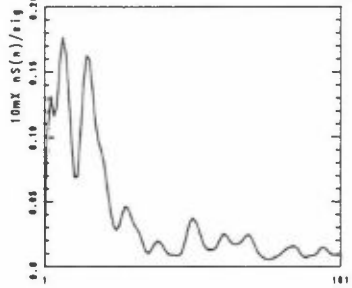
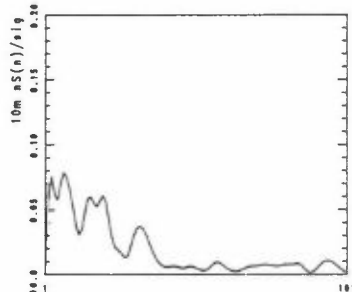
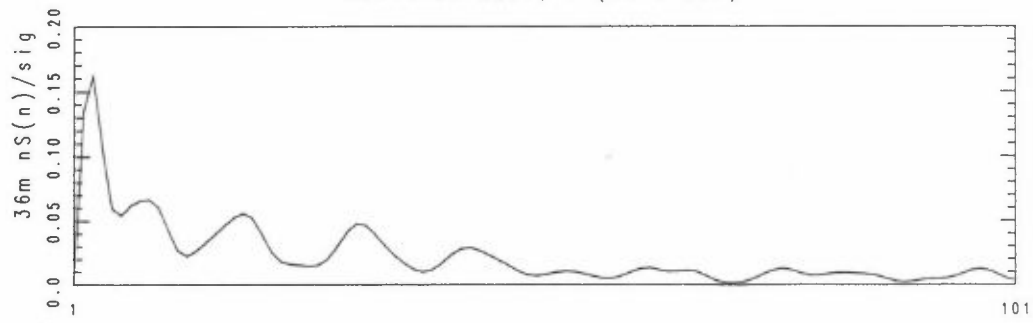
22.06.90 2250, H (Vindvektor)



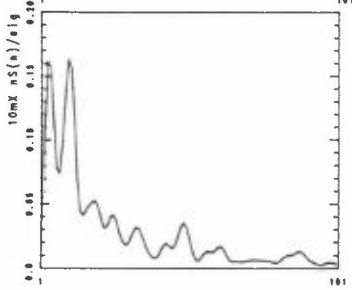
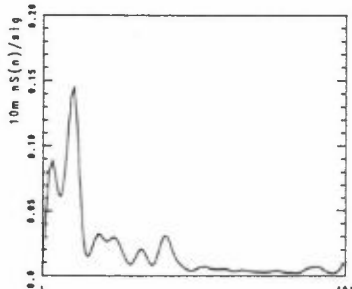
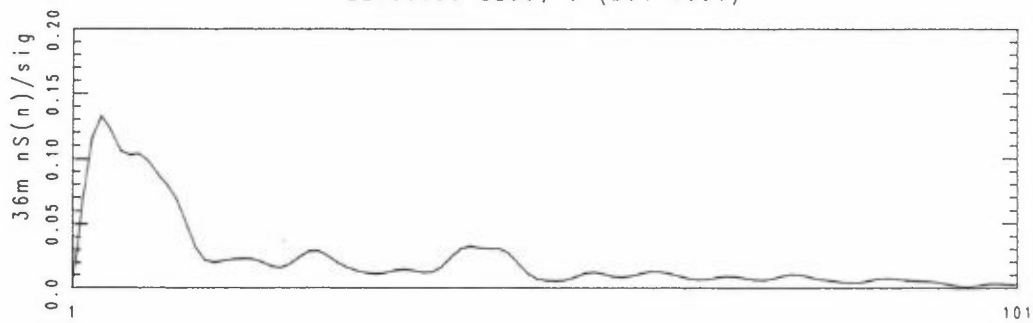
22.06.90 2250, W (Vertikal)



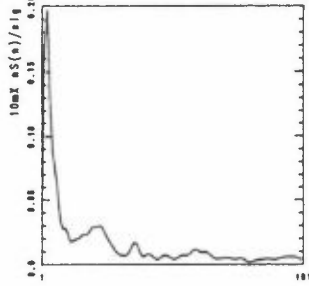
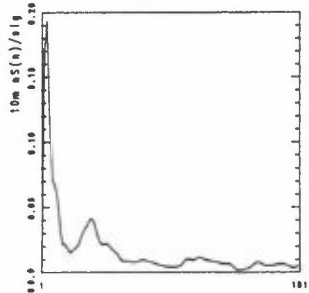
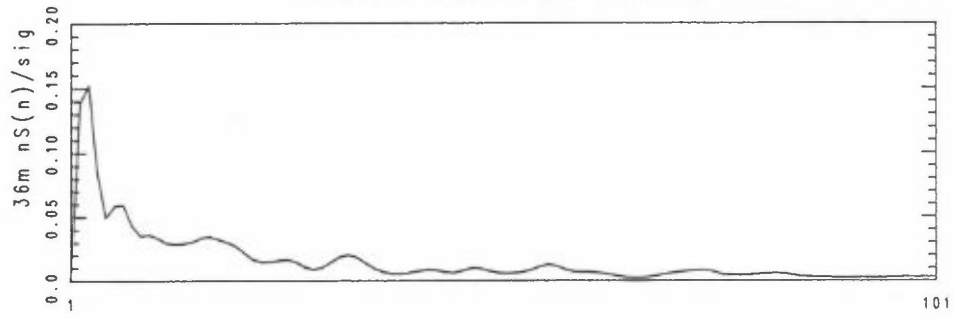
22.06.90 2250, V (Nord-sør)



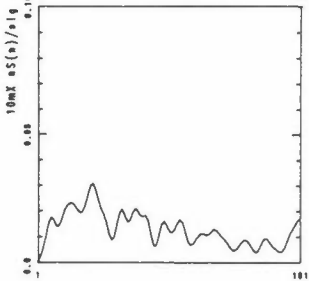
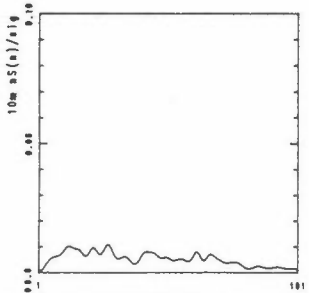
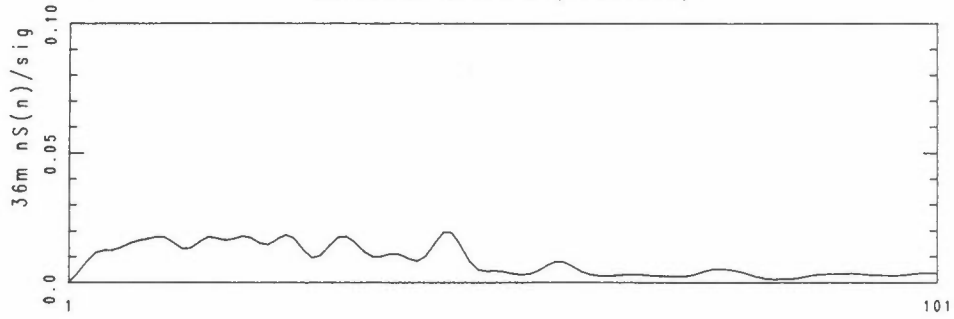
22.06.90 2250, U (Øst-vest)



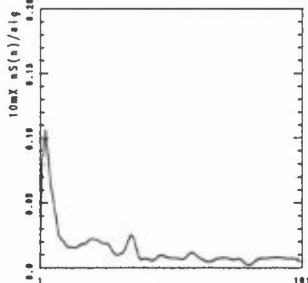
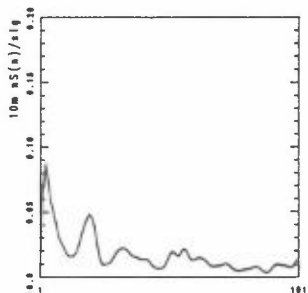
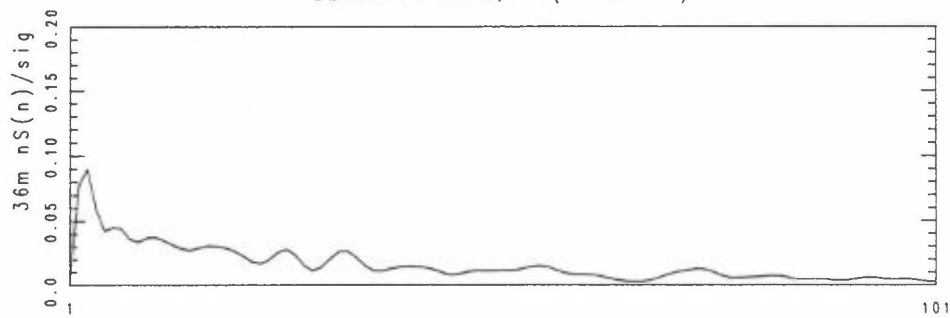
22.06.90 2300, H (Vindvektor)



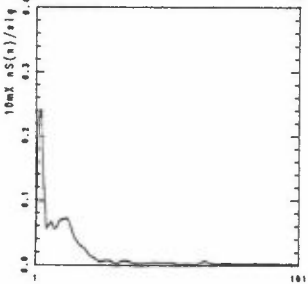
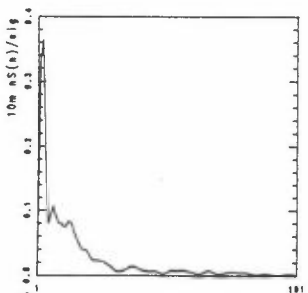
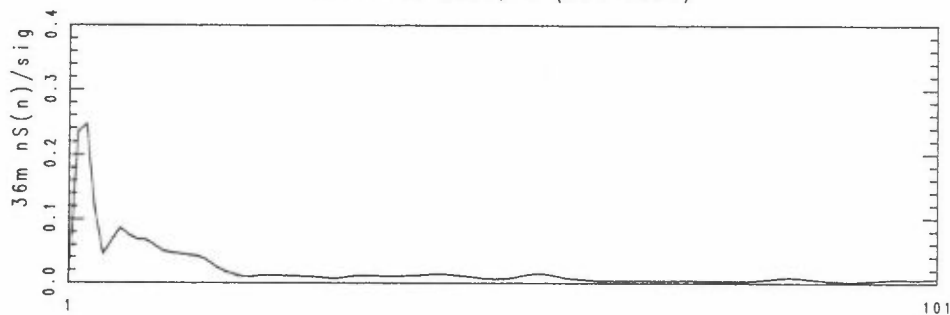
22.06.90 2300, W (Vertikal)



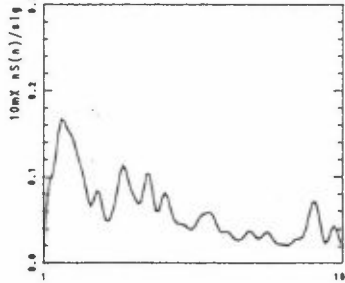
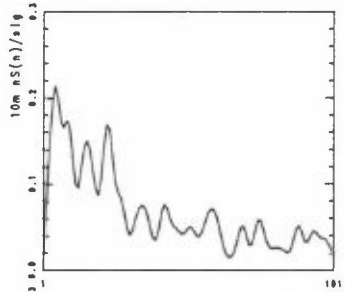
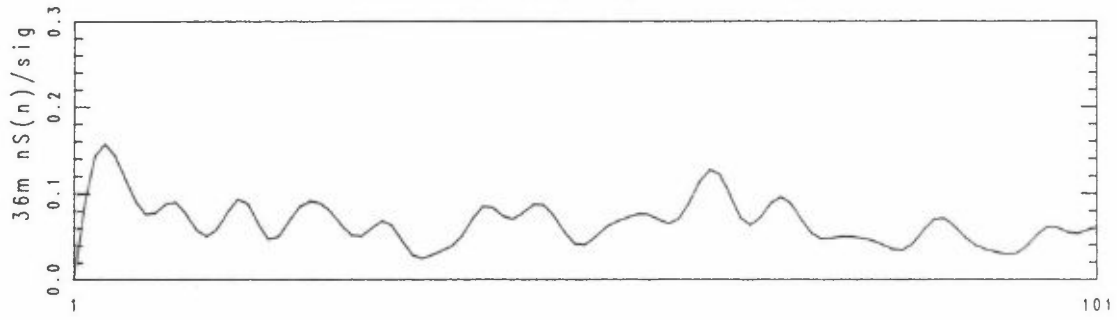
22.06.90 2300, V (Nord-sør)



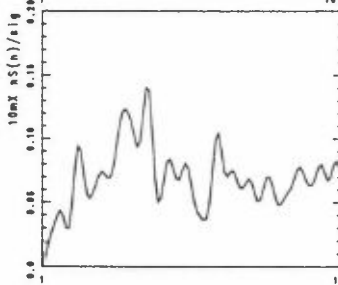
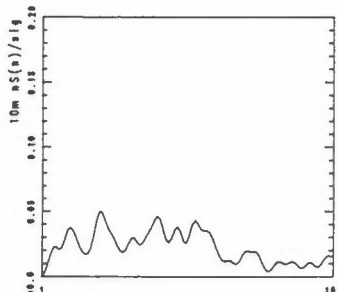
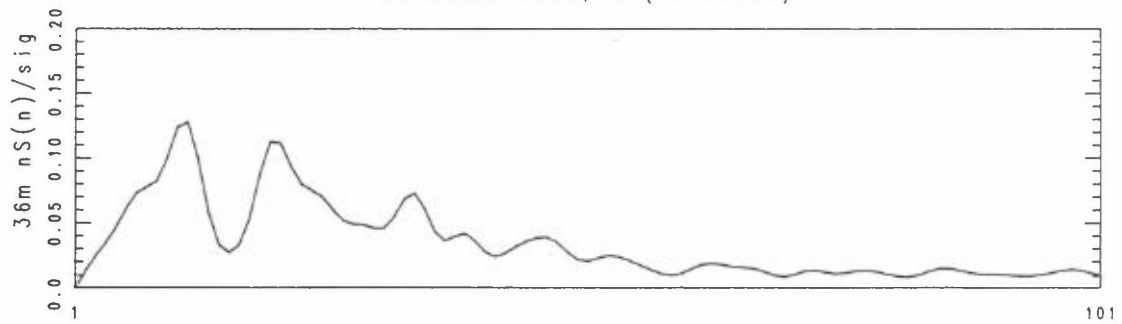
22.06.90 2300, U (Øst-vest)



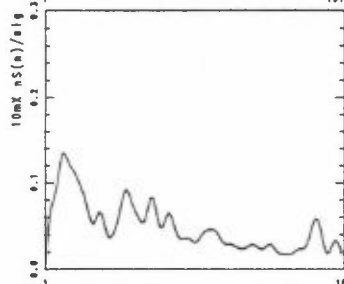
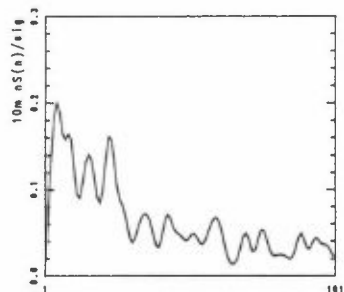
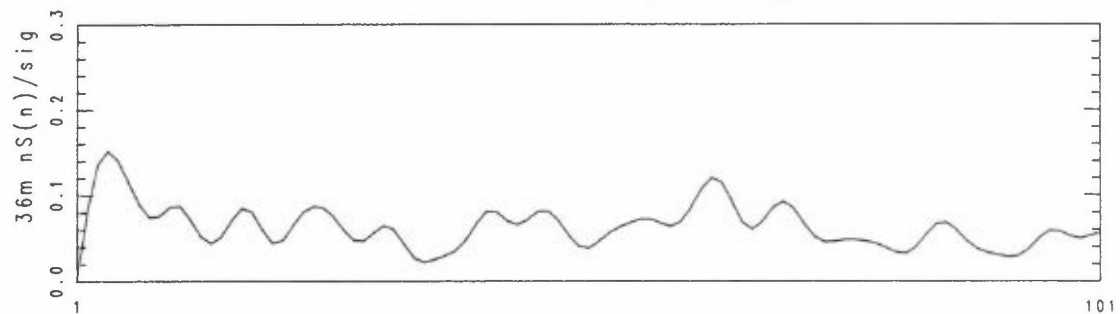
25.06.90 1440, H (Vindvektor)



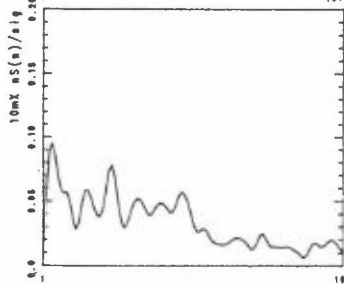
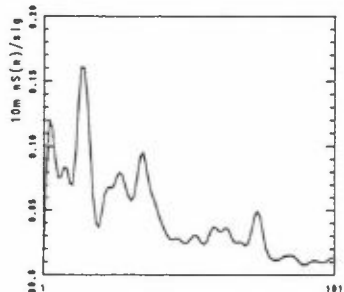
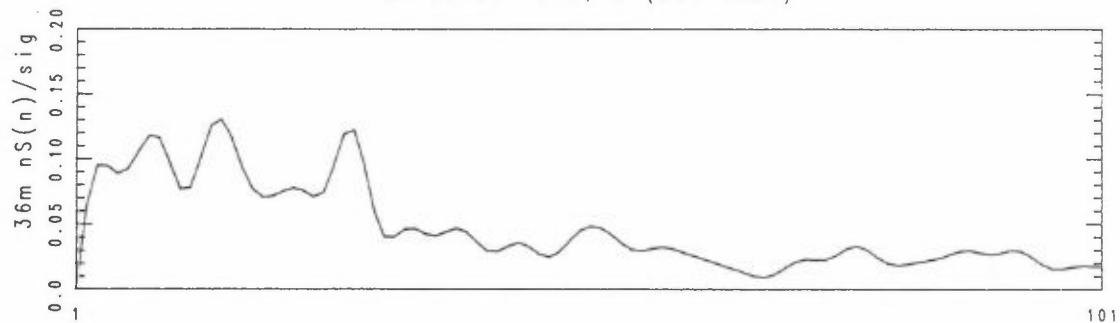
25.06.90 1440, W (Vertikal)



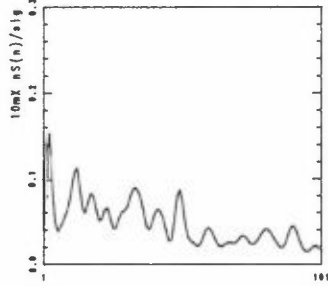
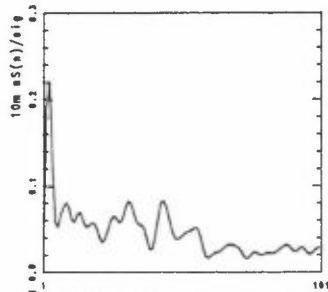
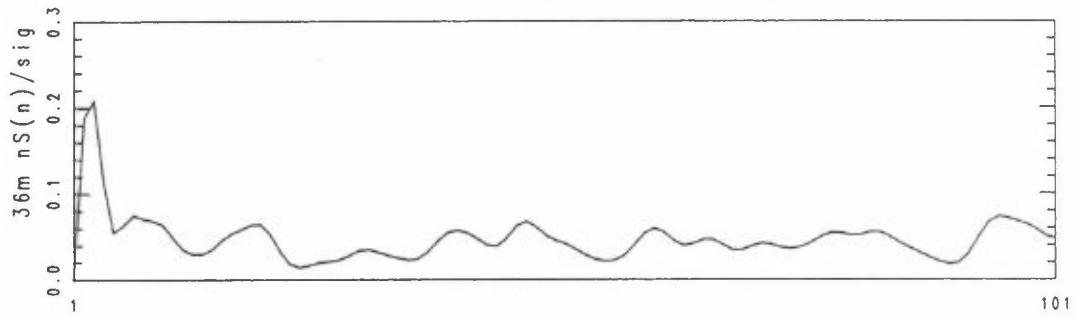
25.06.90 1440, V (Nord-sør)



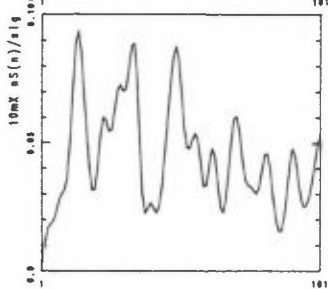
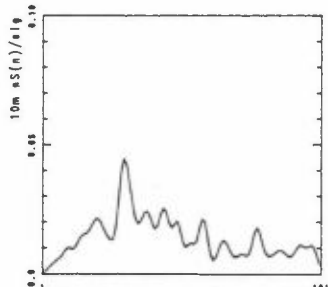
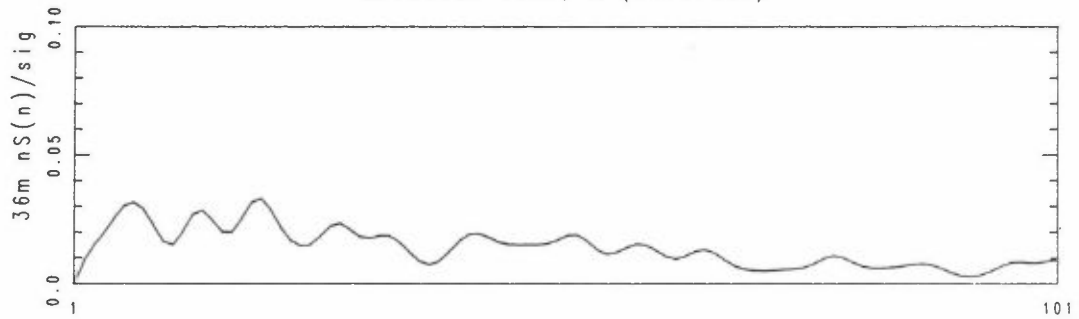
25.06.90 1440, U (Øst-vest)



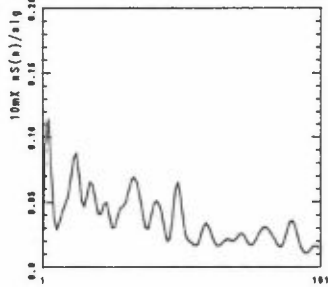
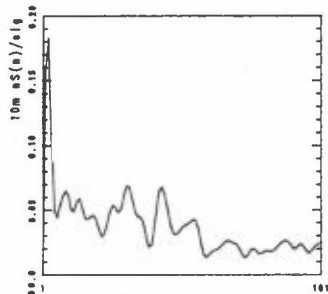
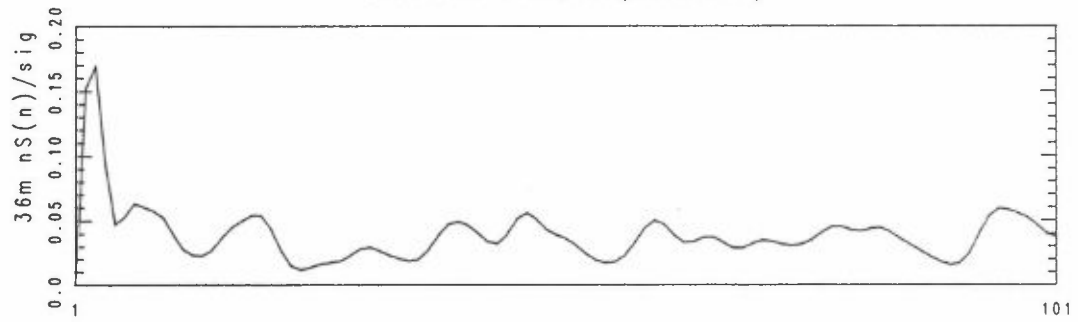
25.06.90 1450, H (Vindvektor)



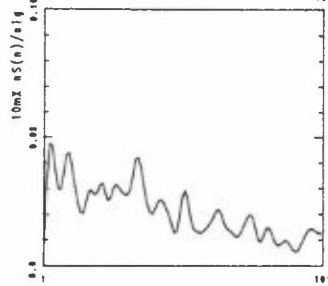
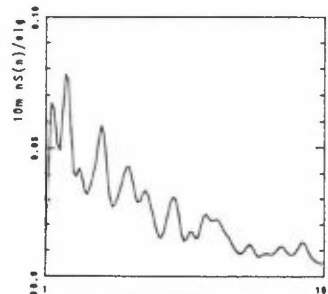
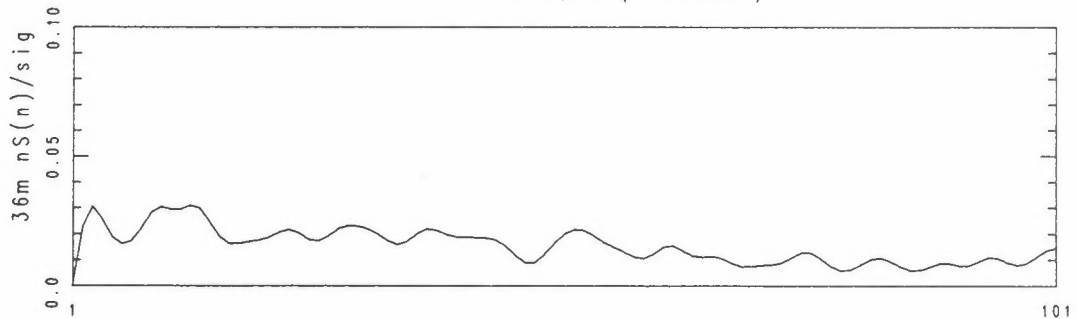
25.06.90 1450, W (Vertikal)



25.06.90 1450, V (Nord-sør)



25.06.90 1450, U (Øst-vest)



VEDLEGG D

Tabeller over korrelasjonskoeffisienter

36U: Østlig vindkomponent i 36 m nivå
36V: Nordlig vindkomponent i 36 m nivå
36W: Vertikalhastighet i 36 m nivå
36H: Horisontal vindvektor i 36 m nivå
10U: Østlig vindkomponent i 10 m nivå i 36 m mast
10V: Nordlig vindkomponent i 10 m nivå i 36 m mast
10W: Vertikalhastighet i 10 m nivå i 36 m mast
10H: Horisontal vindvektor i 10 m nivå i 36 m mast
X10U: Østlig vindkomponent i 10 m nivå, tilleggs mast
X10V: Nordlig vindkomponent i 10 m nivå, tilleggs mast
X10W: Vertikalhastighet i 10 m nivå, tilleggs mast
X10H: Horisontal vindvektor i 10 m nivå, tilleggs mast

VEDLEGG E

Plott av koherensfunksjoner

Kryss-amplitude spektret er definert ved

$$A(\omega) = ((Cf(\omega))^2 + (qf(\omega))^2)^{1/2}$$

og kvadrat koherens er definert ved

$$W(\omega) = \frac{(A(\omega))^2}{S_x(\omega) S_y(\omega)}$$

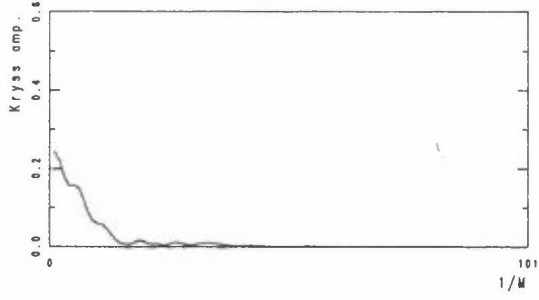
$cf(\omega)$ er reell del av kryss-spekter

$qf(\omega)$ er imaginær del av kryss-spekter

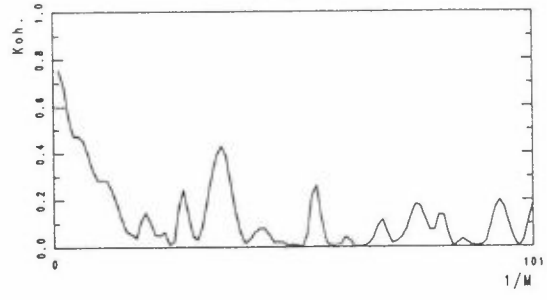
A og W er vist som funksjon av $\frac{n}{U}$ der n er frekvens og

