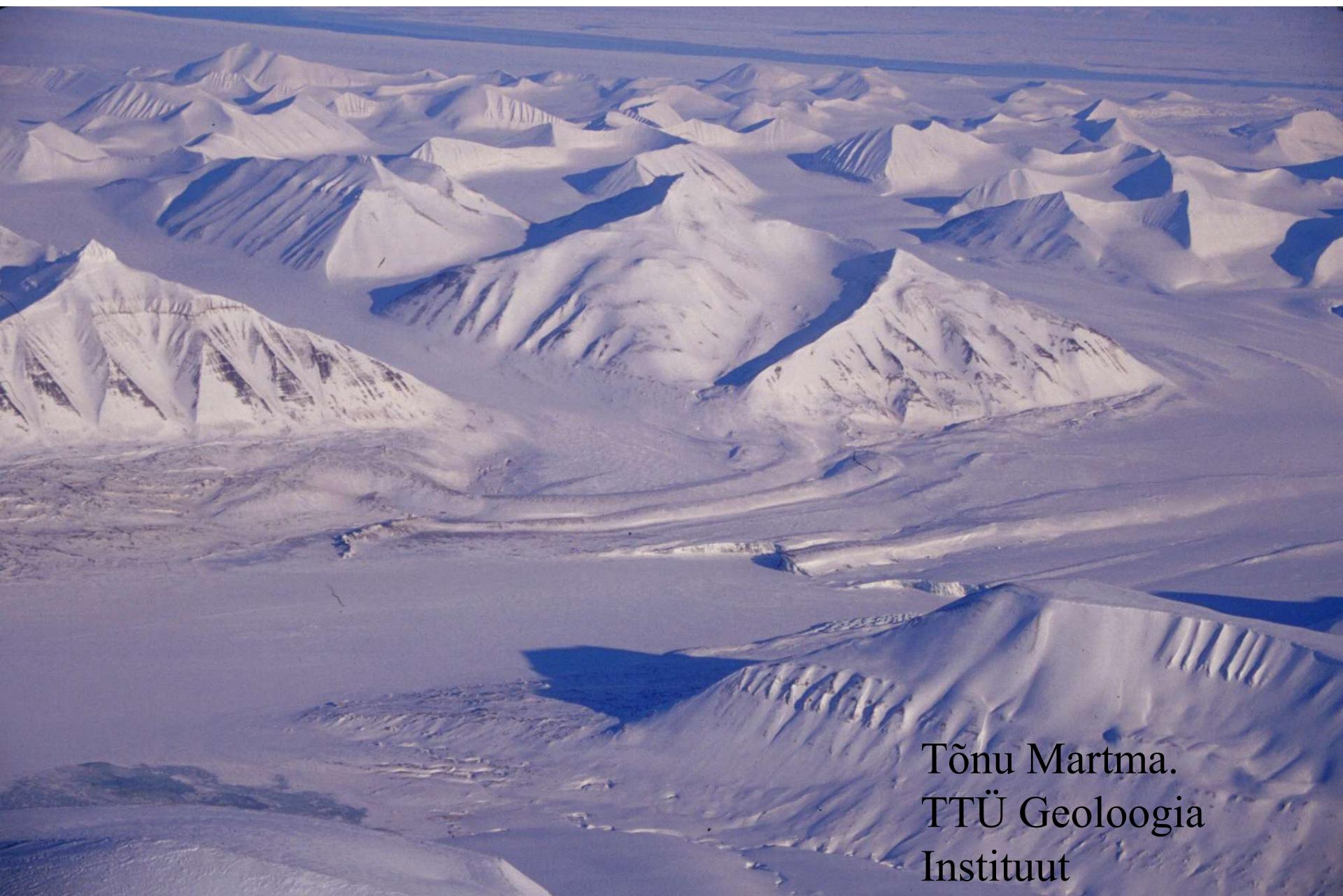
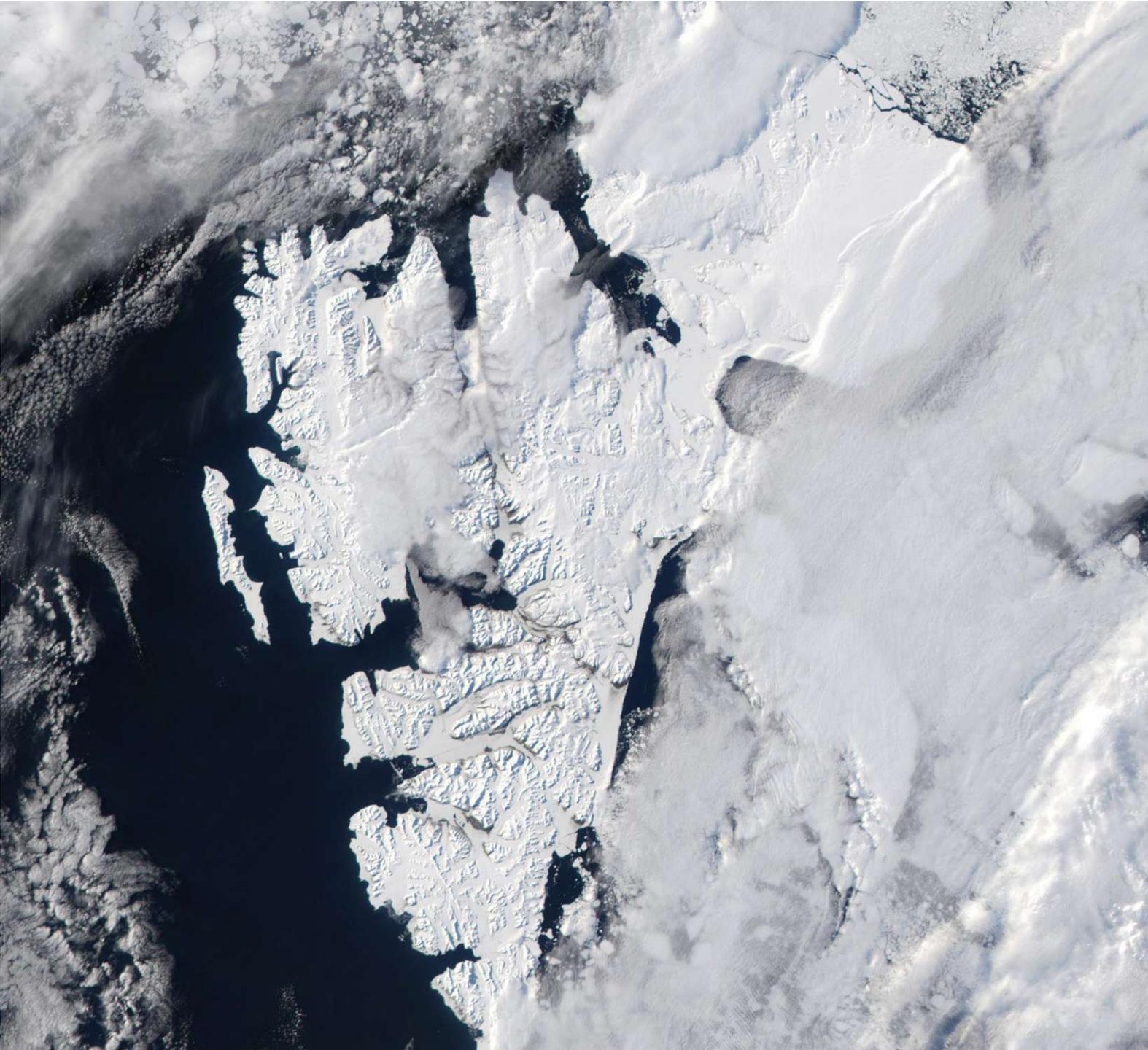
