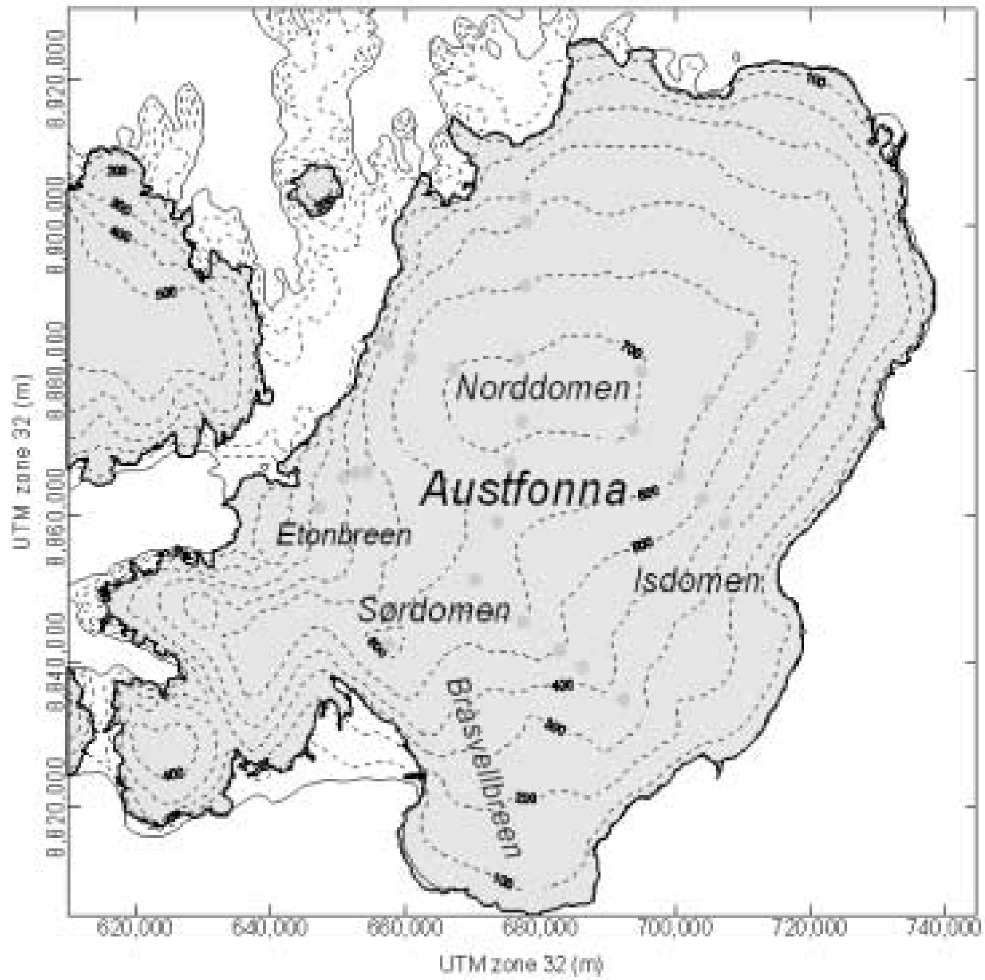
Spatial and temporal variability in snow accumulation on Austfonna, Svalbard.

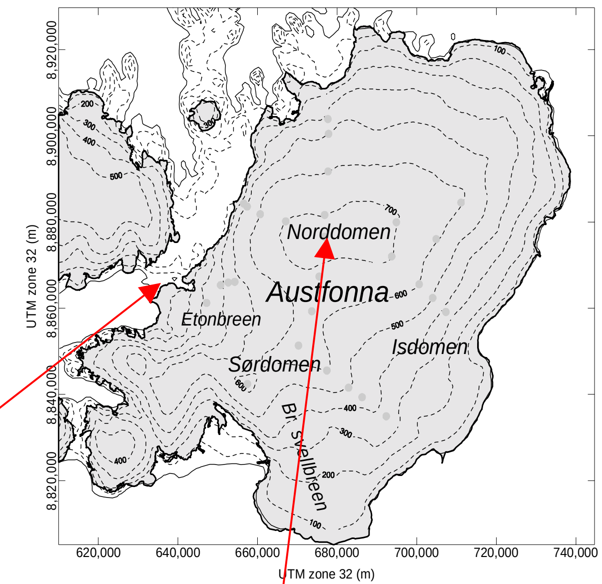
Andrea Taurisano, Jack Kohler, Jon-Ove Hagen, Trond Eiken,
Even Loe and Kjetil Melvold

