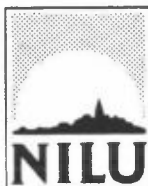


NILU TR : 10/86  
REFERENCE: O-8118  
DATE : SEPTEMBER 1986

**PRECIPITATION AND AIR CHEMISTRY AT THE  
NORWEGIAN BACKGROUND STATIONS, 1983**

**Kari Hoem and Einar Joranger**



**Norsk institutt for luftforskning**

---

Postboks 130 - 2001 Lillestrøm

NILU TR : 10/86  
REFERENCE: O-8118  
DATE : SEPTEMBER 1986

**PRECIPITATION AND AIR CHEMISTRY AT THE  
NORWEGIAN BACKGROUND STATIONS, 1983**

Kari Hoem and Einar Joranger

NORWEGIAN INSTITUTE FOR AIR RESEARCH  
P.O. BOX 130, N-2001 LILLESTRØM  
NORWAY



**PRECIPITATION AND AIR CHEMISTRY AT THE NORWEGIAN  
BACKGROUND STATIONS, 1983**

This report presents precipitation chemistry data for 1983, based on samples collected at 20 background stations in Norway. Air measurements of sulphur dioxide and particulate sulphate were made at 8 of the stations.

Ten of the stations were operated as part of the Norwegian national environmental monitoring programme (Statlig program for forurensnings-*overvåking*) which started in 1981 with The State Pollution Control Authority (SFT) as responsible for the co-ordination and implementation of the programme. Six of these stations are also part of the Co-operative programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollution in Europe (EMEP), in operation from 1978.

The present data report is a supplement to the SFT yearly report for 1983 (Statens forurensningstilsyn, 1984), and includes the precipitation chemistry data from eleven supplementary NILU-stations. Of these, three stations have daily sampling (Lista, Vatnedalen, Løken), six have weekly sampling (Vikedal, Kjeller, Kaupanger, Skrova, Vardø, Kise (week)) and two stations have monthly sampling (Ås and Kise (month)).

The air samples of sulphur dioxide and particulate sulphate are made daily, except at Vardø and Skrova with sampling three times a week.

The Norwegian background measurements of zinc, cadmium and lead in precipitation at 4 stations are only presented in the SFT report. Reference is also made to the SFT report for description of analytical methods and the discussion of the data.

The data are presented as monthly and annual values. The daily values are available at NILU.

At the monthly precipitation sampling stations at As and Kise the monthly mean concentrations of the main components are generally higher than measured at the stations with daily precipitation sampling. This is probably due to greater dry deposition from local and long-range transported pollutants when using monthly bulk sampling. In addition, the evaporation from the bulk sampler may cause higher concentrations particularly in the summer season and with small precipitation amounts.

#### **REFERENCES**

Statens forurensnings-  
tilsyn

Overvåking av langtransportert forurenset  
luft og nedbør. Årsrapport 1983.  
Oslo 1984. (Statlig program for forurensnings-  
overvåking. Rapport nr 162/84).

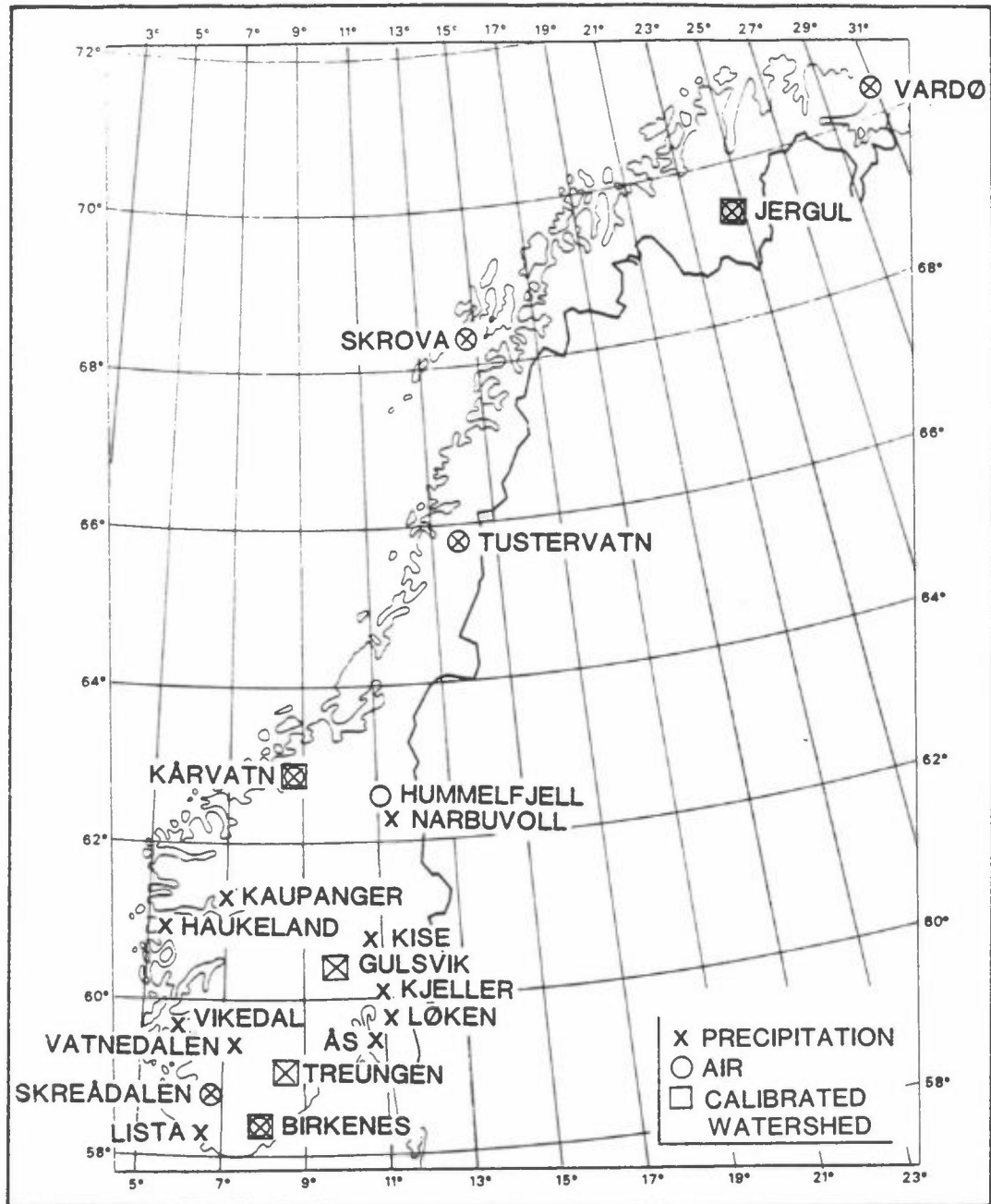


Figure 1: Norwegian background stations, 1983.

Table 1: Background stations in Norway 1983. The station sites are shown in Figure 1.

Station	County	Precipi. normal 1931-60*	m. a. s. l.	Lat. (N)	Long. (E)	Start	Measurements						Station address
							Air			Precipitation			
							D	W	M	1	2	M	
Birkenes	Aust-Agder	(1305)	190	58° 23'	8° 15'	Nov 71	x	x	x	x	x		Håvar Aage Lien
Skredåalen*	Vest-Agder	2015	475	58° 49'	6° 43'	Nov 71	x	x	x	x	x		Asa Skreå
Treungen (Storgama)	Telemark	(1005)	270	59° 01'	8° 32'	Sep 73	x	x	x	x	x		P.Ø. Stokstad
Gulsvik (Langtjern)	Buskerud	(760)	260	60° 22'	9° 39'	Sep 74	x	x	x	x	x		K. Sønsteby
Narbuvoll	Hedmark	(534)	768	62° 21'	11° 28'	Apr 77	x	x	x	x	x		T. Narbuvoll
Hummelfjell	Hedmark	-	1539	62° 27'	11° 16'	Mar 73	x	x	x	x	x		T. Hernes
Haukeland*	Hordaland	3225	204	60° 49'	5° 35'	Aug 81	x	x	x	x	x		H. Haukeland
Kårvatn (Todalen)	Møre og Romsdal	(1467)	210	62° 47'	8° 53'	Feb 78	x	x	x	x	x		Erik Halle
Tustervatn*	Nordland	1100	439	65° 50'	13° 55'	Des 71	x	x	x	x	x		A. Tustervatn
Jergul	Finnmark	(370)	255	69° 24'	24° 36'	Nov 76	x	x	x	x	x		K. Holmestrand
Lista*	Vest-Agder	1049	13	58° 06'	6° 34'	Nov 71	x	x	x	x	x		Kåre Nordberg
Vatnedalen	Aust-Agder	(945)	800	59° 28'	7° 23'	Nov 73	x	x	x	x	x		Lilly Vatnedalen
Løken I*	Akershus	(774)	150	59° 48'	11° 27'	Feb 72	x	x	x	x	x		Mimmi Hauer
Vikedal I*	Rogaland	2650	156	59° 33'	6° 00'	Mar 82	x	x	x	x	x		Magne Hunseid
Kjeller	Akershus	(810)	100	59° 58'	11° 02'	Sep 83	x	x	x	x	x		NILU
Kaupanger	Sogn og Fjordane	(910)	500	61° 09'	7° 06'	Jul 83	x	x	x	x	x		Harald Haukås
Skrova*	Nordland	742	18	68° 09'	14° 39'	Sep 82	x	x	x	x	x		Skrova Fyr
Vardø	Finnmark	(545)	60	70° 23'	31° 09'	Sep 82	x	x	x	x	x		Vardø Fyr
As*	Akershus	785	95	59° 40'	10° 47'	1954	x	x	x	x	x		Margit Hopland
Kise	Hedmark	(534)	128	60° 46'	10° 48'	1956	x	x	x	x	x		Statens forskpøksgård 2350 Nes i Hedmark