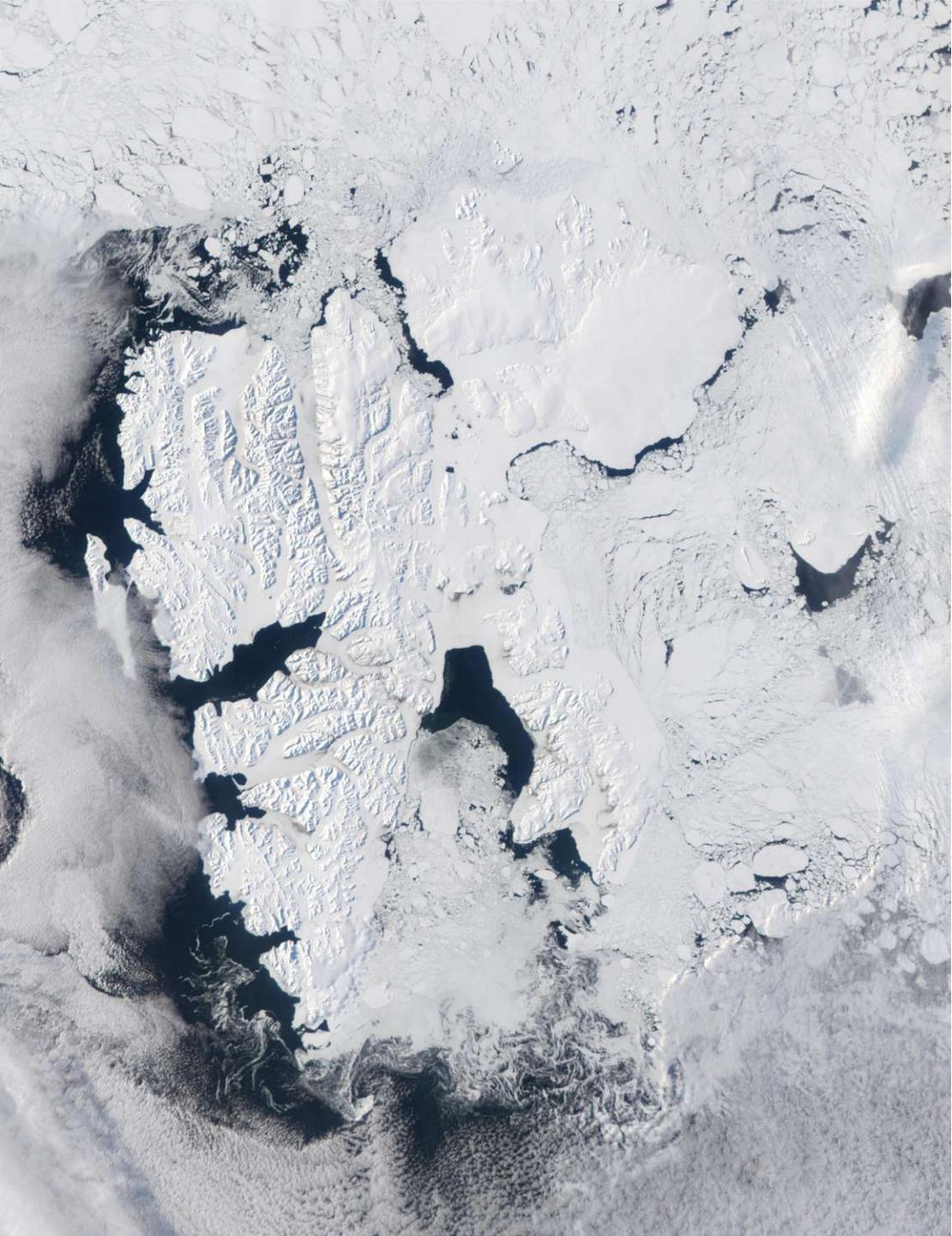