Austfonna

- Area ~8200 km^2
- Simple-dome shape topography with a number of drainage basins
- Maximum elevation c.a 800 m a.s.l., max. ice thickness 560 m
- Polythermal - highest part is below the percolation-zone for most years



Cryosat Cal-Val field campaign Spring 2004: Austfonna (Svalbard)



Period: 15 April – 1 May 2004

Team: Andrea Taurisano and Jørgen Haagensli (NPI)
Jon Ove Hagen, Trond Eiken and Even Loe (UiO)

Airborne measurements: AWI team on Dornier Do228-100


Depot on Oxfordhalvøya


Camp on Austfonna summit

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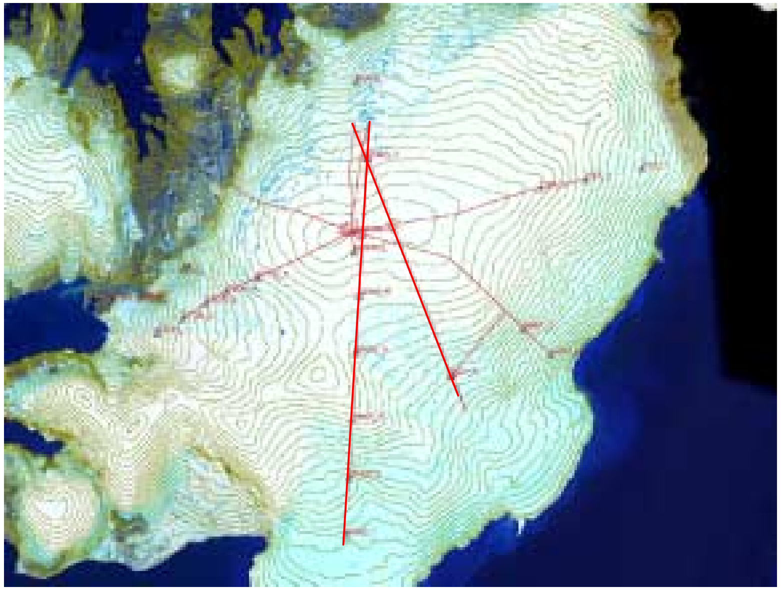
8	Corner reflectors	Airborne radar altimetry measur. (image calibration)	5 reflectors along Cryosat orbit tracks



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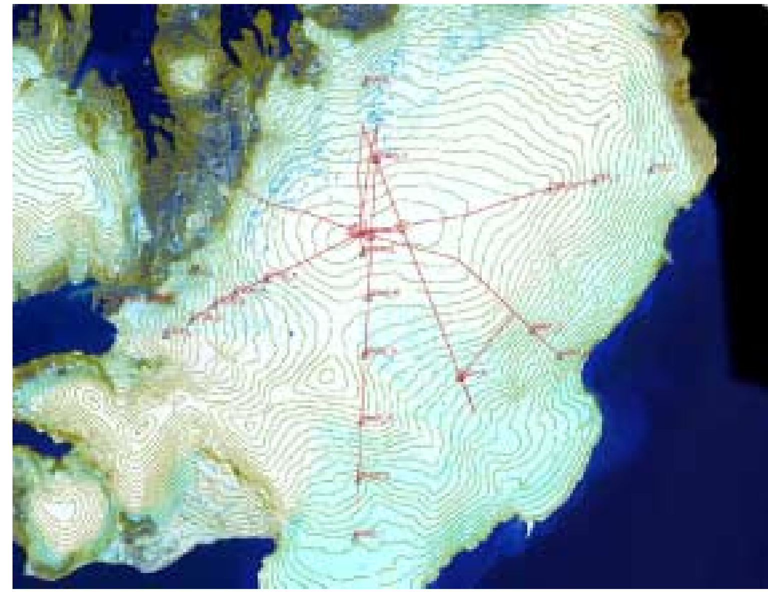

