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Data Set Description:

PI: Christoph Ritter
Instrument: Stratospheric Aerosol Lidar
Site(s): Koldewey station, Ny-Alesund
Measurement Quantities: aerosol backscatter ratio, aerosol backscatter coefficient, volume depolarization

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Reference Articles:

R. Neuber, G. Beyerle, and O. Schrems, LIDAR Measurements of Stratospheric Aerosols in the Arctic, Ber. Bunsenges. Phys. Chem. 96, 350-353, 1992.

R. Neuber, G. Beyerle, G. Fiocco, A. di Sarra K.-H. Fricke, B. Knudsen, C. David, S. Godin, L. Stefanutti, and G. Vaughan, Latitudinal distribution of stratospheric aerosols during the EASOE winter 1991/92, Geophys. Res. Letts., 21 (13) 1283-1286, 1994.

G. Beyerle, R. Neuber, O. Schrems, F. Wittrock, and B. Knudsen, Multiwavelength lidar measurements of stratospheric aerosols above Spitsbergen during winter 1992/93, Geophys. Res. Lett., 21 (1), 57-60, 1994.

G. Beyerle, Untersuchungen stratosph"arischer Aerosole vulkanischen Ursprungs und polarer stratosph"arischer Wolken mit einem Mehrwellenl"angen-Lidar auf Spitzbergen, Dissertation, Berichte Polarforsch., 138 1994.

Neuber, R., G. Beyerle, B. Heese, K. Stebel, P. von der Gathen, F. Wittrock, Aerosol, ozone, and temperature measurements with a multi-wavelength LIDAR at Spitsbergen, in: Abstracts of Papers, 17th Intern. Laser Radar Conf., Sendai, Japan, July 25-29, 1994

Gathen, P. von der, B. Heese, G. Beyerle, R. Neuber, Multi-wavelength LIDAR configurations for polar stratospheric research, in: Abstracts of Papers, 17th Intern. Laser Radar Conf., Sendai, Japan, July 25-29, 1994

G. Beyerle, B. Luo, R. Neuber, Th. Peter, and I. S. McDermid, Temperature dependence of ternary solution particle volumes as observed by lidar in the Arctic stratosphere during winter 1992/1993, Journal of Geophysical Research, 102 (D3) 3603-3609, 1997.

W. Steinbrecht, H. J\"ager, A. Adriani, G. di Donfranceso, J. Barnes, G. Beyerle, R. Neuber, C. David, S. Godin, D. Donovan, A. I. Carswell, M. Gross, T. McGee, F. Masci, A. D'Altorio, V. Rizi, G. Visconti, I. S. McDermid, G. Megie, A. Mielke, B. Stein, C. Wedekind, T. Nagai, O. Uchino, H. Nakane, M. Osborn, D. Winker, NDSC intercomparison of stratospheric aerosol processing algorithms, in: Advances in Atmospheric Remote Sensing with Lidar (Ansmann, Neuber, Rairoux, Wandinger, eds.), Selected papers of the 18th ILRC, Berlin, 22-26 July 1996, Springer-Verlag Berlin Heidelberg, pp 501-504, 1997.

K. Stebel, Lidar-Beobachtungen stratosph\"arischer Aerosole in der Arktis \"uber Spitzbergen (79°N, 12°E), Dissertation, Universit\"at Bremen, 1998.

J. Biele, Polare stratospheric clouds: Lidar-observations, Characterization of Formation and Development, Ber. Polarforsch. 303 1999

Instrument Description:

Location:

Ny-Alesund, Spitsbergen, 78.92°N, 11.93°E, 10 m asl

until fall 1994 in a 20ft container

since fall 1994 in a dedicated NDSC observatory see http://www.awi-potsdam.de/www-pot/koldewey/kolndscgeb.html

Transmitter:

until 1994:

Continuum NY 61-30 Nd:YAG laser,

1064 nm (200 mJ),

532 nm (190 mJ),

30 Hz pulse repetition frequency

Lambda Physik EMG 150 TMSC Excimer laser

353 nm (150 mJ) (stimulated Raman scattering in H2)

30 Hz pulse repetition frequency

since 1994 - 2006:

Continuum NY 61-30 Nd:YAG laser,

1064 nm (200 mJ),

532 nm (190 mJ),

30 Hz pulse repetition frequency

Lambda Physik LPX 250T Excimer laser

353 nm (50-100 mJ) (stimulated Raman scattering in H2)

90 Hz pulse repetition frequency

since 2006:
Spectra Pro 290-50
1064 nm (200mJ)
532 nm (200mJ)
355 nm (200mJ)
50 Hz pulse repetition