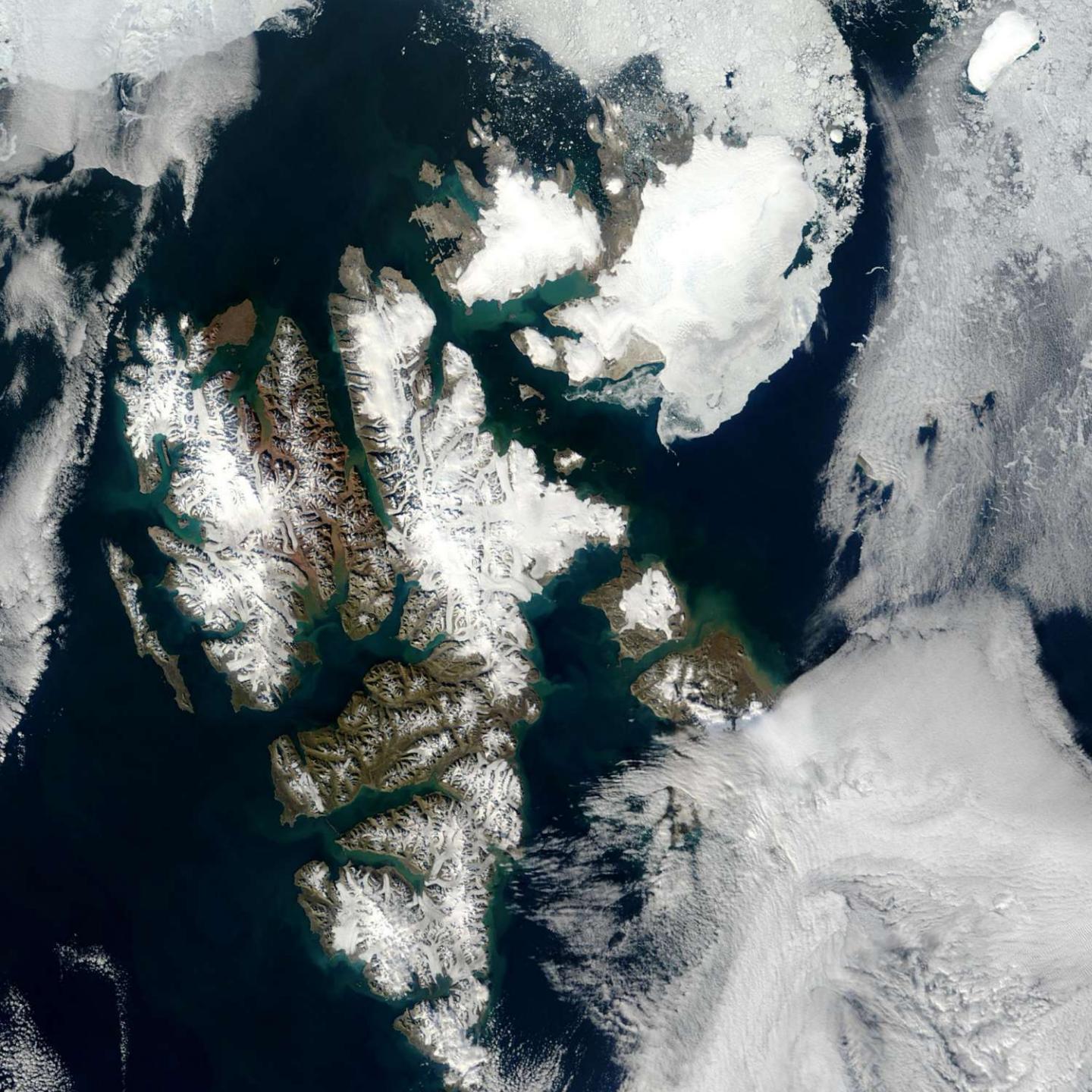
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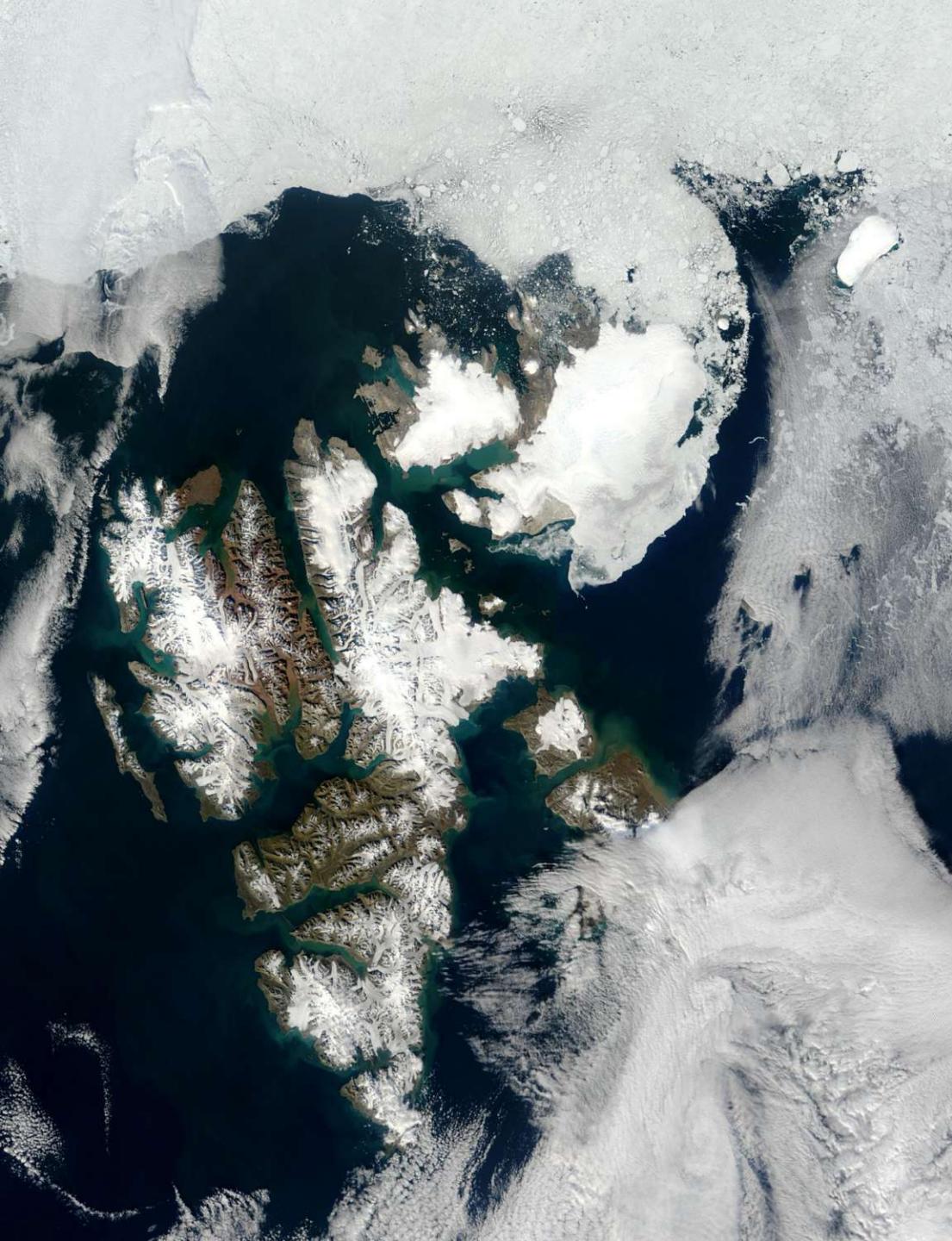