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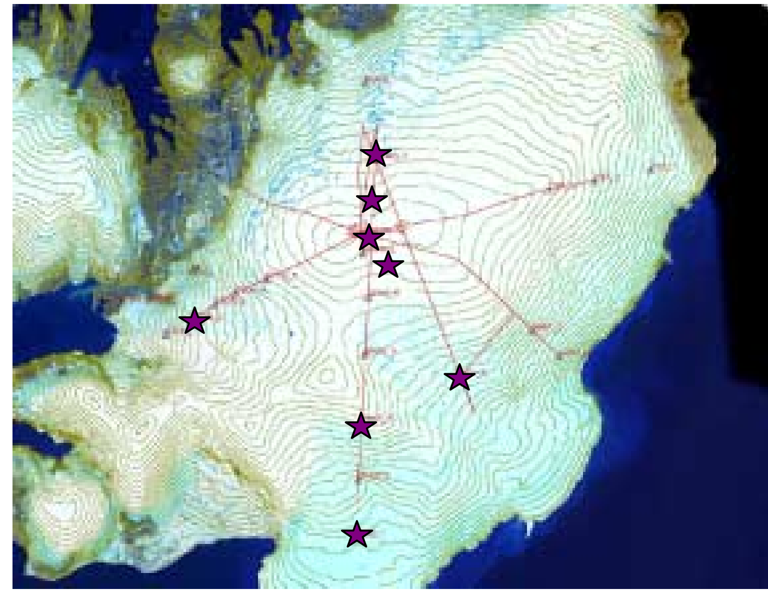

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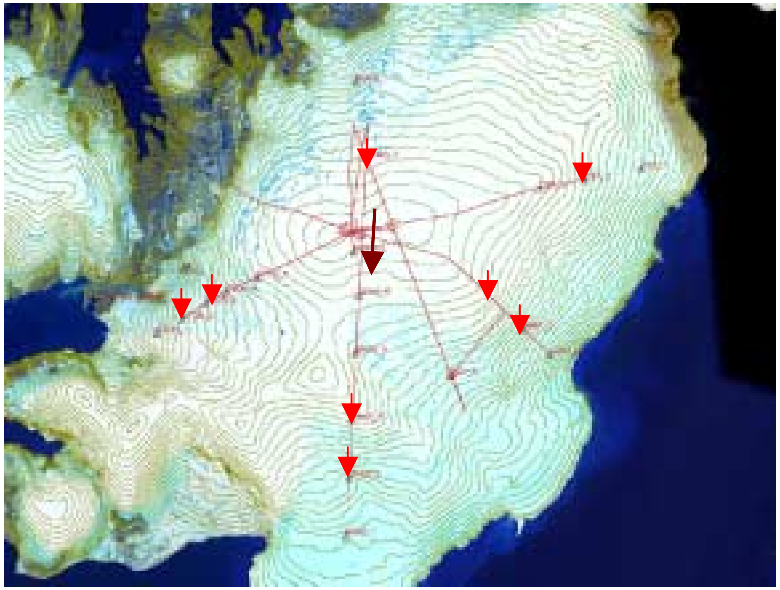

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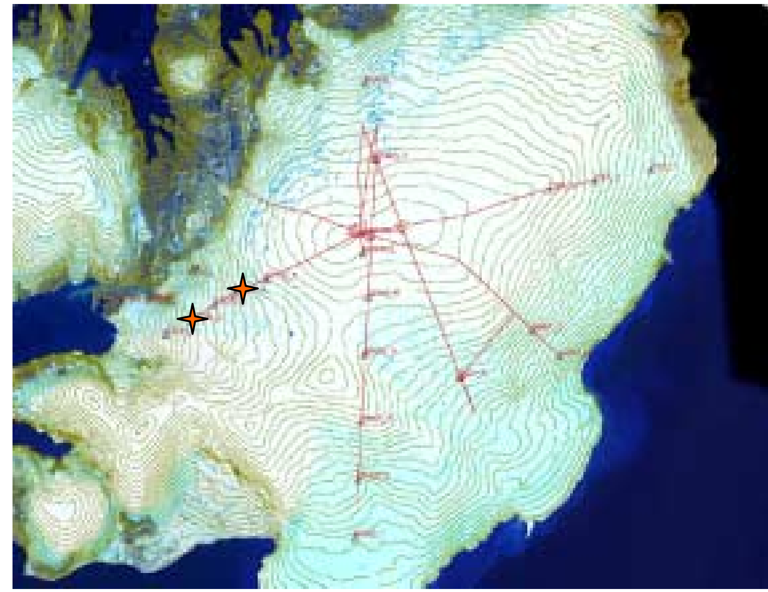