Analyses:

Air, daily and three times

a week (see text)

Precipitation D : SO<sub>2</sub> and SO<sub>3</sub>

Precipitation W1 : Amount (mm), pH, conductivity, SO<sub>4</sub>, NH<sub>4</sub>, NO<sub>3</sub>, Ca, (K), Mg, Cl, (Na)

Precipitation W2 : Amount (mm), Pb, Cd, Zn

Precipitation M : Amount (mm), pH, conductivity, SO<sub>4</sub>, NH<sub>4</sub>, NO<sub>3</sub>, Ca, (K), Mg, Cl, (Na)

: Amount (mm), pH, conductivity, SO<sub>4</sub>, NH<sub>4</sub>, NO<sub>3</sub>, Ca, K, Mg, Cl, Na

\* Precipitation stations for the Norwegian Meteorological Institute (DNMI)

( ) the nearest DNMI station

Table 2: Annual weighted mean concentrations ( $\mu\text{ekv/l}$ ) of precipitation components measured at the Norwegian background stations, 1983.

Station	H <sup>+</sup>	SO <sub>4</sub> <sup>2-</sup>	NO <sub>3</sub> <sup>-</sup>	NH <sub>4</sub> <sup>+</sup>	Ca <sup>2+</sup>	Sea salt content		
						Mg <sup>2+</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>
Birkenes	47	57	35	35	12	14	65	7
Skreådalen	20	27	14	18	9	19	100	10
Treungen	44	52	28	31	9	4	19	2
Gulsvik	41	59	28	41	12	4	10	2
Narbuvoll	17	24	11	13	9	4	12	2
Haukeland	20	20	10	10	7	21	105	11
Kårvatn	8	9	4	4	9	16	80	8
Tustervatn	13	13	4	6	8	18	92	9
Jergul	25	26	8	8	6	3	10	2
Lista	44	55	35	29	38	139	697	73
Vatnedalen	17	18	9	7	7	6	30	3
Løken	38	57	34	44	14	8	32	4
Vikedal I	22	25	12	12	10	24	118	13
Skrova	18	33	20	15	142	708	3665	365
Vardø	11	86	23	118	149	676	3512	350
Kise (week)	36	61	31	48	21	5	10	3
Kise (month)	36	93	35	59	28	8	11	4
As	42	95	51	48	38	19	56	10



Table 3: Annual weighted mean concentrations of precipitation components at the Norwegian background stations, 1983.

Station	H <sup>+</sup>	SO <sub>4</sub> <sup>-S</sup>	NO <sub>3</sub> <sup>-N</sup>	NH <sub>4</sub> <sup>-N</sup>	Ca	Mg	Cl
	µeq/l	mg S/l	mg N/l	mg N/l	mg/l	mg/l	mg/l
Birkenes	47	0.91	0.49	0.50	0.24	0.17	2.30
Skreådalen	20	0.43	0.19	0.26	0.18	0.23	3.55
Treungen	44	0.83	0.40	0.43	0.18	0.05	0.69
Gulsvik	41	0.94	0.40	0.58	0.25	0.05	0.37
Narbuvoll	17	0.38	0.16	0.19	0.18	0.05	0.42
Haukeland	20	0.32	0.14	0.14	0.15	0.26	3.72
Kårvatn	8	0.14	0.05	0.06	0.18	0.20	2.82
Tustervatn	13	0.20	0.06	0.09	0.16	0.22	3.27
Jergul	25	0.41	0.11	0.11	0.13	0.04	0.34
Lista	44	0.88	0.49	0.40	0.77	1.69	24.72
Vatnedalen	17	0.29	0.13	0.10	0.14	0.08	1.08
Løken	38	0.91	0.47	0.62	0.28	0.10	1.13
Vikedal I	22	0.40	0.17	0.16	0.20	0.29	4.20
Skrova	18	0.53	0.28	0.21	2.84	8.61	129.92
Vardø	11	1.38	0.33	1.65	2.99	8.21	124.50
Kise (week)	36	0.97	0.43	0.67	0.33	0.06	0.35
Kise (month)	36	1.49	0.49	0.83	0.57	0.10	0.39
As	42	1.52	0.71	0.67	0.77	0.23	2.00

Table 4: The wet deposition of precipitation components at the Norwegian background stations, 1983.

Station	H <sup>+</sup>	SO <sub>4</sub> <sup>-S</sup>	NO <sub>3</sub> <sup>-N</sup>	NH <sub>4</sub> <sup>-N</sup>	Ca	Mg	Cl
	µeq/m <sup>2</sup>	g S/m <sup>2</sup>	g N/m <sup>2</sup>	g N/m <sup>2</sup>	g/m <sup>2</sup>	g/m <sup>2</sup>	g/m <sup>2</sup>
Birkenes	62	1.20	0.65	0.65	0.31	0.22	3.03
Skreådalen	57	1.22	0.55	0.73	0.51	0.66	10.08
Treungen	48	0.91	0.43	0.47	0.20	0.06	0.76
Gulsvik	27	0.62	0.26	0.38	0.16	0.04	0.24
Narbuvoll	11	0.23	0.10	0.11	0.11	0.03	0.26
Haukeland	96	1.54	0.65	0.69	0.72	1.22	17.73
Kårvatn	16	0.27	0.10	0.11	0.34	0.37	5.42
Tustervatn	21	0.34	0.10	0.14	0.26	0.36	5.45
Jergul	10	0.16	0.04	0.04	0.05	0.01	0.13
Lista	53	1.05	0.58	0.48	0.92	2.02	29.61
Vatnedalen	22	0.36	0.17	0.13	0.17	0.10	1.34
Løken	25	0.59	0.31	0.40	0.19	0.06	0.74
Vikedal I	63	1.12	0.47	0.46	0.56	0.82	11.87
Skrova	19	0.57	0.30	0.23	3.03	9.17	138.40
Vardø	3	0.45	0.11	0.54	0.98	2.69	40.78
Kise (week)	13	0.36	0.16	0.25	0.13	0.02	0.13
Kise (month)	11	0.44	0.15	0.24	0.17	0.03	0.12
As	19	0.69	0.32	0.31	0.35	0.10	0.92

Table 5: Monthly and annual weighted mean values of pH in precipitation at the Norwegian background stations, 1983.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	4.63	4.39	4.30	4.22	4.17	4.49	4.23	4.05	4.47	4.35	4.34	4.29	4.33
Skreådalen	5.05	4.79	4.73	4.12	4.34	4.71	4.34	4.41	4.48	4.96	4.81	4.84	4.70
Treungen	4.87	4.37	4.35	4.13	4.31	4.44	4.33	4.19	4.40	4.38	4.53	4.34	4.35
Gulsvik	5.03	4.57	4.38	4.06	4.28	4.75	4.78	4.38	4.39	5.06	5.52	4.36	4.39
Narbuvoil	5.12	5.07	4.89	4.42	4.56	5.15	4.82	4.32	4.77	5.22	5.16	4.79	4.76
Haukeland	5.09	4.73	4.57	4.22	4.54	4.35	4.95	4.47	4.64	4.96	4.58	4.65	4.70
Kårvatn	5.46	5.20	5.28	4.71	4.58	4.80	4.77	4.80	5.09	5.35	5.08	5.49	5.08
Tustervatn	5.29	4.36	5.10	4.44	4.64	4.91	5.06	4.80	4.98	5.13	5.05	5.07	4.90
Jergul	5.07	5.02	4.46	4.25	4.36	4.67	4.31	4.72	4.34	4.97	5.20	4.85	4.60
Lista	4.86	4.43	4.18	4.07	4.24	4.22	4.15	4.21	4.48	4.46	4.24	4.42	4.36
Vatnedalen	5.16	4.89	4.94	4.51	4.48	4.48	4.50	4.37	4.56	4.99	4.85	4.91	4.76
Løken	4.74	4.68	4.35	4.02	4.38	4.56	4.79	4.43	4.45	4.62	4.41	4.27	4.42
Vikedal I	4.94	5.22	5.00	4.38	4.43	4.32	4.73	4.40	4.48	4.82	4.52	4.69	4.65
Kjeller									4.42	4.52	4.76	4.43	(4.46)
Kaupanger							4.61	4.50	4.71	5.03	4.79	4.86	(4.78)
Skrova	5.20	4.90	4.94	4.96	4.61	4.81	4.50	4.38	5.02	5.42	5.22	4.70	4.74
Vardø	4.53	-	5.03	4.48	5.07	6.00	6.26	5.96	5.46	4.90	5.04	4.58	4.98
Rise (week)	5.31	*	4.32	4.08	4.36	4.73	-	4.48	4.42	5.02	5.02	4.47	4.45
Rise (month)	5.00	4.65	4.20	4.10	4.20	4.35	4.70	4.25	5.40	5.20	4.90	4.80	4.44
Ås	4.65	4.60	4.35	4.05	4.15	4.35	4.25	4.20	5.20	5.50	5.15	6.40	4.38

\*small amount of precipitation.