Tõnu Martma.  
TTÜ Geoloogia  
Instituut

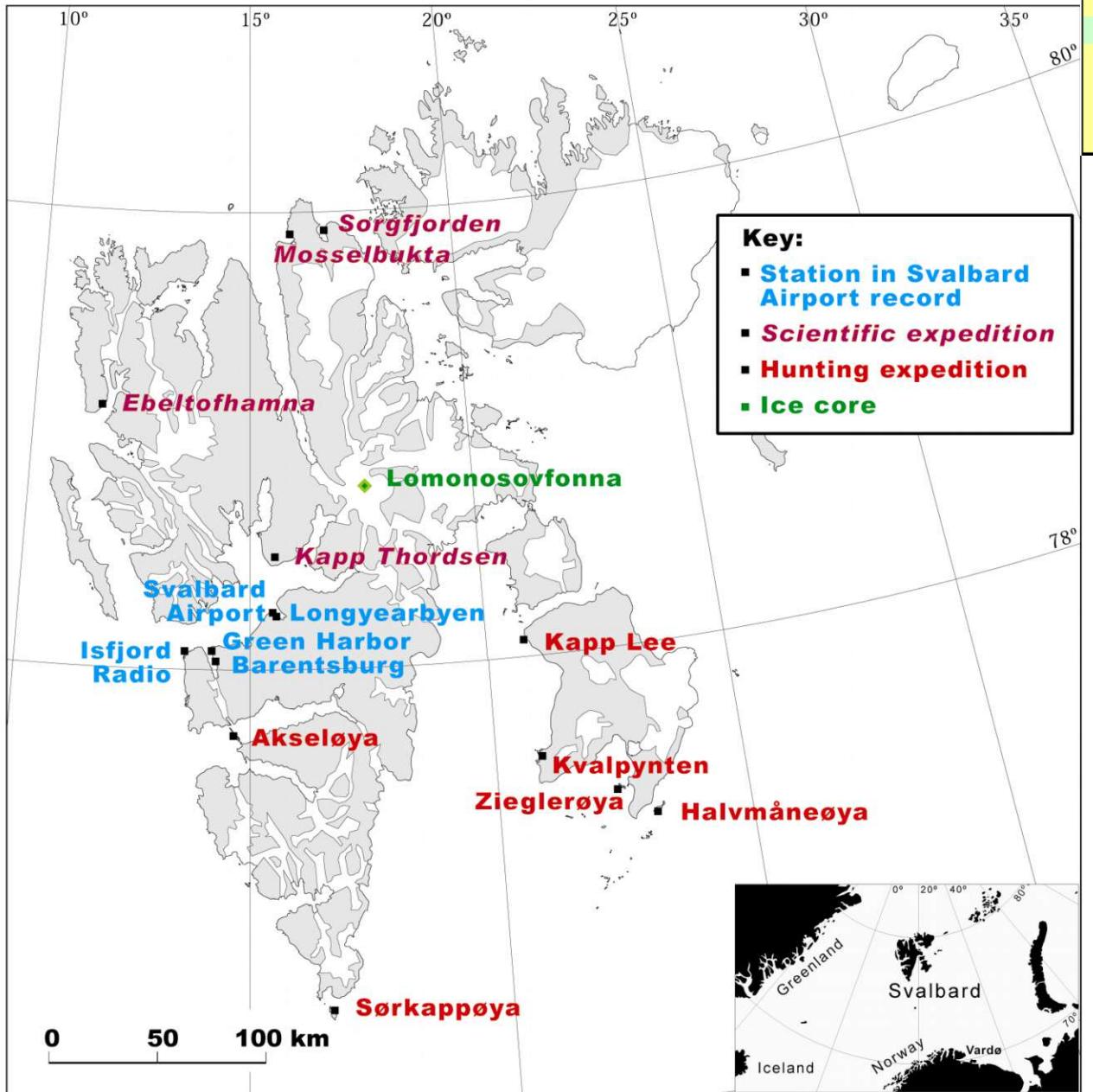








Mosselbukta 1872-1873	Halvmåneøya 1906-1907
Kapp Thordsen 1882-1883	Kvalpynten 1906-1907
Akseløya 1898-1899	Kvalpynten 1908-1909
Sorgfjorden 1899-1900	Sørkappøya 1908-1909
Akseløya 1900-1901	Akseløya 1910-1911
Akseløya 1902-1903	Longyearbyen 1911-1912
Akseløya 1904-1905	Sørkappøya 1911-1912
Kvalpynten 1904-1905	Ebeltofthamna 1912-1913
Kapp Lee 1904-1905	Sørkappøya 1914-1915
Zieglerøya 1904-1905	





*Figure 2 The site of the first regular measurements, Finneset in Grønfjorden also called Green Harbour. The photo is probably taken in the 1920s (unknown photographer).*