U er midlere vindhastighet

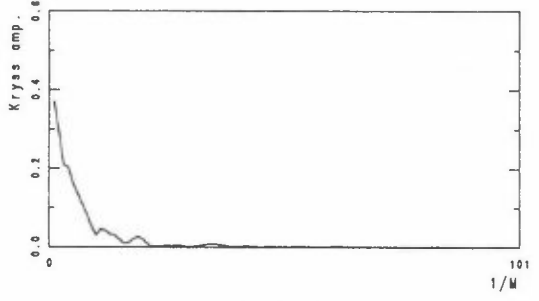
6. april 1990 kl. 1600
W36-W10



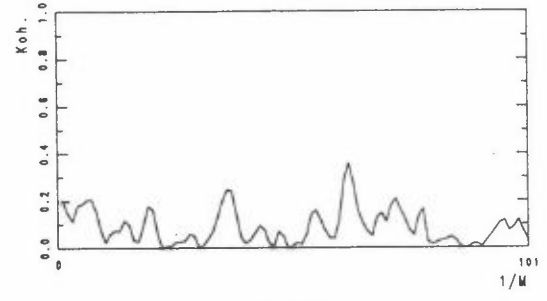
6. april 1990 kl. 1600
W36-W10



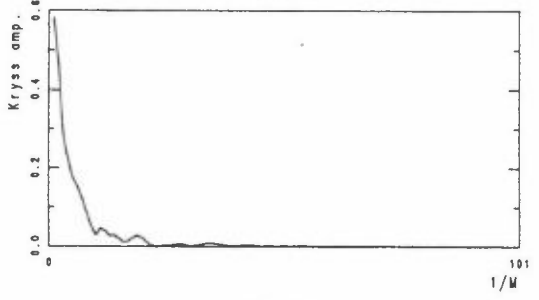
H36-W36



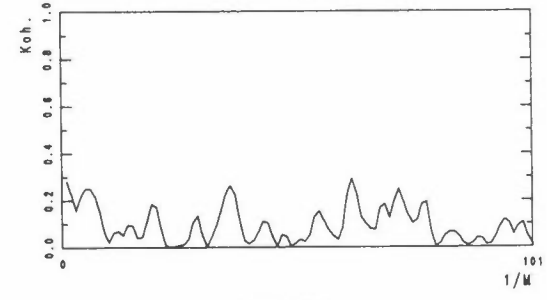
H36-W36



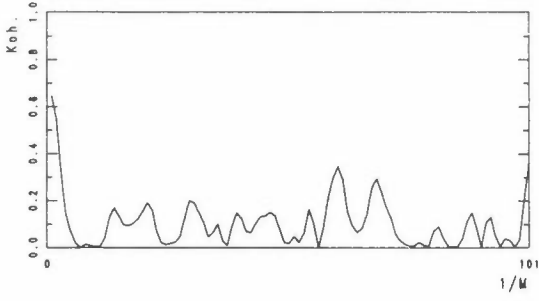
V36-W36



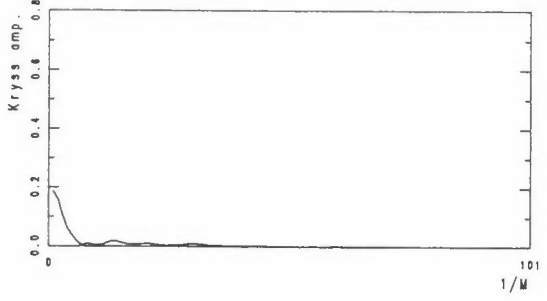
V36-W36



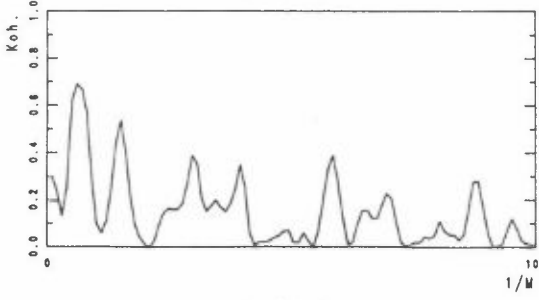
W10-W10x



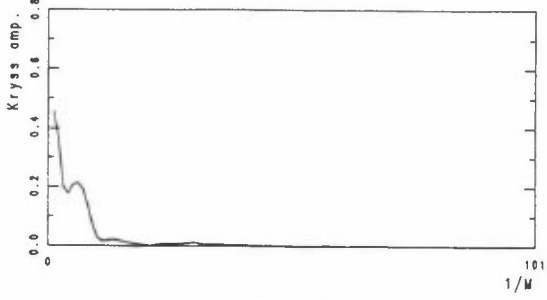
W10-W10x



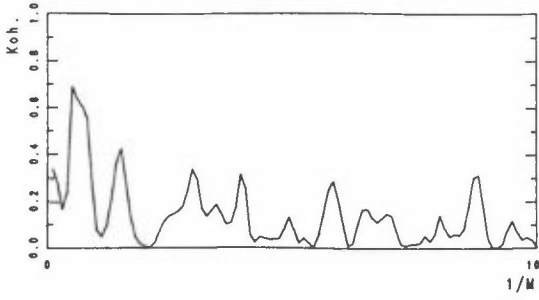
H10-W10



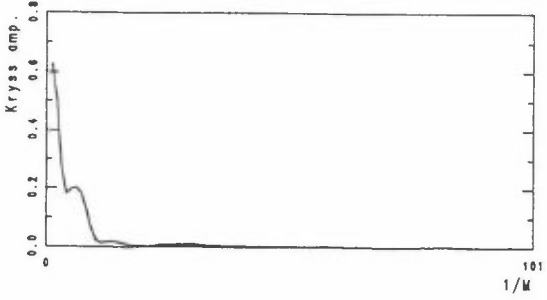
H10-W10



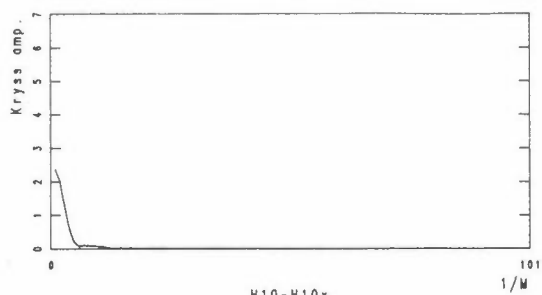
V10-W10



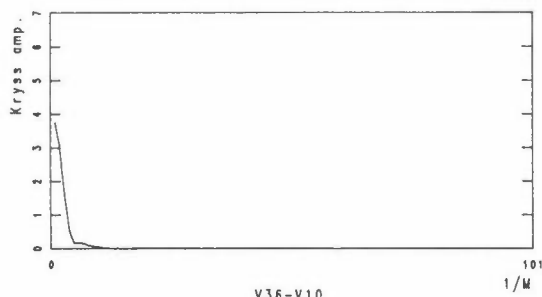
V10-W10



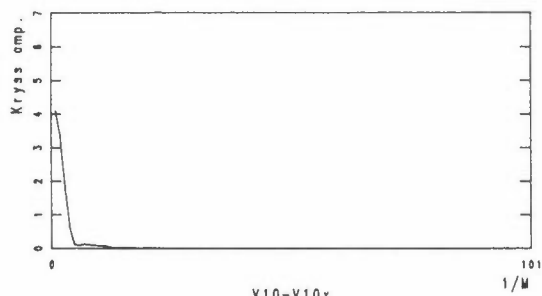
6. april 1990 kl. 1600
H36-H10



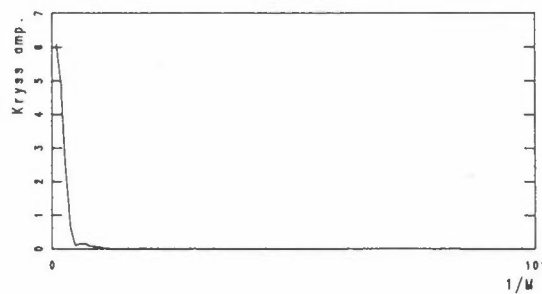
H10-H10x



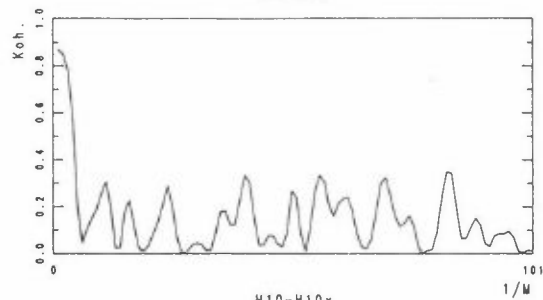
V36-V10



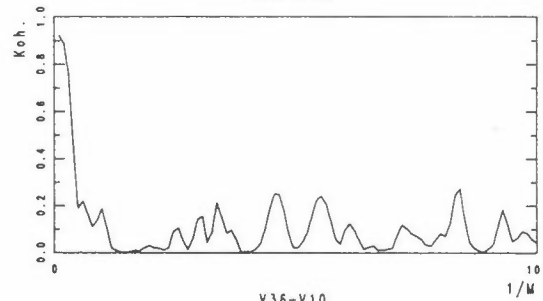
V10-V10x



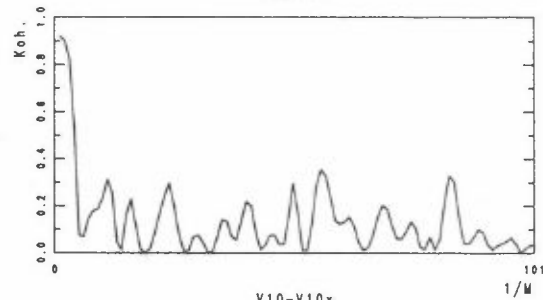
6. april 1990 kl. 1600
H36-H10



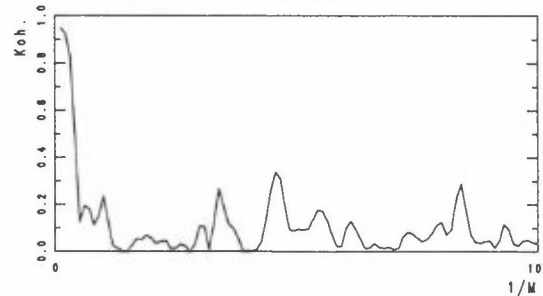
H10-H10x



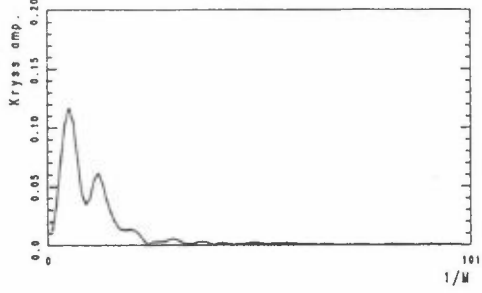
V36-V10



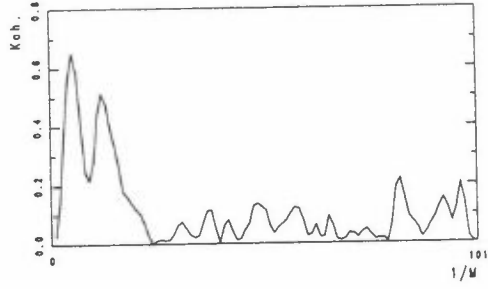
V10-V10x



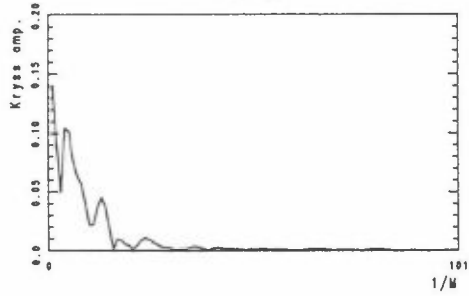
6. april 1990 kl. 1610
W36-W10



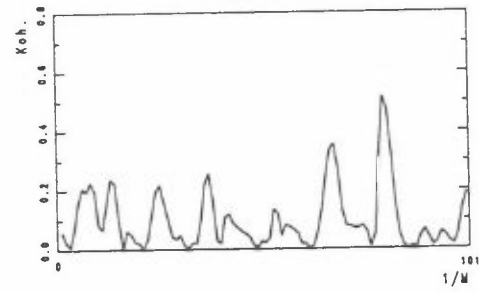
6. april 1990 kl. 1610
W36-W10



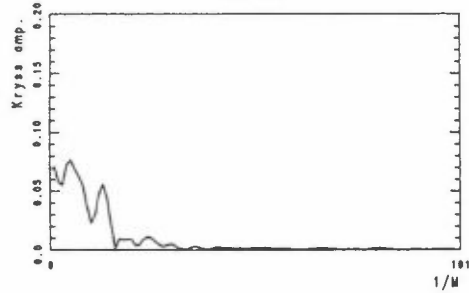
H36-W36



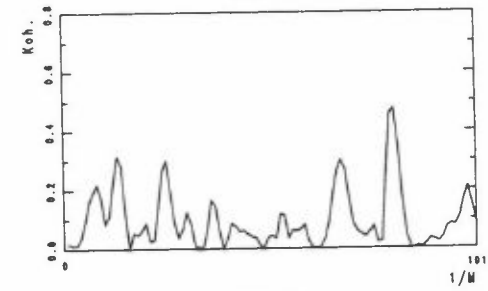
H36-W36



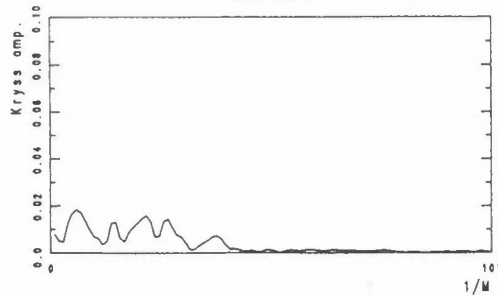
V36-W36



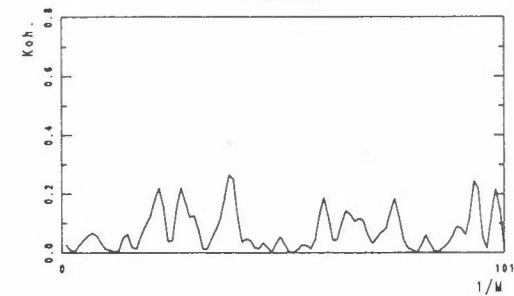
V36-W36



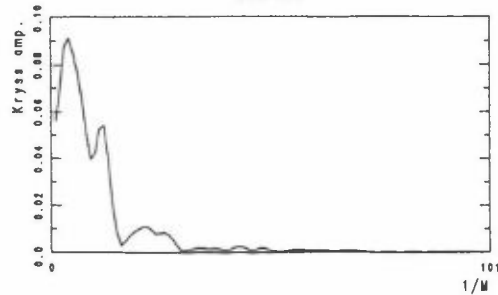
W10-W10x



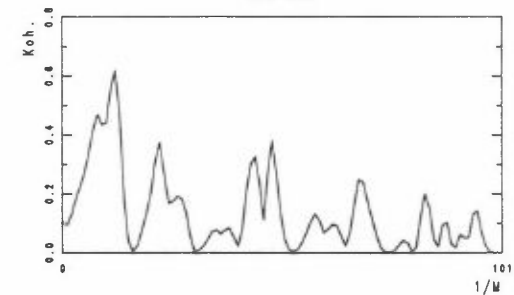
W10-W10x



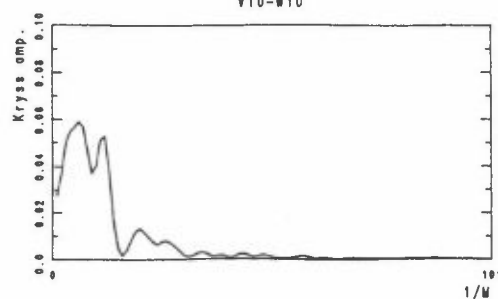
H10-W10



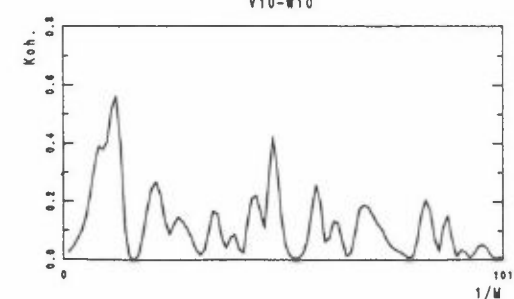
H10-W10



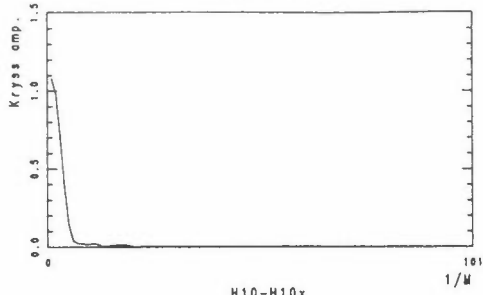
V10-W10



V10-W10

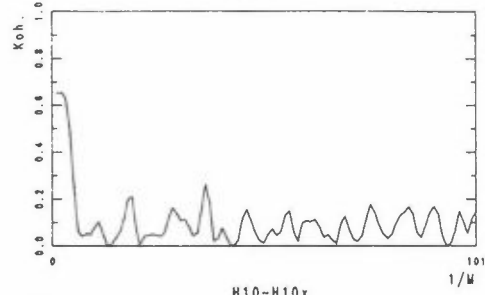


6. april 1990 kl. 1610
H36-H10

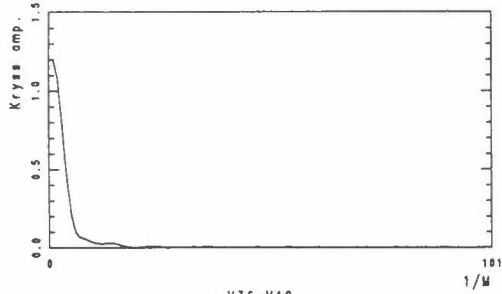


H10-H10x

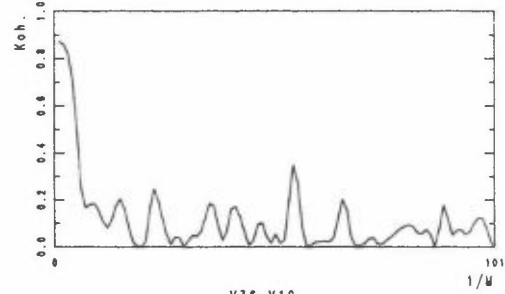
6. april 1990 kl. 1610
H36-H10



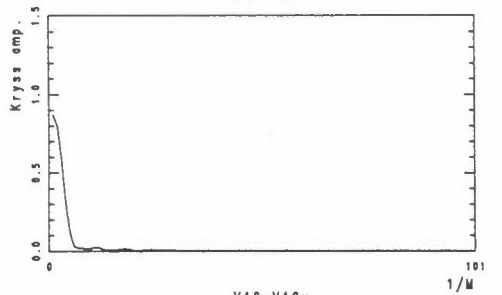
H10-H10x



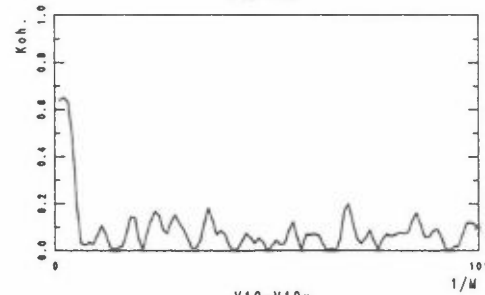
V36-V10



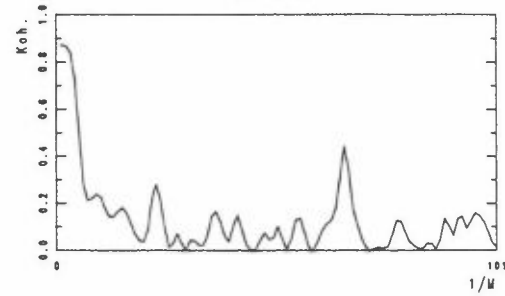
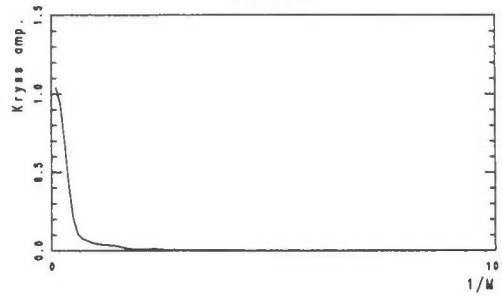
V36-V10



V10-V10x



V10-V10x

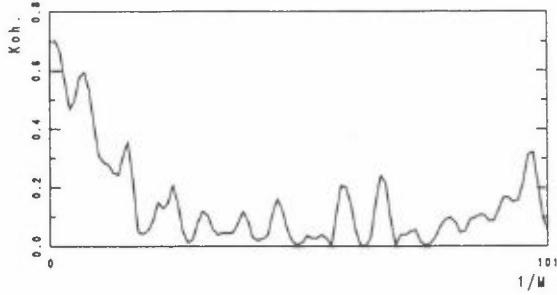
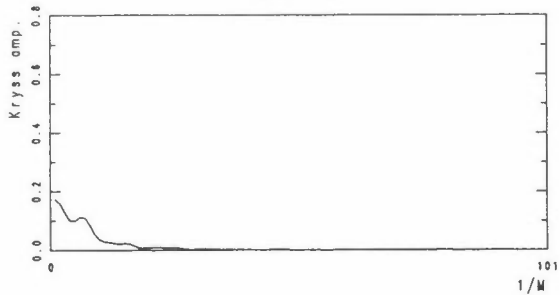


6. april 1990 kl. 1620

6. april 1990 kl. 1620

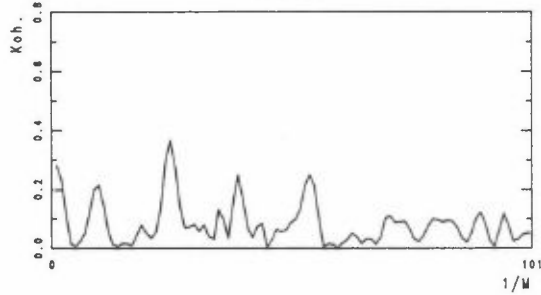
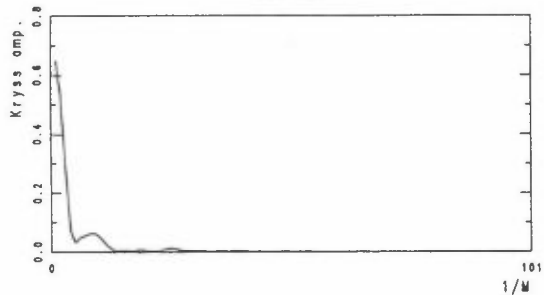
W36-W10

W36-W10



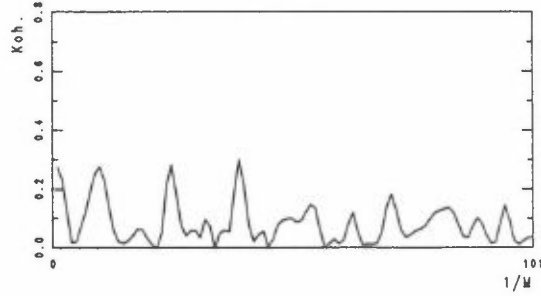
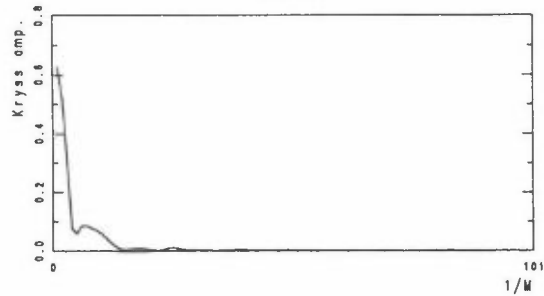
H36-W36

H36-W36



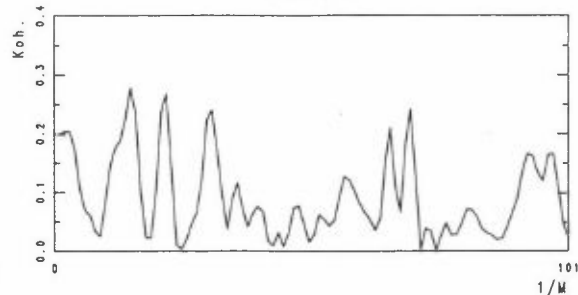
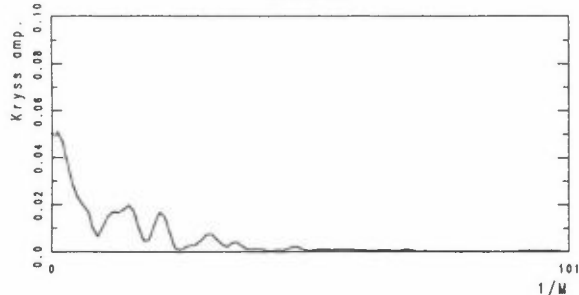
V36-W36

V36-W36



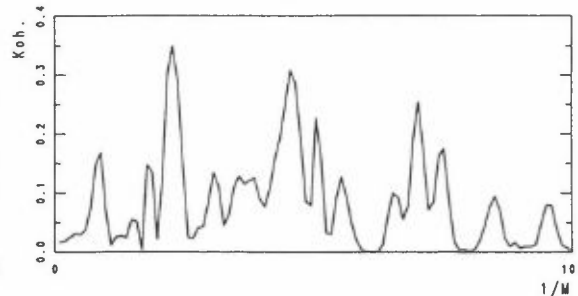
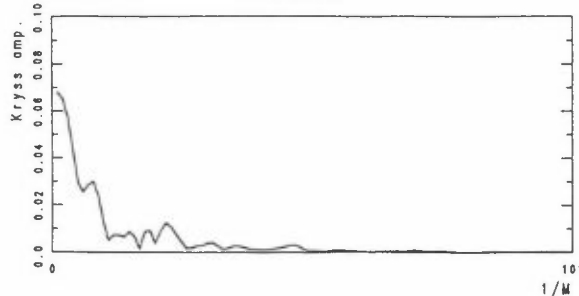
W10-W10x

W10-W10x



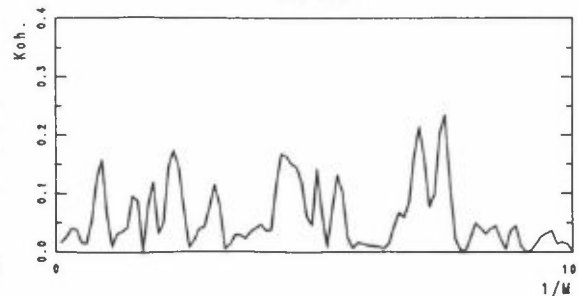
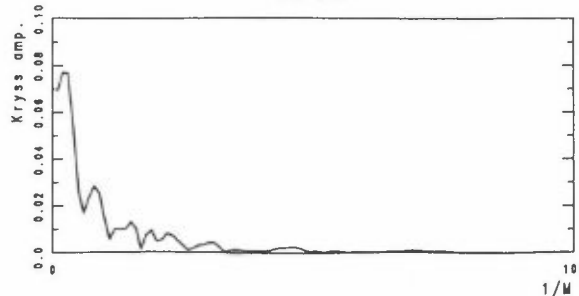
H10-W10

H10-W10

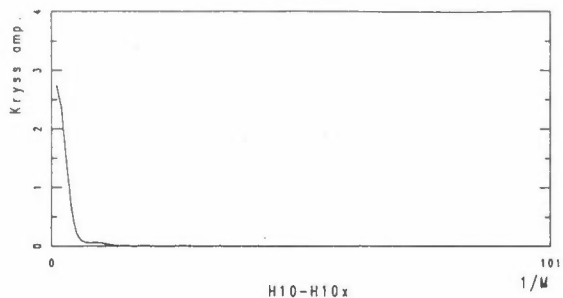


V10-W10

V10-W10

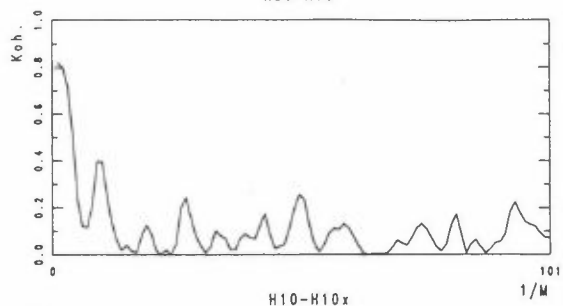


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H36-H10

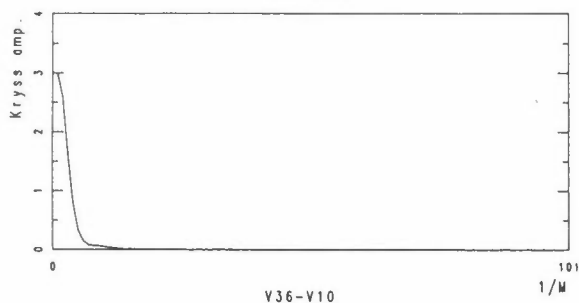


H10-H10x

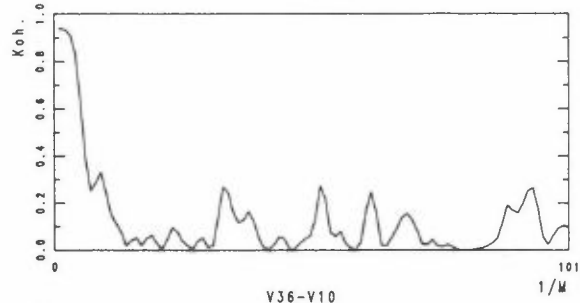
6. april 1990 kl. 1620
H36-H10



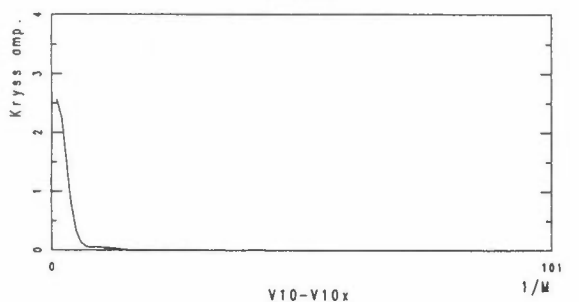
H10-H10x



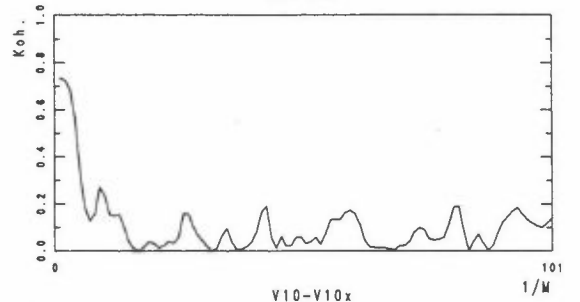
V36-V10



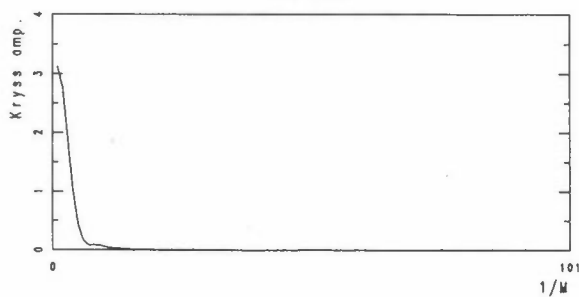
V36-V10



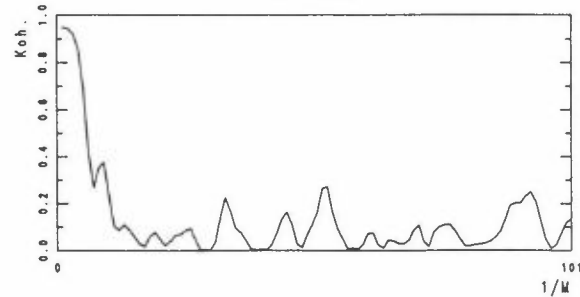
V10-V10x



V10-V10x

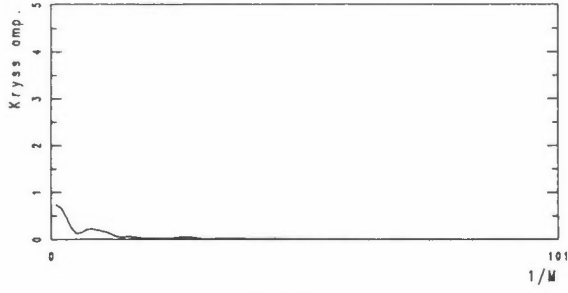


1/M

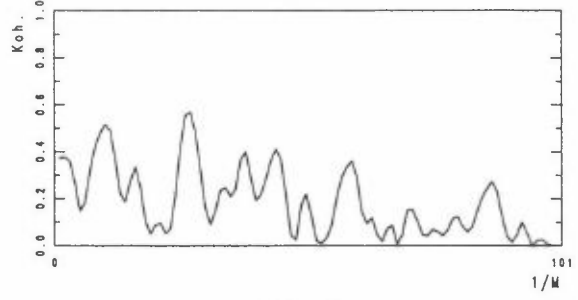


1/M

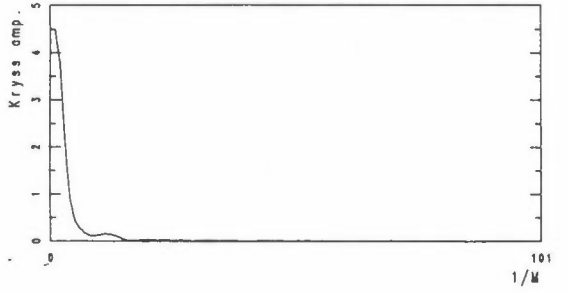
11. mai 1990 kl. 1310
W36-W10



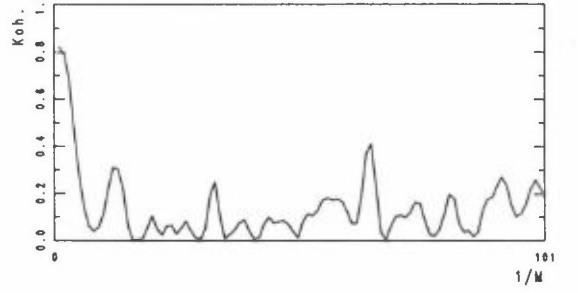
11. mai 1990 kl. 1310
W36-W10



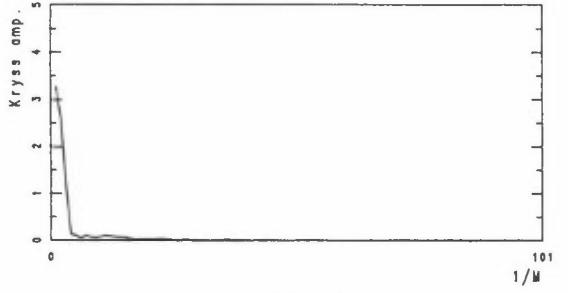
H36-W36



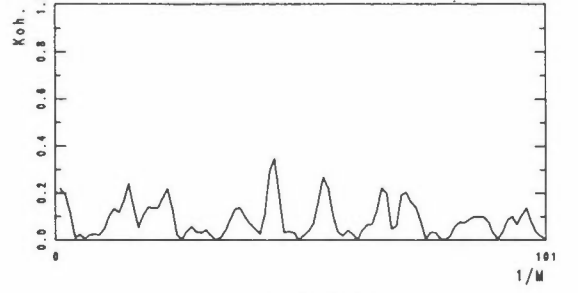
H36-W36



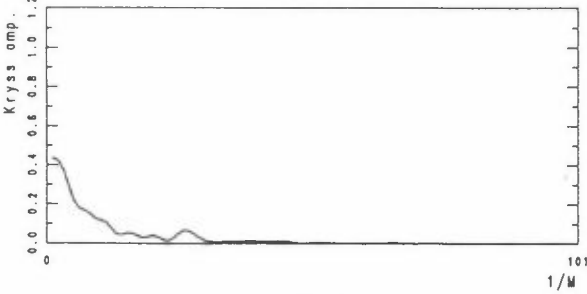
V36-W36



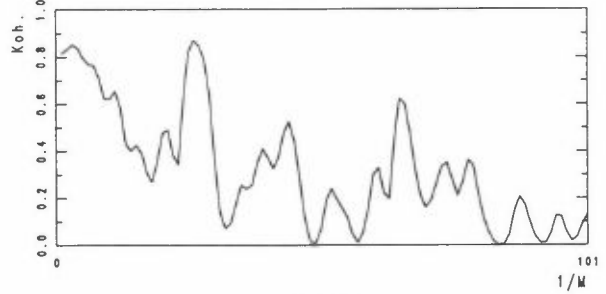
V36-W36



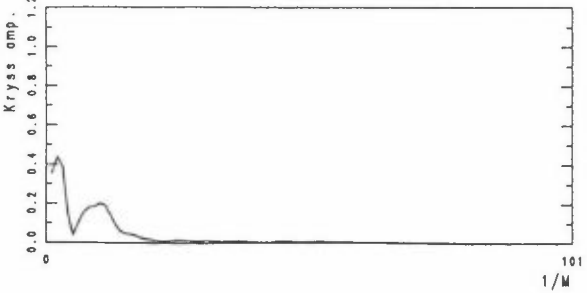
W10-W10x



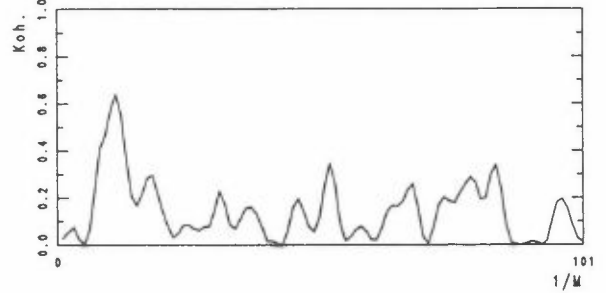
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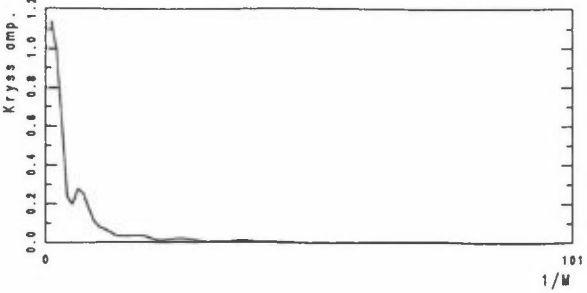
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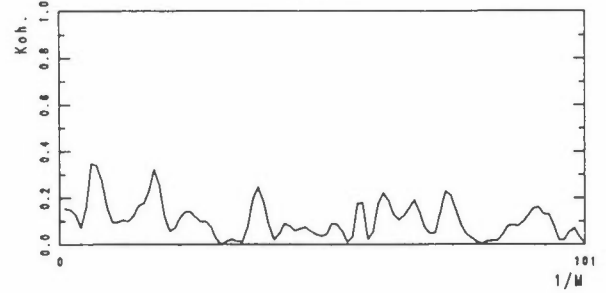
H10-W10