Table 6: Monthly and annual weighted mean concentrations of excess sulphate in precipitation at the Norwegian background stations, 1983.  
Unit: mgS/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.49	0.64	0.90	1.82	1.44	0.80	1.16	3.23	0.54	0.52	0.81	0.74	0.91
Skreådalen	0.23	0.25	0.33	2.37	1.03	0.41	1.14	0.99	0.69	0.22	0.26	0.19	0.43
Treungen	0.18	0.50	0.58	2.16	1.13	0.75	0.76	1.85	0.70	0.39	0.40	0.61	0.83
Gulsvik	0.49	0.64	0.85	2.46	1.20	0.78	0.70	1.10	0.61	0.31	0.36	0.67	0.94
Narbuvoil	0.15	0.20	0.20	1.32	0.74	0.29	0.46	0.66	0.28	0.14	0.16	0.15	0.38
Haukeland	0.15	0.36	0.49	1.26	0.53	0.83	0.41	0.56	0.32	0.13	0.35	0.26	0.32
Kårvatn	0.08	0.15	0.10	0.34	0.59	0.32	0.28	0.24	0.07	0.06	0.12	0.09	0.14
Tustervatn	0.07	0.35	0.15	0.85	0.78	0.28	0.16	0.26	0.15	0.15	0.16	0.12	0.20
Jergul	0.07	0.17	0.51	1.14	0.72	0.43	0.75	0.25	0.96	0.14	0.07	0.14	0.41
Lista	0.80	0.62	0.94	2.46	1.17	1.41	1.55	1.84	0.43	0.61	0.82	0.58	0.88
Vatnedalen	0.10	0.19	0.20	0.67	0.73	0.73	0.61	0.63	0.39	0.14	0.19	0.13	0.29
Løken	0.41	0.71	1.02	1.97	1.31	1.41	0.81	1.67	0.63	0.48	0.95	0.72	0.91
Vikedal I	0.30	0.12	0.30	1.52	0.66	1.00	0.37	0.63	0.45	0.18	0.36	0.27	0.40
Kjeller									1.02	0.59	1.31	0.83	(0.86)
Kaupanger							0.45	0.36	0.21	0.14	0.23	0.17	(0.22)
Skrova	1.47	0.81	0.46	1.25	0.80	0.40	0.56	0.41	0.13	0.15	0.26	0.25	0.53
Vardø	2.04	-	1.54	2.92	3.82	1.79	1.75	1.10	1.09	0.68	1.14	1.72	1.38
Rise (week)	0.89	*	1.61	2.46	1.06	0.86	-	1.16	0.72	0.28	0.92	0.50	0.97
Rise (month)	0.35	1.44	1.48	4.13	1.53	1.15	1.00	1.58	2.09	0.39	0.80	0.61	1.49
Ås	0.78	0.77	1.15	3.05	2.04	0.07	1.36	1.97	0.98	1.27	3.54	1.75	1.52

\*small amount of precipitation

Table 7: Monthly and annual weighted mean concentrations of nitrate in precipitation at the Norwegian background stations, 1983.  
Unit: mgN/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.25	0.42	0.61	0.99	0.59	0.34	0.48	1.20	0.36	0.28	0.59	0.64	0.49
Skreådalen	0.08	0.15	0.21	1.33	0.39	0.15	0.33	0.28	0.33	0.10	0.16	0.15	0.19
Treungen	0.13	0.41	0.42	1.20	0.41	0.27	0.25	0.67	0.34	0.16	0.26	0.42	0.40
Gulsvik	0.41	0.64	0.66	1.30	0.38	0.16	0.06	0.31	0.30	0.05	0.44	0.52	0.40
Narbuvoll	0.14	0.15	0.15	0.46	0.24	0.35	0.11	0.19	0.08	0.07	0.08	0.17	0.16
Haukeland	0.06	0.14	0.28	0.52	0.20	0.32	0.07	0.18	0.09	0.06	0.18	0.14	0.14
Kårvatn	0.04	0.03	0.04	0.10	0.23	0.13	0.09	0.05	0.02	0.03	0.07	0.04	0.05
Tustervatn	0.04	0.11	0.07	0.20	0.19	0.09	0.04	0.06	0.03	0.05	0.05	0.07	0.06
Jergul	0.12	0.07	0.17	0.39	0.10	0.07	0.13	0.05	0.14	0.07	0.04	0.12	0.11
Lista	0.27	0.43	0.76	1.66	0.49	0.66	0.70	0.81	0.24	0.31	0.74	0.48	0.49
Vatnedalen	0.07	0.32	0.22	0.32	0.30	0.23	0.16	0.17	0.13	0.06	0.11	0.10	0.13
Løken	0.28	0.54	0.73	1.05	0.46	0.46	0.25	0.74	0.33	0.30	0.66	0.61	0.47
Vikedal I	0.14	0.10	0.12	0.93	0.27	0.32	0.06	0.17	0.15	0.06	0.24	0.17	0.17
Kjeller									0.50	0.27	0.70	0.49	(0.43)
Kaupanger							0.10	0.06	0.03	0.05	0.13	0.10	(0.08)
Skrova	0.12	0.39	0.20	0.46	0.27	0.12	0.23	0.10	0.05	1.15	0.13	0.13	0.28
Vardø	0.72	-	0.49	0.74	0.92	0.35	0.28	0.11	0.18	0.21	0.60	0.20	0.33
Kise (week)	0.33	-*	1.21	1.15	0.35	0.29	-	0.42	0.35	0.15	0.80	0.42	0.43
Kise (month)	0.32	0.97	0.77	1.35	0.37	0.32	0.24	0.49	0.57	0.22	0.89	0.54	0.49
Ås	0.49	0.61	0.78	1.53	0.60	0.27	0.48	0.70	0.52	0.61	1.98	0.93	0.71

\*small amount of precipitation

Table 8: Monthly and annual weighted mean concentrations of ammonium in precipitation at the Norwegian background stations, 1983.  
Unit: mgN/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.28	0.30	0.57	1.20	0.66	0.47	0.14	1.40	0.31	0.26	0.62	0.55	0.50
Skreådalen	0.10	0.13	0.26	1.96	0.45	0.19	0.50	0.80	0.45	0.11	0.23	0.14	0.26
Treungen	0.09	0.23	0.24	1.63	0.45	0.54	0.24	0.96	0.42	0.08	0.11	0.35	0.43
Gulsvik	0.48	0.46	0.60	1.73	0.61	0.53	0.28	0.68	0.39	0.17	0.96	0.55	0.58
Narbuvoll	0.08	0.07	0.05	0.74	0.37	0.62	0.28	0.25	0.05	0.03	0.03	0.06	0.19
Haukeland	0.04	0.14	0.22	0.66	0.15	0.34	0.72	0.35	0.13	0.03	0.11	0.09	0.14
Kårvatn	0.06	0.04	0.04	0.05	0.21	0.18	0.14	0.09	0.03	0.03	0.04	0.04	0.06
Tustervatn	0.04	0.16	0.07	0.14	0.27	0.15	0.04	0.13	0.06	0.05	0.08	0.07	0.09
Jergul	0.03	0.03	0.03	0.38	0.05	0.19	0.28	0.09	0.26	0.03	0.02	0.02	0.11
Lista	0.15	0.23	0.53	1.92	0.54	0.70	0.61	1.35	0.19	0.19	0.28	0.29	0.40
Vatnedalen	0.06	0.32	0.26	0.21	0.27	0.22	0.18	0.18	0.08	0.02	0.03	0.06	0.10
Løken	0.32	0.35	0.73	1.15	0.67	1.46	0.87	0.99	0.40	0.29	0.42	0.62	0.62
Vikedal I	0.13	0.17	0.05	1.16	0.27	0.40	0.14	0.29	0.19	0.04	0.15	0.12	0.16
Kjeller									1.24	0.27	0.71	0.39	(0.76)
Kaupanger							0.31	0.05	0.02	0.03	0.08	0.05	(0.06)
Skrova	0.06	0.16	0.14	2.14	0.33	0.12	0.26	0.28	0.02	0.04	0.03	0.03	0.21
Vardø	0.57	-	1.53	2.34	6.72	3.02	4.21	3.88	0.99	0.45	0.40	0.31	1.65
Kise (week)	0.26	-*	1.01	1.43	0.47	1.26	-	0.92	0.64	0.19	0.62	0.45	0.67
Kise (month)	0.14	0.24	0.02	2.20	0.48	0.29	0.36	1.00	2.04	0.22	0.45	0.42	0.83
Ås	0.58	0.27	0.40	1.80	0.71	0.27	0.40	1.15	0.27	0.46	1.60	1.55	0.67