Kapp Linne

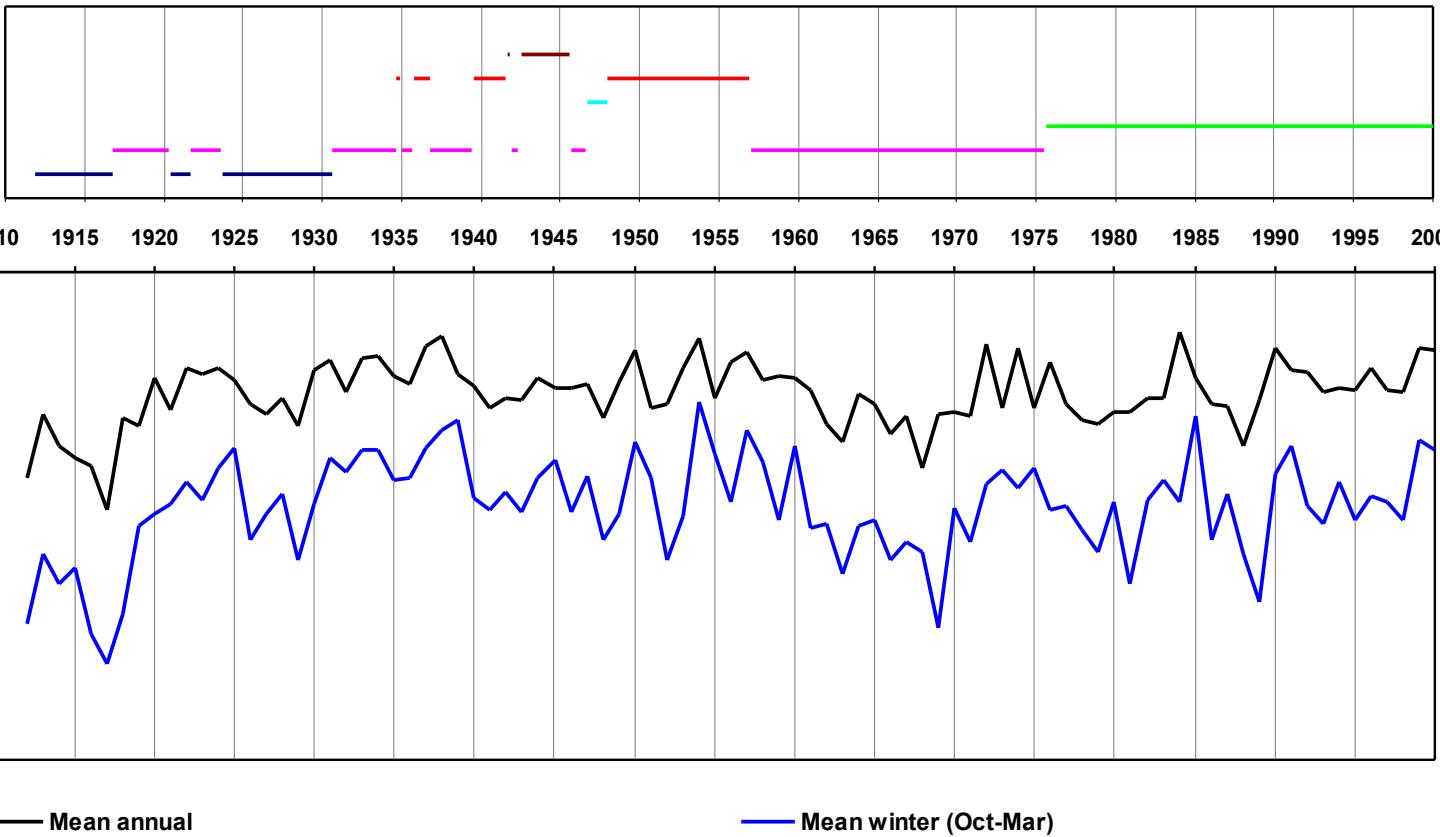


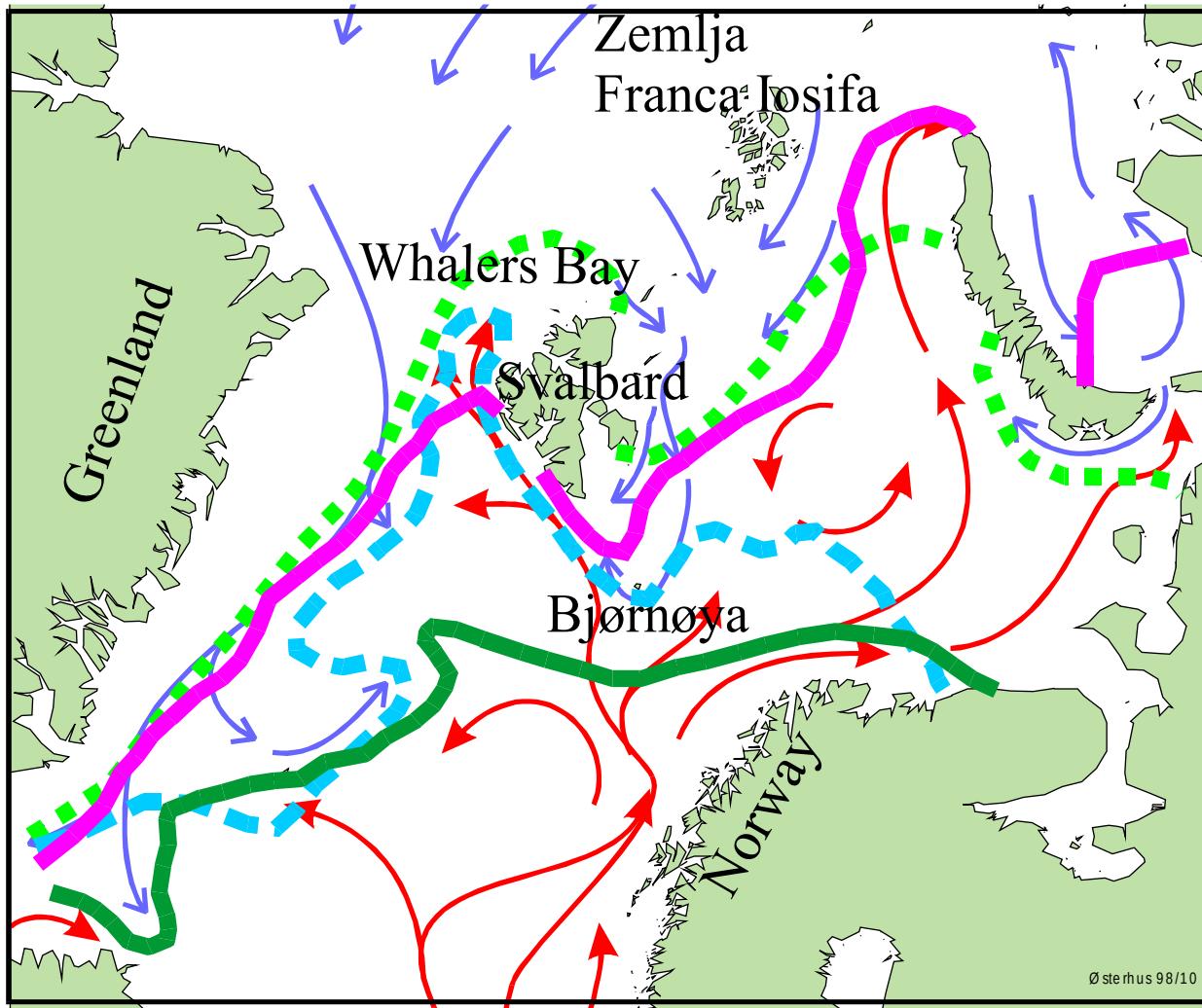
Kapp Linne



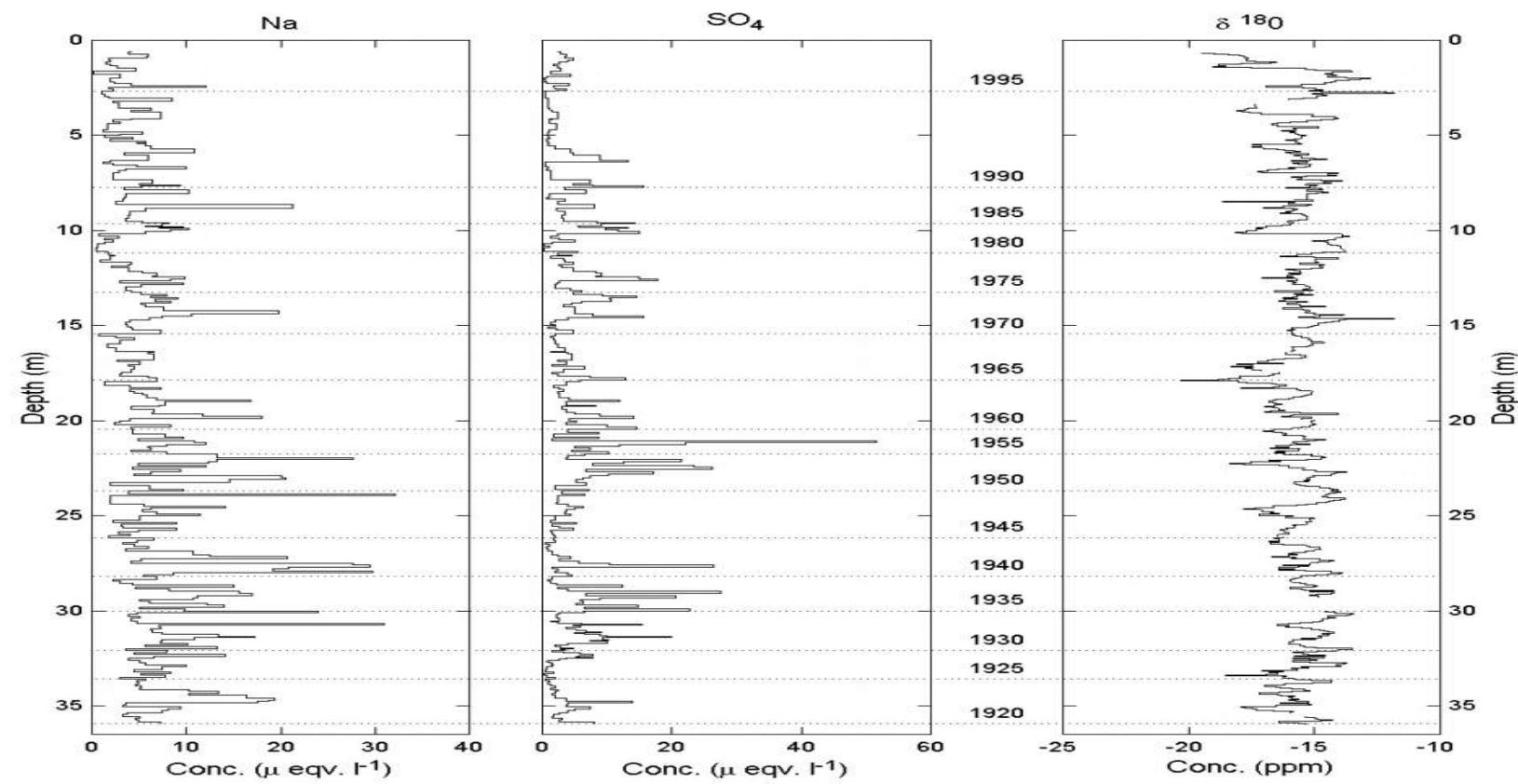


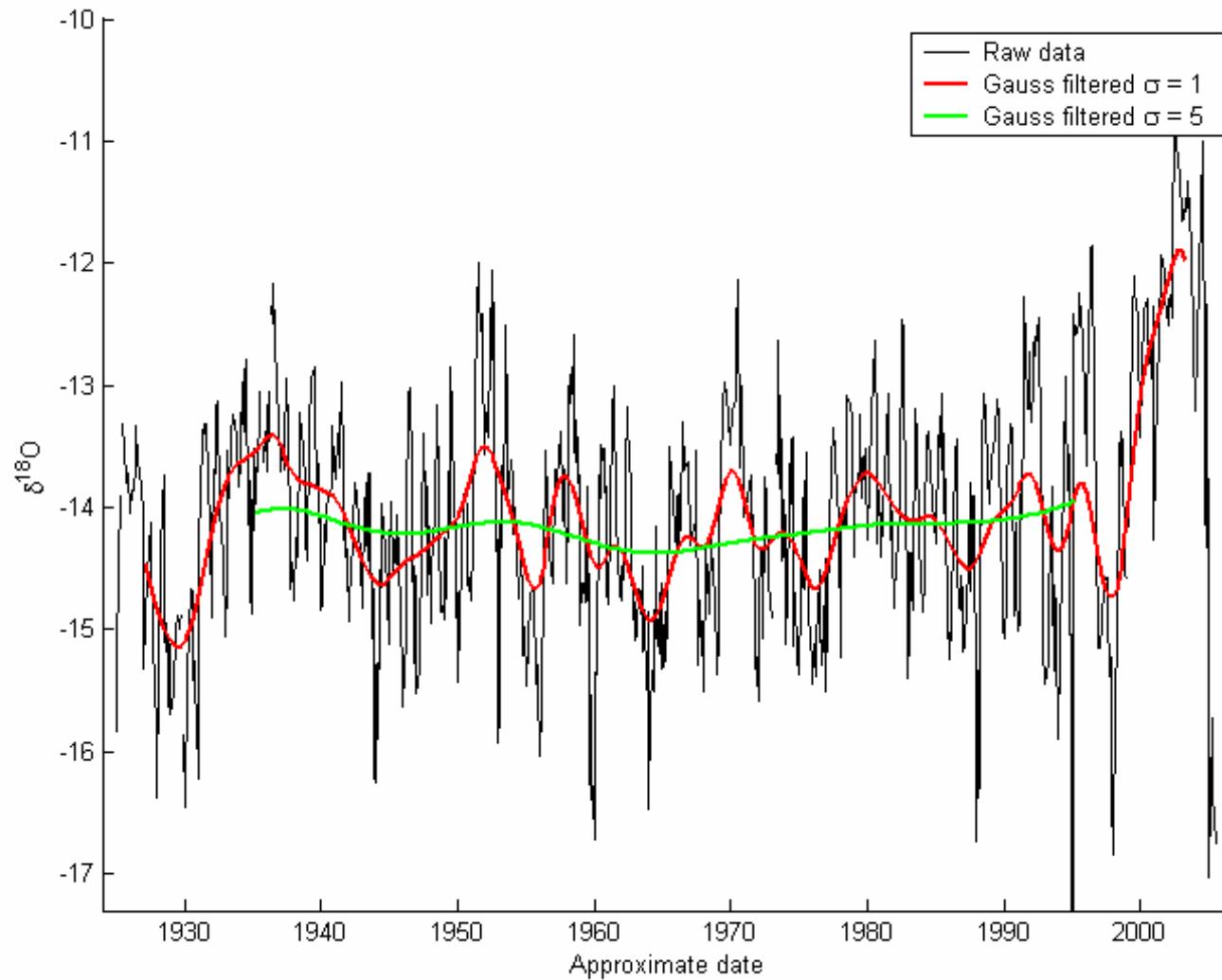
- Interpolation
- Barentsburg
- Isfjord Radio
- Svalbard Airport
- Longyearbyen
- Green Harbor