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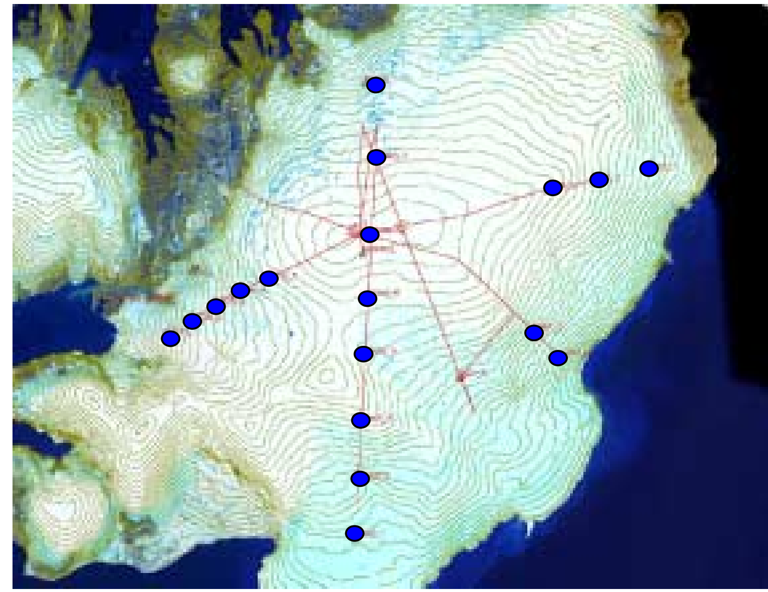