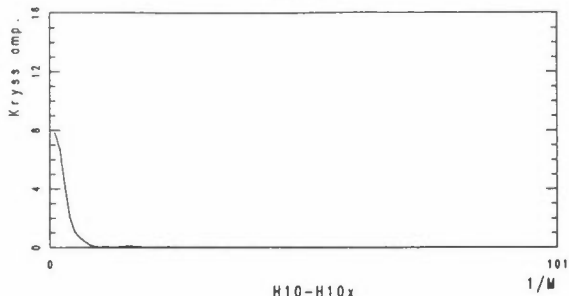
V10-W10



V10-W10

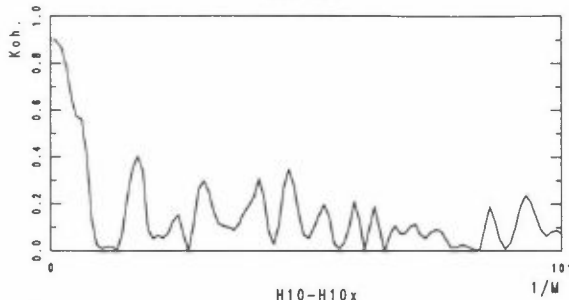


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H36-H10

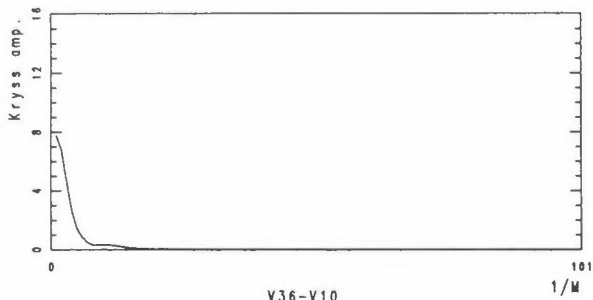


H10-H10x

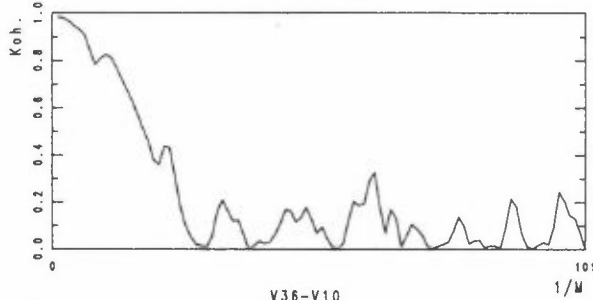
11. mai 1990 kl. 1310
H36-H10



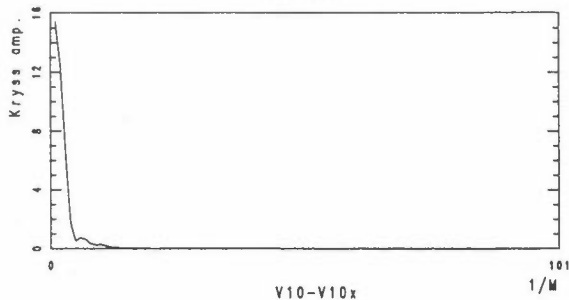
H10-H10x



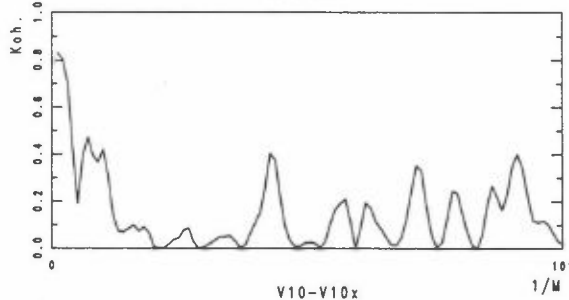
V10-V10x



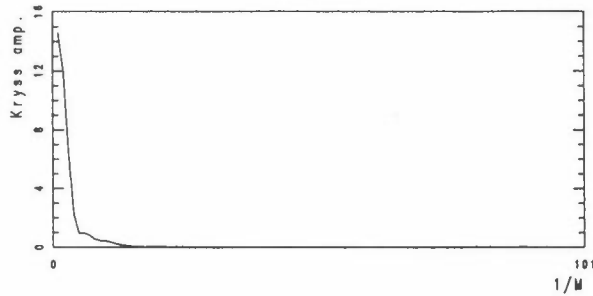
V10-V10x



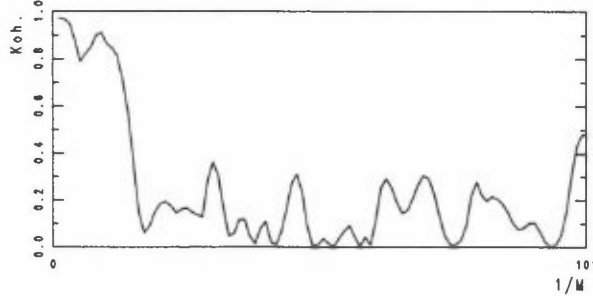
V10-V10x



V10-V10x

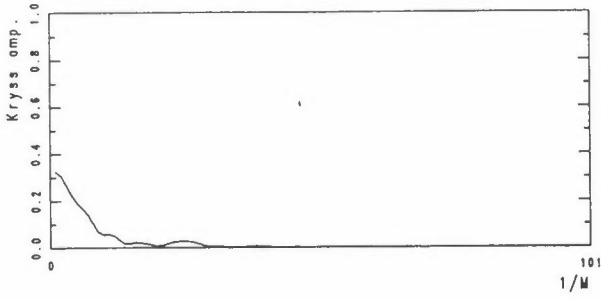


1/M

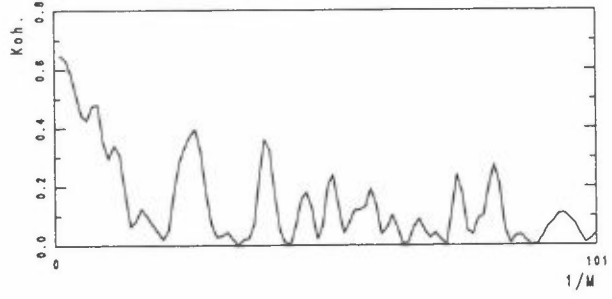


1/M

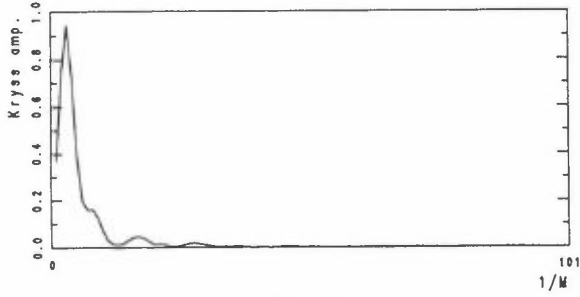
11. mai 1990 kl. 1320
W36-W10



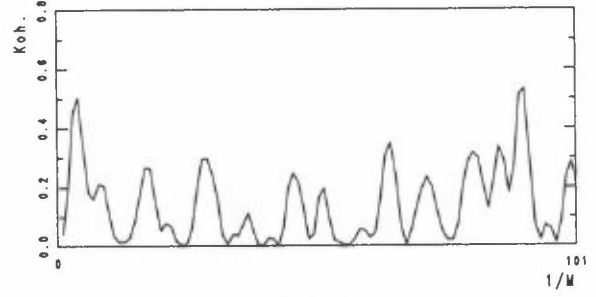
11. mai 1990 kl. 1320
W36-W10



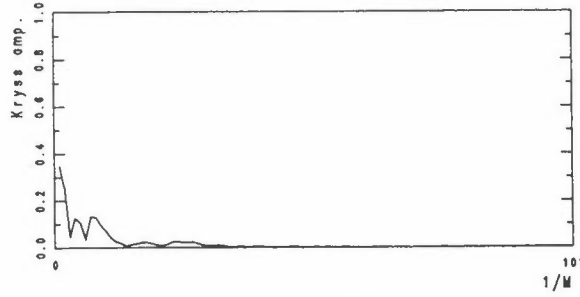
H36-W36



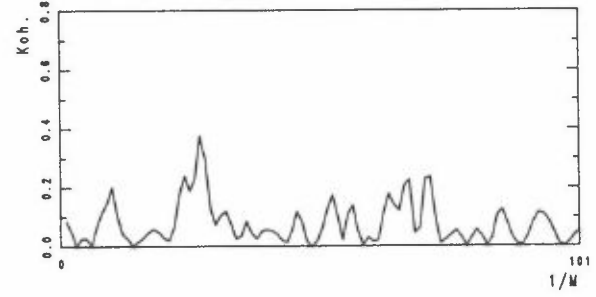
H36-W36



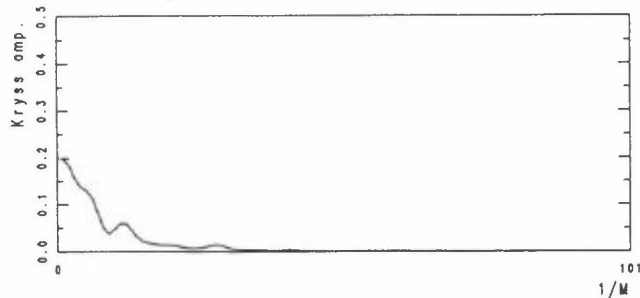
V36-W36



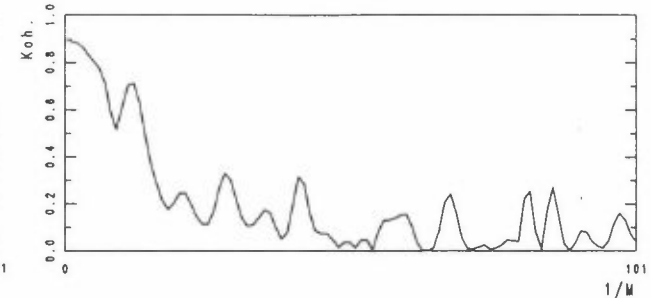
V36-W36



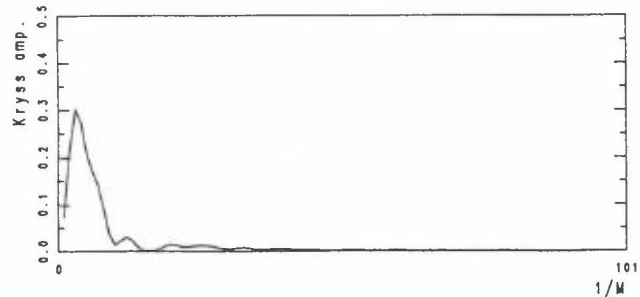
W10-W10x



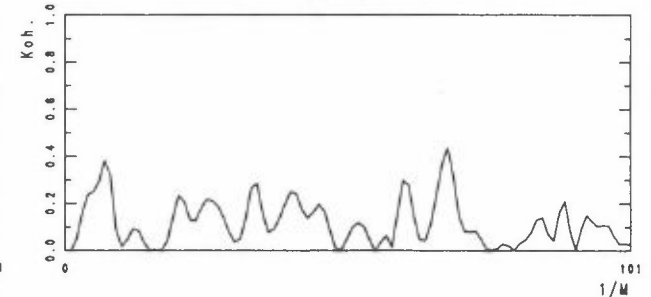
W10-W10x



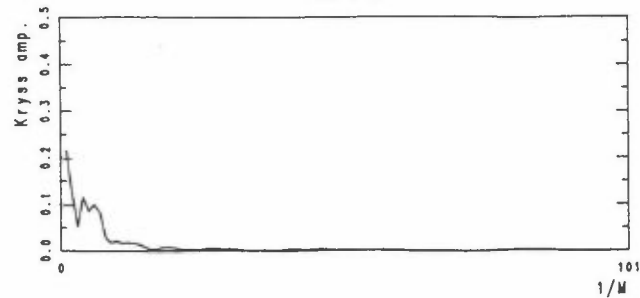
H10-W10



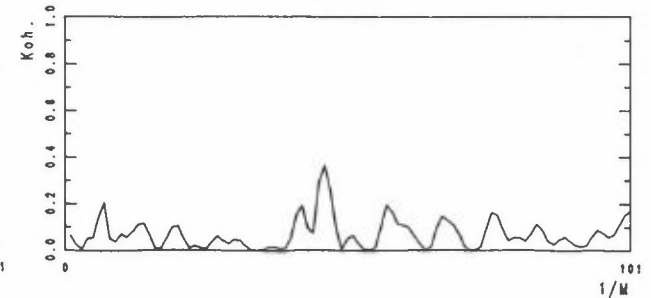
H10-W10



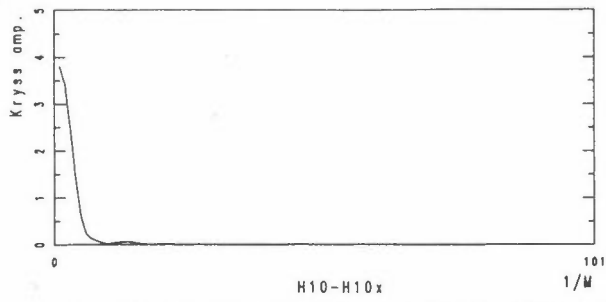
V10-W10



V10-W10

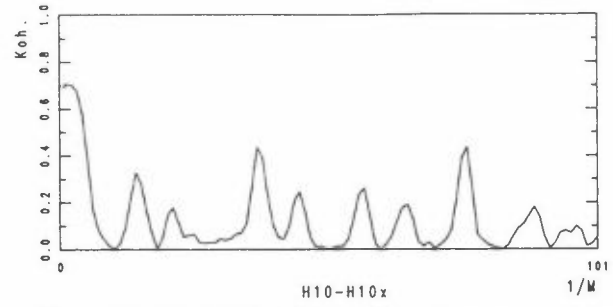


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H36-H10

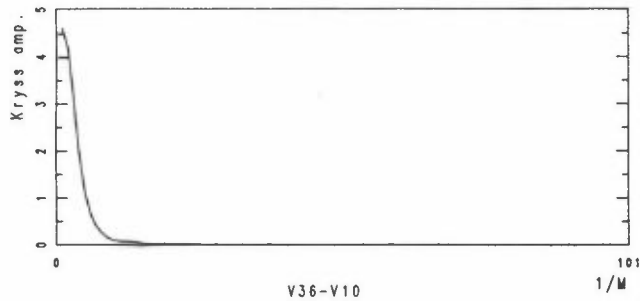


H10-H10x

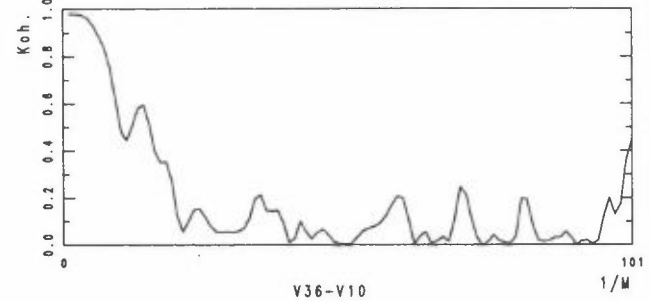
11. mai 1990 kl. 1320
H36-H10



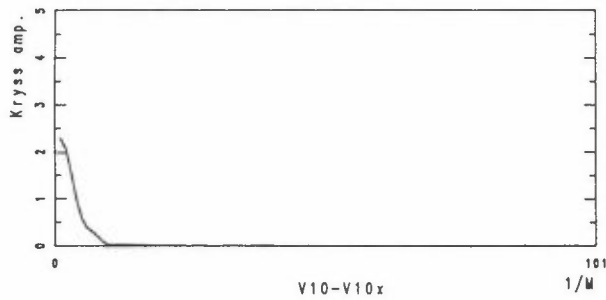
H10-H10x



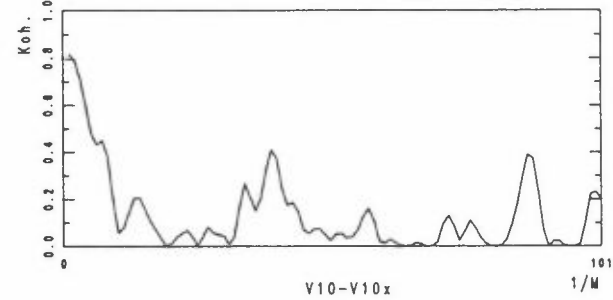
V36-V10



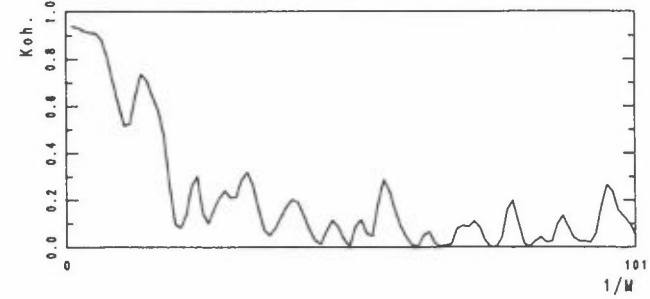
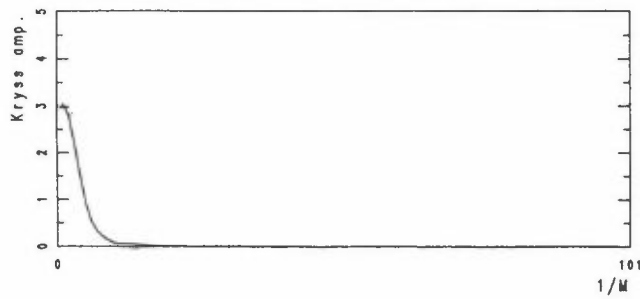
V36-V10



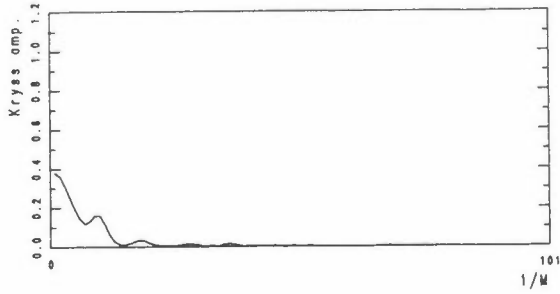
V10-V10x



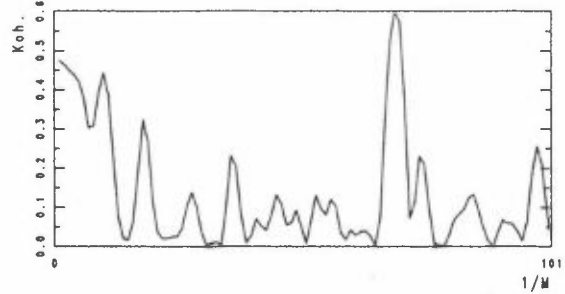
V10-V10x



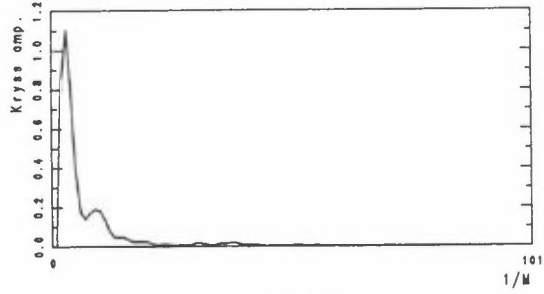
11. mai 1990 kl. 1330
W36-W10



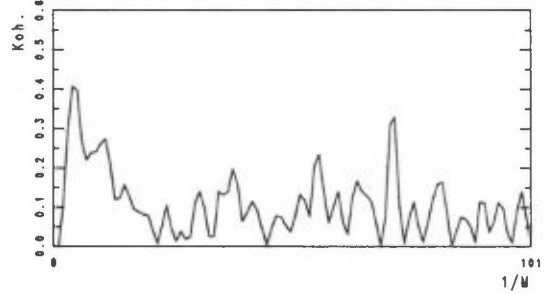
11. mai 1990 kl. 1330
W36-W10



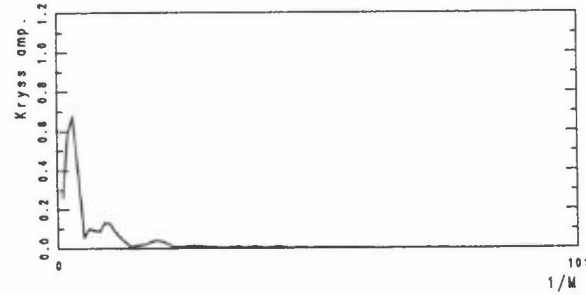
H36-W36



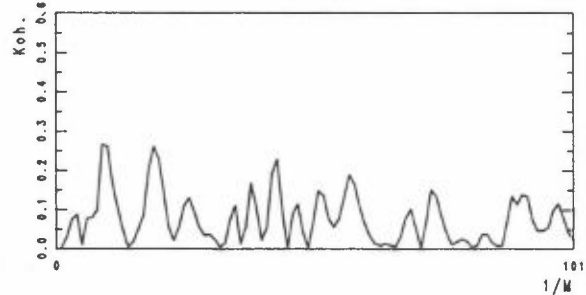
H36-W36



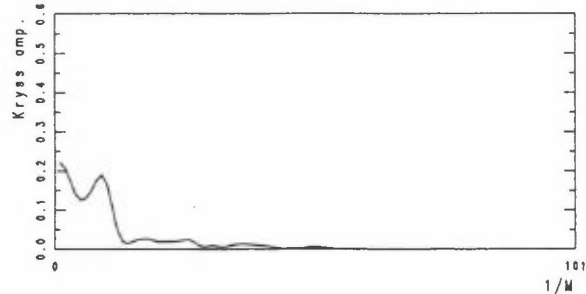
V36-W36



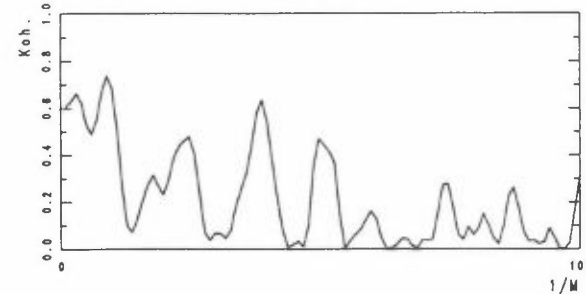
V36-W36



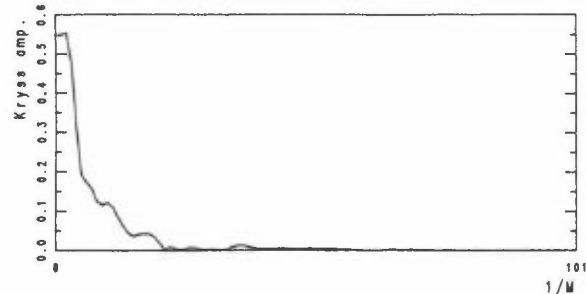
W10-W10x



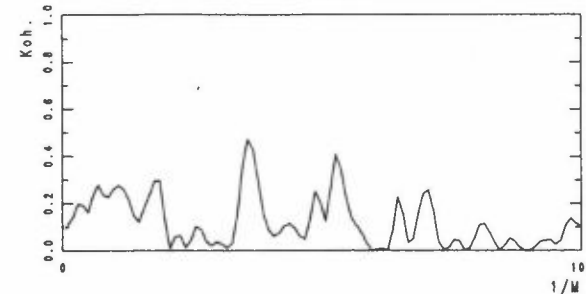
W10-W10x



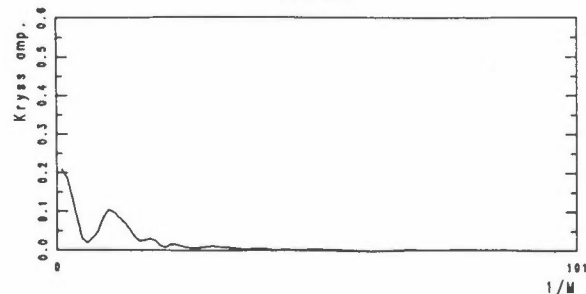
H10-W10



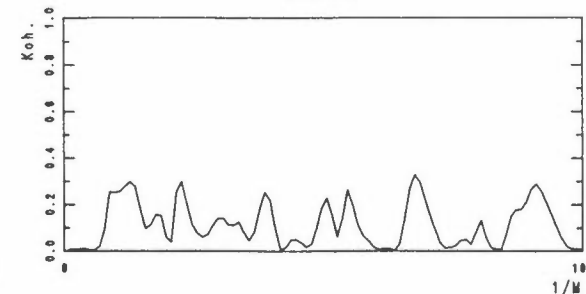
H10-W10



V10-W10

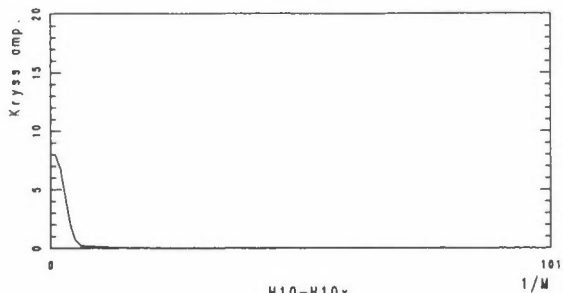


V10-W10



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H36-H10

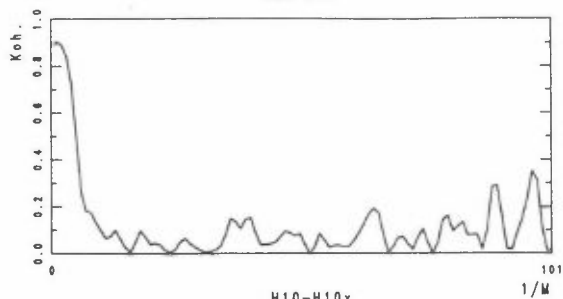


H10-H10x

1/M

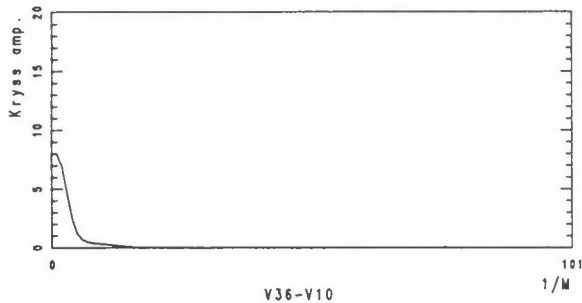
11. mai 1990 kl. 1330

H36-H10



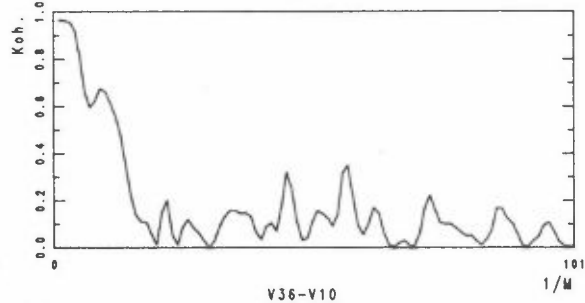
H10-H10x

1/M



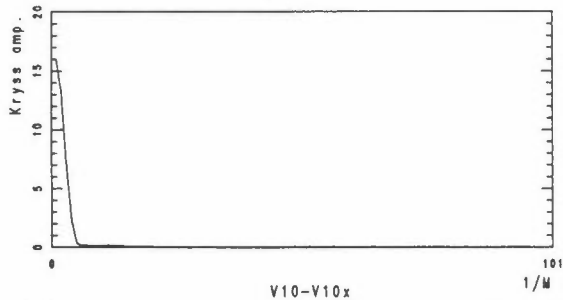
V36-V10

1/M



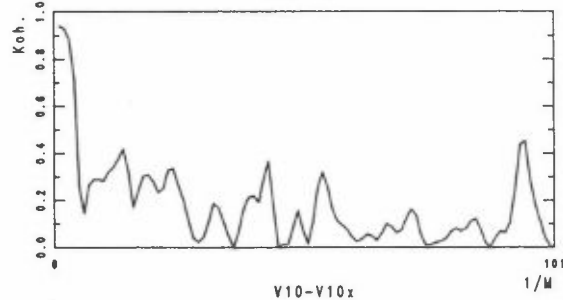
V36-V10

1/M



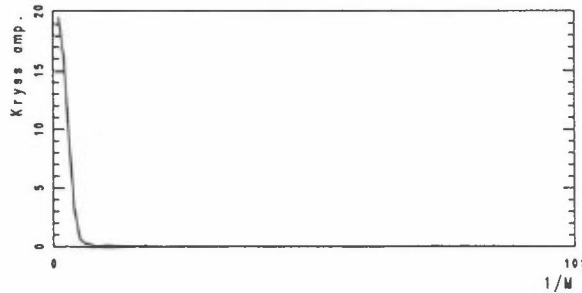
V10-V10x

1/M

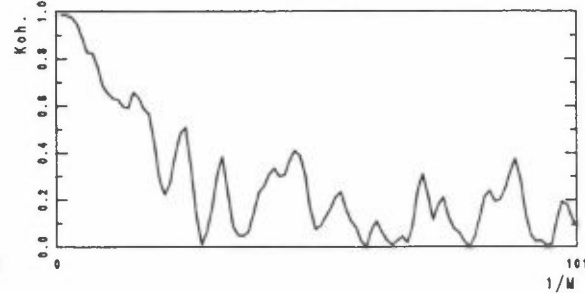


V10-V10x

1/M

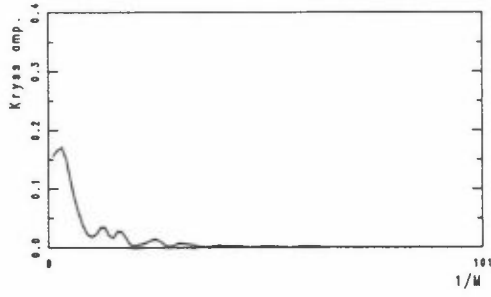


1/M

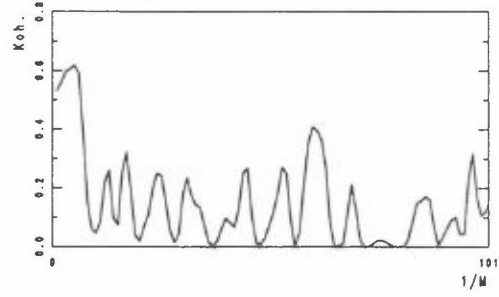


1/M

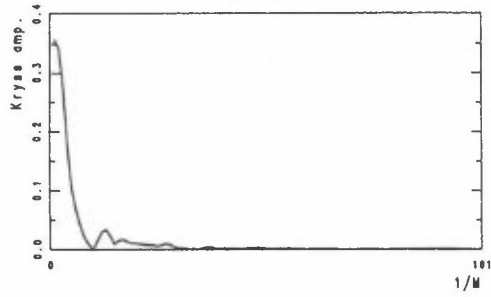
16. mai 1990 kl. 0730
W36-W10



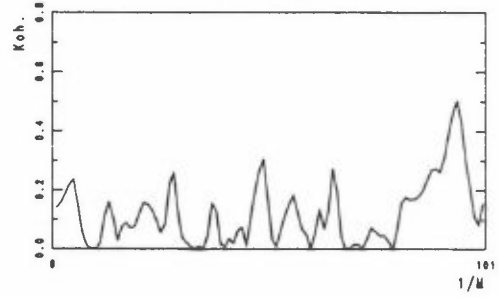
16. mai 1990 kl. 0730
W36-W10



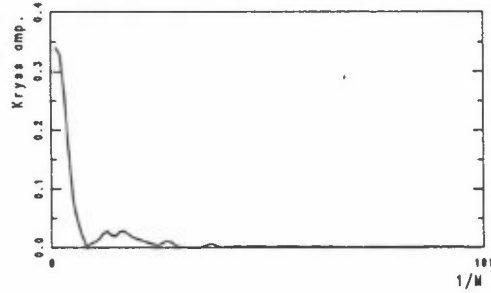
H36-W36



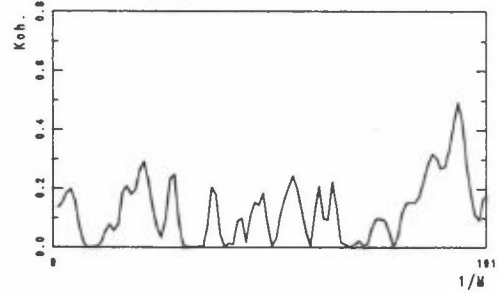
H36-W36



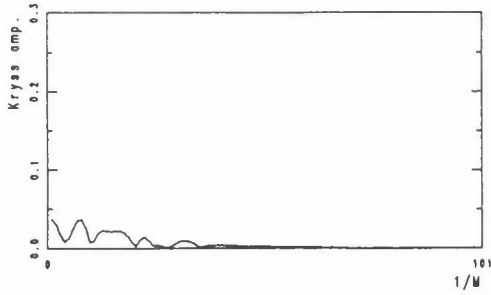
V36-W36



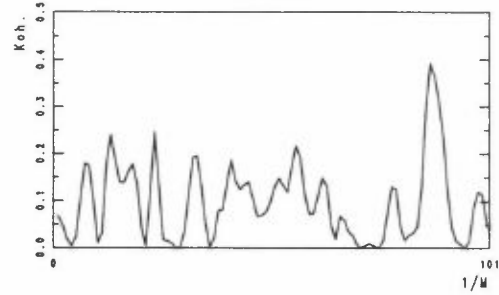
V36-W36



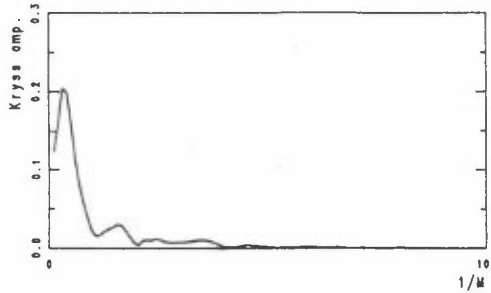
W10-W10x



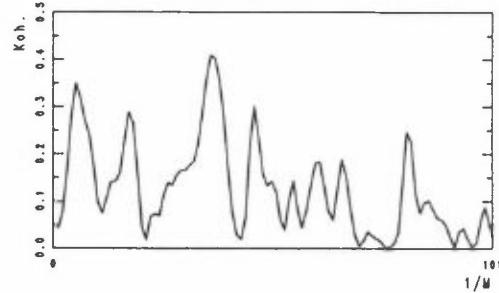
W10-W10x



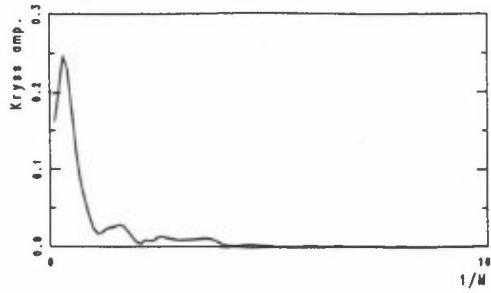
H10-W10



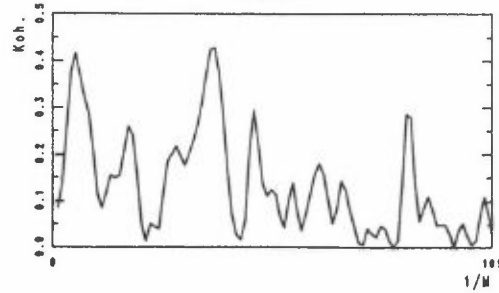
H10-W10



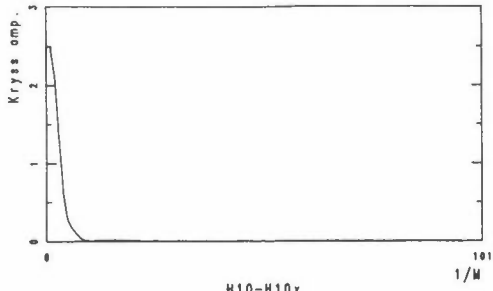
V10-W10



V10-W10

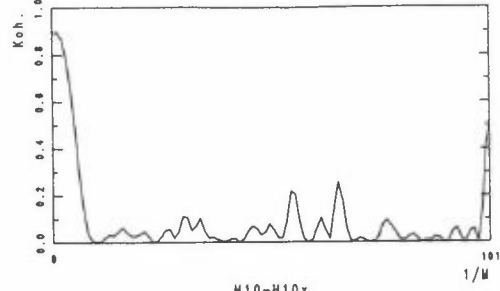


16. mai 1990 kl. 0730
H36-H10

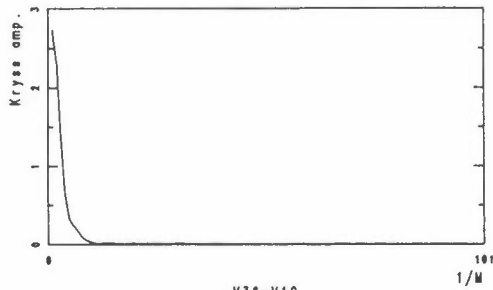


H10-H10x

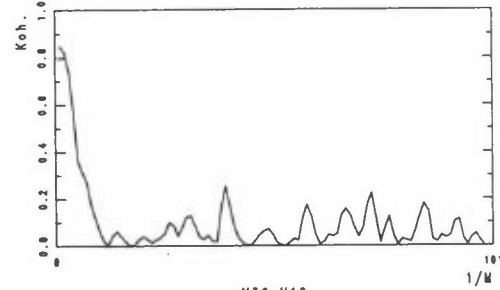
16. mai 1990 kl. 0730
H36-H10



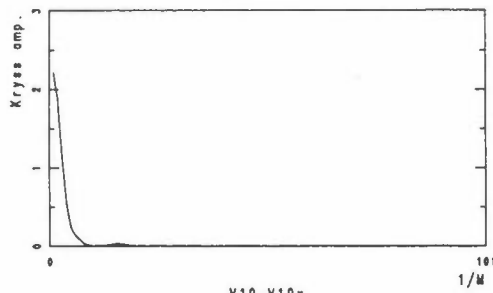
H10-H10x



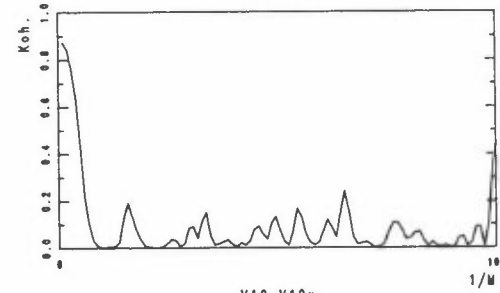
V36-V10



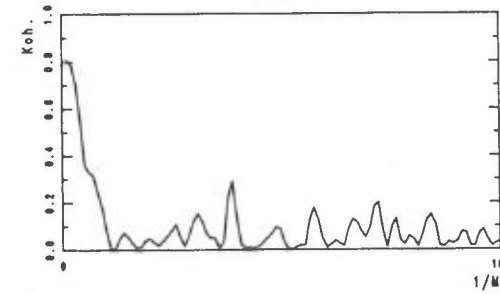
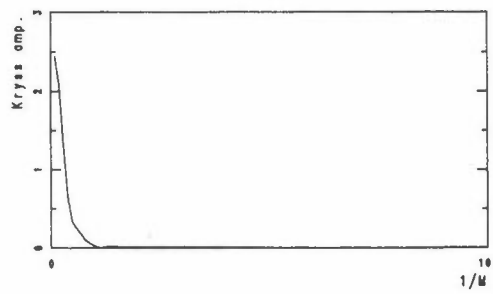
V36-V10



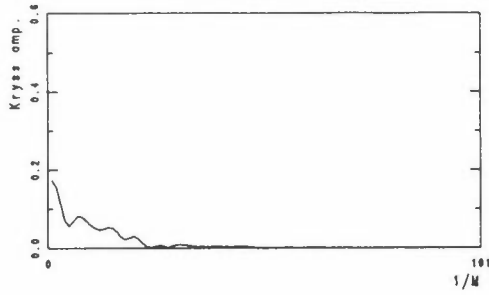
V10-V10x



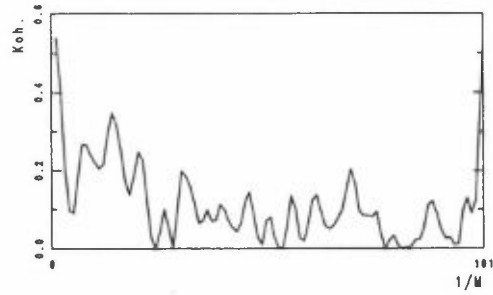
V10-V10x



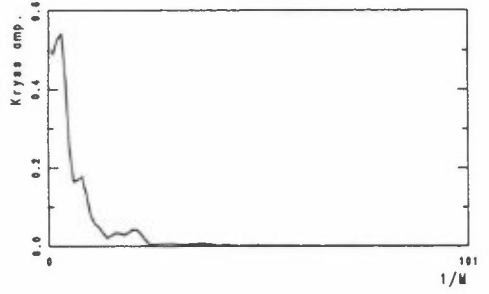
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W36-W10



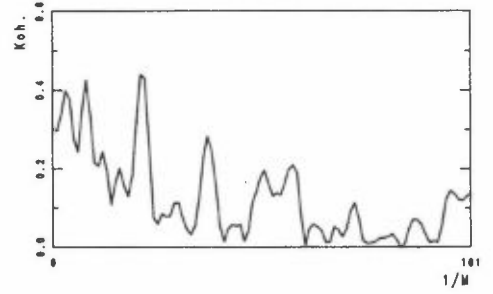
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W36-W10



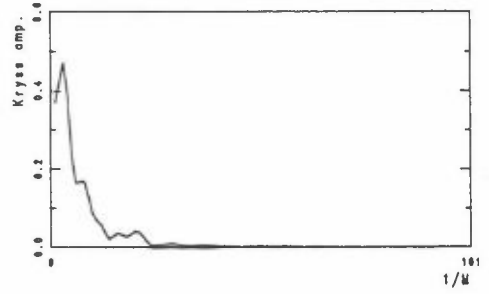
H36-W36



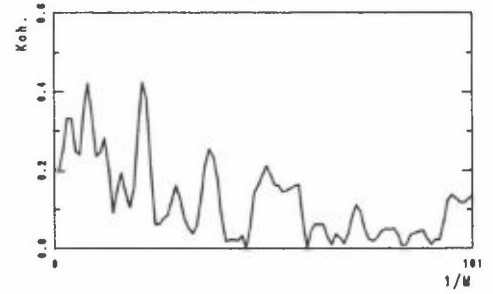
H36-W36



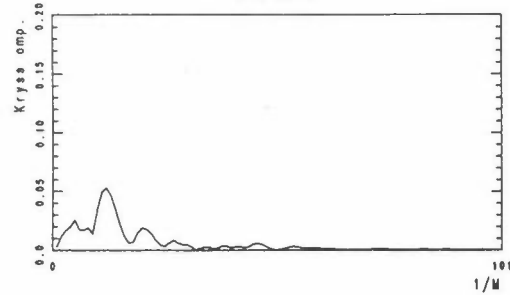
V36-W36



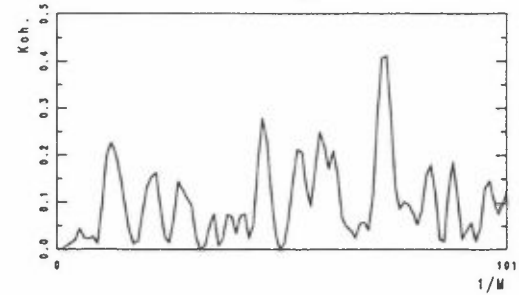
V36-W36



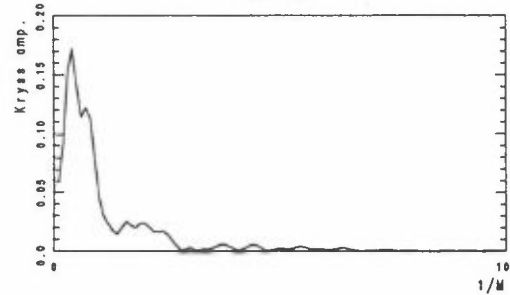
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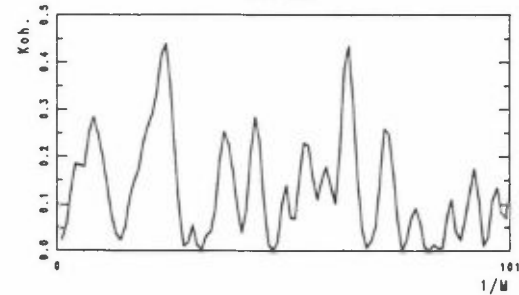
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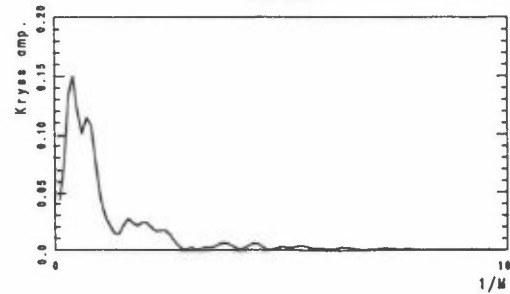
H10-W10