\*small amount of precipitation

Table 9: Monthly and annual weighted mean concentrations of calcium in precipitation at the Norwegian background stations, 1983.  
Unit: mg/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.17	0.06	0.15	0.63	0.20	0.16	0.26	1.60	0.29	0.18	0.25	0.20	0.24
Skreådalen	0.18	0.06	0.11	0.48	0.20	0.11	0.13	0.17	0.21	0.17	0.19	0.20	0.18
Treungen	0.09	0.06	0.11	0.62	0.21	0.11	0.10	0.75	0.12	0.10	0.21	0.15	0.18
Gulsvik	0.25	0.37	0.31	0.69	0.18	0.19	0.38	0.51	0.15	0.16	0.21	0.10	0.25
Narbuvoll	0.16	0.19	0.18	0.47	0.22	0.18	0.12	0.19	0.13	0.20	0.16	0.12	0.18
Haukeland	0.23	0.09	0.14	0.15	0.10	0.16	0.10	0.15	0.14	0.12	0.18	0.12	0.15
Kårvatn	0.19	0.16	0.19	0.12	0.14	0.13	0.08	0.06	0.09	0.14	0.24	0.41	0.18
Tustervatn	0.18	0.13	0.17	0.15	0.24	0.15	0.08	0.08	0.09	0.31	0.16	0.18	0.16
Jergul	0.09	0.09	0.13	0.22	0.13	0.15	0.14	0.08	0.11	0.15	0.09	0.12	0.13
Lista	1.83	0.66	0.42	0.75	0.18	0.44	0.45	0.72	0.42	1.08	0.76	0.91	0.77
Vatnedalen	0.11	0.06	0.15	0.18	0.20	0.24	0.12	0.10	0.14	0.11	0.12	0.13	0.14
Løken	0.15	0.76	0.46	0.39	0.21	0.36	0.16	0.95	0.17	0.27	0.48	0.17	0.28
Vikedal I	0.23	0.17	0.36	0.56	0.09	0.14	0.09	0.08	0.59	0.15	0.24	0.11	0.20
Kjeller									0.20	0.18	1.17	0.37	(0.25)
Kaupanger							0.09	0.06	0.07	0.09	0.14	0.16	(0.11)
Skrova	2.40	6.01	2.72	0.76	0.94	2.15	0.78	0.61	1.55	12.46	1.56	1.00	2.84
Vardø	2.26	-	3.16	4.59	7.27	1.96	1.56	1.70	1.80	2.79	6.16	2.28	2.99
Kise (week)	0.20	-*	0.76	0.75	0.18	0.35	-	0.57	0.28	0.21	1.54	0.15	0.33
Kise (month)	0.20	1.80	0.90	1.40	0.30	0.30	0.60	0.70	0.60	0.30	1.30	0.80	0.57
As	0.20	0.60	0.60	0.90	0.40	0.40	0.40	1.10	1.00	1.10	3.20	1.10	0.77

\*small amount of precipitation

Table 10: Monthly and annual weighted mean concentrations of potassium in precipitation at the Norwegian background stations, 1983.  
Unit: mg/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.27	0.14	0.27	0.27	0.12	0.36	0.34	0.49	0.16	0.23	0.21	0.32	0.21
Vikedal I	0.24	0.30	0.11	0.19	0.07	0.18	0.09	0.11	0.13	0.17	0.28	0.12	0.16
Kjeller									0.31	0.11	0.76	0.27	(0.25)
Kaupanger							0.43	0.16	0.12	0.19	0.19	0.23	(0.20)
Kise (week)	0.48	-*	0.61	0.20	0.18	0.98	-	0.23	0.14	0.15	0.62	0.13	0.25
Kise (month)	0.28	0.50	0.15	0.15	0.12	0.65	0.22	0.17	1.29	0.12	0.13	0.07	0.35
As	0.14	0.14	0.14	0.20	0.30	0.28	0.28	0.47	1.54	2.30	1.15	0.39	0.63

\* small amount of precipitation

Table 11: Monthly and annual weighted mean concentrations of magnesium in precipitation at the Norwegian background stations, 1983.  
Unit: mg/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.31	0.12	0.09	0.09	0.05	0.11	0.09	0.24	0.19	0.37	0.18	0.23	0.17
Skreådalen	0.41	0.24	0.10	0.07	0.03	0.04	0.03	0.04	0.18	0.26	0.34	0.23	0.23
Treungen	0.12	0.03	0.03	0.08	0.03	0.04	0.01	0.09	0.06	0.08	0.07	0.07	0.05
Gulsvik	0.19	0.08	0.05	0.09	0.04	0.05	0.12	0.11	0.03	0.07	0.09	0.03	0.05
Marbuvoll	0.04	0.09	0.03	0.06	0.03	0.05	0.02	0.03	0.03	0.08	0.09	0.09	0.05
Haukeland	0.54	0.26	0.15	0.07	0.03	0.09	0.13	0.05	0.19	0.18	0.42	0.23	0.26
Kårvatn	0.32	0.21	0.21	0.05	0.02	0.04	0.05	0.03	0.16	0.14	0.29	0.35	0.20
Tustervatn	0.36	0.25	0.28	0.03	0.04	0.05	0.01	0.05	0.07	0.57	0.18	0.32	0.22
Jergul	0.03	0.12	0.08	0.04	0.02	0.09	0.03	0.02	0.03	0.02	0.05	0.05	0.04
Lista	4.20	1.76	0.79	0.28	0.07	0.91	0.84	0.45	0.86	2.84	1.95	2.28	1.69
Vatnedalen	0.15	0.03	0.07	0.03	0.05	0.04	0.01	0.02	0.04	0.06	0.12	0.08	0.08
Løken	0.08	0.12	0.10	0.06	0.06	0.21	0.03	0.13	0.07	0.16	0.17	0.10	0.10
Vikedal I	0.51	0.65	0.25	0.09	0.04	0.08	0.07	0.06	0.14	0.36	0.65	0.22	0.29
Kjeller									0.13	0.12	0.12	0.05	(0.11)
Kaupanger							0.02	0.01	0.02	0.06	0.20	0.41	(0.15)
Skrova	6.82	19.00	6.49	0.89	2.18	3.71	2.11	2.06	5.52	39.32	5.44	2.65	8.61
Vardø	5.24	-	7.18	12.18	10.87	4.28	3.34	4.18	5.15	8.69	20.15	5.14	8.21
Kise (week)	0.25	-*	0.10	0.09	0.03	0.05	-	0.12	0.04	0.07	0.19	0.01	0.06
Kise (month)	0.05	0.41	0.24	0.17	0.05	0.06	0.09	0.09	0.16	0.06	0.28	0.13	0.10
Ås	0.17	0.23	0.11	0.13	0.08	0.13	0.08	0.18	0.26	0.58	1.60	0.21	0.23

\*small amount of precipitation

Table 12: Monthly and annual weighted mean concentrations of sodium in precipitation at the Norwegian background stations, 1983.  
Unit: mg/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	2.67	1.00	0.93	0.53	0.18	2.34	0.70	1.10	1.01	3.11	1.34	2.07	1.35
Vikedal I	4.29	4.78	1.94	0.50	0.20	0.58	0.73	0.46	0.62	3.09	5.31	1.91	2.39
Kjeller									0.67	0.94	1.33	0.53	(0.77)
Kaupanger							0.55	0.20	0.30	0.70	1.76	3.52	(1.40)
Kise (week)	0.59	-*	0.63	0.23	0.06	0.15	-	0.20	0.13	0.22	0.68	0.15	0.19
Kise (month)	0.30	1.10	0.60	0.30	0.10	0.30	0.05	0.20	0.30	0.40	0.70	0.20	0.26
Ås	1.40	1.70	0.80	0.40	0.20	0.70	0.40	0.80	0.80	3.30	10.60	1.60	1.19

\* small amount of precipitation

Table 13: Monthly and annual weighted mean concentrations of chloride in precipitation at the Norwegian background stations, 1983.  
Unit: mg/l.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	5.14	1.94	1.64	0.76	0.52	1.26	1.70	2.80	1.67	5.56	2.29	3.75	2.30
Skreådalen	6.16	3.67	1.57	0.64	0.63	0.77	1.11	0.64	2.60	4.11	5.16	3.45	3.55
Treungen	2.15	0.54	0.44	0.57	0.15	0.21	0.20	0.65	0.76	1.17	1.04	1.04	0.69
Gulsvik	2.15	1.01	0.51	0.58	0.13	0.28	0.36	0.44	0.22	0.56	1.17	0.32	0.37
Marbuvoll	0.46	1.18	0.15	0.29	0.13	0.23	0.13	0.16	0.16	0.46	1.43	1.20	0.42
Haukeland	8.40	3.69	1.94	1.47	0.31	0.91	1.85	0.52	2.38	2.31	6.27	3.27	3.72
Kårvatn	5.11	3.07	2.94	0.77	0.09	0.26	0.70	0.32	1.90	2.02	4.40	4.94	2.82
Tustervatn	5.79	3.04	4.05	0.46	0.27	0.75	0.35	0.64	1.00	8.99	2.74	4.84	3.27
Jergul	0.27	1.85	1.02	0.39	0.11	0.13	0.48	0.11	0.05	0.11	0.58	0.48	0.34
Lista	66.78	24.78	11.48	4.03	0.82	9.60	9.62	5.20	12.30	42.48	29.20	28.84	24.72
Vatnedalen	2.35	0.60	0.85	0.16	0.25	0.26	0.17	0.15	0.42	0.80	1.83	1.25	1.08
Løken	1.15	1.84	1.10	0.40	0.41	0.91	0.51	0.95	0.93	2.02	2.09	1.68	1.13
Vikedal I	8.11	8.68	3.49	1.14	0.29	0.95	1.32	0.75	1.19	5.26	8.30	3.51	4.20
Kjeller									1.18	1.64	2.06	1.07	(1.36)
Kaupanger							0.96	0.30	0.41	1.16	3.01	6.29	(2.42)
Skrova	109.99	292.52	91.80	11.04	28.73	46.38	28.36	30.48	77.38	608.47	72.99	38.22	129.92
Vardø	83.17	-	101.03	176.73	154.78	55.06	45.36	60.48	76.82	148.06	300.10	76.93	124.50
Kise (week)	1.04	-*	0.86	0.47	0.11	0.43	-	0.24	0.24	0.38	1.33	0.38	0.35
Kise (month)	0.40	1.90	0.40	0.40	0.10	0.50	0.20	0.40	0.60	0.50	1.10	0.40	0.39
As	2.50	3.00	1.20	0.80	0.20	0.90	0.70	1.20	1.60	6.00	17.00	3.00	2.00