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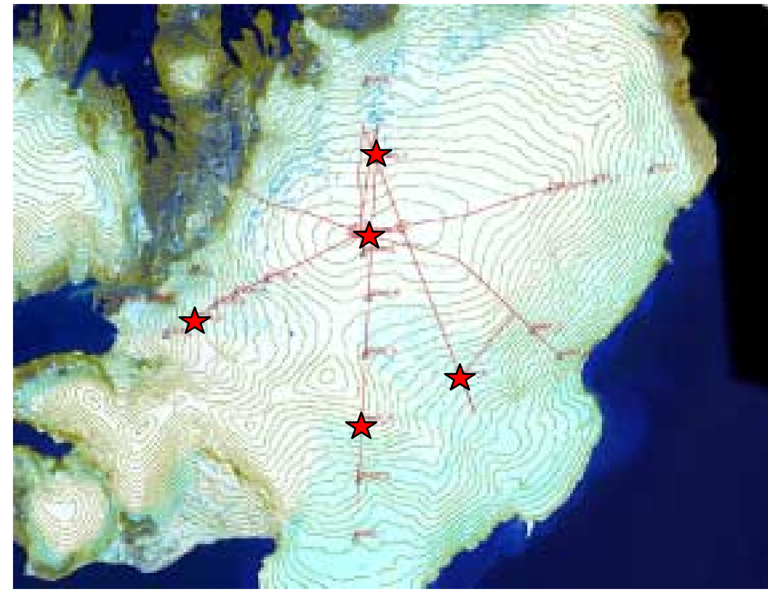
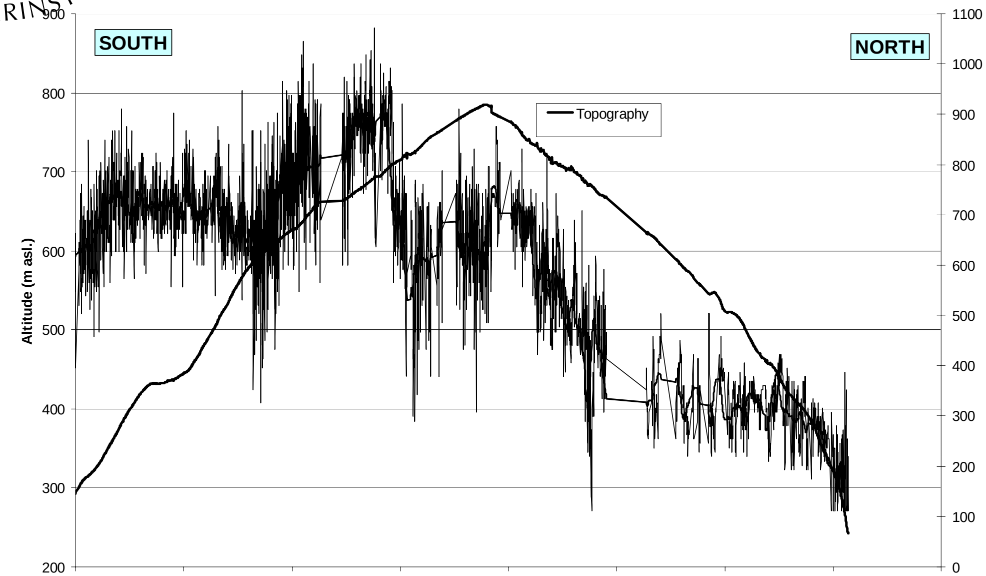
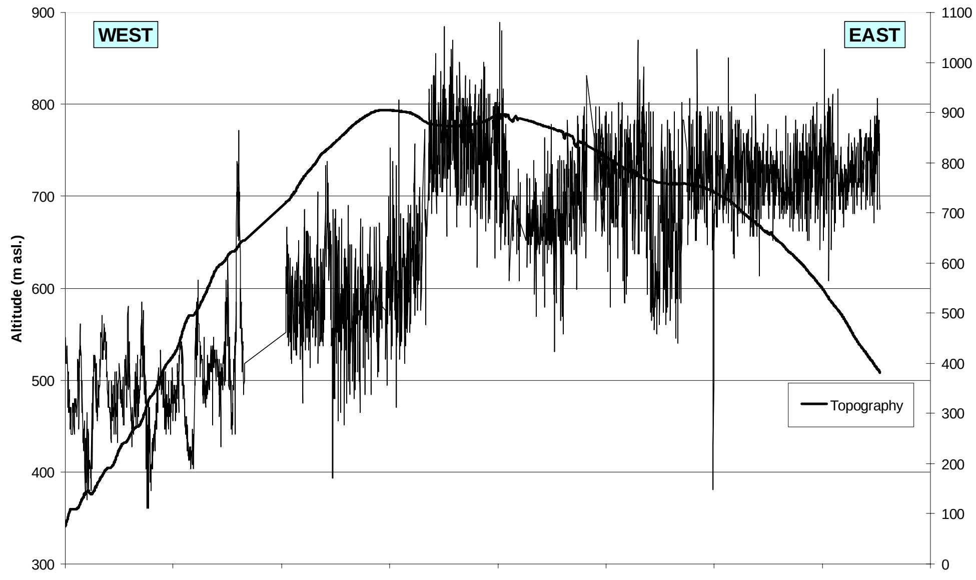
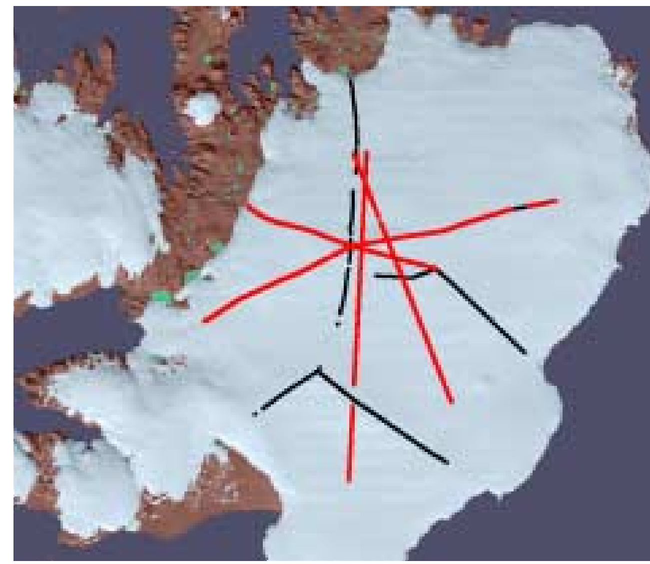