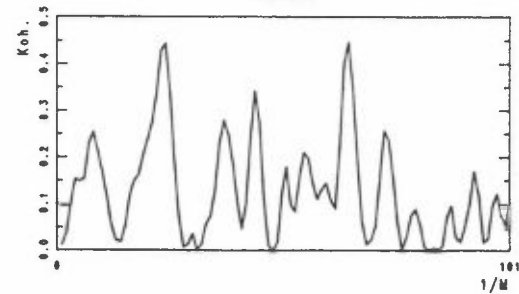
H10-W10



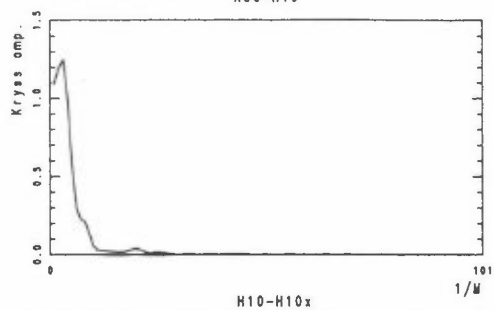
V10-W10



V10-W10

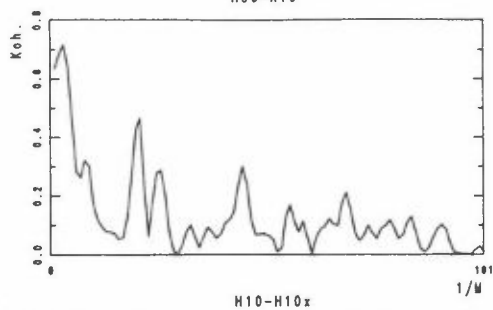


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H36-H10

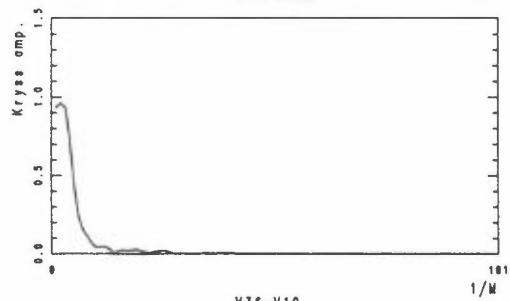


H10-H10x

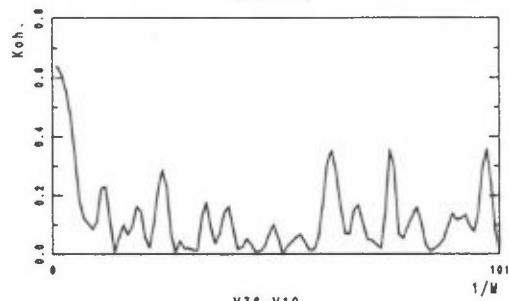
16. mai 1990 kl. 0740
H36-H10



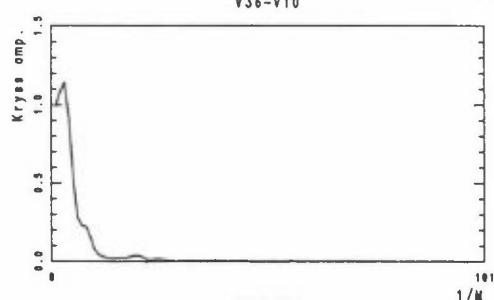
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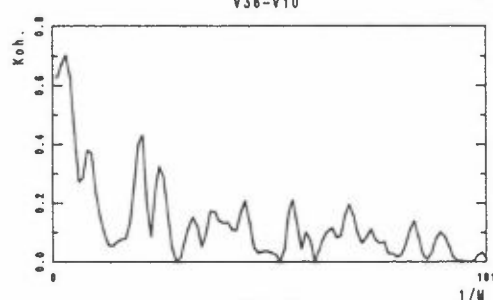
V36-V10



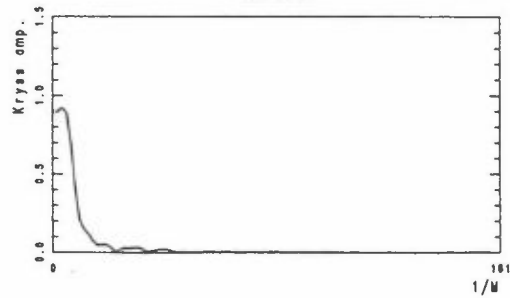
V36-V10



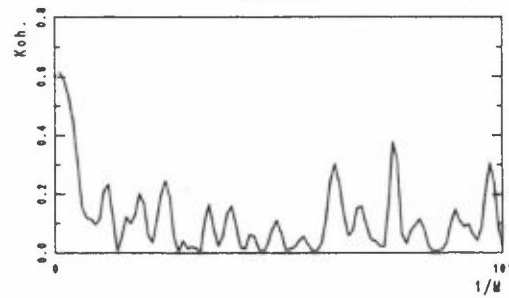
V10-V10x



V10-V10x

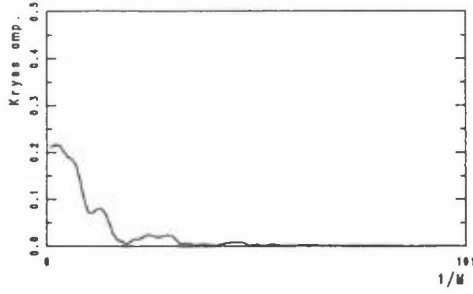


$1/M$

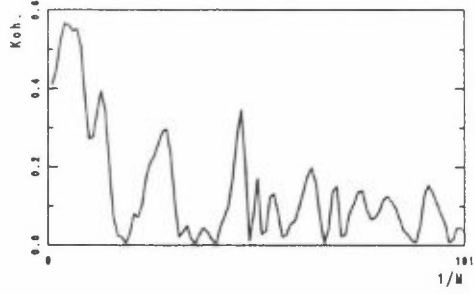


$1/M$

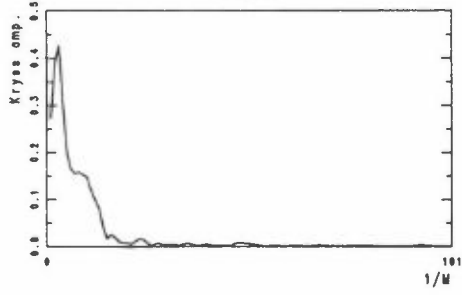
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W36-W10



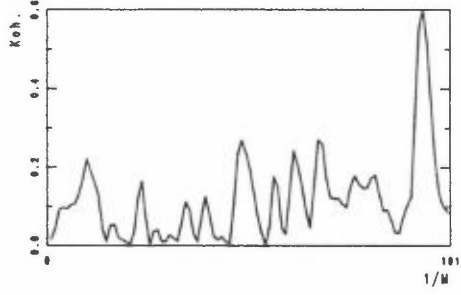
18. mai 1990 kl. 0530
W36-W10



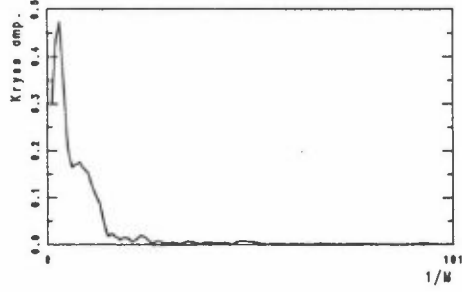
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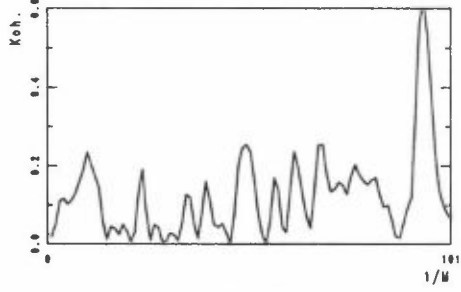
H36-W36



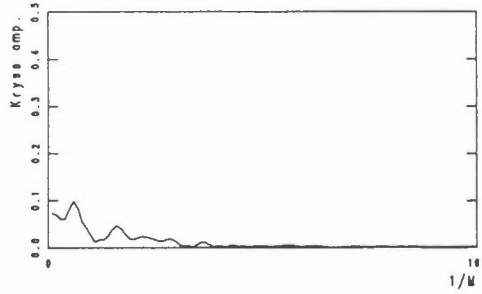
V36-W36



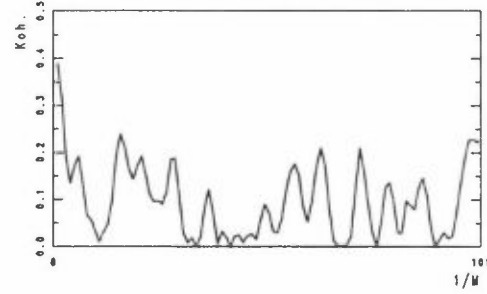
V36-W36



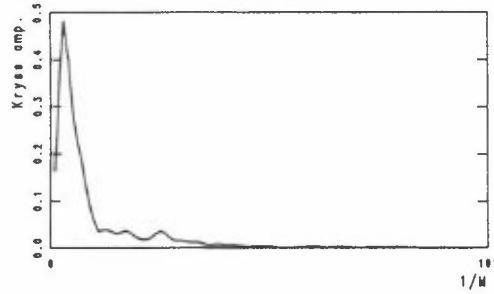
W10-W10x



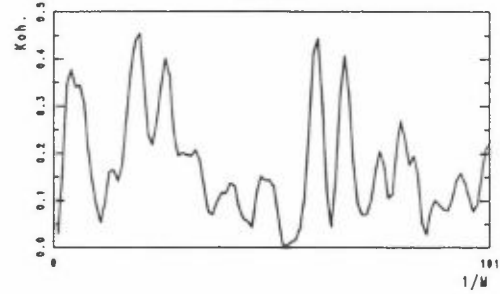
W10-W10x



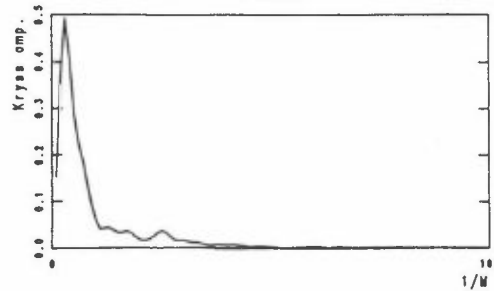
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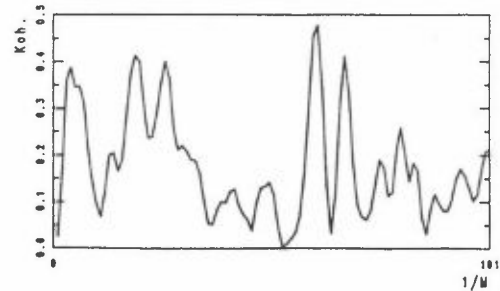
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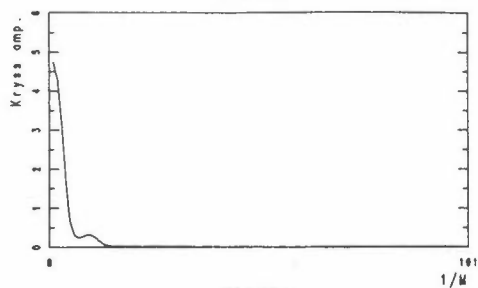
V10-W10



V10-W10

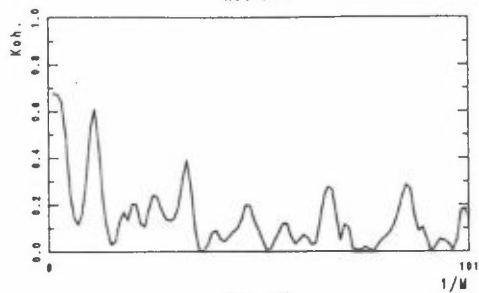


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H36-H10

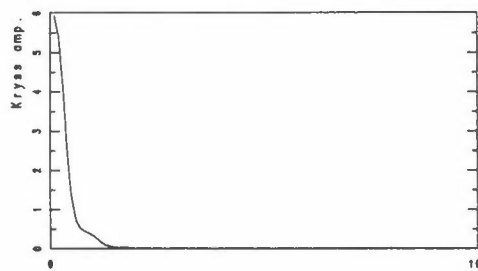


H10-H10x

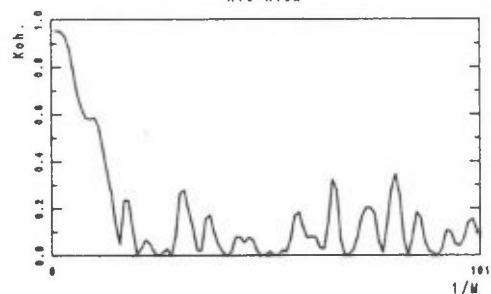
18. mai 1990 kl. 0530
H36-H10



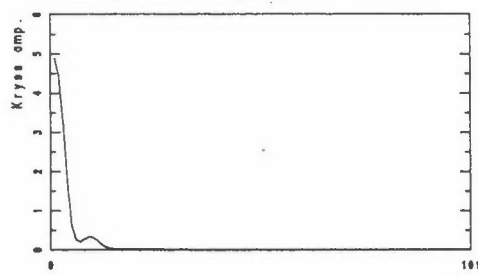
H10-H10x



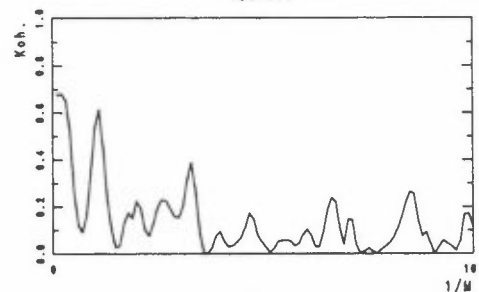
V36-V10



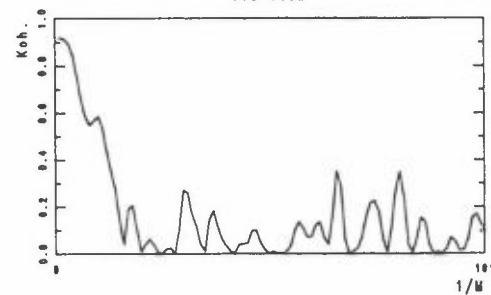
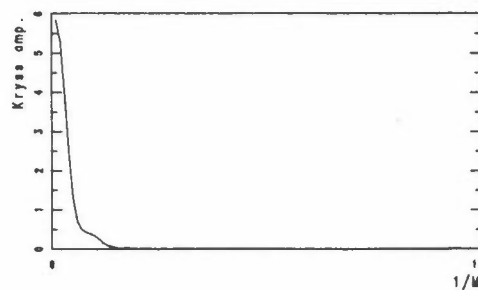
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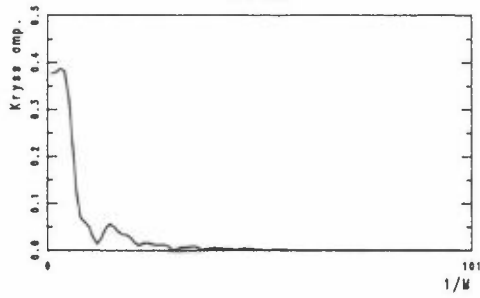
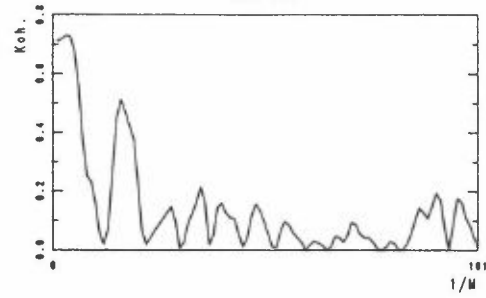


V10-V10x

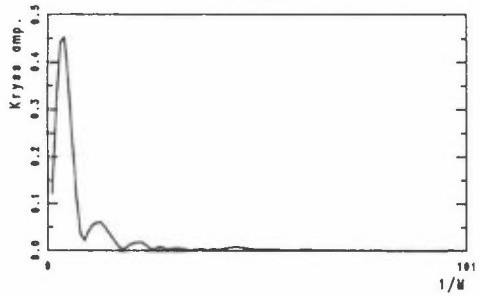


V10-V10x

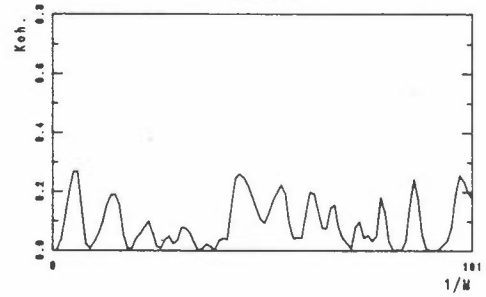


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W36-W10

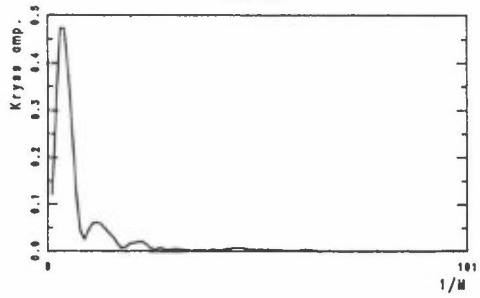
H36-W36



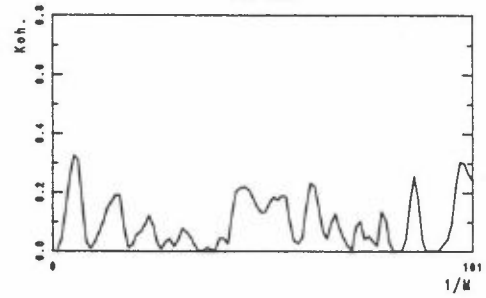
H36-W36



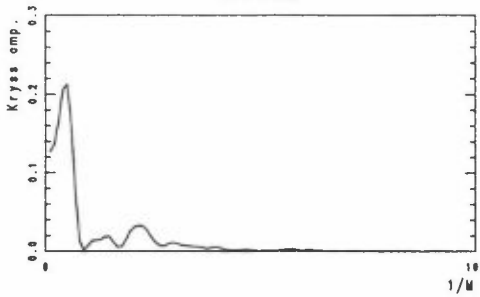
V36-W36



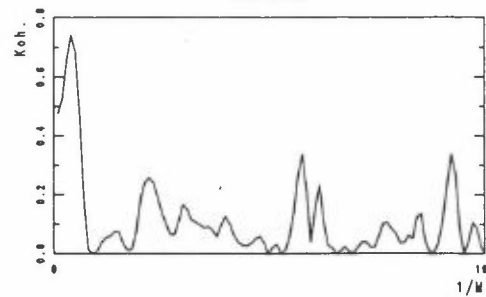
V36-W36



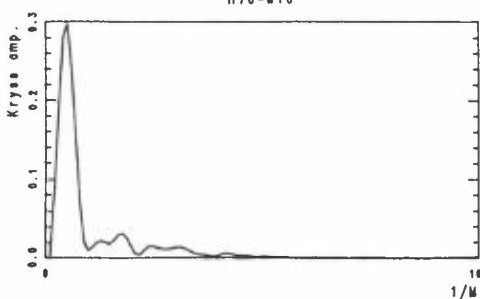
W10-W10x



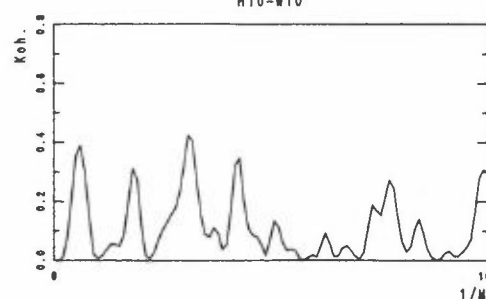
W10-W10x



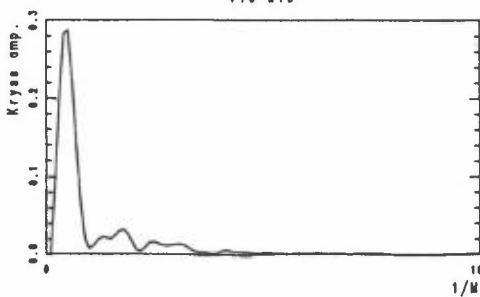
H10-W10



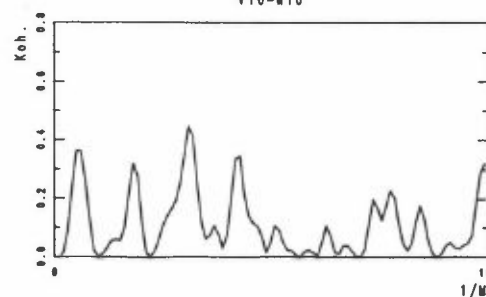
H10-W10



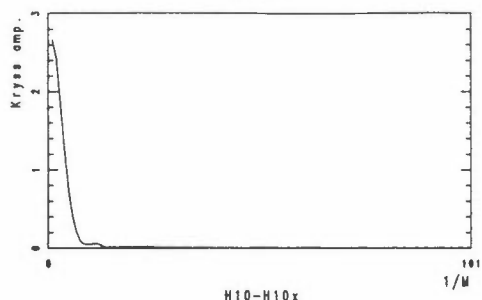
V10-W10



V10-W10

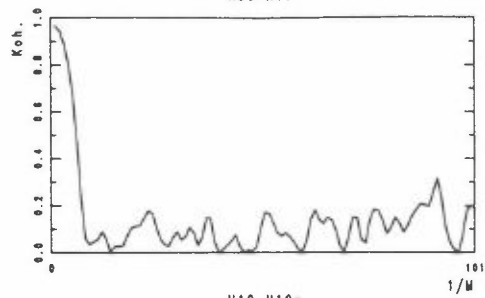


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H36-H10

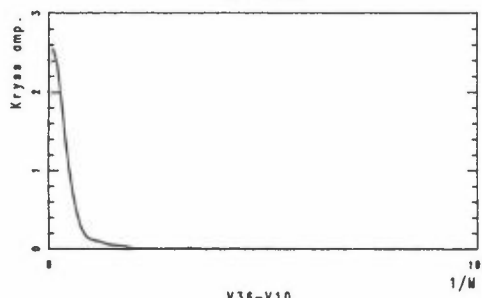


H10-H10x

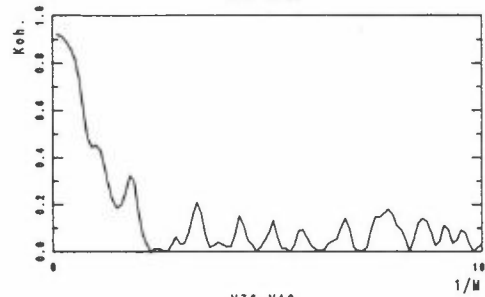
18. mai 1990 kl. 0540
H36-H10



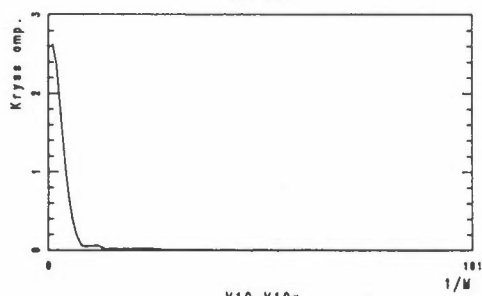
H10-H10x



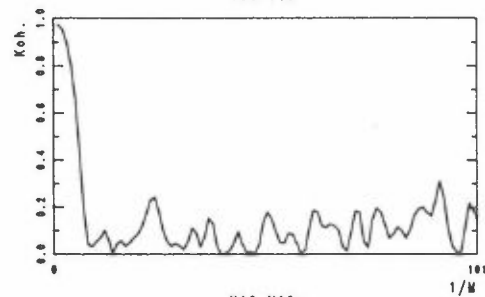
V36-V10



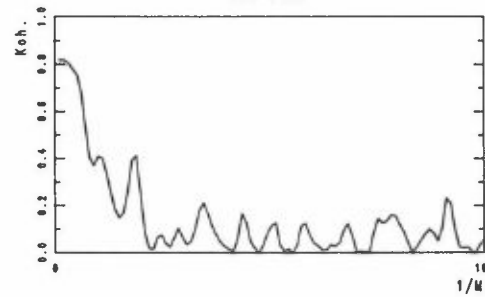
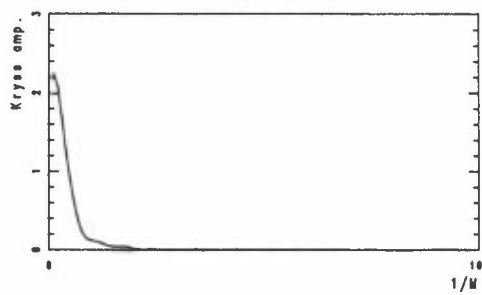
V36-V10



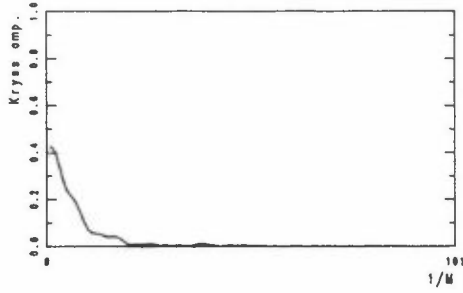
V10-V10x



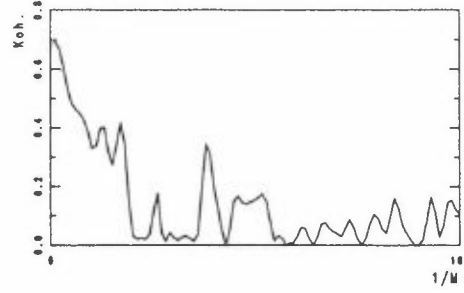
V10-V10x



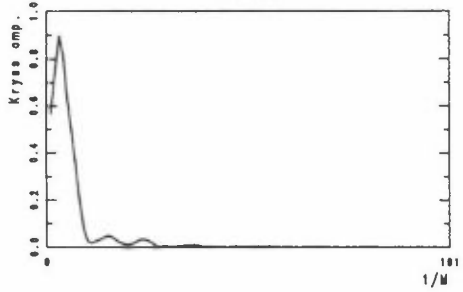
18. mai 1990 kl. 0550
W36-W10



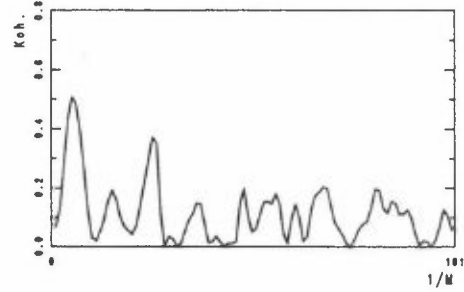
18. mai 1990 kl. 0550
W36-W10



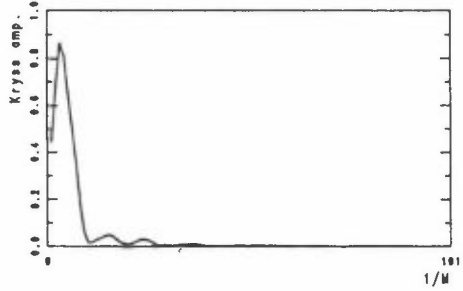
H36-W36



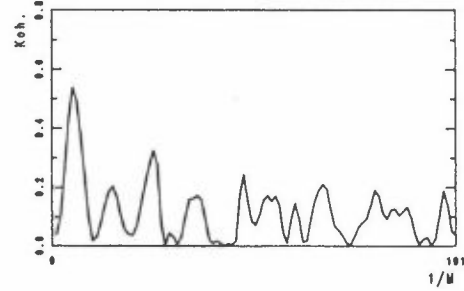
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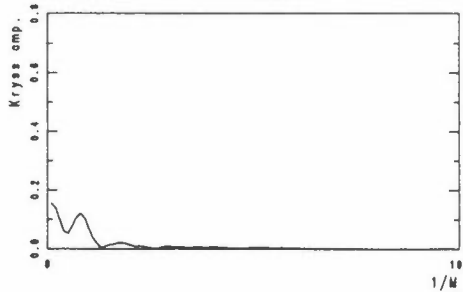
V36-W36



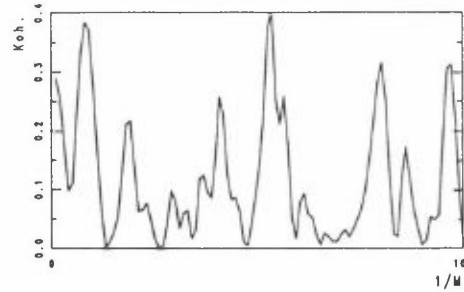
V36-W36



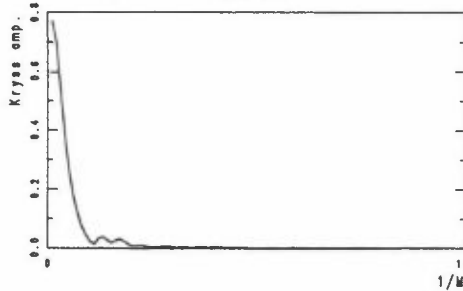
W10-W10x



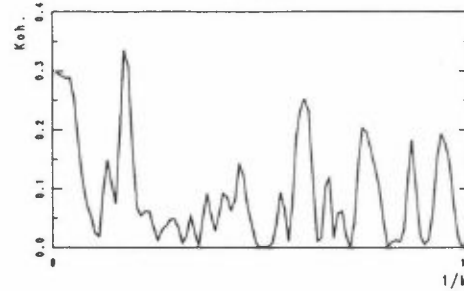
W10-W10x



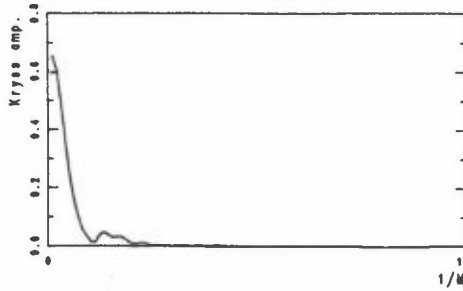
H10-W10



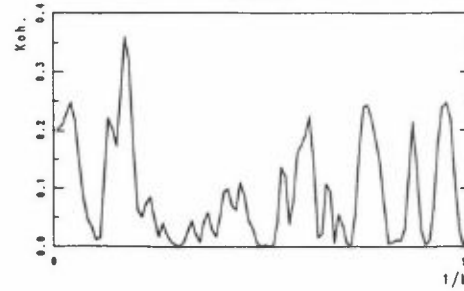
H10-W10



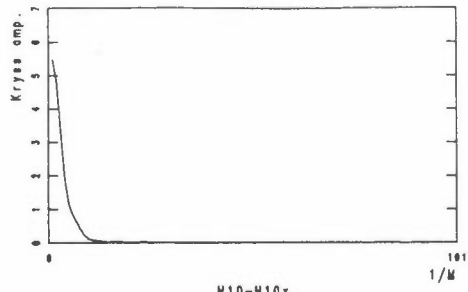
V10-W10



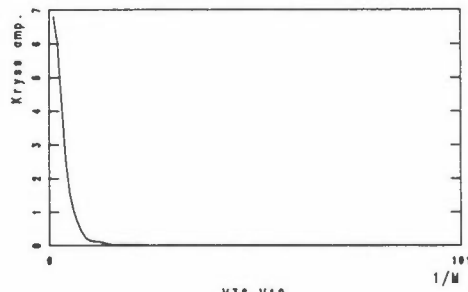
V10-W10



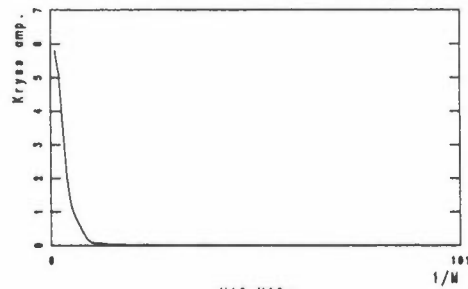
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H36-H10



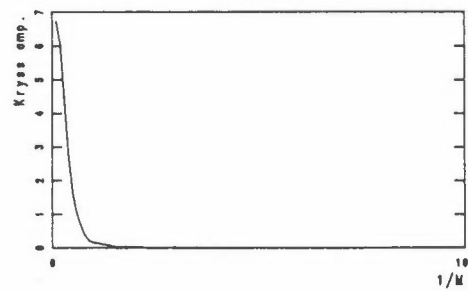
H10-H10x



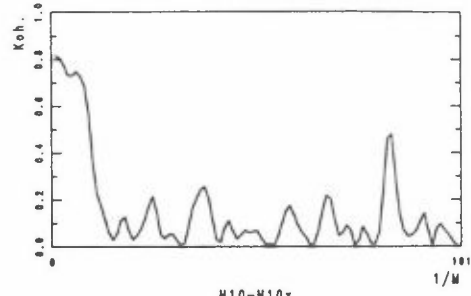
V36-V10



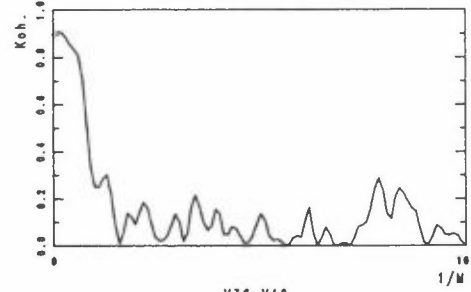
V10-V10x



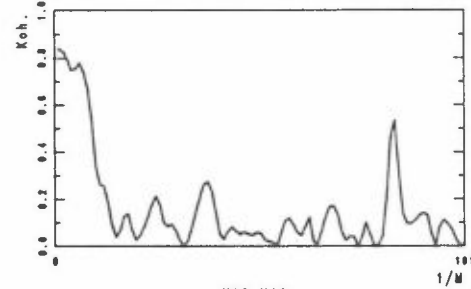
18. mai 1990 kl. 0550
H36-H10



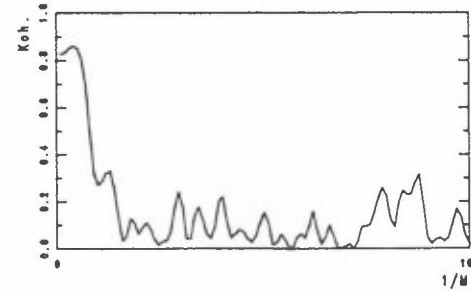
H10-H10x

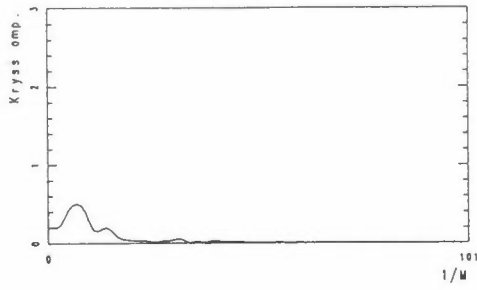
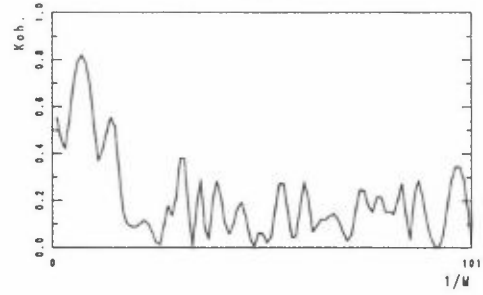