\*small amount of precipitation

Table 14: Monthly and annual amounts of precipitation at the Norwegian background stations, 1983.  
Unit: mm. NILU sampler.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year	% of normal precipitation, DNMI 1931-1960
Birkenes	106	110	120	100	256	71	21	10	242	163	22	94	1313	89*
Skreådalen	595	37	198	49	183	92	91	95	312	658	139	394	2843	134
Treungen	70	42	92	86	236	55	42	22	214	154	16	63	1091	102*
Gulsvik	9	20	42	50	192	39	11	42	150	83	9	18	664	83*
Marbuvoll	41	18	48	30	78	33	52	41	108	70	50	44	613	101*
Haukeland	884	48	394	177	191	94	146	212	428	1103	483	609	4769	148
Kårvatn	266	106	157	74	35	72	114	128	225	298	270	174	1918	162*
Tustervatn	209	99	73	41	38	81	89	231	203	184	240	178	1665	152
Jergul	24	12	16	24	34	31	45	47	19	72	41	18	382	104*
Lista	160	40	107	42	184	45	34	26	191	183	61	126	1198	122
Vatnedalen	246	11	61	36	135	31	45	37	135	225	86	201	1249	145*
Løken	61	14	37	46	83	34	41	29	123	100	16	72	656	89*
Vikedal I	438	60	235	56	198	177	182	164	137	579	214	382	2823	146
Kjeller									147	107	13	46	(313)	85*
Kaupanger							40	103	101	215	179	167	(805)	165*
Skrova	123	47	28	46	54	47	97	169	93	126	93	142	1065	145
Vardø	8	-	18	11	8	24	28	36	38	67	48	43	328	143
Kise (week)	17	3	6	40	76	26	18	36	83	59	6	24	394	74*
Kise (month)	15	2	6	28	63	20	20	32	42	49	5	14	295	74*
As	37	13	37	42	96	38	35	20	98	14	20	9	458	92

\* The nearest DNMI-sampler.

Table 15: Monthly and annual wet deposition of strong acid ( $H^+$ ) at the Norwegian background stations, 1983.  
Unit: mekv/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	2.47	4.52	5.95	5.97	17.52	2.27	1.25	0.86	8.21	7.33	1.02	4.78	62.13
Skreådalen	5.36	0.60	3.69	3.70	8.47	1.81	4.20	3.72	10.33	7.24	2.14	5.70	56.95
Treungen	0.95	1.77	4.14	6.38	11.61	1.99	1.97	1.43	8.44	6.46	0.47	2.87	48.49
Gulsvik	0.08	0.52	1.73	4.28	10.20	0.68	0.18	1.74	6.08	0.73	0.03	0.80	27.06
Narbuvoll	0.31	0.15	0.63	1.15	2.11	0.24	0.79	1.97	1.84	0.42	0.35	0.71	10.67
Haukeland	7.16	0.89	10.49	10.73	5.55	4.17	1.66	7.20	9.91	12.11	12.82	13.54	96.24
Kårvatn	0.93	0.66	0.82	1.45	0.91	1.14	1.95	2.02	1.85	1.33	2.26	0.57	15.89
Tustervatn	1.08	4.34	0.58	1.48	0.87	1.00	0.78	3.70	2.14	1.38	2.13	1.51	20.98
Jergul	0.20	0.11	0.57	1.31	1.51	0.66	2.18	0.89	0.88	0.77	0.26	0.25	9.58
Lista	2.18	1.48	7.05	3.56	10.63	2.74	2.39	1.61	6.27	6.33	3.55	4.73	52.53
Vatnedalen	1.69	0.15	0.71	1.10	4.49	1.01	1.42	1.58	3.70	2.30	1.22	2.45	21.81
Løken	1.11	0.29	1.62	4.39	3.49	0.94	0.66	1.09	4.40	2.42	0.60	3.88	24.90
Vikedal I	5.02	0.36	2.33	2.37	7.33	8.49	3.36	6.51	4.56	8.79	6.43	7.85	63.41
Kjeller									5.65	3.23	0.23	1.70	(10.80)
Kaupanger							0.98	3.25	1.99	2.02	2.92	2.28	(13.43)
Skrova	0.78	0.60	0.32	0.51	1.32	0.72	3.04	7.11	0.88	0.49	0.56	2.84	19.19
Vardø	0.23	-	0.17	0.37	0.07	0.02	0.02	0.04	0.13	0.84	0.44	1.15	3.46
Kise (week)	0.08	-0	0.30	3.33	3.33	0.49	-	1.21	3.12	0.55	0.05	0.82	13.28
Kise (month)	0.15	0.04	0.37	2.20	3.99	0.88	0.40	1.81	0.17	0.31	0.06	0.22	10.60
Ås	0.82	0.32	1.64	3.73	6.80	1.69	1.97	1.25	0.62	0.05	0.14	0.00	19.02

Table 16: Monthly and annual wet deposition of excess sulphate of the Norwegian background stations, 1983.  
Unit: mgS/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	52	70	107	181	370	56	24	31	131	84	18	69	1195
Skreådalen	135	9	66	117	188	38	104	94	216	141	36	76	1221
Treungen	12	21	53	186	267	41	32	41	149	60	6	39	908
Gulsvik	4	13	36	122	231	30	8	46	92	26	3	12	623
Narbuvoll	6	4	10	39	58	9	24	27	30	10	8	6	232
Haukeland	133	17	192	224	101	78	60	120	138	148	168	158	1536
Kårvatn	21	16	15	25	21	23	32	30	16	17	34	16	265
Tustervatn	15	34	11	35	30	22	14	59	31	28	37	21	337
Jergul	2	2	8	27	25	13	33	12	19	10	3	2	156
Lista	127	25	100	103	216	64	53	48	82	112	50	73	1051
Vatnedalen	25	2	12	24	99	22	28	23	53	32	16	27	363
Løken	25	10	37	92	109	48	33	49	77	48	15	52	595
Vikedal I	131	7	71	86	131	177	66	103	62	102	78	105	1117
Kjeller									150	63	17	38	(268)
Kaupanger							18	37	21	29	40	28	(174)
Skrova	181	38	13	58	43	18	54	69	12	18	25	36	567
Vardø	16	-	28	32	30	42	49	40	41	45	54	74	452
Kise (week)	15	-0	10	100	81	22	-	42	60	16	5	12	362
Kise (month)	5	3	9	114	97	23	20	51	89	19	4	9	441
Ås	29	10	42	127	196	3	48	39	96	18	70	16	694

Table 17: Monthly and annual wet deposition of nitrate at the Norwegian background stations, 1983.  
Unit: mgN/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	27	46	73	98	151	24	10	12	86	46	13	60	646
Skreådalen	47	6	41	65	71	14	30	26	102	68	23	59	551
Treungen	9	17	39	103	96	15	10	15	72	25	4	26	431
Gulsvik	4	12	28	65	72	6	1	13	45	4	4	10	263
Narbuvoll	6	3	7	14	19	12	6	8	9	5	4	7	98
Haukeland	55	7	111	92	37	31	10	37	39	60	86	82	647
Kårvatn	9	3	6	7	8	9	10	7	5	10	18	7	100
Tustervatn	7	11	5	8	7	8	4	13	6	9	12	12	101
Jergul	3	1	3	9	4	2	6	2	3	5	2	2	41
Lista	42	17	81	69	90	30	24	21	46	57	46	61	584
Vatnedalen	17	4	14	11	40	7	7	6	17	13	9	19	166
Løken	17	7	27	49	38	16	10	22	40	30	10	44	311
Vikedal I	63	6	28	52	53	57	11	28	21	37	52	63	470
Kjeller									73	29	9	23	(134)
Kaupanger							4	6	3	10	23	16	(62)
Skrova	15	18	5	21	15	6	22	18	5	145	12	19	302
Vardø	6	-	9	8	7	8	8	4	7	14	29	8	108
Rise (week)	6	-0	7	47	27	8	-	15	29	9	4	10	161
Rise (month)	5	2	5	37	23	6	5	16	24	11	4	8	145
As	18	8	29	64	58	10	17	14	51	9	39	8	324