# Lomonosovfonna liustiku puursüdamik

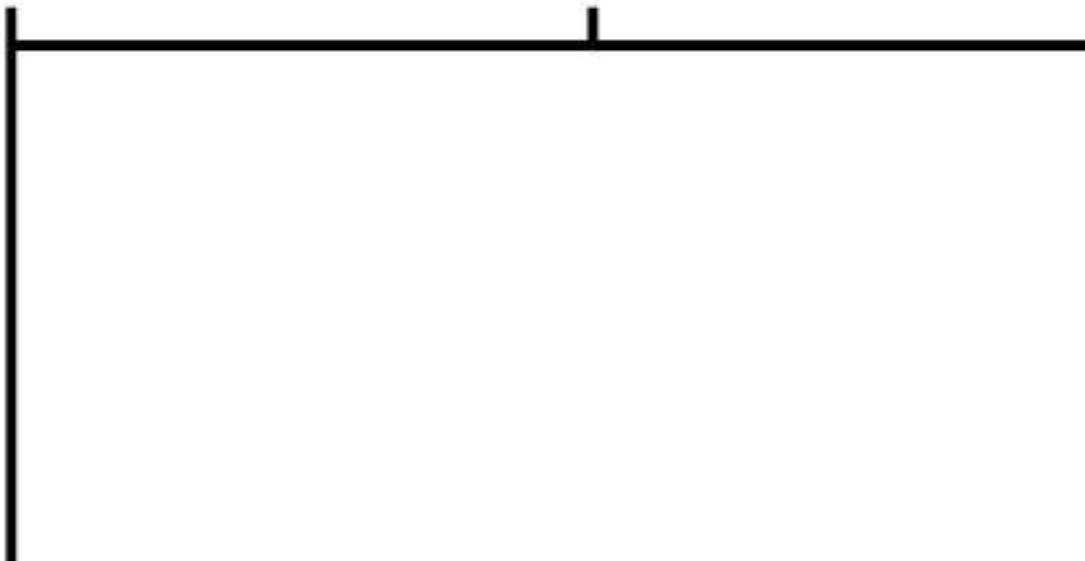




*Figure 4 The Svalbard Airport series and the Lomonosovfonna ice-core series both normalised to zero mean and unite standard deviation during the period 1931 - 1990. Only filtered values are shown.*