V36-V10

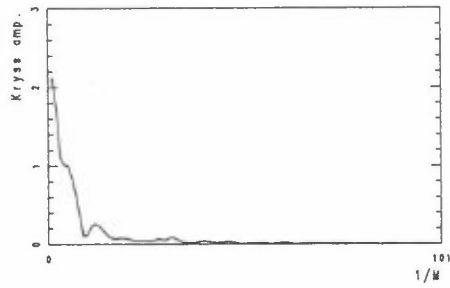


V10-V10x

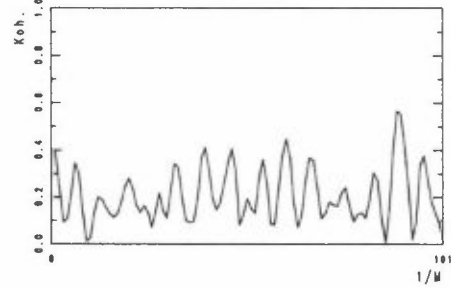


22. juni 1990 kl. 2250
W36-W1022. juni 1990 kl. 2250
W36-W10

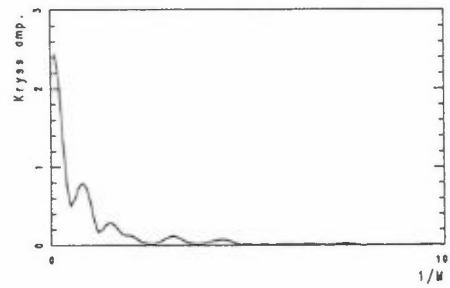
H36-W36



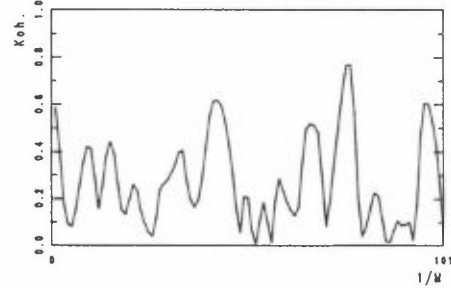
H36-W36



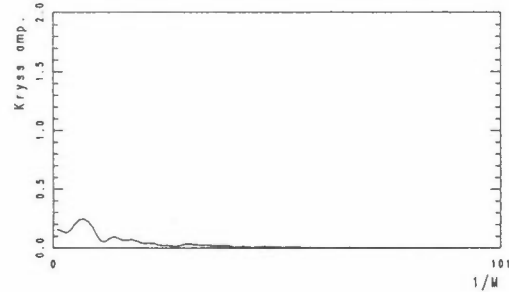
V36-W36



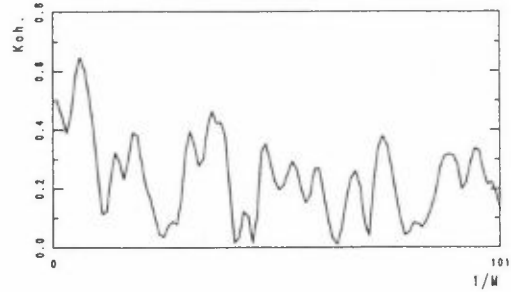
V36-W36



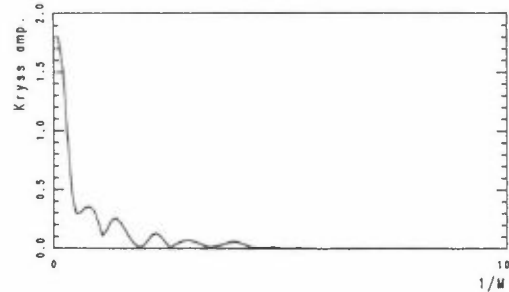
W10-W10x



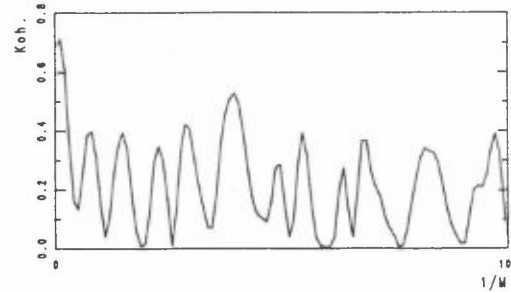
W10-W10x



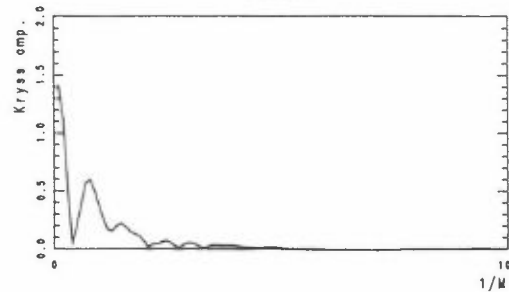
H10-W10



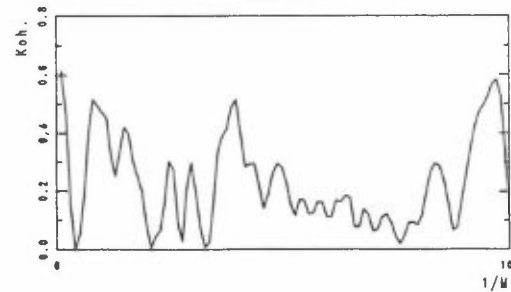
H10-W10



V10-W10

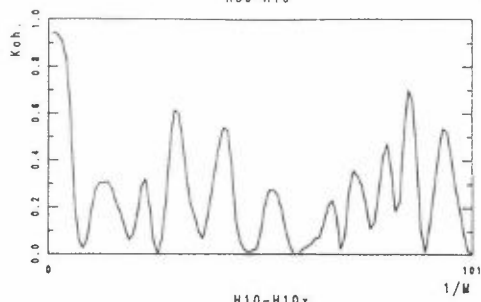


V10-W10



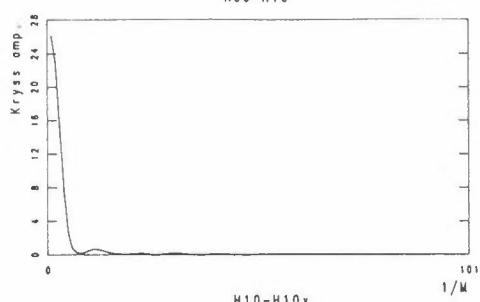
22. juni 1990 kl. 2250

H36-H10

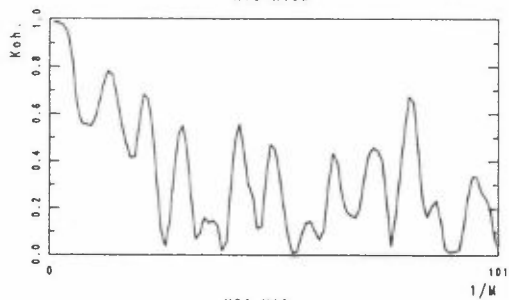


22. juni 1990 kl. 2250

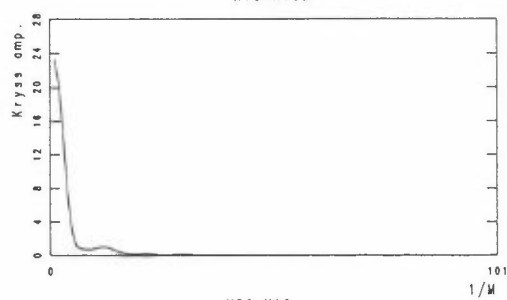
H36-H10



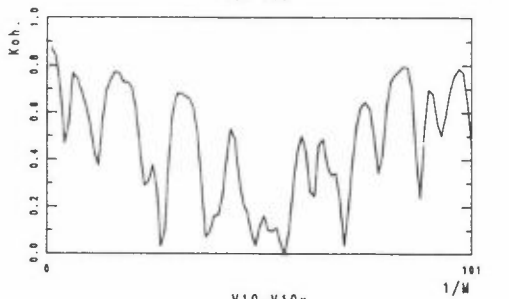
H10-H10x



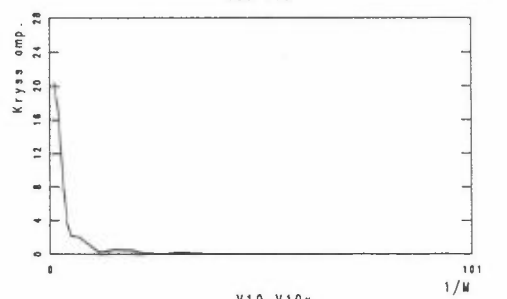
H10-H10x



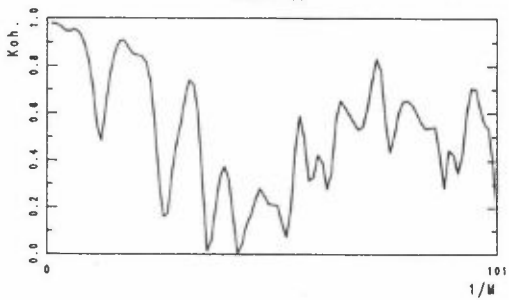
V36-V10



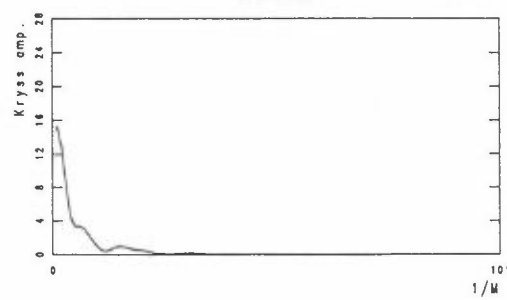
V36-V10



V10-V10x

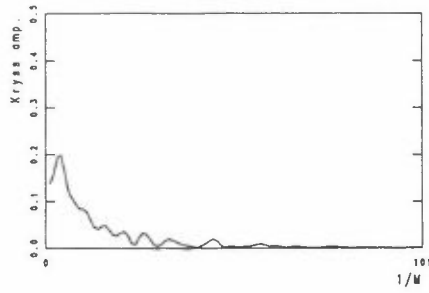


V10-V10x



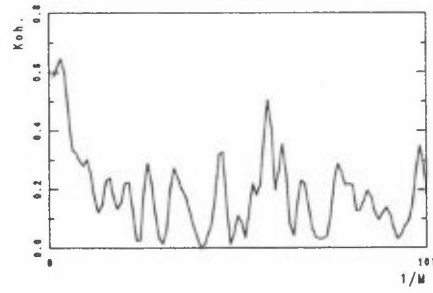
22. juni 1990 kl. 2300

W36-W10

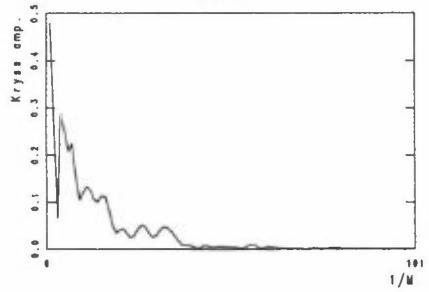


22. juni 1990 kl. 2300

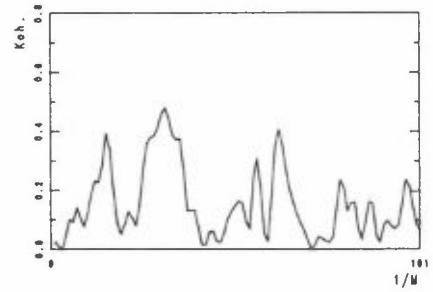
W36-W10



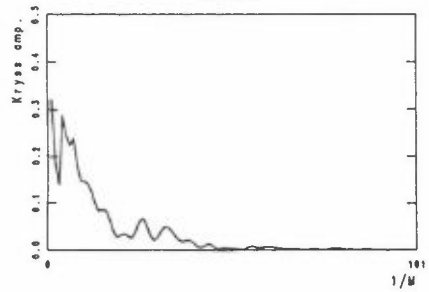
H36-W36



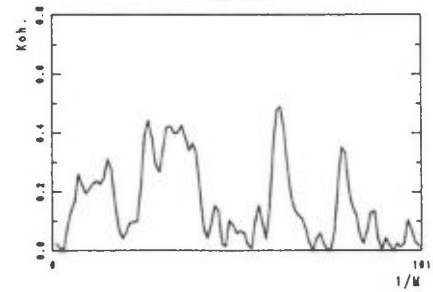
H36-W36



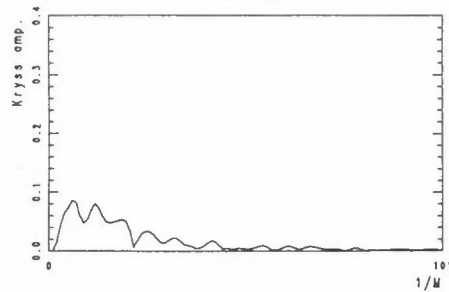
V36-W36



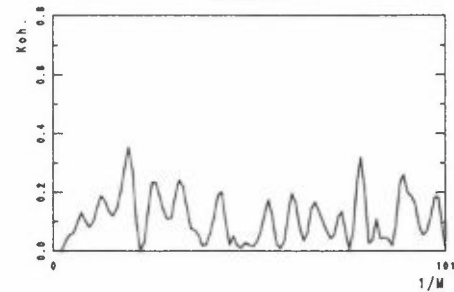
V36-W36



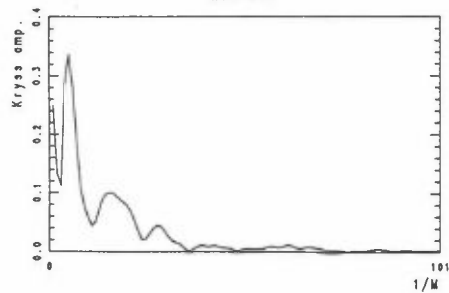
W10-W10x



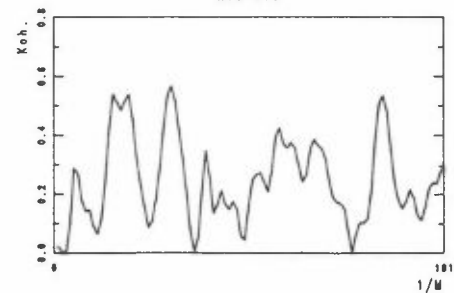
W10-W10x



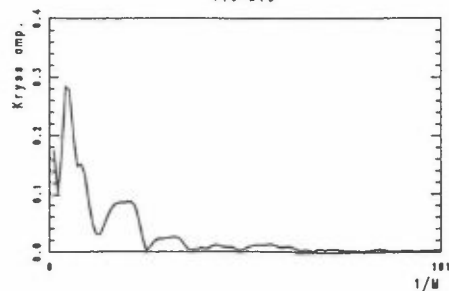
H10-W10



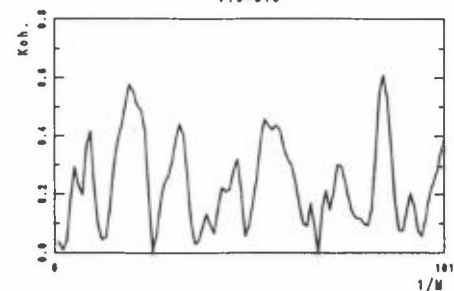
H10-W10



V10-W10

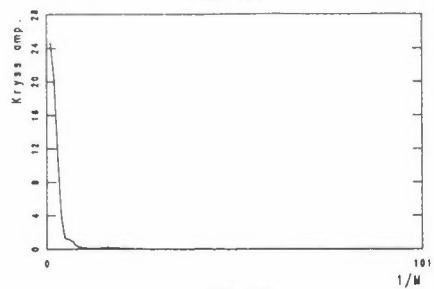


V10-W10

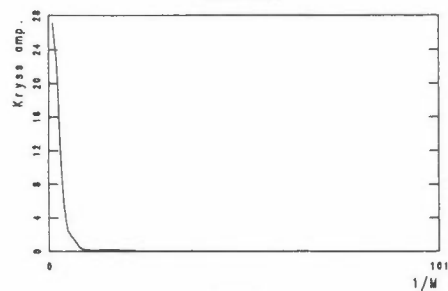


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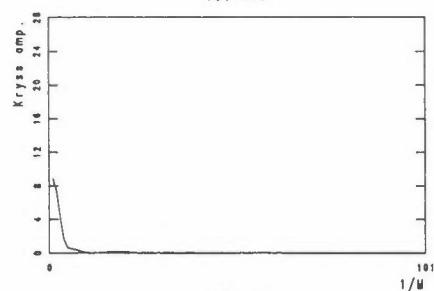
H36-H10



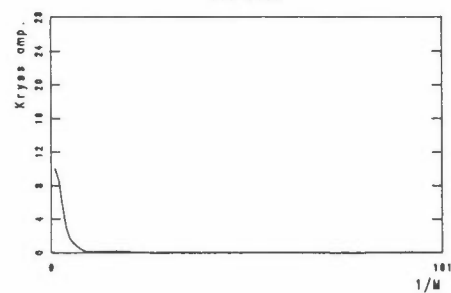
H10-H10x



V36-V10

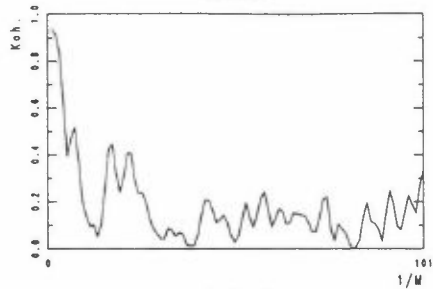


V10-V10x

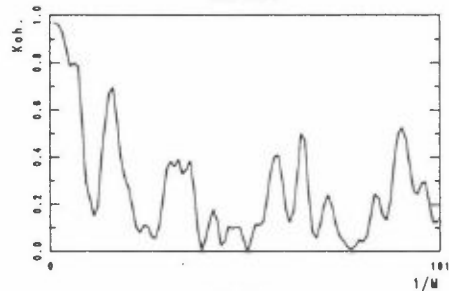


22. juni 1990 kl. 2300

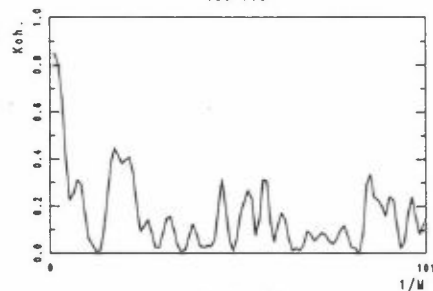
H36-H10



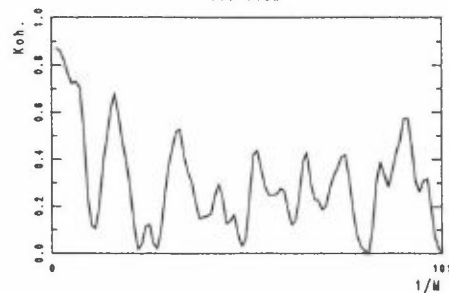
H10-H10x

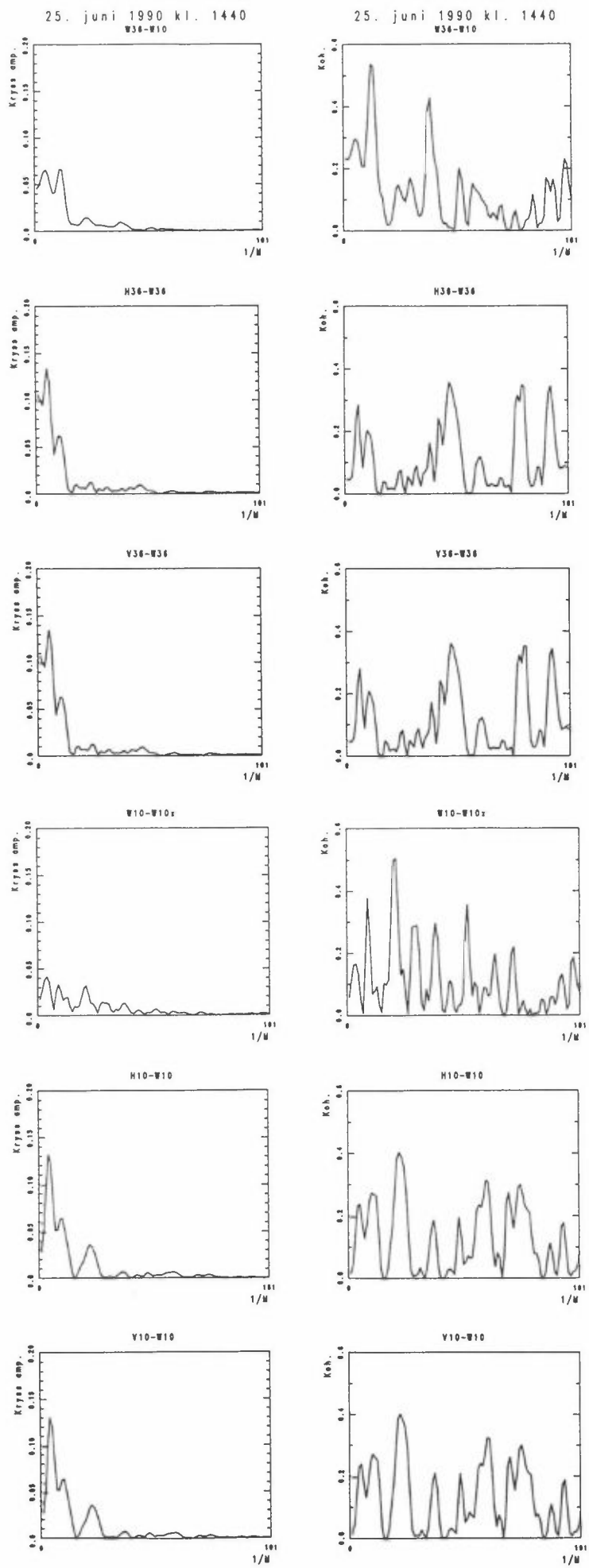


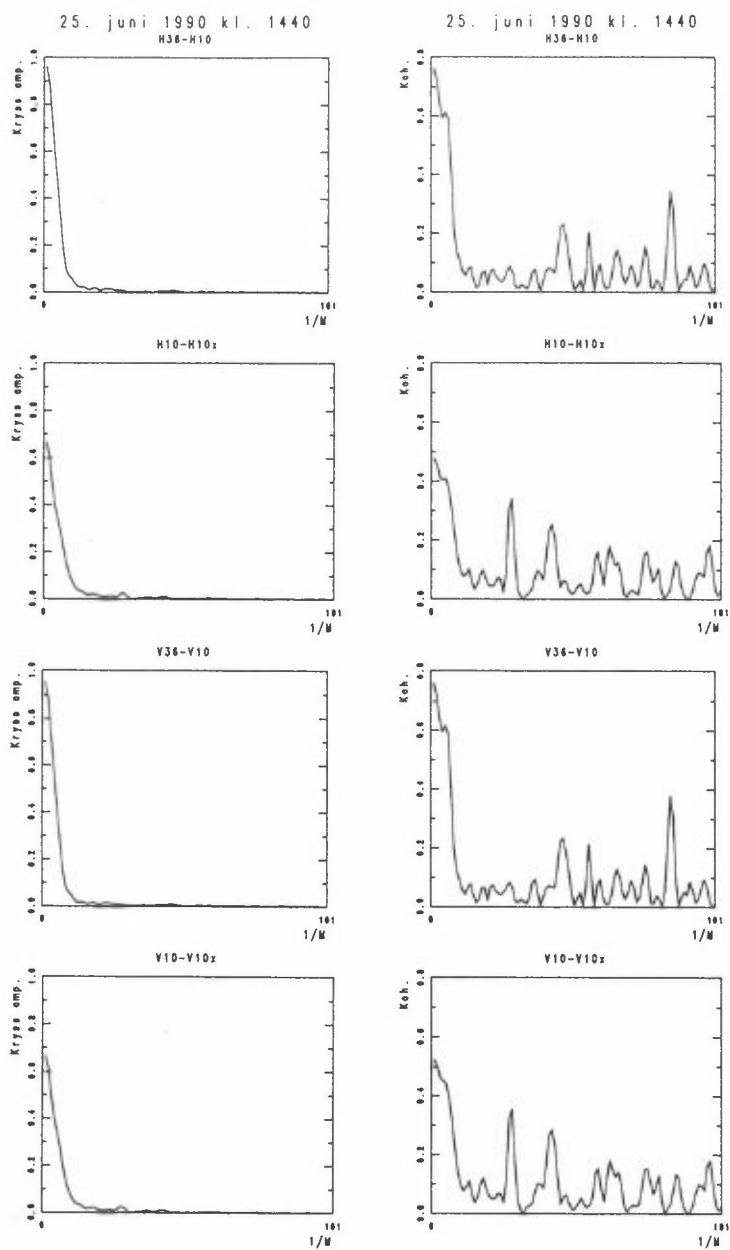
V36-V10

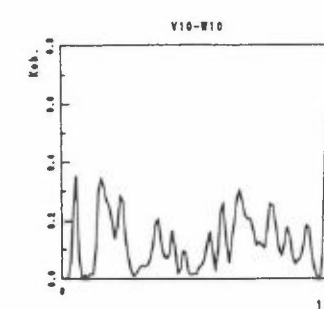
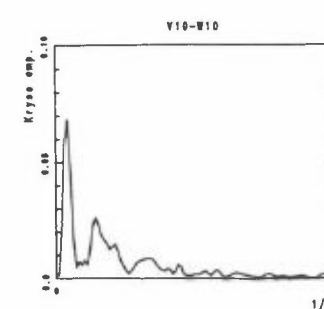
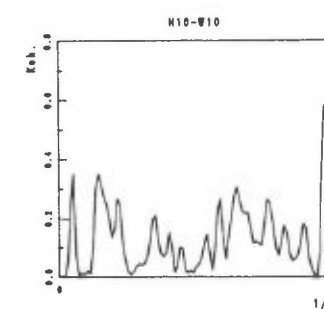
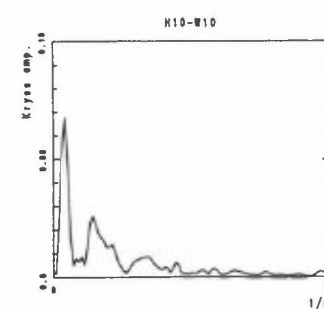
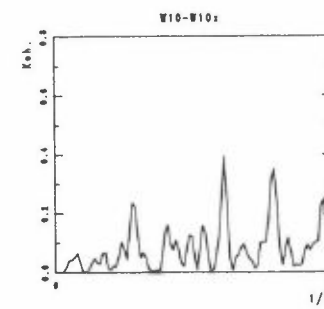
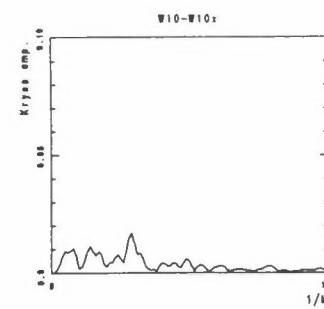
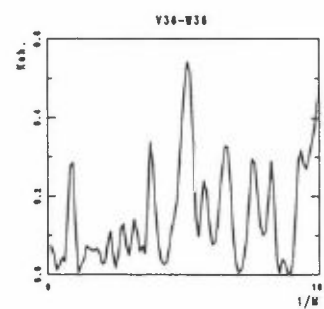
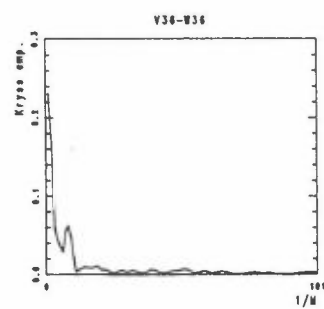
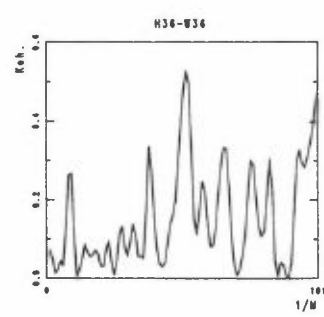
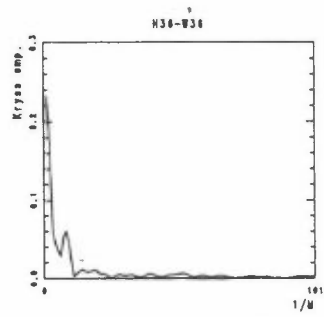
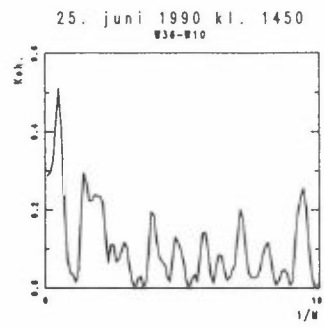
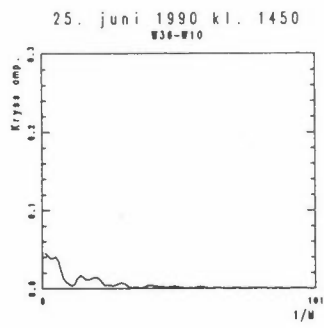


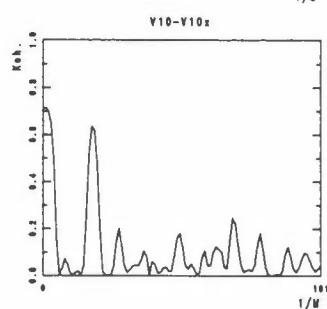
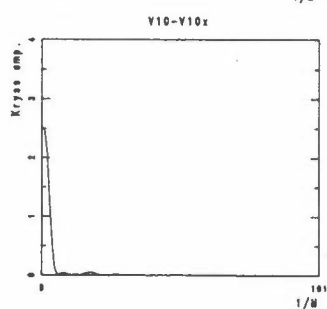
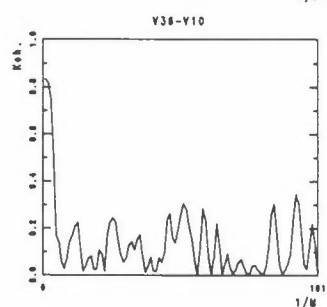
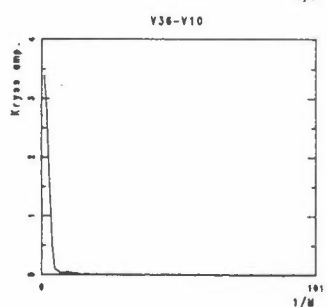
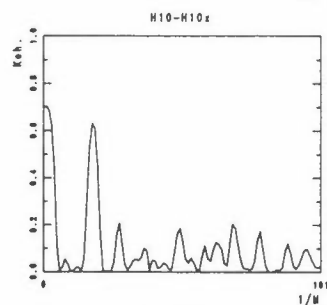
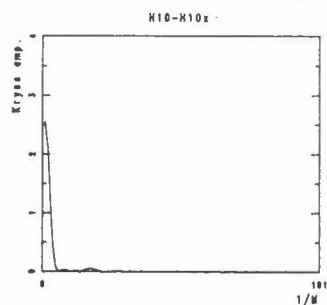
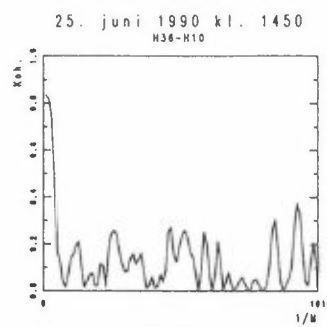
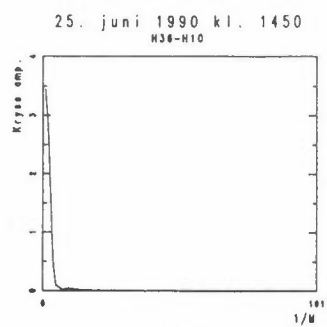
V10-V10x







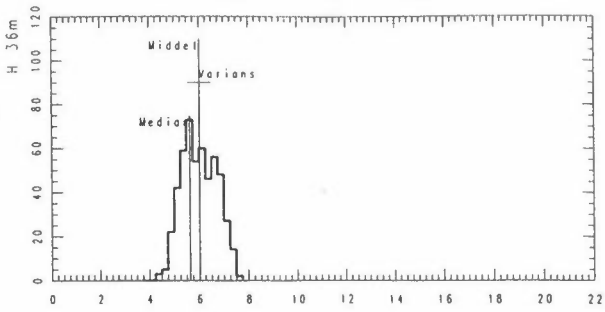




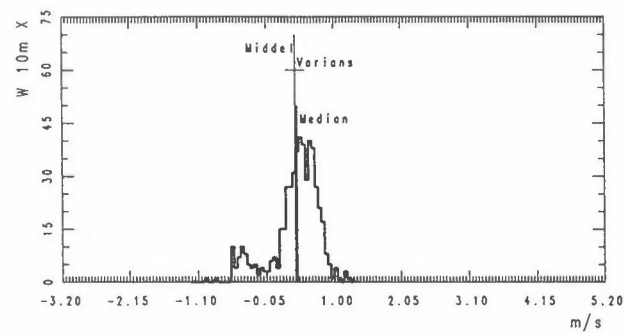
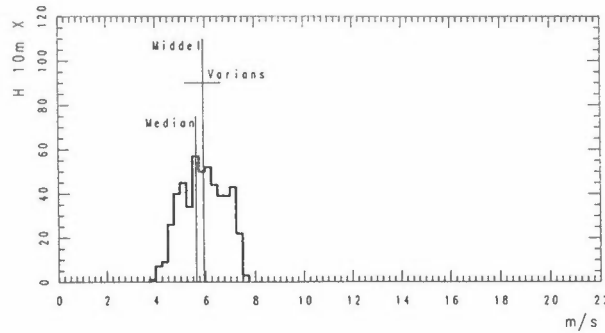
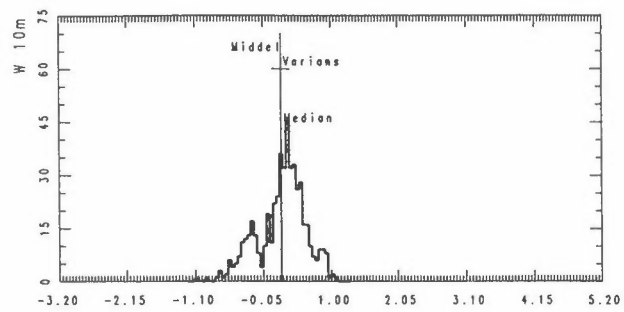
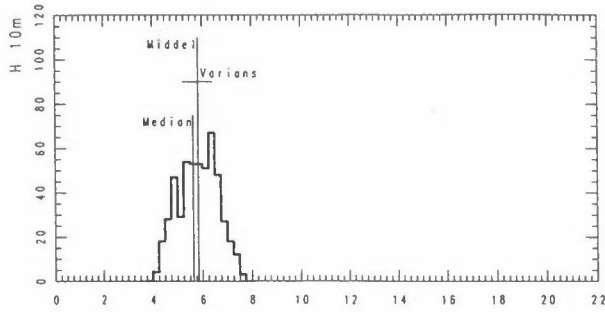
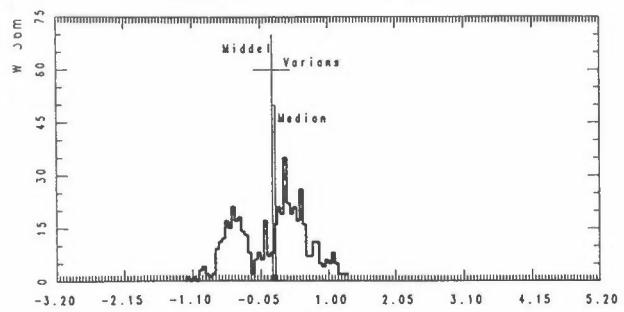
VEDLEGG F

Plott av fordelinger for sekundverdier

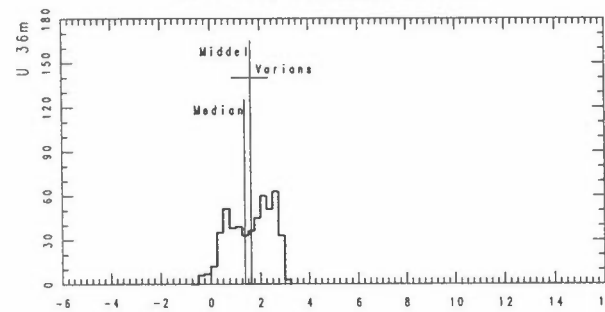
Horisontal vindvektor, 06.04.90, kl 1600