Table 18: Monthly and annual wet deposition of ammonium at the Norwegian background stations, 1983.  
Unit: mgN/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	30	33	68	120	168	33	3	14	76	42	14	51	650
Skreådalen	62	5	50	97	83	17	45	76	140	74	32	53	734
Treungen	6	9	22	140	107	30	10	21	89	12	2	22	471
Gulsvik	4	9	25	86	117	20	3	28	58	14	9	10	384
Narbuvoll	3	1	2	22	28	21	15	10	5	2	2	3	114
Haukeland	38	7	87	117	28	32	105	75	57	37	54	52	687
Kårvatn	16	4	6	3	7	13	16	12	6	7	9	7	106
Tustervatn	8	15	5	6	10	12	3	29	11	9	19	13	142
Jergul	1	0	1	9	2	6	12	4	5	2	1	0	43
Lista	24	9	57	80	99	32	21	35	37	34	17	36	480
Vatnedalen	14	4	16	8	37	7	8	7	11	5	2	12	130
Løken	19	5	27	53	56	49	36	29	50	29	7	45	404
Vikedal I	58	10	12	65	53	70	26	48	27	20	31	44	464
Kjeller									181	29	9	18	(238)
Kaupanger							13	6	2	6	14	9	(50)
Skrova	7	8	4	99	18	5	25	47	2	5	3	5	228
Vardø	4	-	27	26	53	71	117	141	37	30	19	14	540
Rise (week)	4	-0	6	58	36	33	-	33	53	11	3	11	249
Rise (month)	2	0	0	61	30	6	7	32	87	11	2	6	244
As	21	3	15	75	68	10	14	23	26	7	32	14	308



Table 19: Monthly and annual wet deposition of calcium at the Norwegian background stations, 1983.  
Unit: mg/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	18	7	18	63	50	12	5	16	70	29	6	19	312
Skreådalen	110	2	22	23	37	10	12	16	67	109	27	78	513
Treungen	6	2	10	53	49	6	4	17	25	15	3	10	200
Gulsvik	2	7	13	34	35	7	4	21	22	13	2	2	163
Narbuvoll	7	4	9	14	17	6	6	8	14	14	8	5	111
Haukeland	205	4	56	26	19	15	14	31	60	134	85	73	725
Kårvatn	50	17	30	9	5	9	9	8	21	43	66	71	337
Tustervatn	39	12	12	6	9	12	7	19	18	56	38	32	262
Jergul	2	1	2	5	4	5	6	4	2	11	4	2	48
Lista	291	26	45	31	32	20	15	19	80	198	47	114	918
Vatnedalen	28	1	9	7	27	7	5	4	19	25	10	26	169
Løken	9	11	17	18	18	12	6	28	21	27	7	12	186
Vikedal I	102	10	85	31	19	25	16	12	81	89	51	41	564
Kjeller									29	19	15	17	(80)
Kaupanger							4	6	7	20	26	27	(89)
Skrova	295	285	76	35	51	100	75	104	144	1575	145	142	3028
Vardø	17	-	57	51	57	47	43	62	67	187	293	99	980
Kise (week)	3	-0	5	30	14	9	-	21	23	12	9	4	129
Kise (month)	3	4	5	39	19	6	12	23	25	15	6	11	167
Ås	7	8	22	38	38	15	14	22	98	16	63	10	351

Table 20: Monthly and annual wet deposition of potassium at the Norwegian background stations, 1983.  
Unit: mg/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	28	16	32	27	32	25	7	5	38	37	5	30	282
Vikedal I	105	18	25	11	13	33	16	18	18	100	60	45	462
Kjeller									46	12	10	12	(80)
Kaupanger							17	17	12	40	34	39	(159)
Kise (week)	8	-0	4	8	14	26	-	8	11	9	4	3	95
Kise (month)	4	1	1	4	8	13	4	5	55	6	1	1	103
Ås	5	2	5	8	29	11	10	9	150	33	23	4	289

Table 21: Monthly and annual wet deposition of magnesium at the Norwegian background stations, 1983.  
Unit: mg/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	32.3	13.2	10.7	8.9	11.4	7.7	1.8	2.3	45.1	60.1	4.1	21.7	219.3
Skreådalen	245.9	8.9	19.9	3.5	6.3	3.7	2.8	3.5	56.1	169.8	46.7	88.8	655.9
Treungen	8.7	1.2	2.5	6.4	6.1	1.9	0.3	2.0	11.7	12.5	1.2	4.4	58.9
Gulsvik	1.7	1.6	2.2	4.6	6.7	2.1	1.3	4.5	4.3	6.0	0.8	0.5	36.2
Narbuvoll	1.8	1.7	1.5	1.8	2.3	1.7	1.0	1.0	3.5	5.3	4.5	3.8	29.8
Haukeland	477.8	12.2	57.6	11.6	6.5	8.1	18.6	10.4	79.1	195.0	203.7	137.1	1217.6
Kårvatn	85.6	21.9	32.8	3.4	0.8	2.7	5.3	3.2	36.5	40.8	79.3	60.9	373.2
Tustervatn	75.3	25.0	20.7	1.1	1.5	4.3	1.2	12.0	13.6	104.9	43.0	56.7	359.3
Jergul	0.8	1.5	1.3	1.0	0.7	2.9	1.1	0.8	0.6	1.4	1.9	0.8	14.7
Lista	670.9	70.1	84.4	11.5	12.3	40.8	28.7	11.9	164.8	519.6	119.3	286.5	2020.7
Vatnedalen	36.8	0.4	4.2	1.0	7.3	1.2	0.6	0.8	4.8	12.4	10.3	15.8	95.5
Løken	4.8	1.6	3.5	2.5	4.9	7.2	1.0	3.8	8.9	16.1	2.7	7.5	64.6
Vikedal I	223.5	38.9	57.8	5.0	7.3	15.0	13.2	9.0	19.7	207.0	138.2	83.2	817.6
Kjeller									18.5	12.8	1.6	2.1	(35.1)
Kaupanger							0.9	0.9	2.0	13.8	35.4	67.6	(120.6)
Skrova	837.9	900.4	181.8	41.2	118.0	172.8	203.8	348.4	513.6	4969.8	506.3	375.3	9169.4
Vardø	40.4	-	128.6	135.2	85.9	101.3	92.7	152.0	193.3	580.4	959.3	221.9	2690.9
Kise (week)	4.1	-0	0.6	3.4	2.2	1.2	-	4.1	2.9	3.8	1.1	0.2	23.6
Kise (month)	0.7	0.8	1.4	4.7	3.2	1.2	1.8	2.9	6.8	2.9	1.3	1.8	29.5
Ås	6.2	2.9	4.0	5.4	7.7	4.9	2.8	3.6	25.4	8.4	31.7	1.9	104.9

Table 22: Monthly and annual wet deposition of sodium at the Norwegian background stations, 1983.  
Unit: mg/m<sup>2</sup>.

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	283	110	111	53	47	165	15	11	244	507	30	194	1768
Vikedal I	1880	284	457	28	39	103	133	75	85	1786	1136	729	6735
Kjeller									99	101	17	24	(241)
Kaupanger							22	21	30	149	315	588	(1126)
Kise (week)	10	-0	4	9	5	4	-	7	11	13	4	4	70
Kise (month)	4	2	4	8	6	6	1	6	13	19	3	3	76
Ås	51	22	29	17	19	27	14	16	78	48	210	14	545

Table 23: Monthly and annual wet deposition of chloride at the Norwegian background stations, 1983.  
Unit:  $\text{mg}/\text{m}^2$ .

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	544	212	196	76	133	89	36	27	404	906	51	352	3026
Skreådalen	3667	136	311	31	116	71	101	61	813	2704	716	1357	10082
Treungen	151	22	40	49	34	12	8	14	163	180	17	65	757
Gulsvik	19	20	22	29	26	11	4	19	33	46	11	6	245
Narbuvoll	19	21	7	9	10	8	7	7	17	32	71	53	260
Haukeland	7423	176	764	260	59	86	270	110	1018	2550	3028	1991	17735
Kårvatn	1358	325	459	57	3	19	80	41	427	600	1187	861	5418
Tustervatn	1209	301	296	19	10	61	31	148	203	1652	657	860	5446
Jergul	6	22	17	9	4	4	21	5	1	8	24	8	129
Lista	10658	986	1224	169	151	433	328	136	2346	7769	1790	3622	29613
Vatnedalen	579	7	53	6	33	8	8	5	56	180	158	251	1343
Løken	70	25	41	19	34	31	21	28	115	203	33	121	739
Vikedal I	3554	517	822	64	57	168	239	122	164	3042	1774	1342	11866
Kjeller									173	176	27	49	(424)
Kaupanger							38	31	41	248	540	1050	(1949)
Skrova	13517	13865	2570	511	1557	2161	2737	5148	7204	76911	6796	5423	138401
Vardø	640	-	1813	1962	1223	1305	1261	2201	2881	9891	14285	3323	40785
Kise (week)	17	-0	5	19	9	11	-	9	20	22	7	9	129
Kise (month)	6	4	2	11	6	10	4	13	25	24	5	6	117
Ås	92	38	44	33	19	34	25	24	156	86	337	27	915

Table 24: Annual weighted mean concentrations and wet depositions of main components in precipitation at Norwegian background stations, 1973-1983.