**-19**

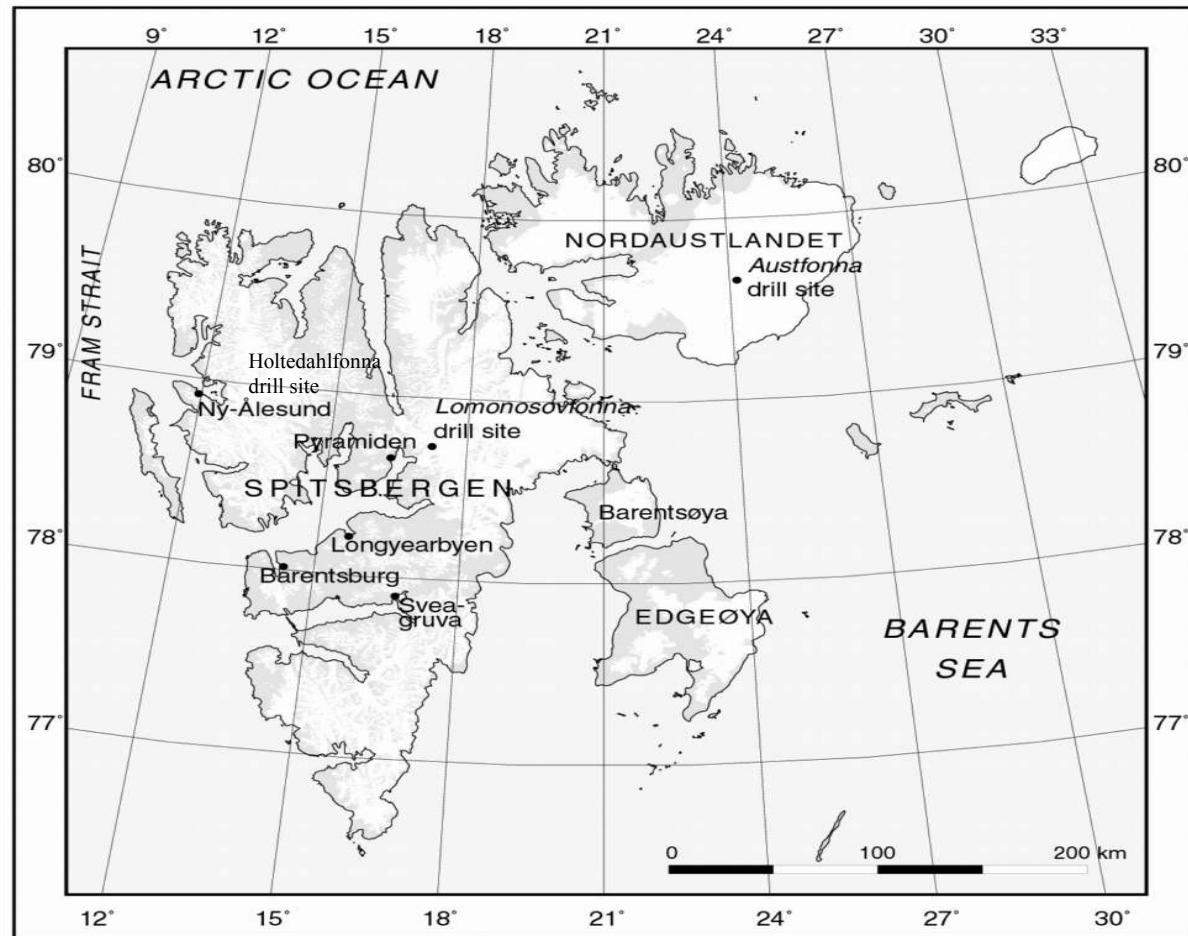
**-18**



**1 820**

**- 5**

**+**





Linne org





# Kongsvegen N6



# Kongsvegen N9



Lomonosovfonna meteojaam aprill 2001



Laager Lomonosovfonna liustikuplatool, 1200 m, aprill 2002





Figure 7. Norwegian Polar Institute mass balance study glaciers near Ny-Ålesund. BRG:Austre Brøggerbreen; MLB:Midre Lovénbreen; KNG: Kongsvegen.