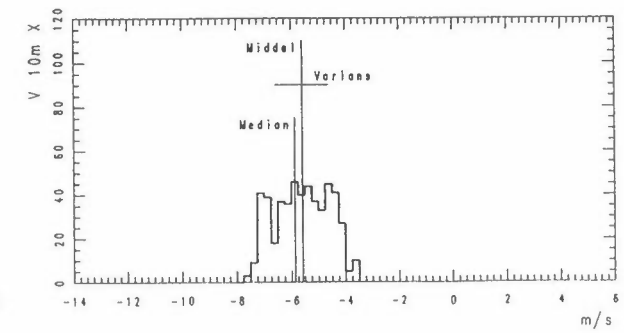
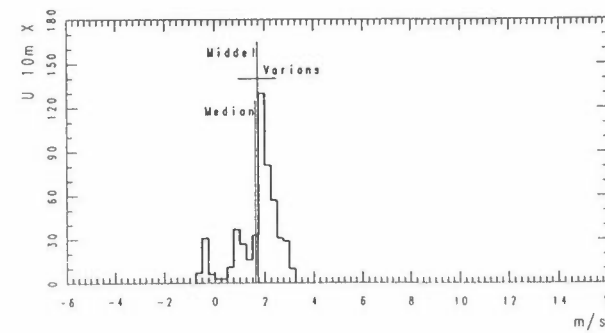
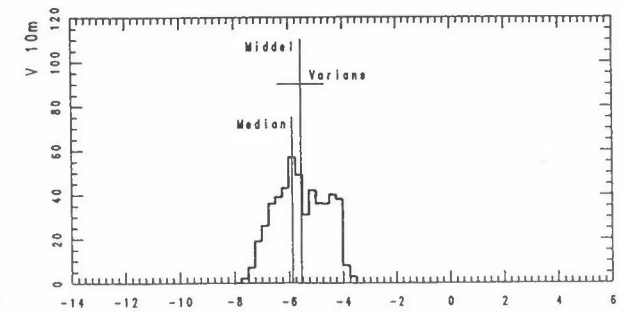
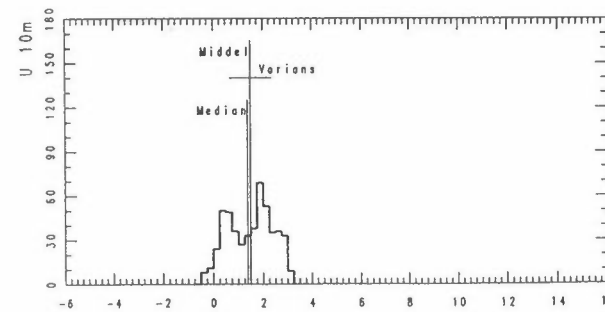
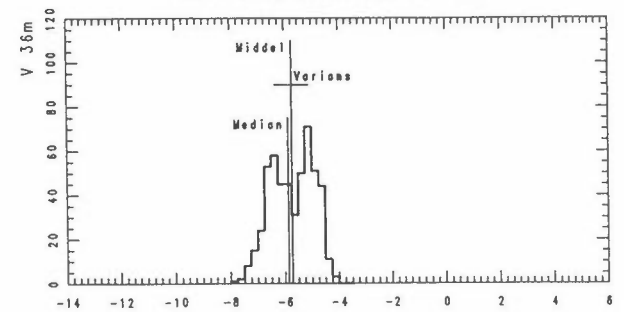
Vertikall, 06.04.90, kl 1600



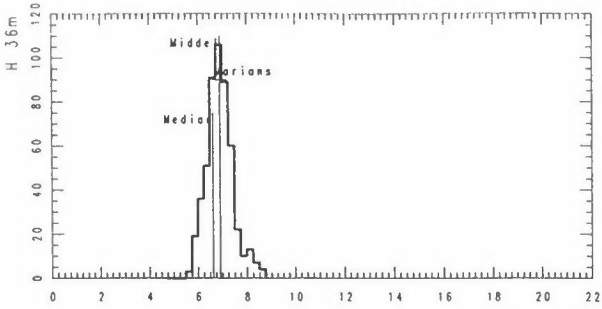
Øst-vest, 06.04.90, kl 1600



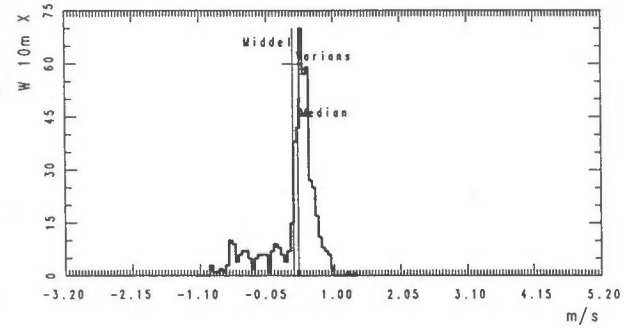
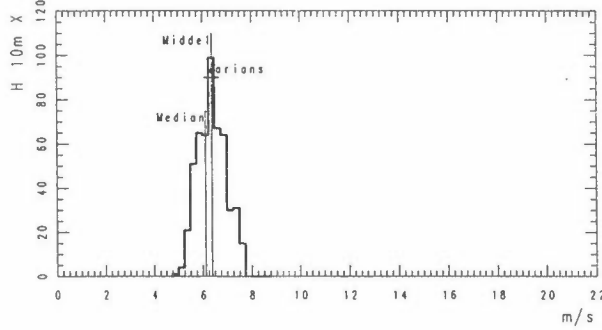
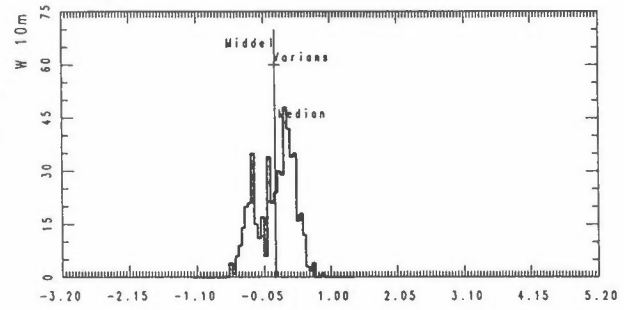
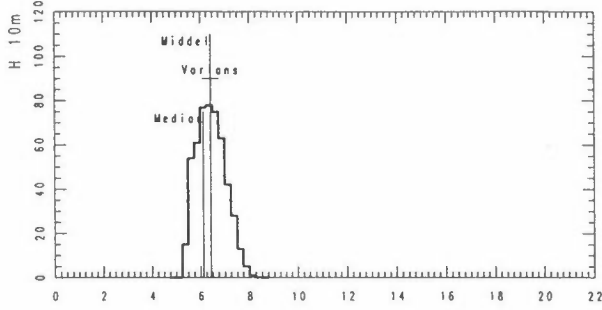
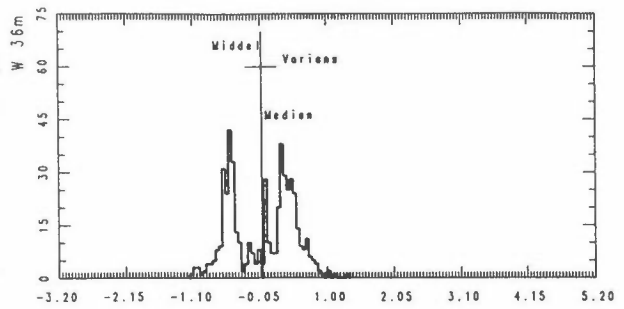
Nord-sør, 06.04.90, kl 1600



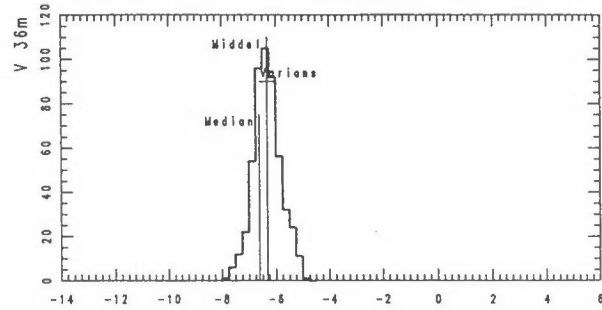
Horisonal vindvektor, 06.04.90, kl 1610



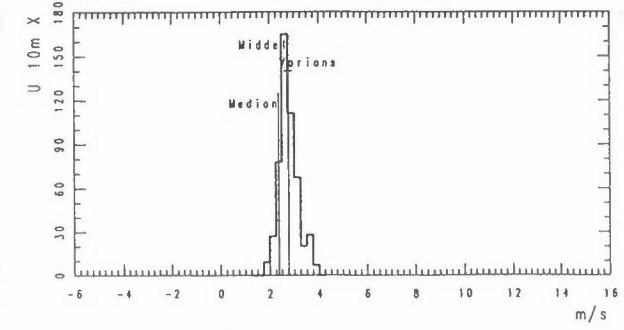
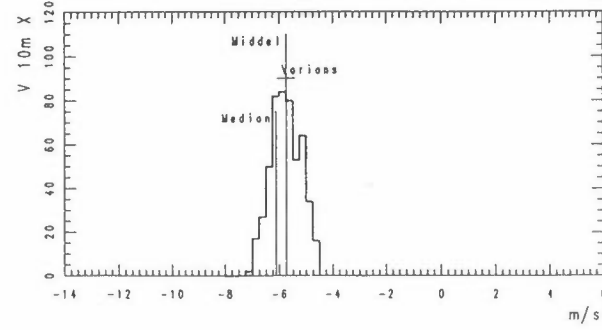
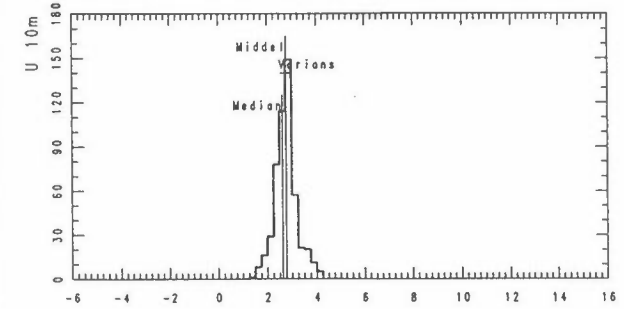
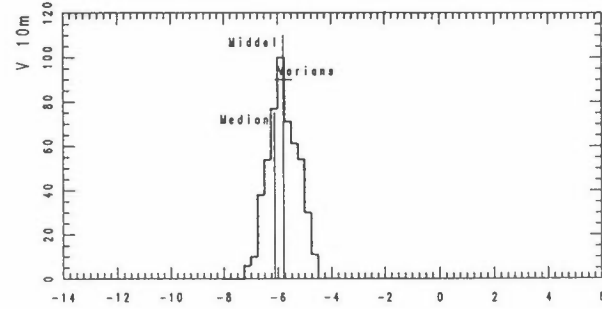
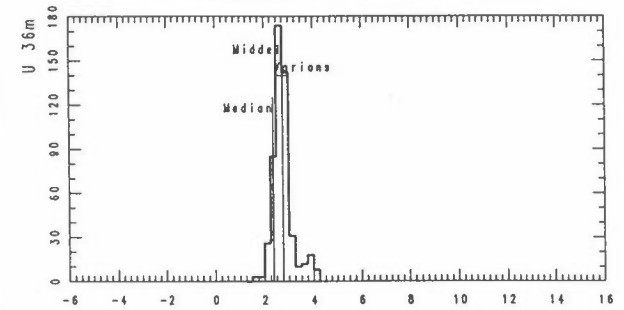
Vertikalt, 06.04.90, kl 1610



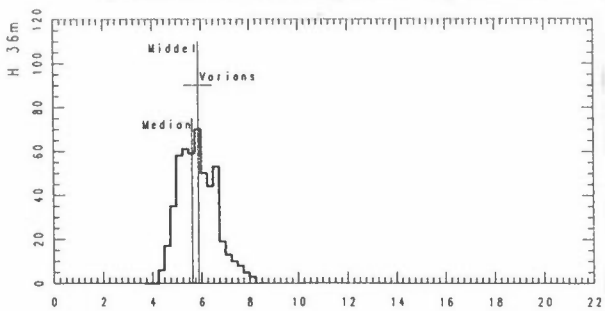
Nord-sør, 06.04.90, kl 1610



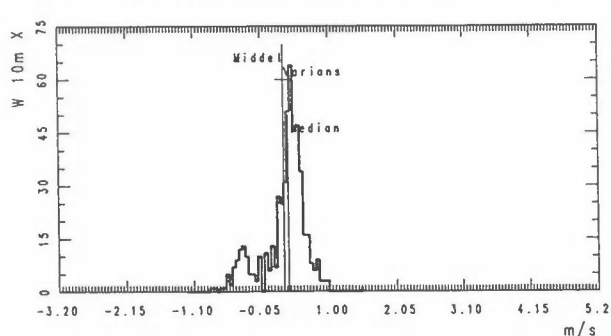
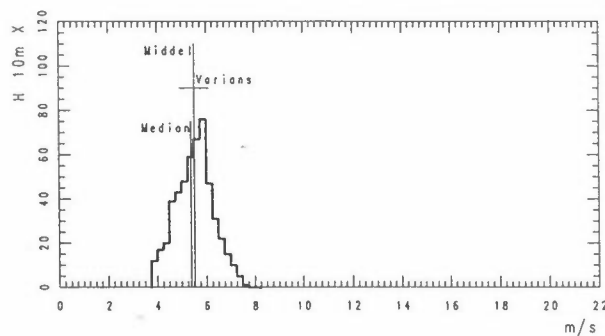
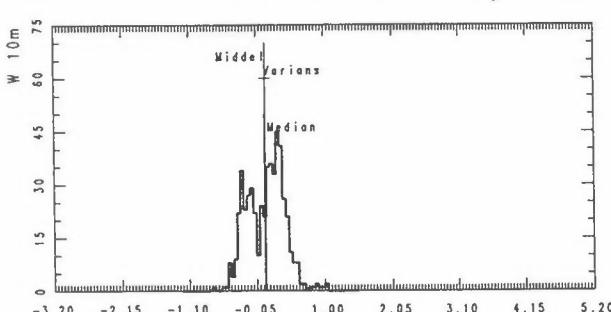
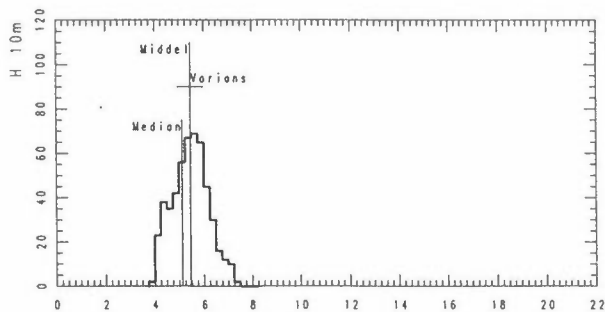
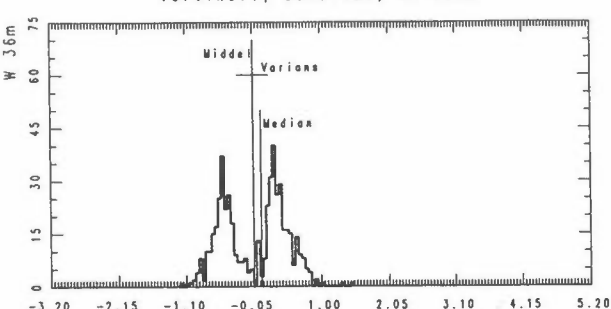
Øst-vest, 06.04.90, kl 1610



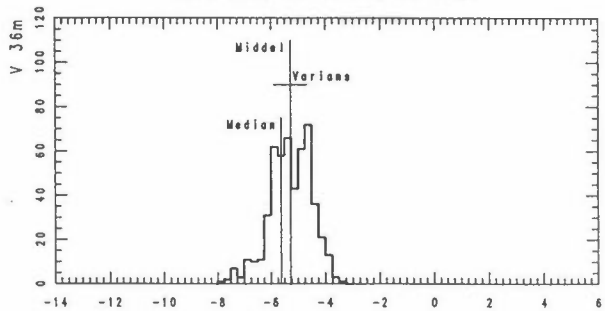
Horizontal vindvektor, 06.04.90, kl 1620



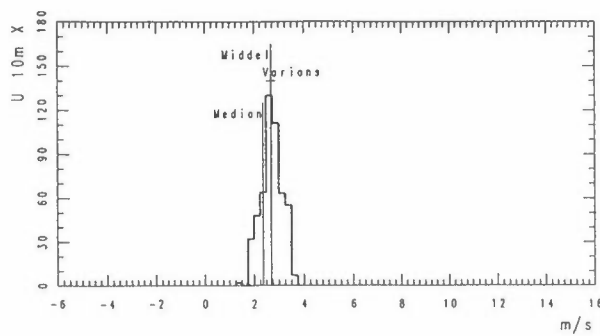
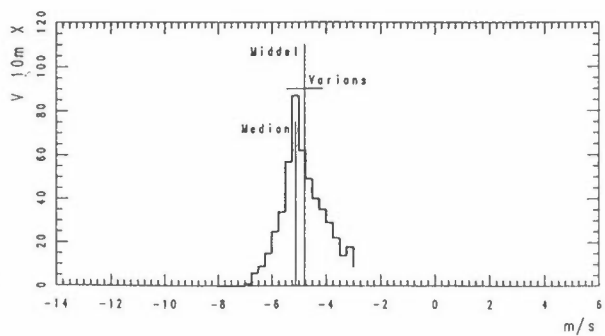
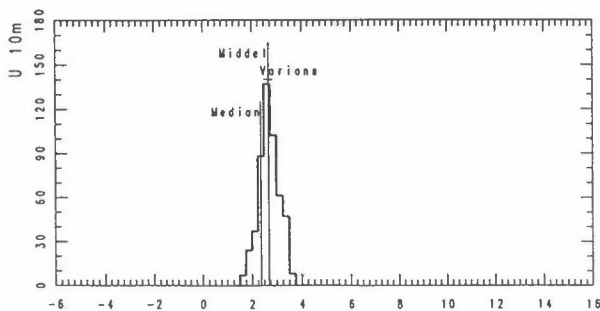
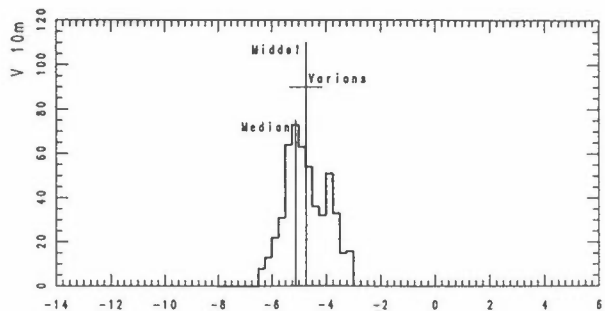
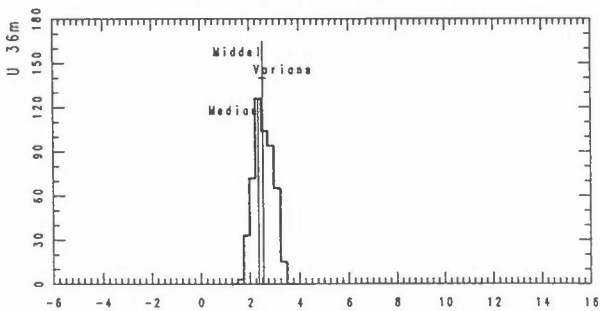
Vertikalt, 06.04.90, kl 1620



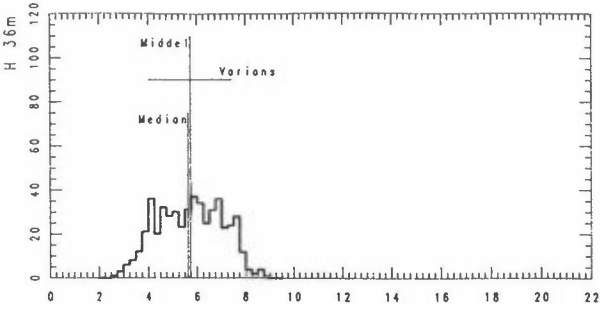
Nord-sør, 06.04.90, kl 1620



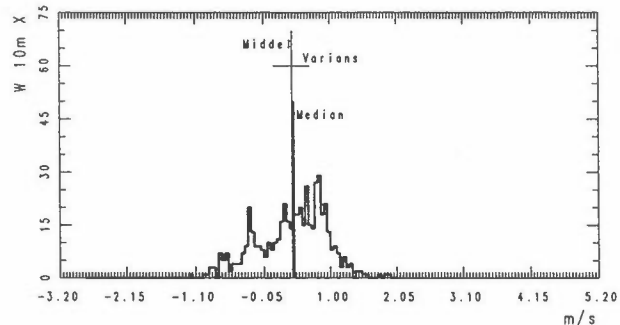
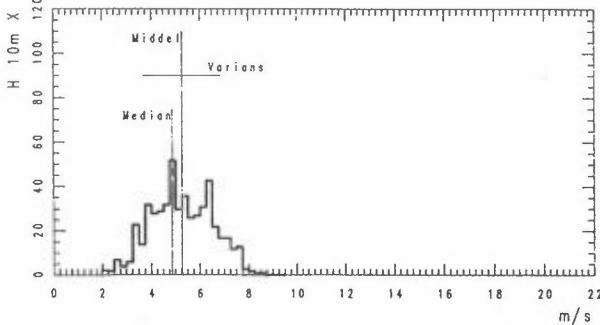
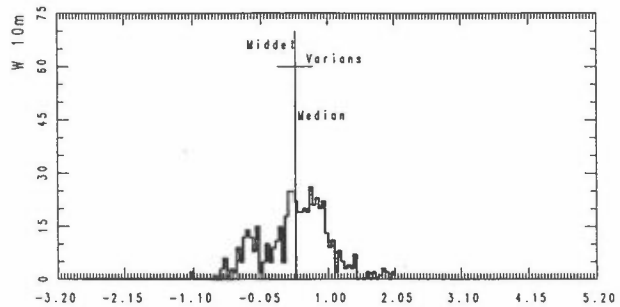
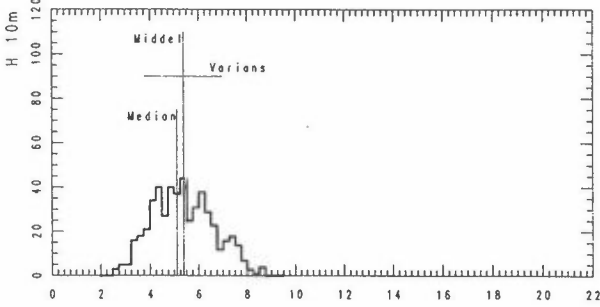
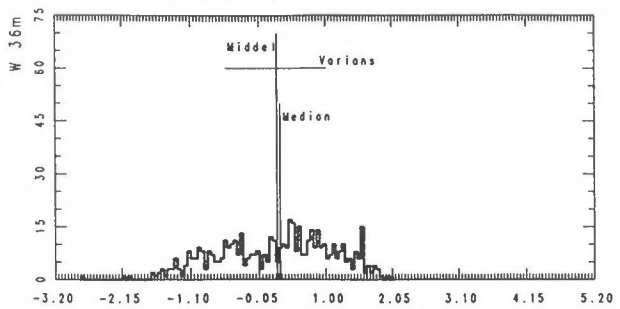
Øst-vest, 06.04.90, kl 1620



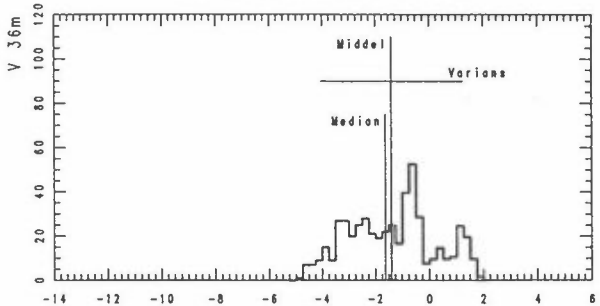
Horizontal vindvektor, 11.05.90, kl 1310



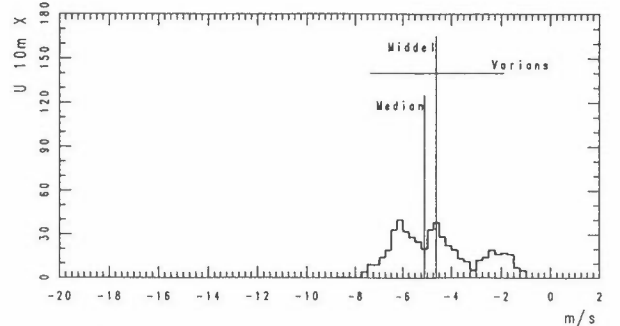
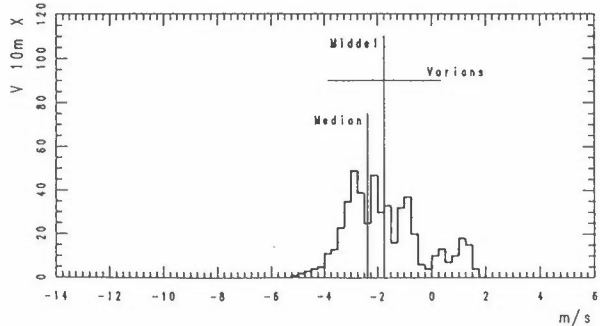
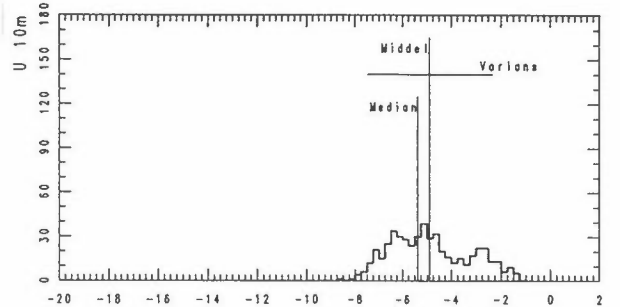
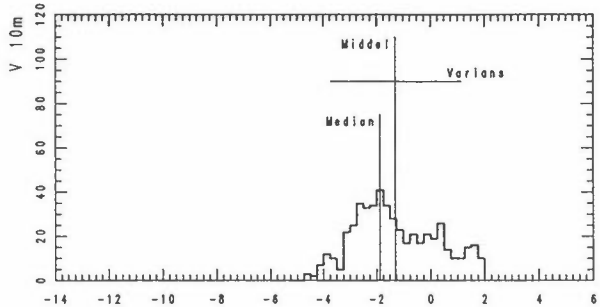
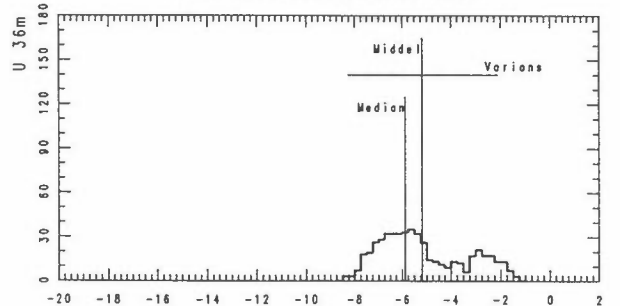
Vertikalt, 11.05.90, kl 1310



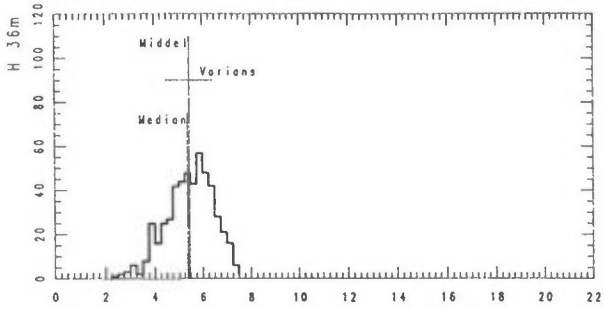
Nord-sør, 11.05.90, kl 1310



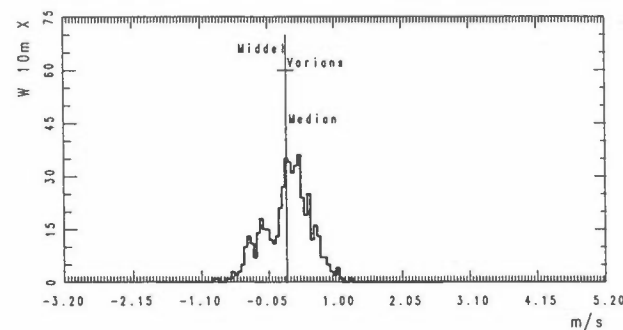
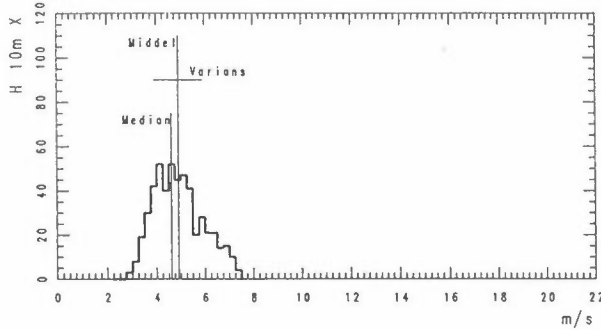
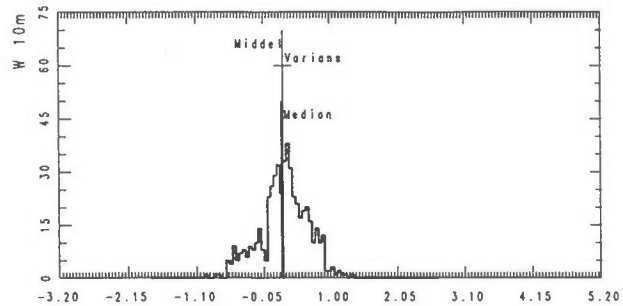
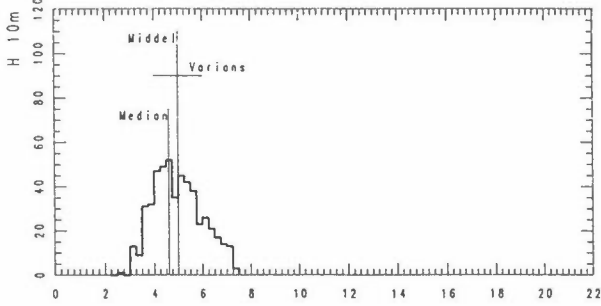
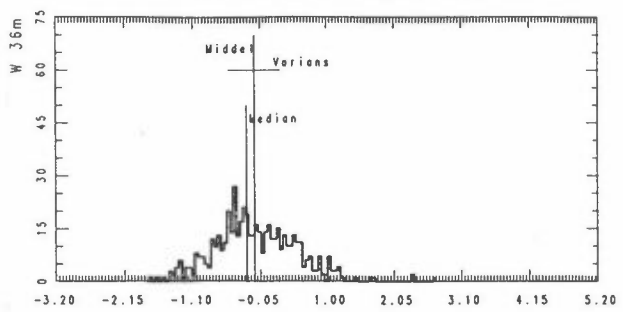
Øst-vest, 11.05.90, kl 1310



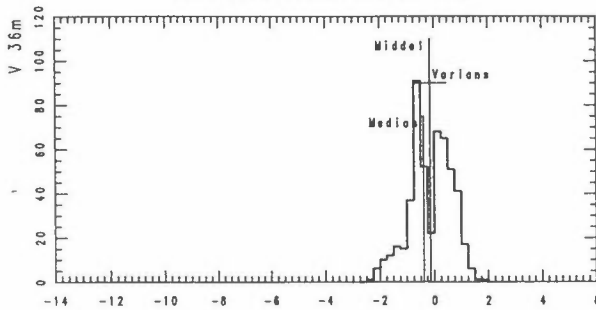
Horisontal vindvektor, 11.05.90, kl 1320



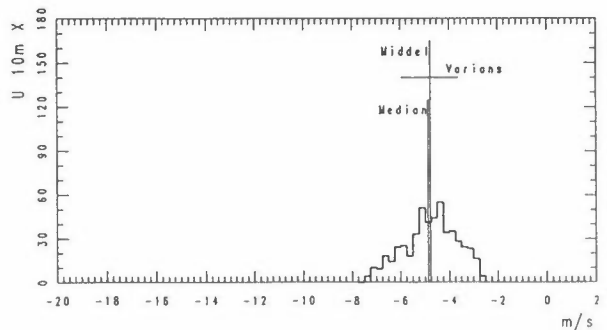
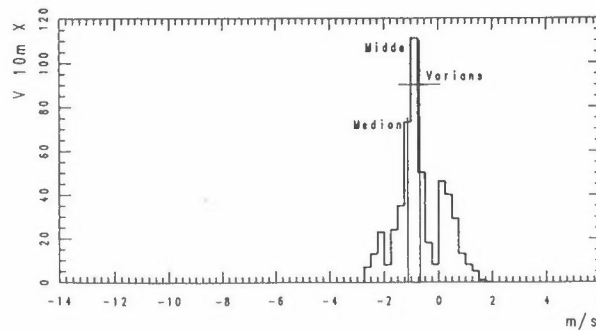
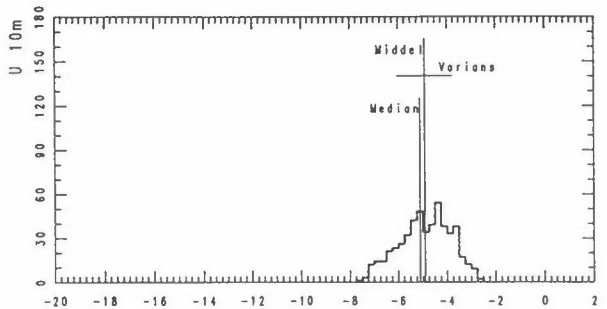
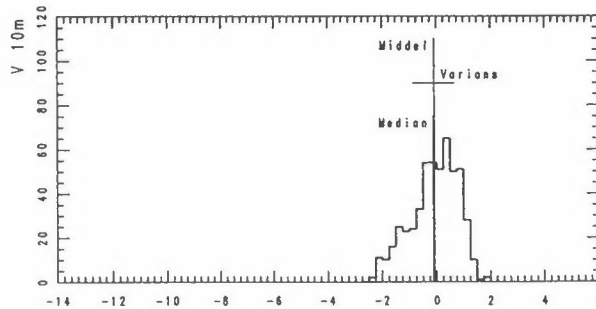
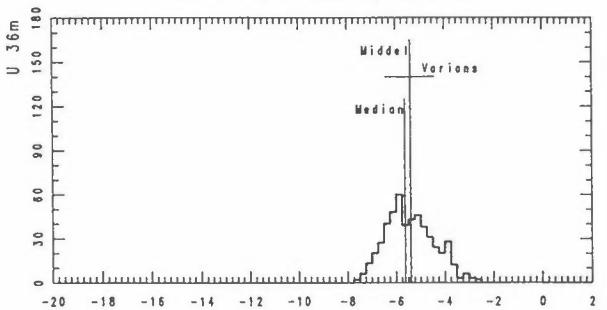
Vertikalt, 11.05.90, kl 1320