Station	Year	Annual mean conc. mg/l					Annual means pH	Annual prec. mm	Wet deposition			
		SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Ca	Mg			SO <sub>4</sub> -S mg/m <sup>2</sup>	NO <sub>3</sub> -N mg/m <sup>2</sup>	NH <sub>4</sub> -N mg/m <sup>2</sup>	H <sup>+</sup> mekv/m <sup>2</sup>
Birkenes	1973	1.06				0.11	4.27	1072	1136			58
	1974	1.11	0.50	0.52	0.23	0.19	4.25	1563	1735	782	813	88
	1975	1.01	0.49	0.45	0.19	0.17	4.27	1341	1354	657	603	72
	1976	1.18	0.63	0.50	0.17	0.12	4.21	1434	1692	903	717	88
	1977	1.04	0.54	0.54	0.17	0.17	4.27	1597	1661	862	862	86
	1978	1.17	0.62	0.57	0.17	0.12	4.11	1242	1453	770	708	96
	1979	1.25	0.57	0.65	0.22	0.15	4.09	1560	1950	889	1014	127
	1980	1.23	0.57	0.63	0.22	0.11	4.16	1160	1427	661	731	80
	1981	1.04	0.52	0.53	0.20	0.13	4.21	1316	1369	684	697	81
	1982	1.05	0.56	0.72	0.22	0.21	4.27	1592	1663	887	1140	86
	1983	0.91	0.49	0.50	0.24	0.17	4.33	1313	1195	646	650	62
Skreådalen	1973	0.50				0.19	4.60	2185	1093			55
	1974	0.55				0.18	4.47	2460	1350			83
	1975	0.57	0.18	0.17		0.19	4.55	2436	1389	438	414	69
	1976	0.60	0.24	0.23		0.17	4.55	1687	1012	405	388	48
	1977	0.57	0.27	0.28	0.15	0.13	4.55	2051	1169	554	574	58
	1978	0.49	0.20	0.26	0.20	0.29	4.52	1769	867	354	460	53
	1979	0.61	0.26	0.28	0.16	0.14	4.33	2311	1410	601	647	108
	1980	0.48	0.21	0.21	0.15	0.17	4.54	1949	936	409	409	56
	1981	0.49	0.20	0.28	0.16	0.18	4.58	2260	1107	452	633	59
	1982	0.57	0.28	0.37	0.17	0.22	4.52	2519	1436	709	933	76
	1983	0.43	0.19	0.26	0.18	0.23	4.70	2843	1221	551	734	57
Treungen	1974	0.94	0.38	0.33	0.14	0.07	4.27	1039	977	395	343	56
	1975	0.91	0.37	0.34	0.15	0.06	4.26	894	814	331	304	49
	1976	1.05	0.50	0.42	0.11	0.06	4.20	706	741	353	297	45
	1977	0.81	0.44	0.39	0.11	0.05	4.32	1165	944	513	454	56
	1978	0.87	0.38	0.41	0.14	0.04	4.21	945	822	359	387	58
	1979	-	-	-	-	-	-	-	-	-	-	-
	1980	0.88	0.37	0.39	0.14	0.04	4.23	759	668	281	296	45
	1981	0.86	0.39	0.46	0.12	0.05	4.29	949	816	370	437	49
	1982	0.84	0.45	0.50	0.14	0.07	4.32	1130	948	504	563	54
	1983	0.83	0.40	0.43	0.18	0.05	4.35	1091	908	431	471	48

Table 24: Cont.

Station	Year	Annual mean conc. mg/l					Annual means pH	Annual prec. mm	Wet deposition			
		SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Ca	Mg			SO <sub>4</sub> -S mg/m <sup>2</sup>	NO <sub>3</sub> -N mg/m <sup>2</sup>	NH <sub>4</sub> -N mg/m <sup>2</sup>	H <sup>+</sup> mekv/m <sup>2</sup>
Gulavik	1974	0.81	0.38	0.28	0.13	0.04	4.28	783	634	298	219	41
	1975	0.89	0.40	0.34	0.21	0.05	4.36	560	498	224	190	24
	1976	0.85	0.38	0.30	0.10	0.03	4.35	641	545	244	192	29
	1977	0.77	0.39	0.35	0.13	0.03	4.35	683	526	266	239	31
	1978	0.94	0.40	0.38	0.16	0.03	4.22	693	651	277	263	42
	1979	1.27	0.53	0.62	0.23	0.04	4.11	790	1003	419	490	61
	1980	0.78	0.25	0.27	0.13	0.03	4.33	667	520	167	180	31
	1981	0.86	0.35	0.40	0.13	0.03	4.30	628	540	220	251	31
	1982	0.89	0.44	0.52	0.22	0.05	4.38	778	696	346	408	33
	1983	0.94	0.40	0.58	0.25	0.05	4.39	664	623	263	384	27
Narbuvoil	1978	0.34	0.16	0.15	0.18	0.03	4.71	380	129	61	57	7
	1979	0.59	0.23	0.22	0.31	0.04	4.49	422	249	97	93	14
	1980	0.40	0.15	0.14	0.23	0.04	4.80	600	240	90	84	10
	1981	0.41	0.18	0.28	0.23	0.04	4.83	541	222	97	151	8
	1982	0.49	0.28	0.36	0.25	0.06	4.71	358	176	101	129	7
	1983	0.38	0.16	0.19	0.18	0.05	4.76	613	232	98	114	11
Haukeland	74/75*	0.31	0.13	0.15	0.17	0.29	4.70	3901	1207	522	582	78
	75/76*	0.36	0.10	0.17	0.17	0.37	4.73	4551	1636	431	753	85
	76/77*	0.59	0.23	0.45	0.18	0.25	4.59	1808	1060	417	813	46
	1982	0.48	0.18	0.20	0.14	0.24	4.56	3688	1756	674	722	101
	1983	0.32	0.14	0.14	0.15	0.26	4.70	4769	1536	647	687	96
Kårvatn	1978**	0.16	0.05	0.09	0.11	0.13	4.98	1317	211	66	119	14
	1979	0.23	0.09	0.08	0.10	0.10	4.63	1248	287	112	100	29
	1980	0.20	0.07	0.08	0.11	0.13	4.88	1225	245	86	98	16
	1981	0.20	0.08	0.15	0.17	0.25	4.96	1101	220	88	165	12
	1982	0.26	0.08	0.11	0.15	0.16	4.87	995	256	78	112	13
	1983	0.14	0.05	0.06	0.18	0.20	5.08	1918	265	100	106	16

\* From July the first year and to June the next year. Sulphate in precipitation is corrected for sea salt with Cl (instead of Mg).

\*\* One month is missing

Table 24: Cont.

Station	Year	Annual mean conc. mg/l					Annual means pH	Annual prec. mm	Wet deposition			
		SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Ca	Mg			SO <sub>4</sub> -S mg/m <sup>2</sup>	NO <sub>3</sub> -N mg/m <sup>2</sup>	NH <sub>4</sub> -N mg/m <sup>2</sup>	H <sup>+</sup> mekv/m <sup>2</sup>
Tustervatn	1973	0.24				0.18	4.94	1336	321			15
	1974	0.28				0.11	4.88	695	195			9
	1975	0.25				0.33	4.91	1756	439			22
	1976	0.27				0.16	4.97	1064	287			11
	1977	0.30	0.09	0.11	0.17	0.16	4.91	1111	333	100	122	14
	1978	0.23	0.08	0.10	0.16	0.16	4.85	1128	259	90	113	16
	1979	0.28	0.08	0.13	0.15	0.11	4.73	1168	327	93	152	22
	1980**	0.29	0.09	0.16	0.14	0.12	4.91	858	249	77	137	11
	1981	0.18	0.07	0.10	0.21	0.15	5.00	1099	198	77	110	11
	1982	0.16	0.08	0.09	0.22	0.47	4.98	1385	227	109	121	15
	1983	0.20	0.06	0.09	0.16	0.22	4.90	1665	337	101	142	21
Jergul	1977	0.45	0.13	0.11	0.20	0.04	4.75	344	155	45	38	6
	1978	0.43	0.10	0.11	0.13	0.02	4.52	351	151	35	39	11
	1979	0.59	0.18	0.13	0.14	0.03	4.33	306	181	55	40	14
	1980	0.42	0.12	0.09	0.12	0.03	4.57	262	110	31	24	7
	1981	0.46	0.13	0.12	0.11	0.02	4.57	434	200	56	52	12
	1982	0.36	0.13	0.14	0.10	0.03	4.65	473	172	62	65	11
	1983	0.41	0.11	0.11	0.13	0.04	4.60	382	156	41	43	10
Lista	1973	1.01				1.31	4.33	851	860			40
	1974	1.06				1.00	4.28	1208	1280			63
	1975	1.10				1.06	4.30	1109	1220			56
	1976	1.37				1.21	4.23	922	1263			54
	1977	0.95				1.09	4.34	1114	1058			51
	1978	1.01	0.50	0.45	0.54	1.18	4.27	931	940	466	419	50
	1979	1.27	0.63	0.57	0.53	1.04	4.09	1157	1469	729	659	94
	1980	1.05	0.59	0.54	0.47	1.00	4.22	953	1001	562	515	57
	1981	0.90	0.47	0.50	0.60	1.36	4.34	1037	933	487	519	47
	1982	1.09	0.65	0.60	0.85	1.82	4.29	1070	1161	699	645	55
	1983	0.88	0.49	0.40	0.77	1.69	4.36	1198	1051	584	480	53

\*\* One month is missing

Table 24: Cont.