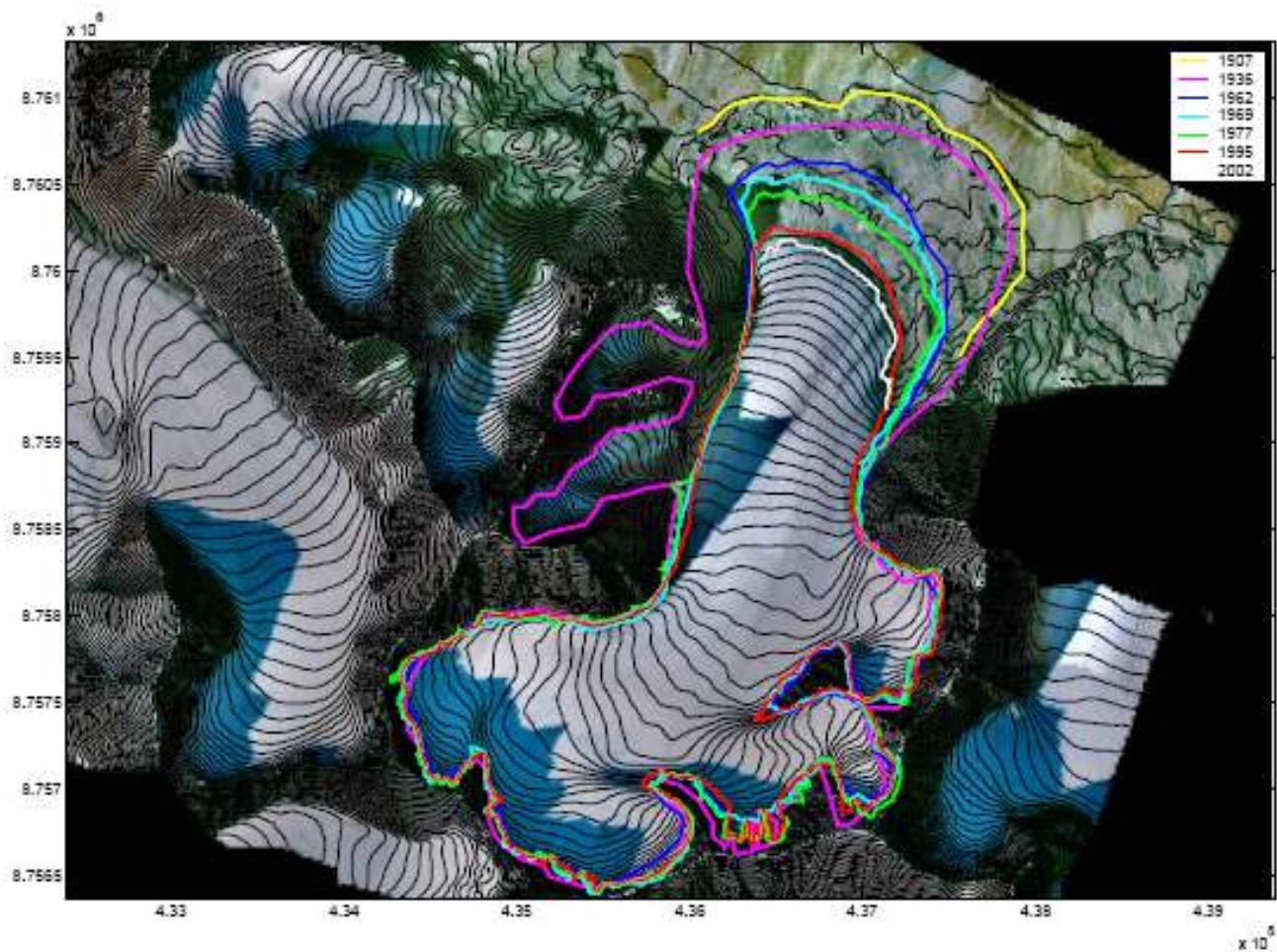


Figure 15 Front positions and/or glacier outlines for Midre Lovénbreen

With sledges across Greenland's ice 1888



# Holtedahlfonna

## – a new Svalbard ice core record

beth Isaksson<sup>1</sup>, Jack Kohler<sup>1</sup>, Ola Brandt<sup>1</sup>, Chris Nuth<sup>1</sup>, Dmitry Divine<sup>1,2</sup>, Tonu Martma<sup>3</sup>, Vaikmae<sup>3</sup>, Roderik S. W. van de Wal<sup>4</sup>, Carina van der Veen<sup>4</sup>, Eric-Jan de Jong<sup>4</sup>, Geerke Floor<sup>4</sup>, Åsa Sjögren<sup>5</sup>, Veijo Pohjola<sup>5</sup>, Kristiina Virkkunen<sup>6,7</sup>, John Moore<sup>6</sup>, Harro Meijer<sup>6</sup>, Fred Godliebsen<sup>1,2</sup>

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### Ice core location



Figure 1. The ice core location on Holtedahlfonna and two earlier locations on Austfonna and Lomassurfonna.

### Ice chemistry

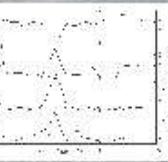


Figure 2. Chemical concentration and winter snow from Holtedahlfonna 2005 (solid line) and Lomassurfonna 2005 (dotted line). The former is in Holtedahlfonna has a clear winter increase that is not seen in Lomassurfonna.

### Abstract

A number of modern ice cores, with high-resolution chemistry and isotope records, have been drilled at Svalbard during the past 10 years. The most recent one was drilled in April of 2005 at 1150 m asl at Holtedahlfonna (Figure 1), an ice saddle about 40 km NE of Ny-Alesund. The ice core was 125 m deep and the estimated ice depth at the drill site is about 150 m (Figure 2). Through the pre-site surveys, snow pits and shallow ice cores have been collected and sampled during the springs of 2003 and 2004 (Figure 3). At this point the whole core has been analysed for dielectric profiling (DEP) and ice structures. The complete core is sub-sampled for water isotopes and ion chemistry. The  $\delta^{18}\text{O}$  are so far analysed back to about 1925 (Figure 4) and are in line with the instrumental record as well as with previous ice core data (Figure 5). Preliminary analysis suggests that this ice core covers the last 400 years. We are currently running analyses of major ions, deuterium, tritium and pesticides.

### Ice depth

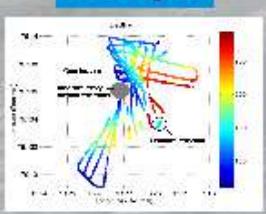


Figure 1. Holtedahlfonna ice thickness map based on 10 MHz ice radar survey.

### $\delta^{18}\text{O}$ stratigraphy

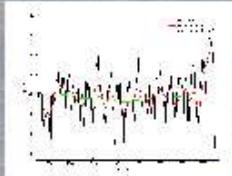


Figure 4. The  $\delta^{18}\text{O}$  record from the uppermost 20 m of the ice core from Holtedahlfonna drilled in April 2005. Using a preliminary dating method we estimate that these data are covering the last 20 years. The last year's warm temperatures are clearly visible in this record.

### Ice cores and Svalbard climate

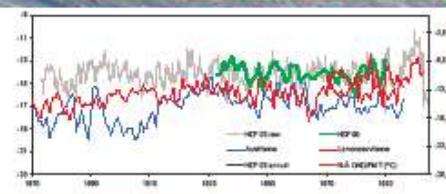


Figure 5. The  $\delta^{18}\text{O}$  records from Holtedahlfonna, Lomassurfonna and Austfonna regular with the homogenized Svalbard Airport record. The comparison suggests that the new ice core data from Holtedahlfonna are in line with existing data.





## References

- Chaudhuri, P. and Marron, J. S., 1999: SiZer for exploration of structures in curves. *Journal of the American Statistical Association* 94(447): 807-823.
- Isaksson, E., Kohler, J., Pohjola, V., Moore, J., Igarashi, M., Karlöf, L., Martma, T., Meijer, H.A.J., Motoyama, H., Vaikmäe, R., and van de Wal, R.S.W. 2005. Two ice core  $\delta^{18}\text{O}$  records from Svalbard illustrating climate and sea ice variability over the last 400 years. *The Holocene*, 15 (4), 501-509.
- Nordli, P.Ø., I. Hanssen-Bauer, E.J. Førland. 1996: Homogeneity analyses of temperature and precipitation series from Svalbard and Jan Mayen. Norsk Meteorologisk Institutt-Klima. Report No. 16/96. 41 pp.
- Vinje T., 2001: Anomalies and trends of sea ice extent and atmospheric circulation in the Nordic Seas during the period 1864-1998. *Journal of Climate* 14 (2): 255-267.

**Seasonal variations** in  $\delta^{18}\text{O}$  are visible at least in the uppermost 60 m of the core (*Pohjola and others, 2002*).

**Reference horizons**

- 1963 nuclear bomb layer
- 1783 Laki eruption

**Glacial modeling** using accumulation and ice depth as input (*Nye, 1963*)

## References

- Chaudhuri, P. and Marron, J. S., 1999: SiZer for exploration of structures in curves. *Journal of the American Statistical Association* 94(447): 807-823.
- Isaksson, E., Kohler, J., Pohjola, V., Moore, J., Igarashi, M., Karlöf, L., Martma, T., Meijer, H.A.J., Motoyama, H., Vaikmäe, R., and van de Wal, R.S.W. 2005. Two ice core  $\delta^{18}\text{O}$  records from Svalbard illustrating climate and sea ice variability over the last 400 years. *The Holocene*, 15 (4), 501-509.
- Nordli, P.Ø., I. Hanssen-Bauer, E.J. Førland. 1996: Homogeneity analyses of temperature and precipitation series from Svalbard and Jan Mayen. Norsk Meteorologisk Institutt-Klima. Report No. 16/96. 41 pp.
- Vinje T., 2001: Anomalies and trends of sea ice extent and atmospheric circulation in the Nordic Seas during the period 1864-1998. *Journal of Climate* 14 (2): 255-267.



# Lomonosovfonna laager 2002 aprill