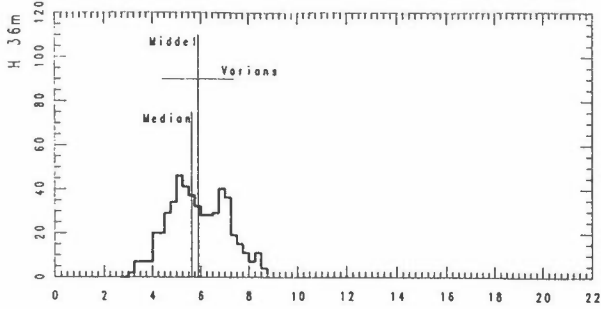
Nord-sør, 11.05.90, kl 1320



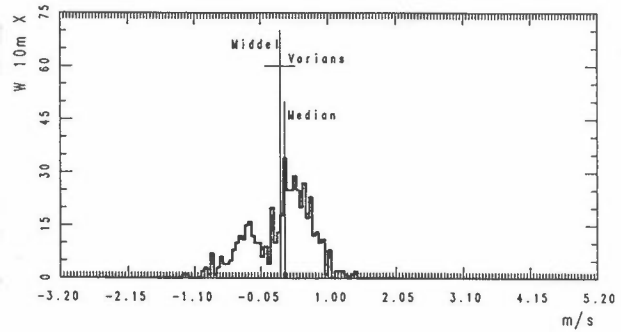
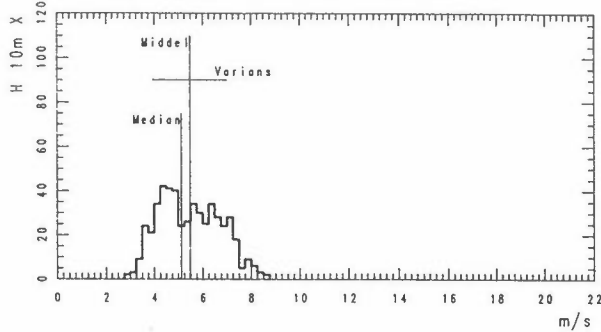
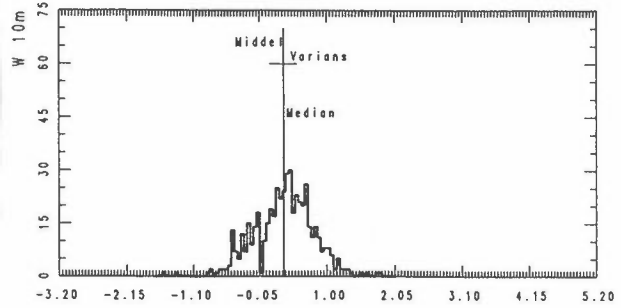
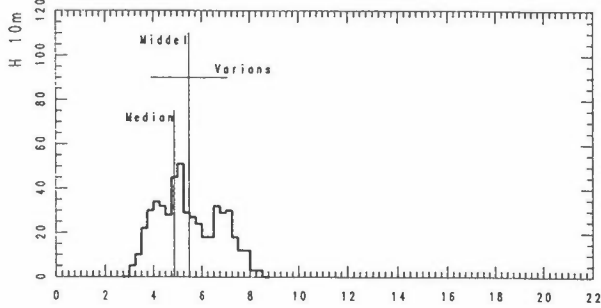
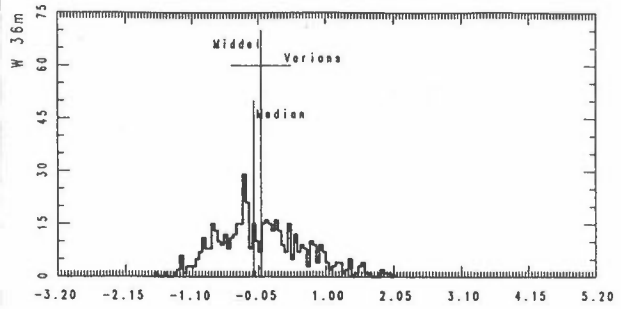
Øst-vest, 11.05.90, kl 1320



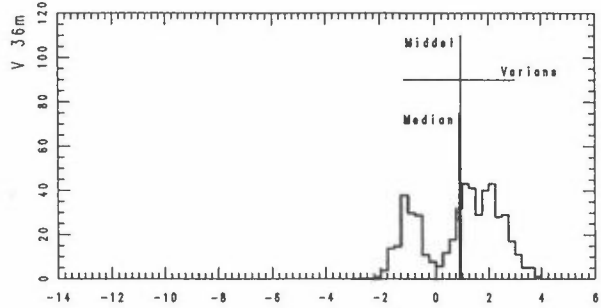
Horizontal vindvektor, 11.05.90, kl 1330



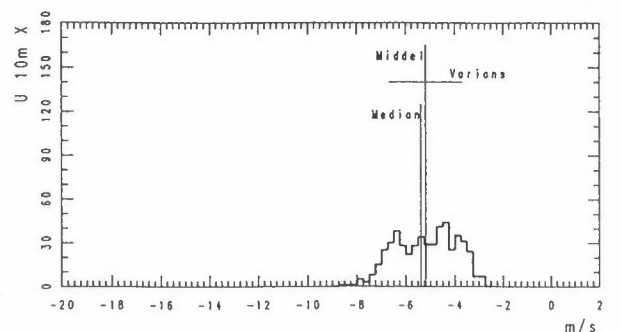
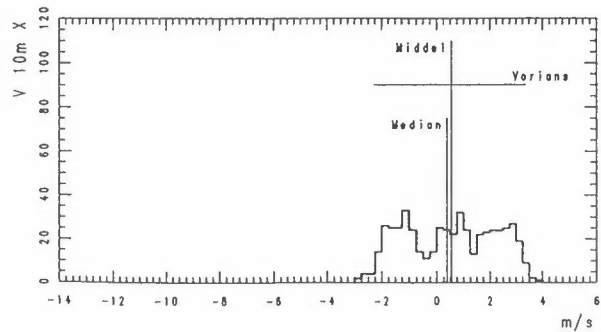
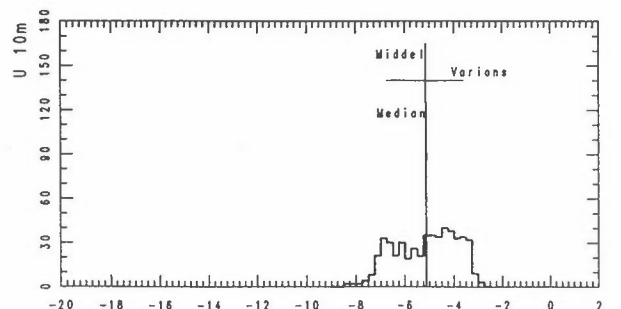
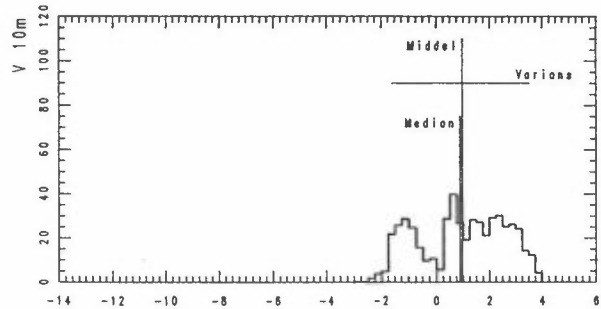
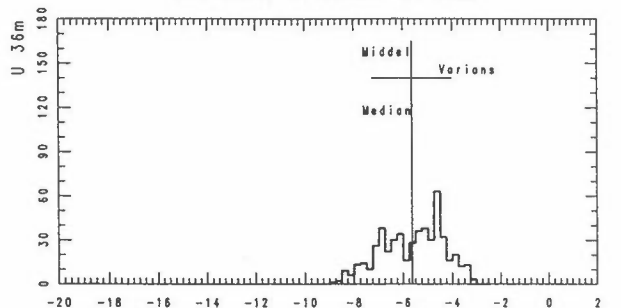
Vertikall, 11.05.90, kl 1330



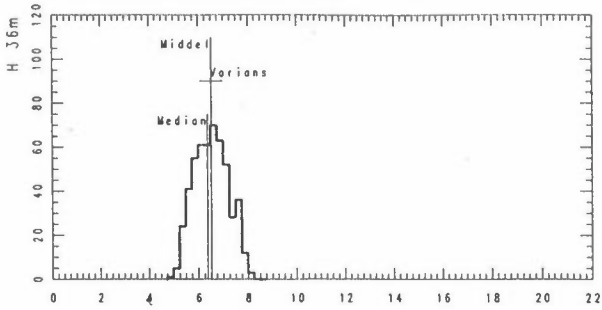
Nord-sør, 11.05.90, kl 1330



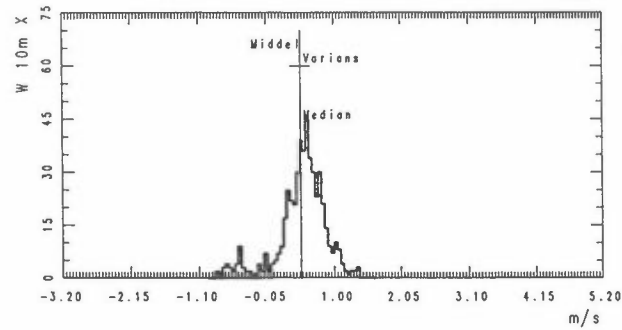
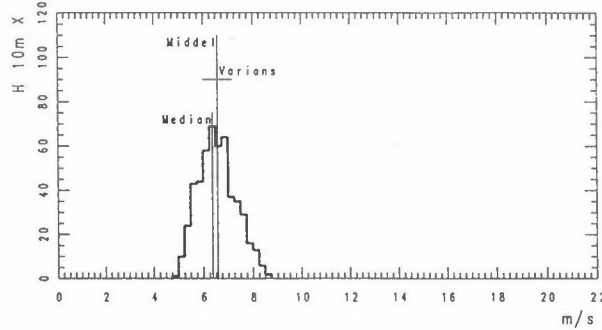
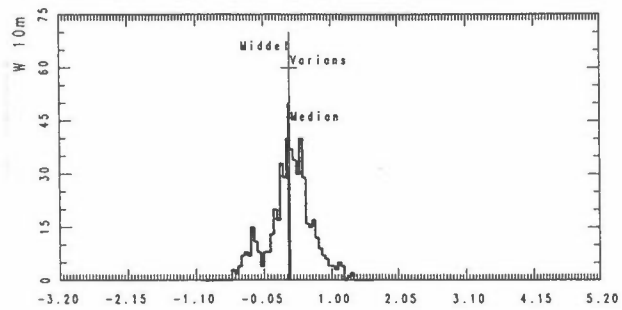
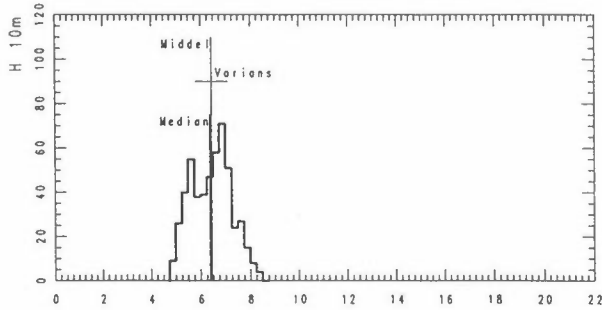
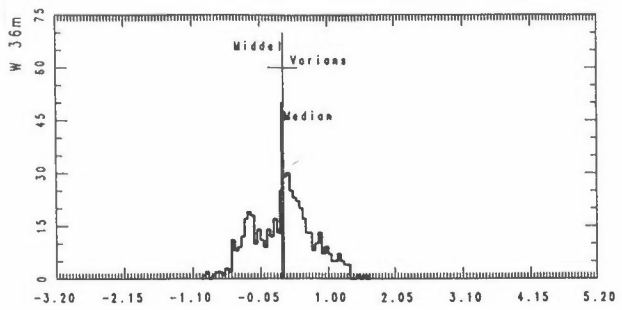
Øst-vest, 11.05.90, kl 1330



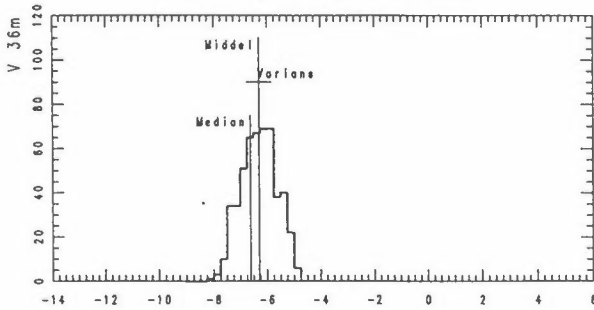
Horisonal vindvektor, 16.05.90, kl 0730



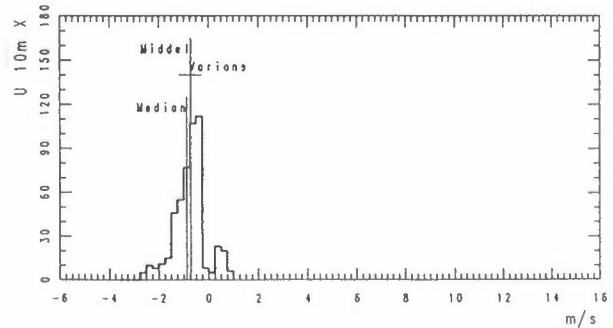
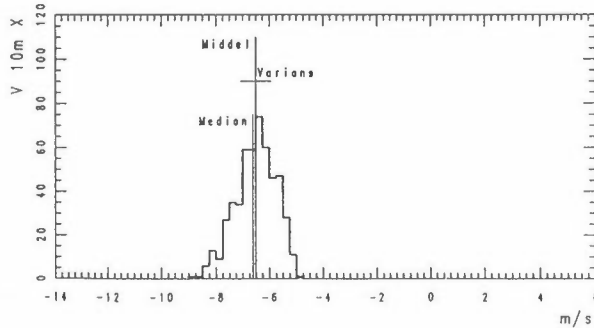
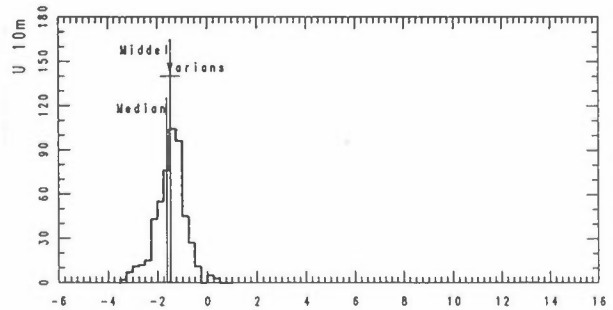
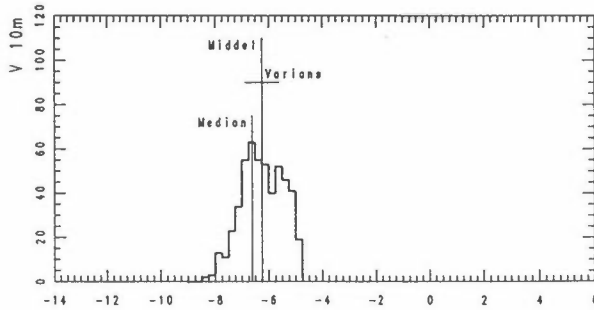
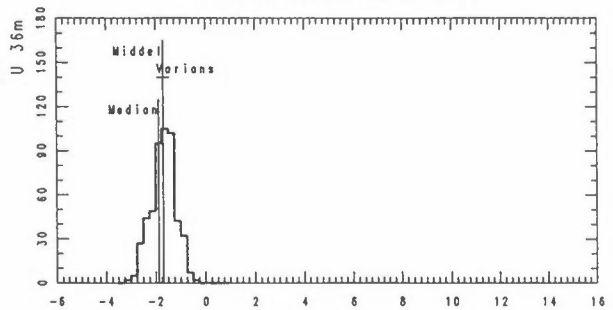
Vertikalt, 16.05.90, kl 0730



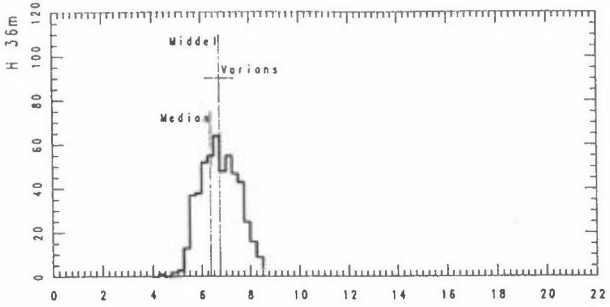
Nord-sør, 16.05.90, kl 0730



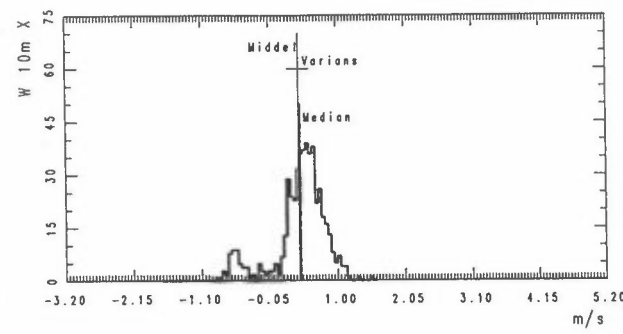
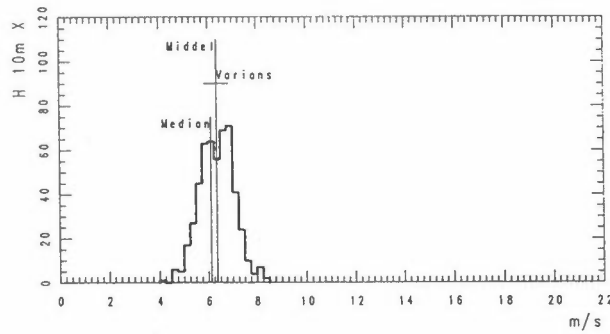
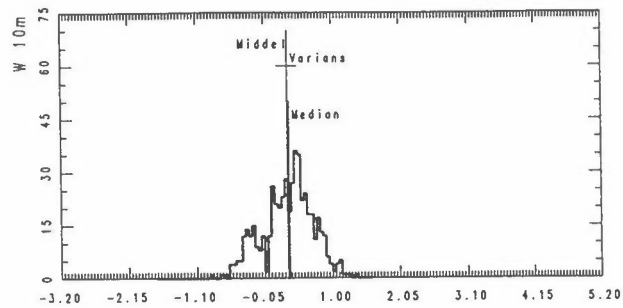
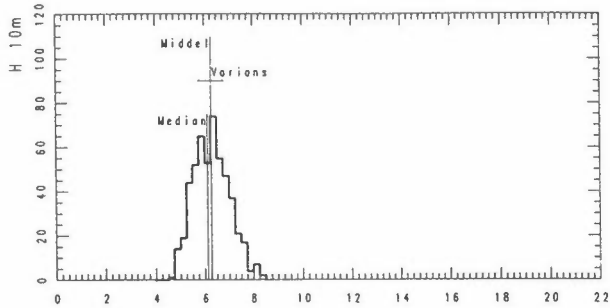
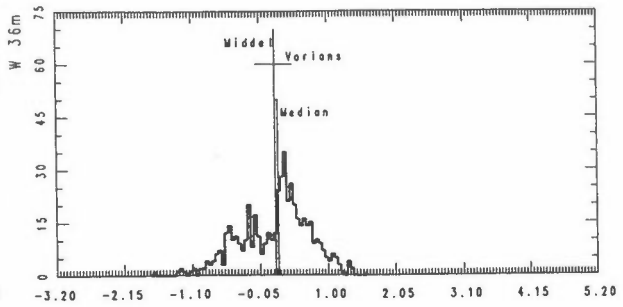
Øst-vest, 16.05.90, kl 0730



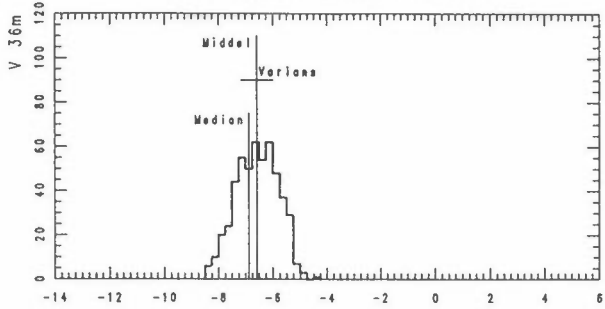
Horizontal vindvektor, 16.05.90, kl 0740



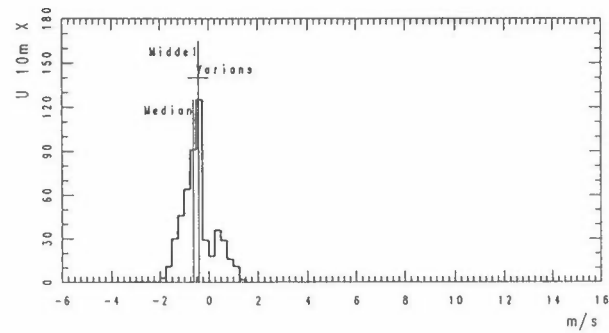
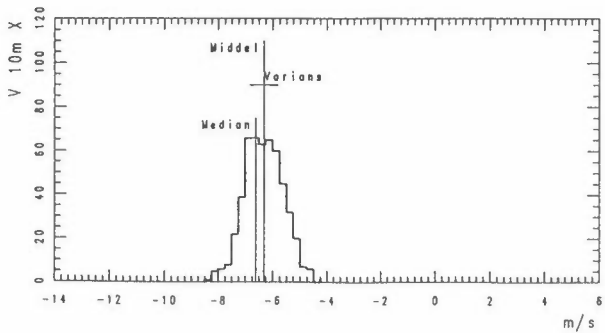
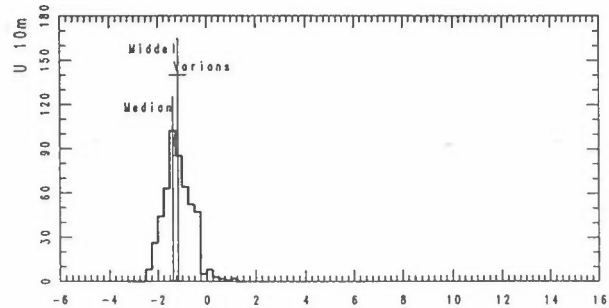
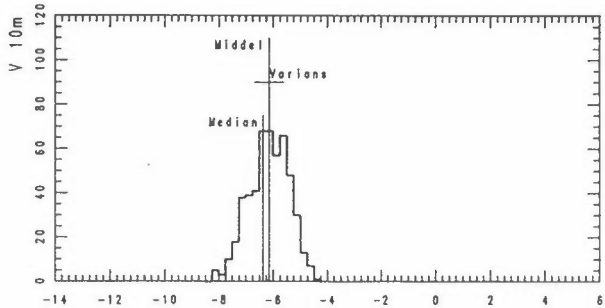
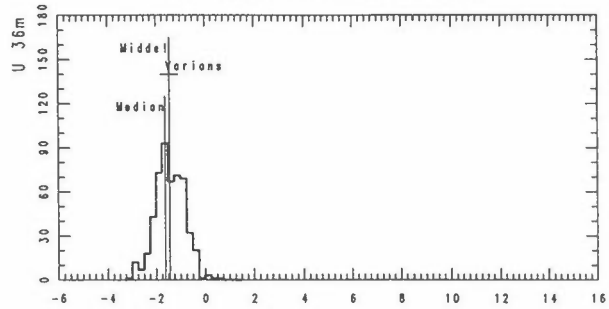
Vertikalt, 16.05.90, kl 0740



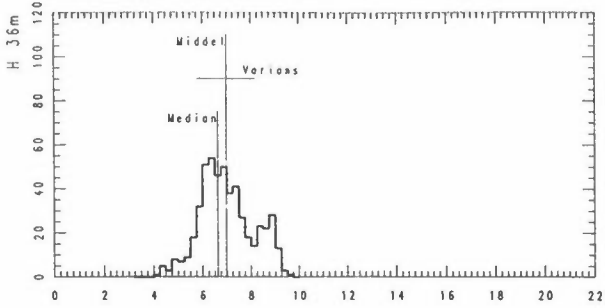
Nord-sør, 16.05.90, kl 0740



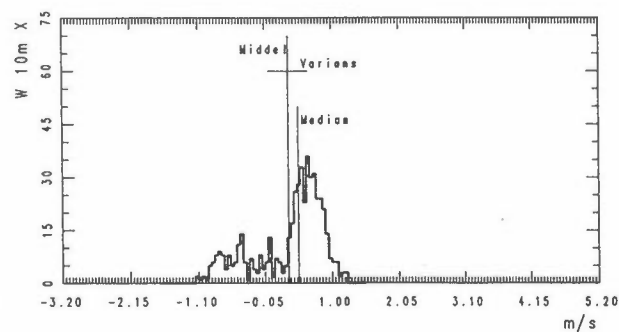
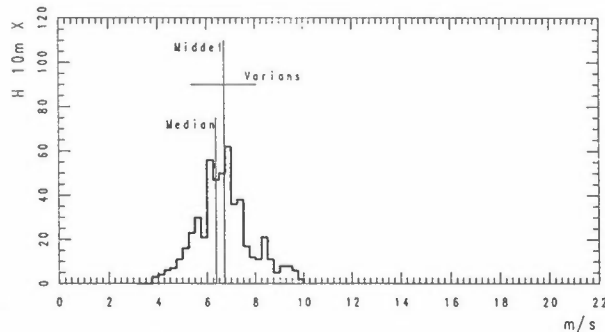
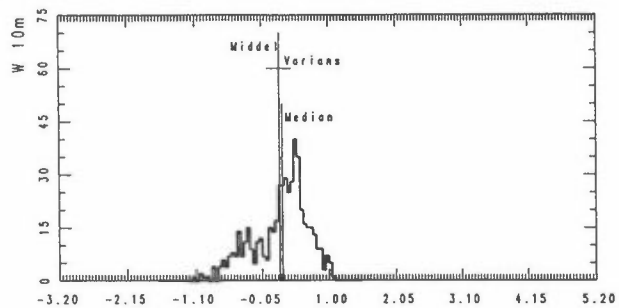
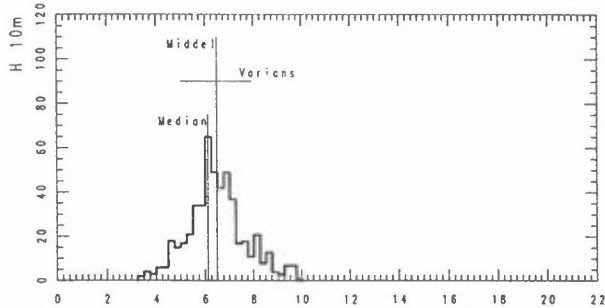
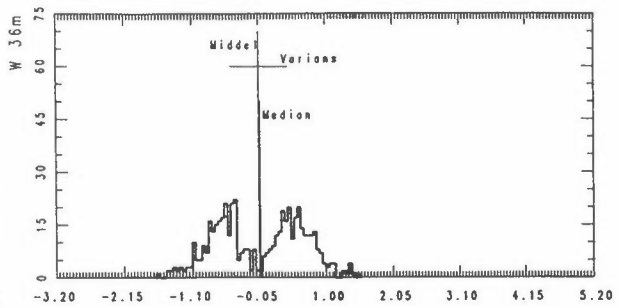
Øst-vest, 16.05.90, kl 0740



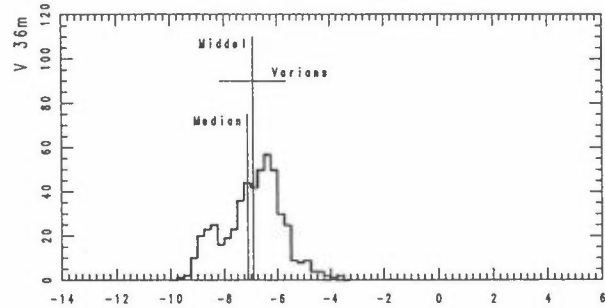
Horizontal vindvektor, 18.05.90, kl 0530



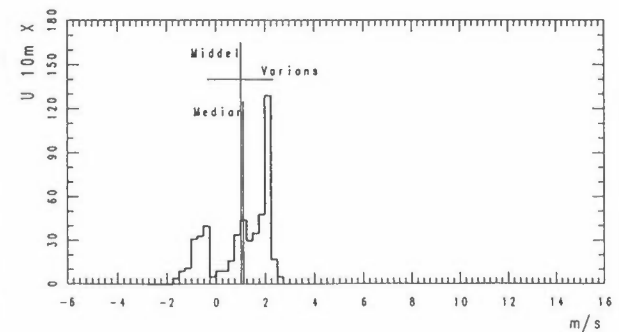
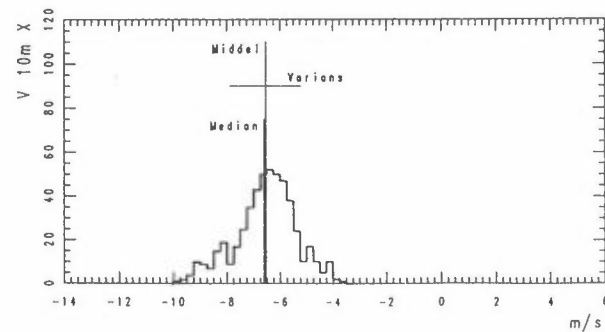
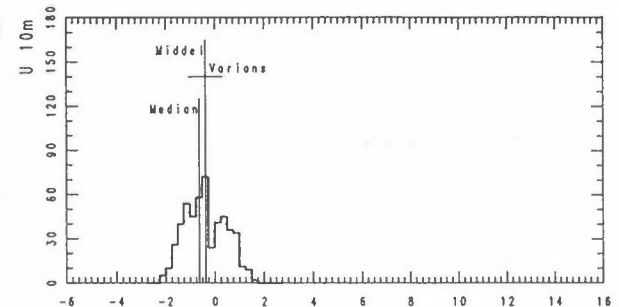
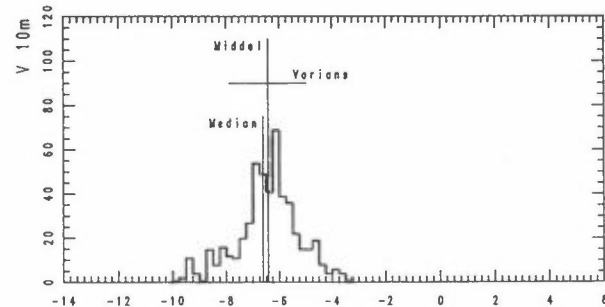
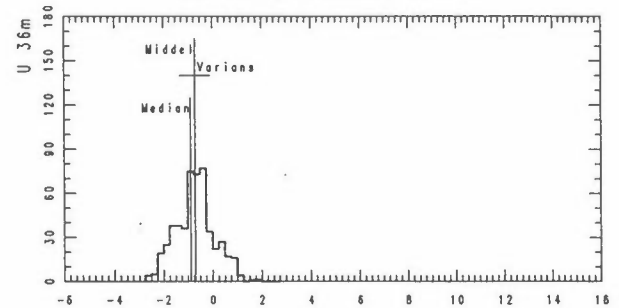
Vertikalt, 18.05.90, kl 0530



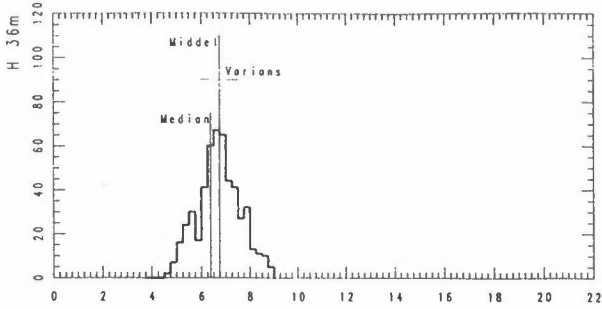
Nord-sør, 18.05.90, kl 0530



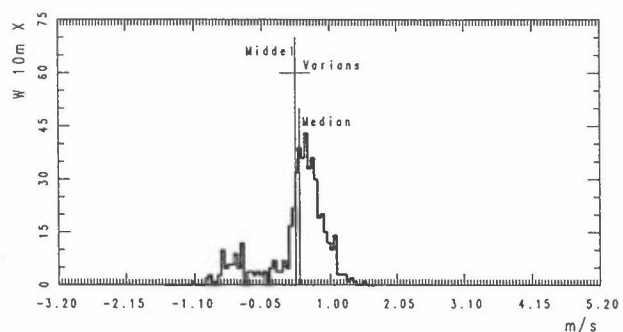
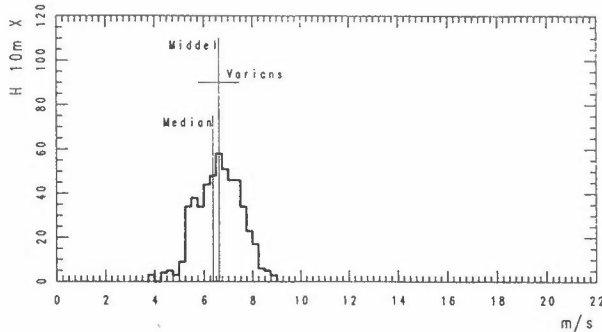
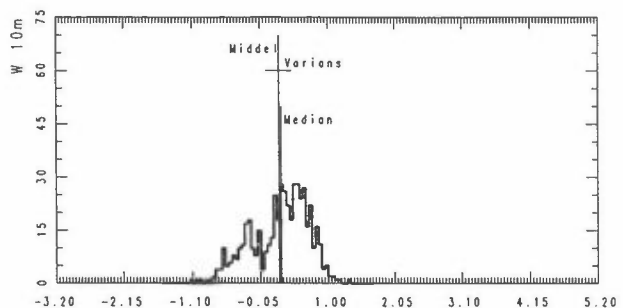
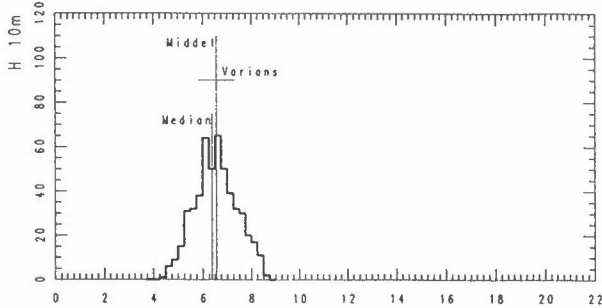
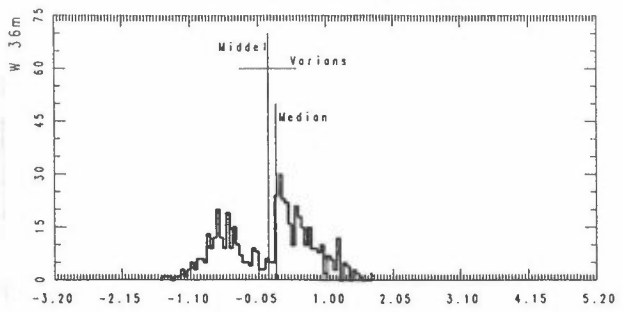
Øst-vest, 18.05.90, kl 0530



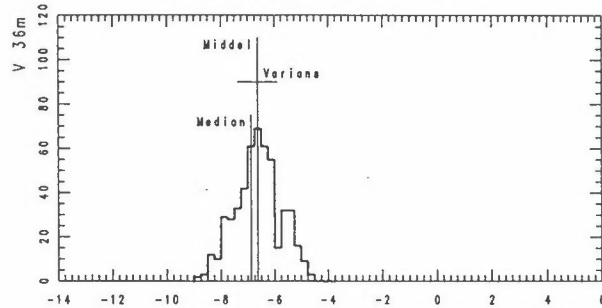
Horizontal vindvektor, 18.05.90, kl 0540



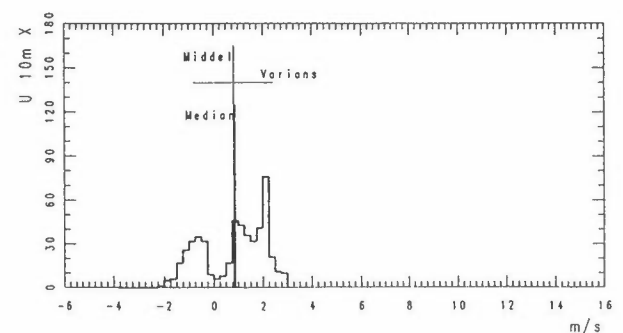
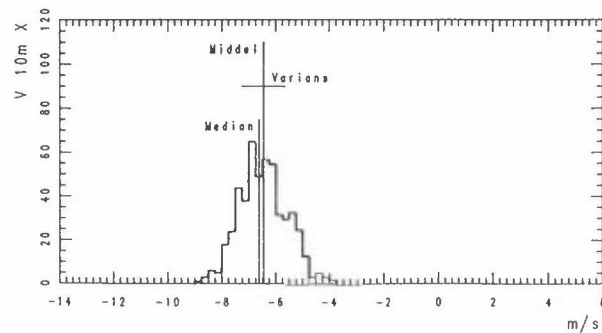
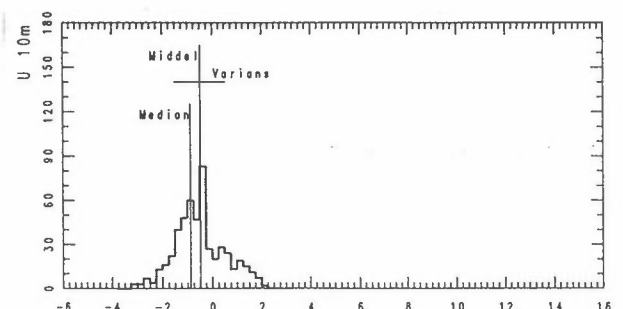
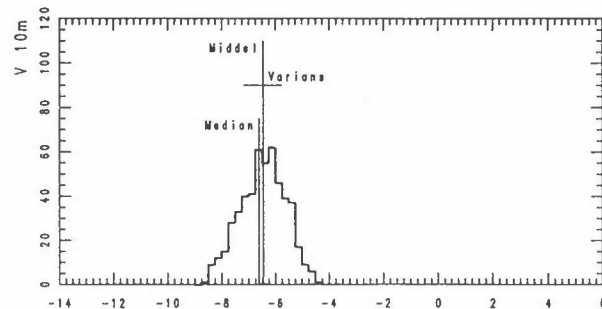
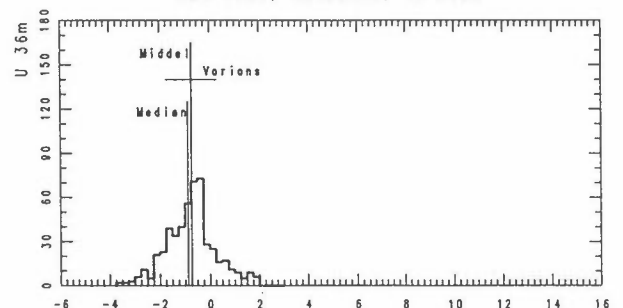
Vertikalt, 18.05.90, kl 0540