Station	Year	Annual mean conc. mg/l					Annual means pH	Annual prec. mm	Wet deposition			
		SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Ca	Mg			SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	H <sup>+</sup>
		mg/m <sup>2</sup>	mg/m <sup>2</sup>	mg/m <sup>2</sup>	mg/m <sup>2</sup>	mg/m <sup>2</sup>			mg/m <sup>2</sup>	mg/m <sup>2</sup>	mg/m <sup>2</sup>	mekv/m <sup>2</sup>
Vatnedalen	1974	0.54				0.06	4.59	884	477			23
	1975	0.53	0.17	0.22		0.09	4.85	994	527	169	219	14
	1976	0.50	0.20	0.36	0.12	0.10	4.85	715	358	143	257	10
	1977	0.44	0.21	0.25	0.13	0.06	4.71	761	335	160	190	15
	1978	0.41	0.17	0.23	0.14	0.10	4.62	862	353	147	198	21
	1979	0.56	0.22	0.20	0.20	0.06	4.38	948	531	209	190	40
	1980	0.45	0.16	0.10	0.14	0.06	4.55	799	360	128	80	23
	1981	0.49	0.19	0.18	0.14	0.09	4.49	900	441	171	162	29
	1982	0.38	0.18	0.17	0.13	0.08	4.62	967	366	174	159	23
	1983	0.29	0.13	0.10	0.14	0.08	4.76	1249	363	166	130	22
Løken	1973	1.03				0.06	4.48	569	586			19
	1974	0.94				0.08	4.43	831	781			31
	1975	1.03	0.41	0.42		0.08	4.32	657	677	269	276	31
	1976	1.20	0.49	0.50	0.40	0.09	4.39	533	640	261	267	22
	1977	0.96	0.41	0.43	0.22	0.07	4.41	699	671	287	301	27
	1978	1.10	0.48	0.52	0.24	0.07	4.25	597	657	287	310	34
	1979	1.03	0.49	0.57	0.30	0.07	4.22	784	808	384	447	47
	1980	0.97	0.39	0.49	0.25	0.08	4.33	695	674	271	341	33
	1981	0.77	0.36	0.51	0.20	0.06	4.48	700	539	252	357	23
	1982	1.06	0.60	0.79	0.24	0.11	4.33	858	908	515	679	40
1983	0.91	0.47	0.62	0.28	0.10	4.42	656	595	311	404	25	
Kise (week)	1982	0.96	0.53	0.74	0.24	0.04	4.34	484	464	255	357	22
	1983	0.97	0.43	0.67	0.33	0.06	4.45	394	362	161	249	13
As	1975	1.58	0.13	0.59	0.42	0.15	4.25	484	765	63	286	27
	1976	1.62	0.57	0.79	0.73	0.18	4.44	506	820	288	400	18
	1977	1.50	0.55	1.06	0.78	0.22	4.50	522	783	287	553	17
	1978	1.71	0.62	0.90	0.60	0.13	4.20	496	848	308	446	31
	1979	2.11	0.88	1.27	0.89	0.25	4.15	454	958	400	577	32
	1980	1.82	0.64	0.75	0.79	0.21	4.22	483	879	309	362	29
	1981	1.11	0.53	0.76	0.47	0.16	4.48	534	593	283	406	18
	1982**	1.30	0.59	0.82	0.51	0.18	4.47	695	901	411	572	23
1983	1.52	0.71	0.67	0.77	0.23	4.38	458	694	324	308	19	

\*\* One month is missing

Table 24: Cont.

Station	Year	Annual mean conc. mg/l					Annual means pH	Annual prec. mm	Wet deposition			
		SO <sub>4</sub> -S	NO <sub>3</sub> -N	NH <sub>4</sub> -N	Ca	Mg			SO <sub>4</sub> -S mg/m <sup>2</sup>	NO <sub>3</sub> -N mg/m <sup>2</sup>	NH <sub>4</sub> -N mg/m <sup>2</sup>	H <sup>+</sup> mekv/m <sup>2</sup>
Kise (month)	1975	0.88	0.10	0.35	0.24	0.05	4.36	335	295	34	117	15
	1976	1.24	0.40	0.61	0.36	0.07	4.40	378	469	151	231	15
	1977	1.32	0.34	0.73	0.32	0.07	4.50	344	454	117	251	11
	1978	1.97	0.49	0.83	0.56	0.10	4.24	203	400	99	168	12
	1979	1.40	0.38	0.81	0.39	0.05	4.33	399	559	152	323	19
	1980	1.10	0.35	1.68	0.55	0.17	4.60	457	503	160	768	11
	1981	1.24	0.42	0.55	0.53	0.06	4.38	325	403	137	179	14
	1982	1.25	0.55	0.81	0.71	0.07	4.44	319	400	177	258	12
	1983	1.49	0.49	0.83	0.57	0.10	4.44	295	441	145	244	11

\* From July the first year and to June the next year. Sulphate in precipitation is corrected for sea salt with Cl (instead of Mg).

\*\* One month is missing



Table 25: Monthly and annual mean concentrations of sulphur dioxide ( $\text{SO}_2$ ) in air at the Norwegian background stations, 1983.  
Unit:  $\text{g S/m}^3$

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.3	0.9	0.9	0.6	0.4	0.5	0.2	0.3	0.3	0.3	0.6	1.1	0.5
Skreådalen	0.1	0.8	1.3	0.8	0.3	0.3	0.2	0.2	0.3	0.1	0.3	1.2	0.5
Hummelfjell	0.1	0.2	0.4	0.2	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.4	0.2
Kårvatn	0.1	0.3	0.4	0.4	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.5	0.2
Tustervatn	0.1	0.2	0.6	0.8	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.6	0.3
Jergul	1.3	0.4	1.9	3.1	1.2	0.1	0.4	0.1	0.2	0.2	0.2	0.6	0.8
Skrova	0.3	0.3	0.8	0.7	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
Vardø	3.7	1.1	1.7	3.4	0.6	0.6	0.6	0.8	1.1	0.8	0.6	2.1	1.4

Table 26: Monthly and annual mean concentrations of sulphate ( $\text{SO}_4$ ) in air at the Norwegian background stations, 1983.  
Unit:  $\text{g S/m}^3$

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
Birkenes	0.4	0.7	1.0	1.5	1.5	0.9	1.0	1.0	0.8	0.5	0.9	1.0	0.9
Skreådalen	0.3	0.5	0.9	1.5	1.1	0.7	1.2	0.9	0.8	0.3	0.7	0.7	0.8
Hummelfjell	0.1	0.2	0.5	0.7	0.7	0.3	0.5	0.3	0.3	0.1	0.1	0.3	0.3
Kårvatn	0.1	0.3	0.4	0.7	0.8	0.3	0.4	0.4	0.7	0.1	0.2	0.3	0.4
Tustervatn	0.2	0.4	0.7	1.4	0.8	0.3	0.3	0.3	0.6	0.2	0.2	0.4	0.5
Jergul	0.7	0.3	1.0	1.7	1.1	0.3	0.6	0.2	0.8	0.2	0.2	0.6	0.7
Skrova	0.3	0.4	0.7	1.2	1.0	0.3	0.4	0.3	0.6	0.2	0.2	0.3	0.5
Vardø	1.6	1.0	2.0	2.5	0.9	0.7	0.8	0.5	1.6	1.6	0.5	1.5	1.3

NORSK INSTITUTT FOR LUFTFORSKNING (NILU)  
 NORWEGIAN INSTITUTE FOR AIR RESEARCH  
 POSTBOKS 130, 2001 LILLESTRØM (ELVEGT. 52), NORGE

RAPPORTTYPE TEKNISK RAPPORT	RAPPORTNR. TR 10/86	ISBN-82-7247-743-2	
DATO SEPTEMBER 1986	ANSV. SIGN. <i>J. Schjoldager</i>	ANT. SIDER 24	PRIS Kr. 20,00
TITTEL Precipitation and air chemistry at the Norwegian background stations, 1983		PROSJEKTLEDER E. Joranger	
		NILU PROSJEKT NR. O-8118	
FORFATTER(E) Kari Hoem og Einar Joranger		TILGJENGELIGHET A	
		OPPDRAGSGIVERS REF.	
OPPDRAGSGIVER (NAVN OG ADRESSE) Norsk institutt for luftforskning			
3 STIKKORD (à maks. 20 anslag) Background stations   Acid precipitation   Air chemistry, 1983			
REFERAT (maks. 300 anslag, 7 linjer) Rapporten inneholder nedbørdata for 20 norske bakgrunnsstasjoner i 1983. Den kjemiske sammensetning av nedbørprøvene er presentert som måneds- og årsverdier. Årsverdiene er også gitt for hver stasjon fra deres start. Luftkonsentrasjonene av svoveldioksid og partikulært sulfat er målt på 8 av stasjonene, og presentert som måneds- og årsmiddelverdier.			

TITLE	Precipitation and air chemistry at the Norwegian background stations, 1983.
ABSTRACT (max. 300 characters, 7 lines)	The precipitation quality data measured in 1983 at 20 Norwegian background stations are presented. The chemical composition is given as monthly and annual values. Annual values from the start of each station are also given. Air conditions of sulphur dioxide and particulate sulphate were measured at 8 stations, and presented as monthly and annual averages.

\* Kategorier: Apen - kan bestilles fra NILU           A  
 Må bestilles gjennom oppdragsgiver           B  
 Kan ikke utleveres                                   C