Receiver:
until 2010:
60 cm diameter Newtonian type telescope, mechanical chopper,
elastic backscattering : 353 nm, 532 nm, 1064 nm
inelastic backscattering : 385 nm, 607 nm
filter bandwidth:
10 nm (532 nm),
5 nm (355, 385, 607, 1064 nm);
polarization detection at 532 nm

since 2010:
70 cm Newton telescope, no chopper
elastic backscattering : 355 nm, 532 nm, 1064 nm
inelastic backscattering : 387 nm, 407 nm, 607 nm, 660 nm

Detectors:
until 2010:

EMI 9893Q / 9863QA	(UV & VIS)	
	until 1994 w/o preamplifier,	
	since 1994 w. preamplifier	
EG&G SPCM 10	(IR)	

since 2010:

Hamamatsu PMT	(UV & IS)	
EG&G AMD	(IR)	

Signal and data processing:
until 1994: two dedicated Dual Multi Channel Counter (DMCC) for UV & VIS
since 1994 -2010: (and for all IR-data)
EG&G TurboMCS Multi channel scaler (photon counting)

since 2010:

Licel Transients	(UV & vis)	both photo counting and analog
	(IR)	only analog

Algorithm Description:

Each data set is based on a signal average of 10 minutes. The backscatter ratio is calculated using Klett's algorithm. Profiles of the molecular backscatter coefficient are calculated from a density profile obtained from daily meteorological soundings. Lidar data profiles are normalized to a backscatter ratio value of 1.0 between 25 and 30 km. Volume depolarisation is calculated as the ratio of the perpendicular and parallel lidar signals. Depolarization is normalized to the molecular value of 0.014 between 25 and 30 km.

Algorith intercomparison: see Steinbrecht et al.

Expected Precision/Accuracy of Instrument:

Accuracy:

Backscatter ratio	: 10-20%
Volume depolarization	: 5-10%

Precision:

Backscatter ratio	: 1%
Volume depolarization	: 8%

Instrument History:

NDSC qualification since 1991.
NDSC data submission since 1991.

Measurement periods

winter 1988/1989	:	5 Jan 1989	-	26 Apr 1989
winter 1989/1990	:	19 Jan 1990	-	11 Mar 1990
winter 1990/1991	:	3 Jan 1991	-	17 Mar 1991
winter 1991/1992	:	13 Nov 1991	-	27 Mar 1992
winter 1992/1993	:	1 Dec 1992	-	1 Mar 1993
winter 1993/1994	:	5 Oct 1993	-	6 Apr 1994
winter 1994/1995	:	9 Jan 1995	-	5 Apr 1995
winter 1995/1996	:	1 Nov 1995	-	19 Mar 1996
winter 1996/1997	:	3 Jan 1997	-	6 Mar 1997
winter 1997/1998	:	24 Aug 1997	-	21 May 1998
winter 1998/1999	:	18 Oct 1998	-	30 May 1999

since: 2010:

winter 2010/2011	:	30 Sep 2010	-	30 Mar 2011
winter 2011/2012	:	30 Sep 2011	-	30 Mar 2012
winter 2012/2013	:	30 Sep 2012	-	30 Mar 2013
winter 2013/2014	:	30 Sep 2013	-	30 Mar 2014
winter 2014/2015	:	30 Sep 2014	-	30 Mar 2015
winter 2015/2016	:	30 Sep 2015	-	30 Mar 2016
winter 2016/2017	:	30 Sep 2016	-	30 Mar 2017

winter 2017/2018 : 31 Dec 2017 - 30 Mar 2018
winter 2018/2019 : 30 Sep 2018 - 30 Mar 2019

Detection channels

winter 1988/1989 : 353 nm (& 308 for O3-DIAL)
winter 1989/1990 : 353 nm (& 308 for O3-DIAL)
winter 1990/1991 : 353 nm (& 308 for O3-DIAL)
winter 1991/1992 : 353, 532p, 532s nm, (& 308 for O3-DIAL)
winter 1992/1993 : 353, 532p, 532s, 1064 nm, (& 308 for O3-DIAL)
winter 1993/1994 : 353, 385, 532, 607 nm, (& 308 for O3-DIAL)
winter 1994/1995 : 353, 385, 532p, 532s, 532, 607 nm, (& 308 for O3-DIAL)
winter 1995/1996 : 353, 385, 532p, 532s, 607 nm, (& 308, 332 for O3-DIAL)
winter 1996/1997 : 353, 385, 532p, 532s, 607 nm, (& 308 for O3-DIAL)
winter 1997/1998 : 353, 385, 532p, 532s, 607 nm, (& 308 for O3-DIAL)
winter 1998/1999 : 353, 532p, 532s, 607 nm, (& 308 for O3-DIAL)

since 2010:
each year: 355p, 355s, 532p, 532s, 1064