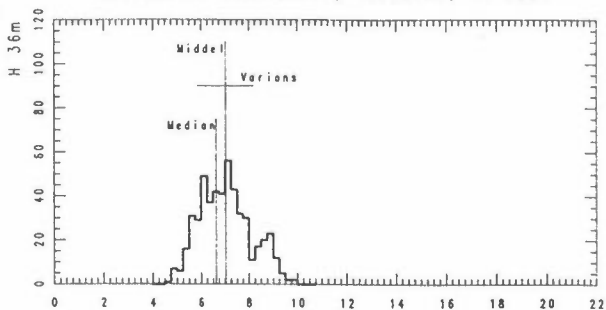
Nord-sør, 18.05.90, kl 0540



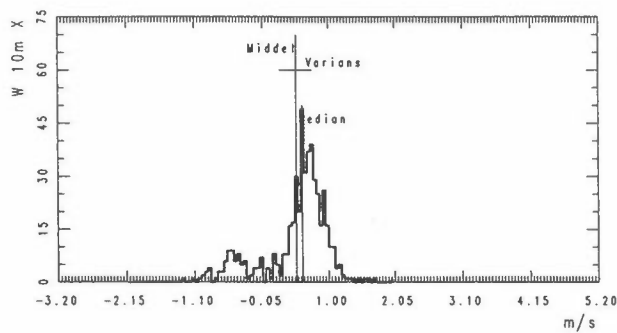
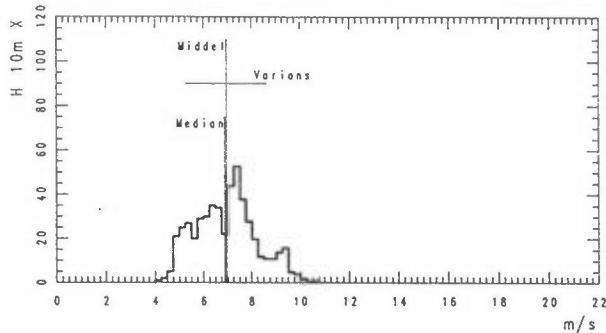
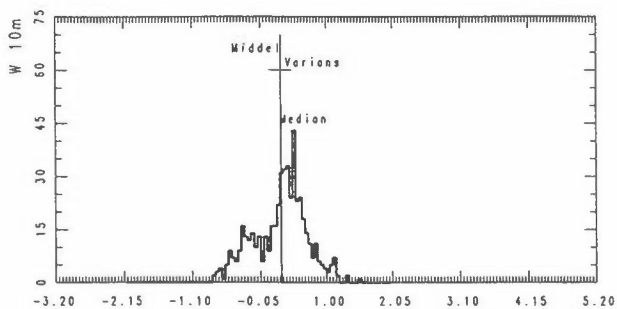
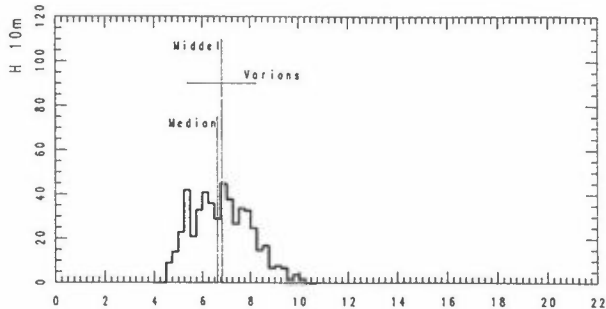
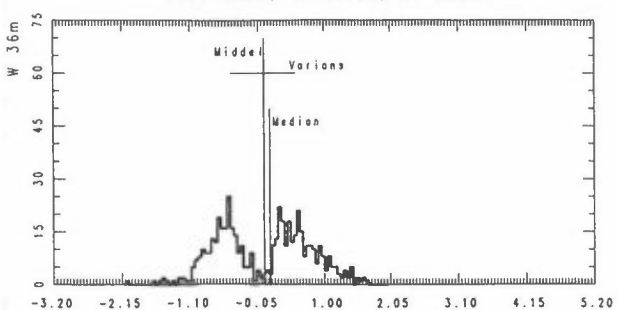
Øst-vest, 18.05.90, kl 0540



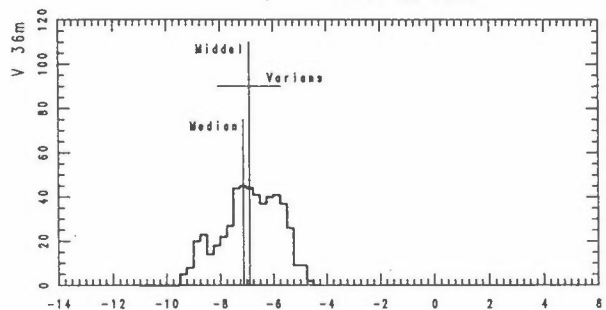
Horizontaal vindvektor, 18.05.90, kl 0550



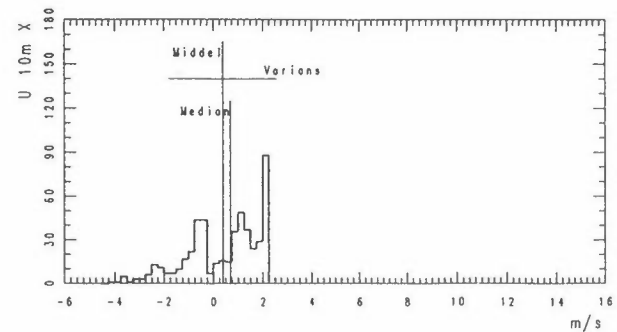
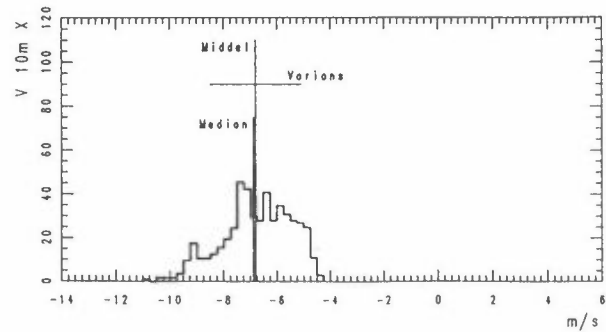
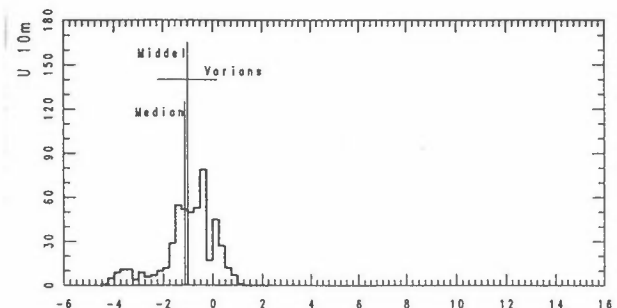
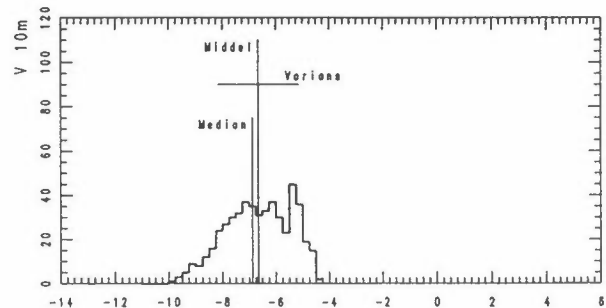
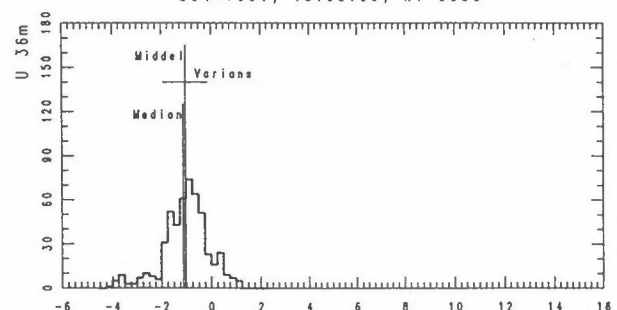
Vertikalt, 18.05.90, kl 0550



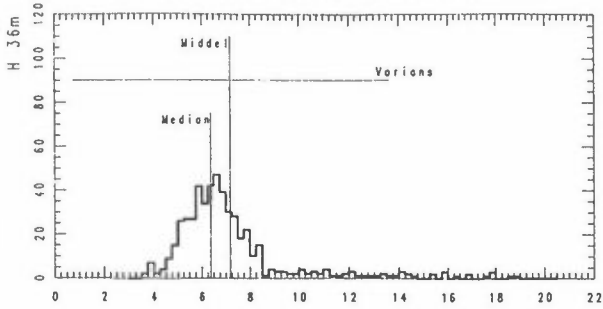
Nord-sør, 18.05.90, kl 0550



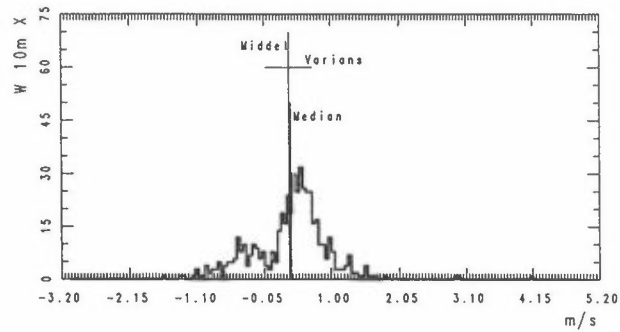
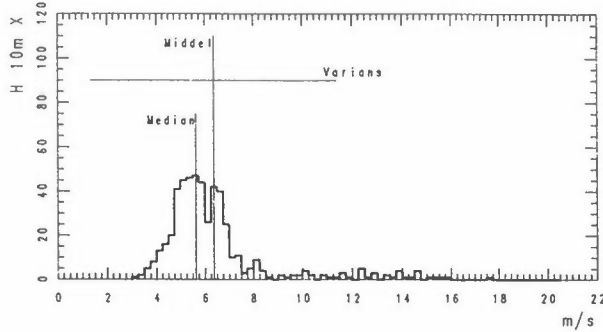
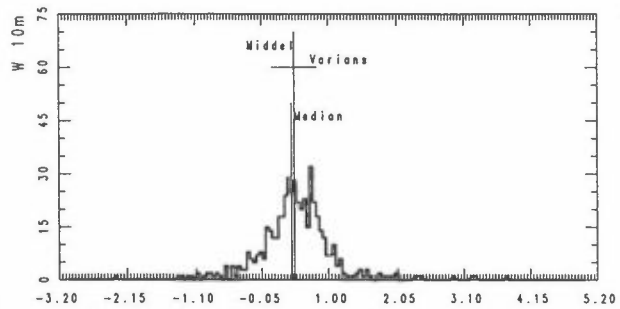
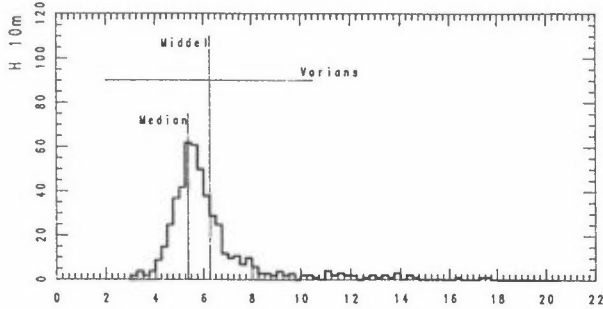
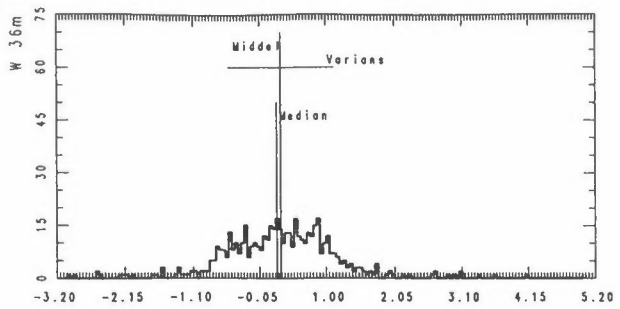
Øst-vest, 18.05.90, kl 0550



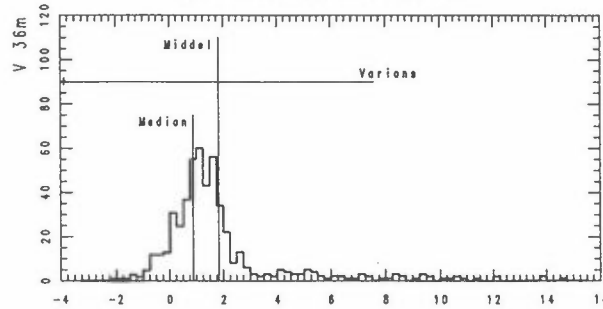
Horizontal vindvektor, 22.06.90, kl 2250



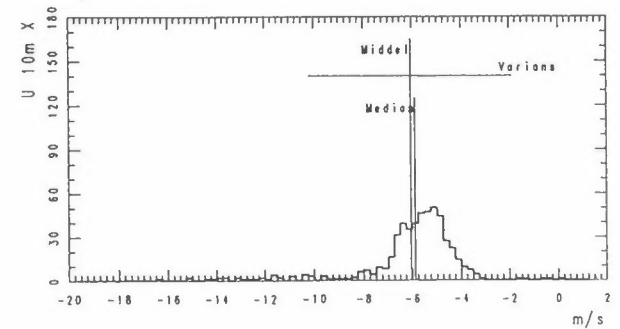
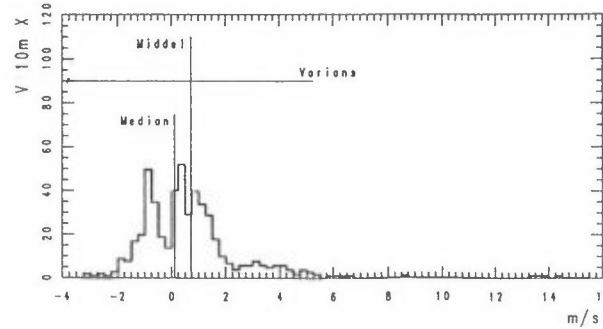
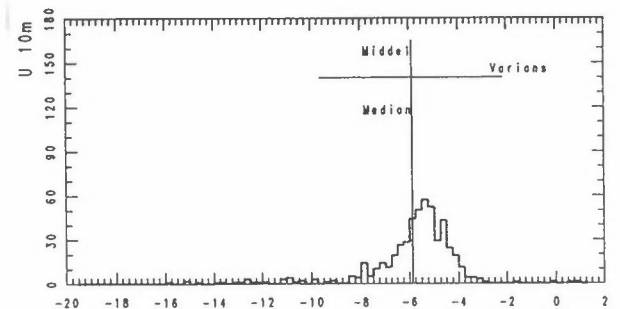
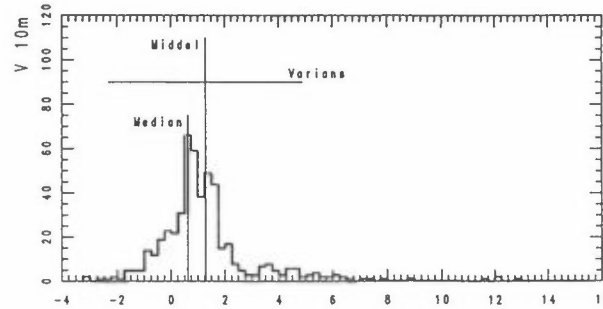
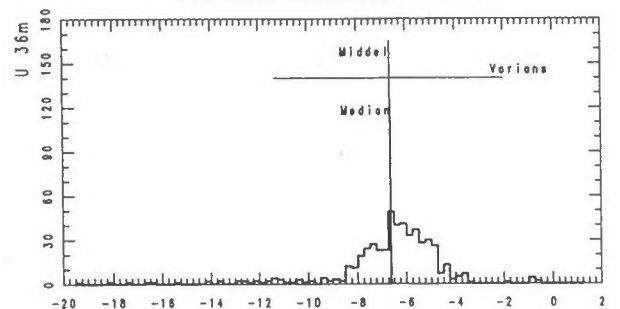
Vertikalt, 22.06.90, kl 2250



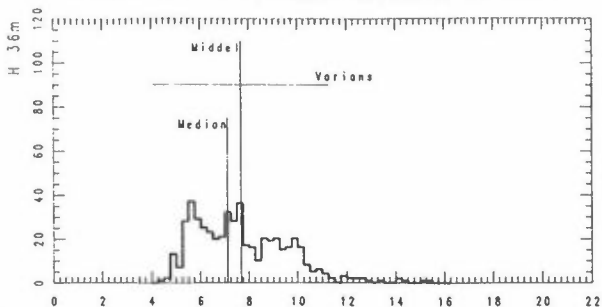
Nord-sør, 22.06.90, kl 2250



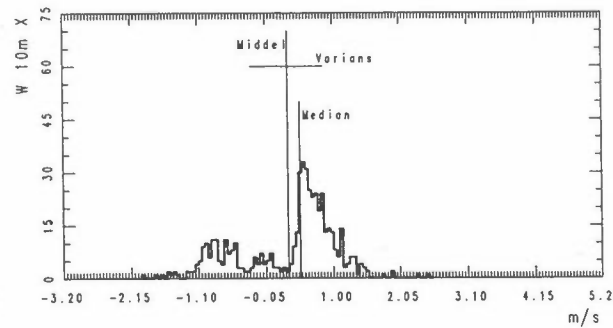
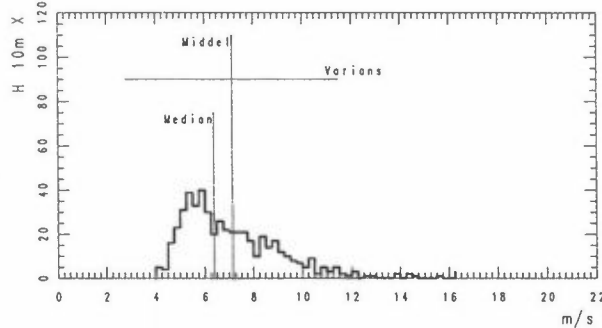
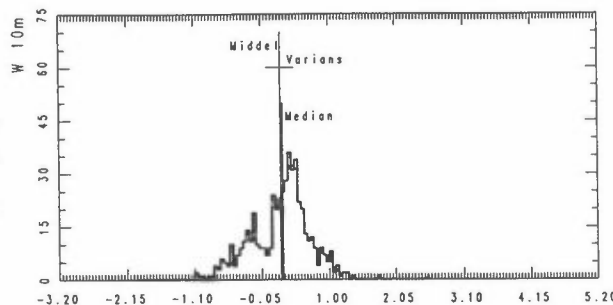
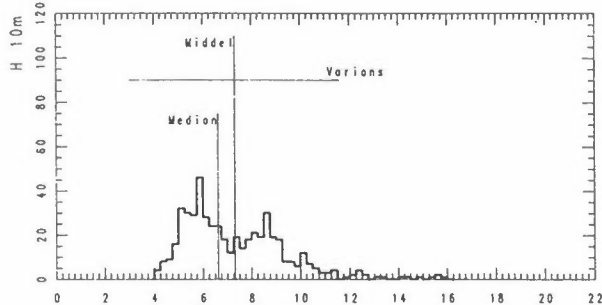
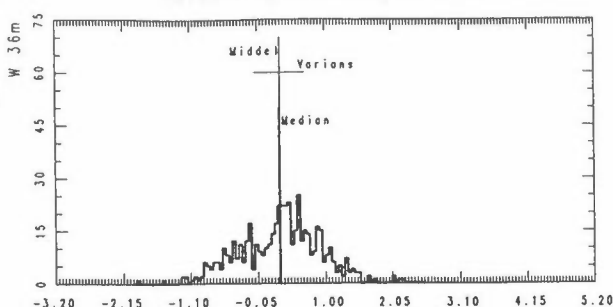
Øst-vest, 22.06.90, kl 2250



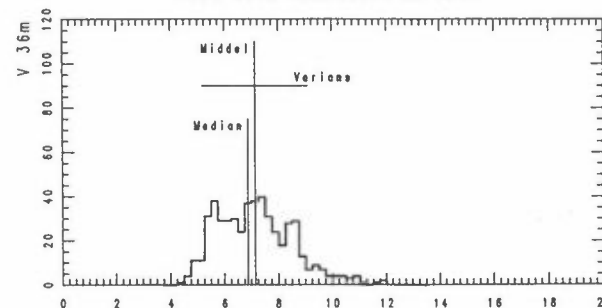
Horizontal vindvektor, 22.06.90, kl 2300



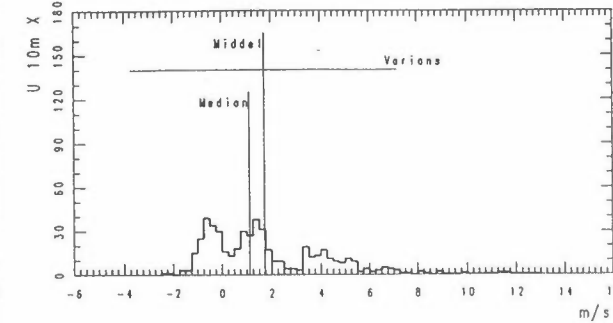
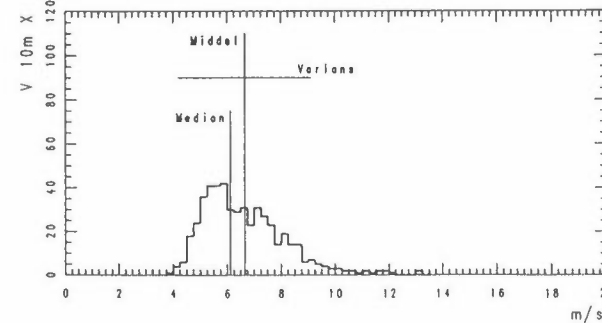
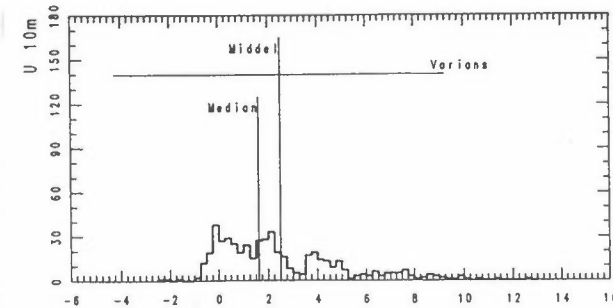
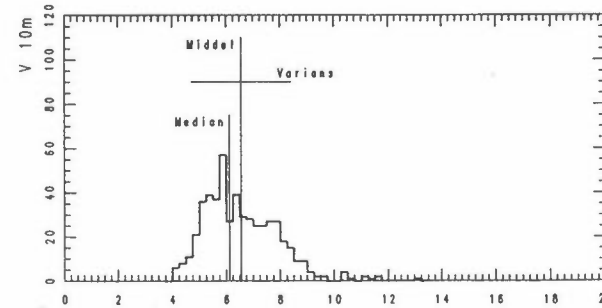
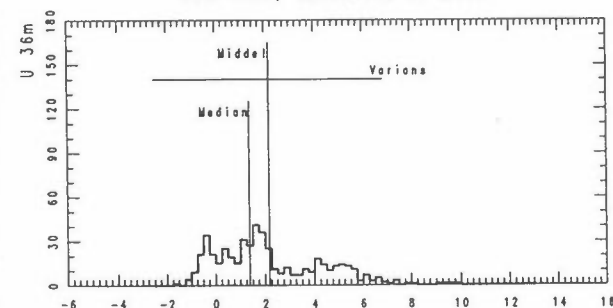
Vertikalt, 22.06.90, kl 2300



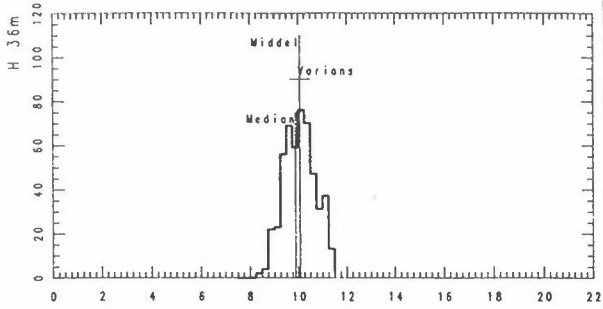
Nord-sør, 22.06.90, kl 2300



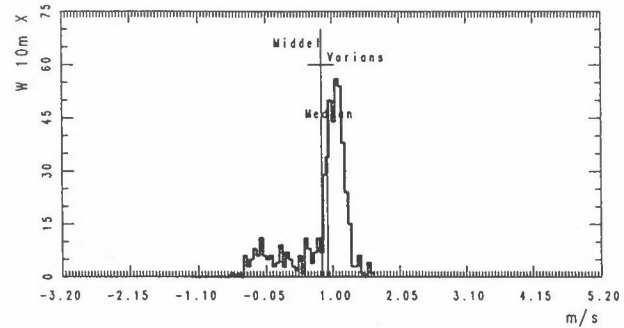
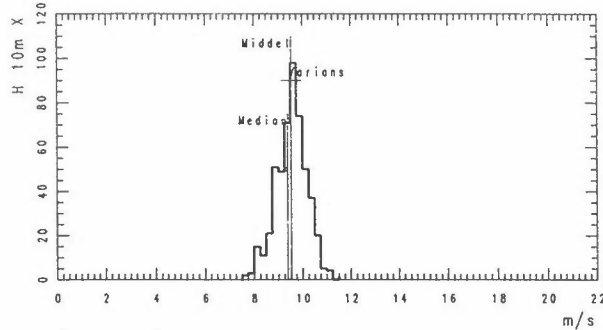
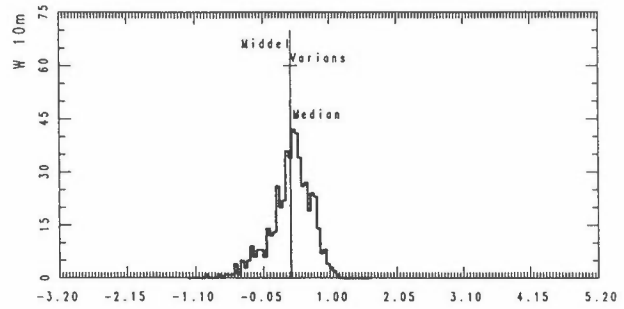
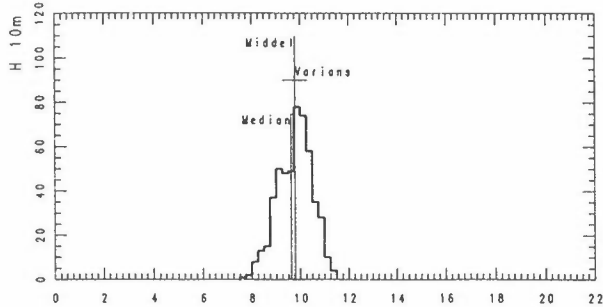
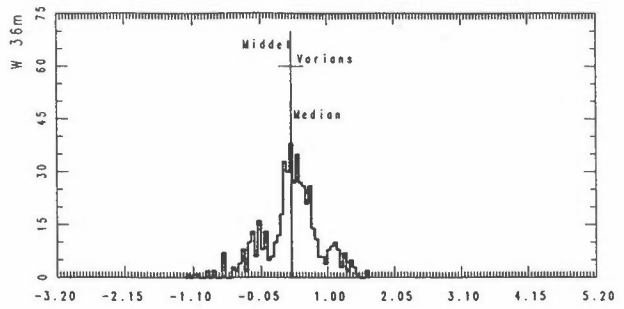
Øst-vest, 22.06.90, kl 2300



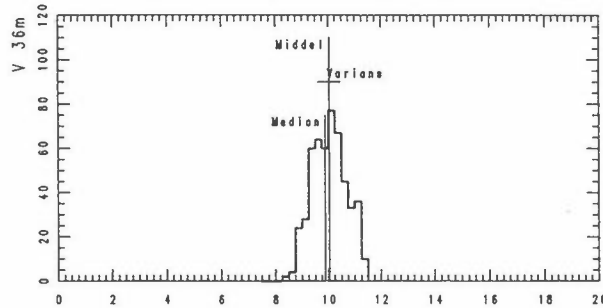
Horisontal vindvektor, 25.06.90, kl 1440



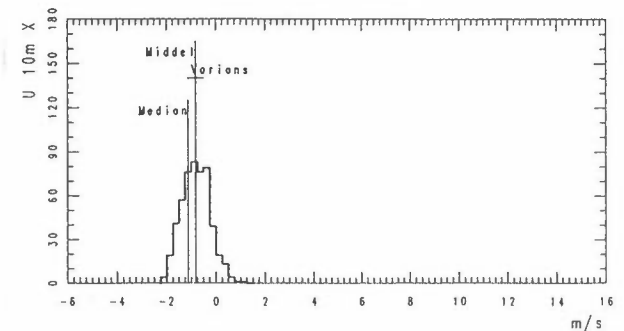
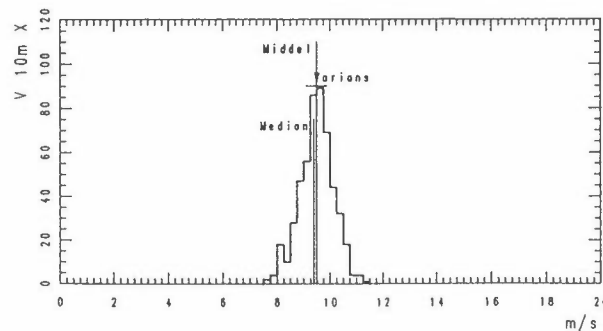
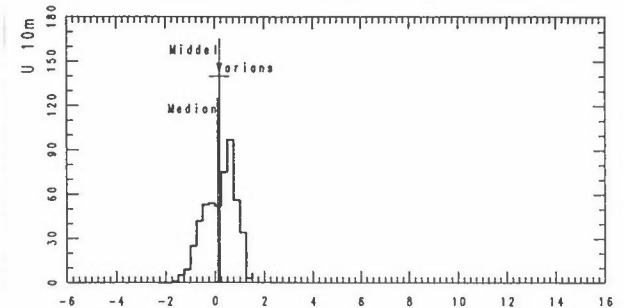
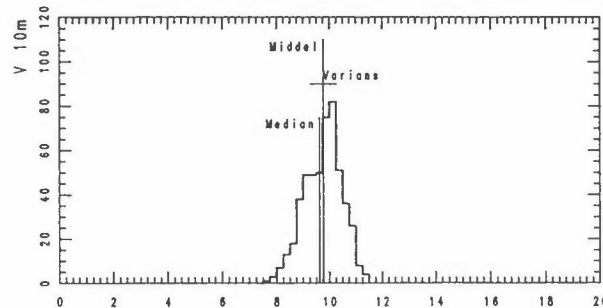
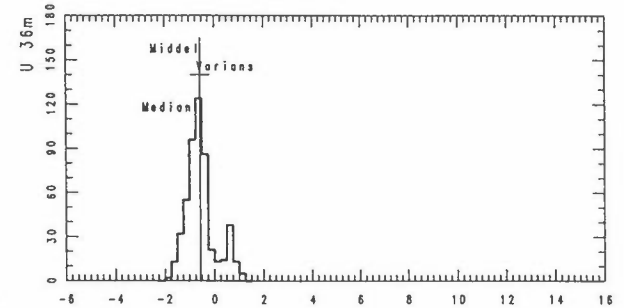
Vertikall, 25.06.90, kl 1440



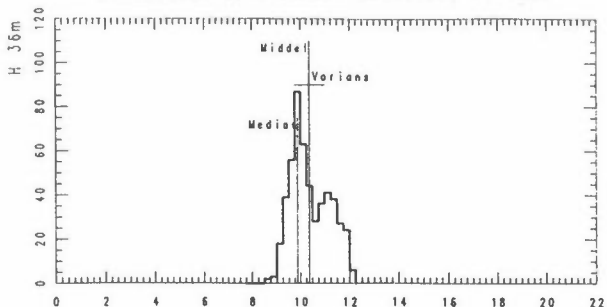
Nord-sør, 25.06.90, kl 1440



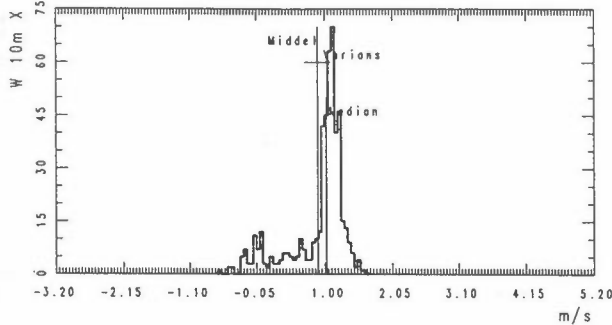
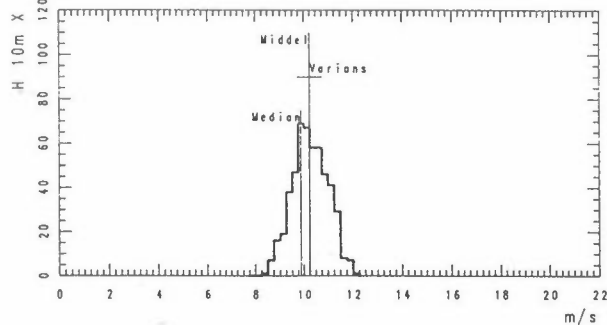
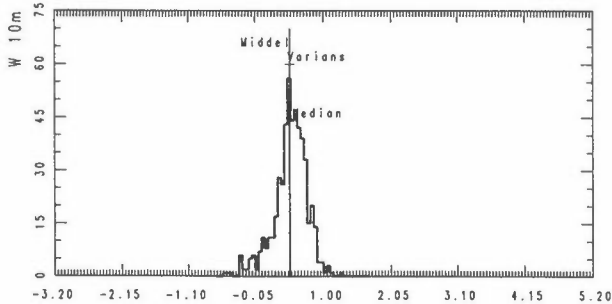
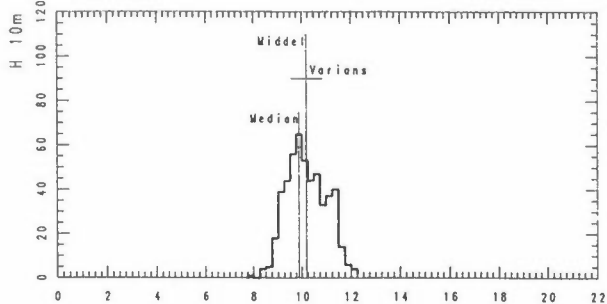
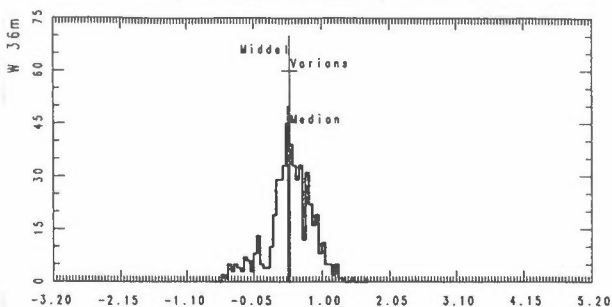
Øst-vest, 25.06.90, kl 1440



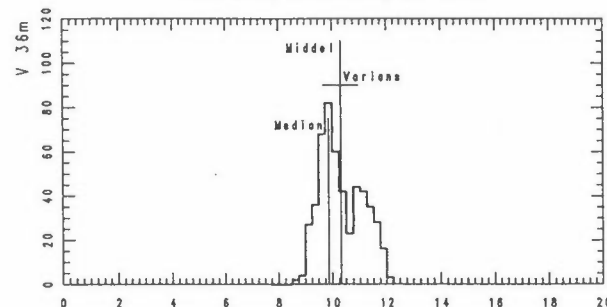
Horisontal vindvektor, 25.06.90, kl 1450



Vertikall, 25.06.90, kl 1450



Nord-sør, 25.06.90, kl 1450



Øst-vest, 25.06.90, kl 1450