Austfonna: snow accumulation (1999)

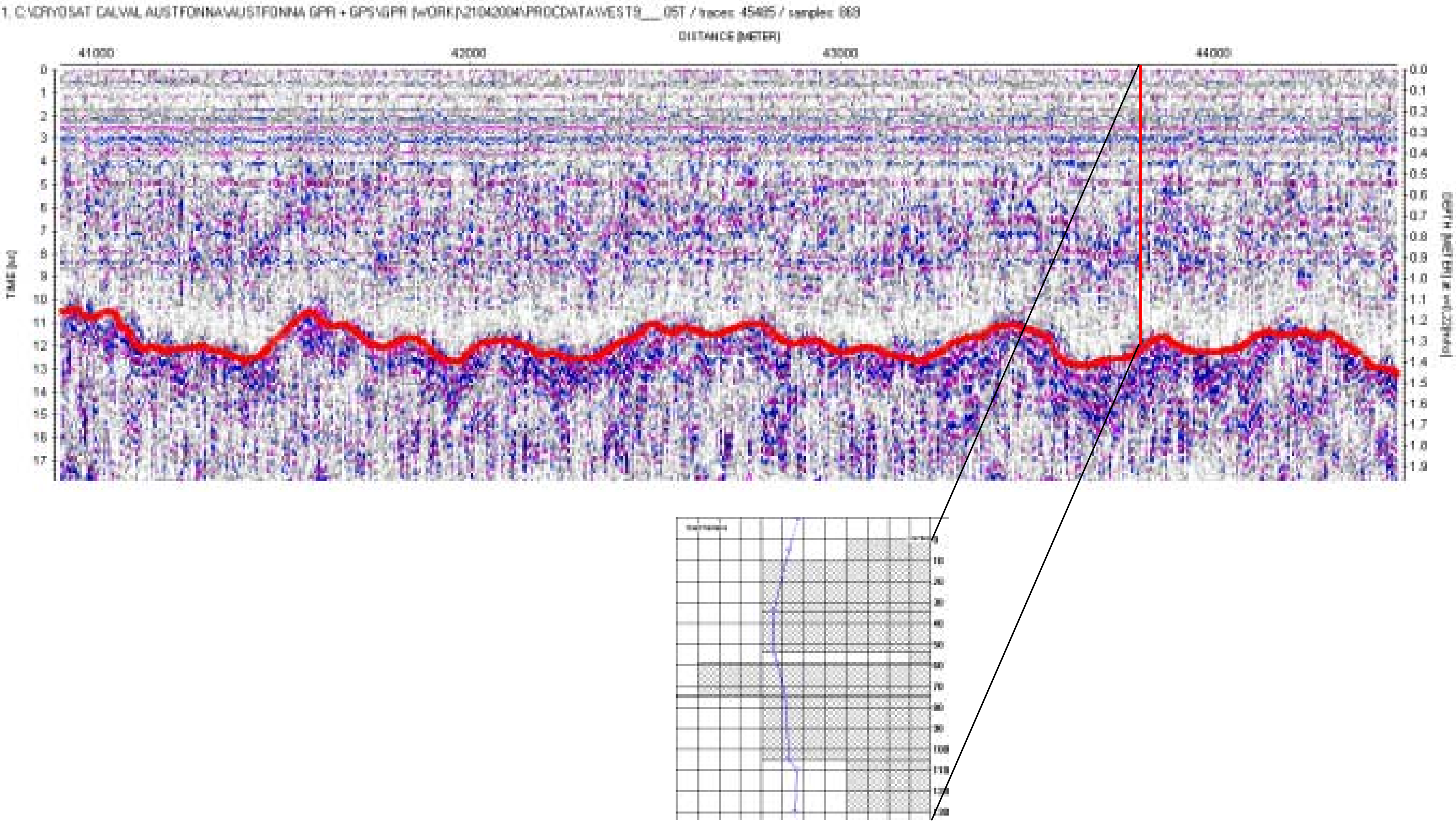




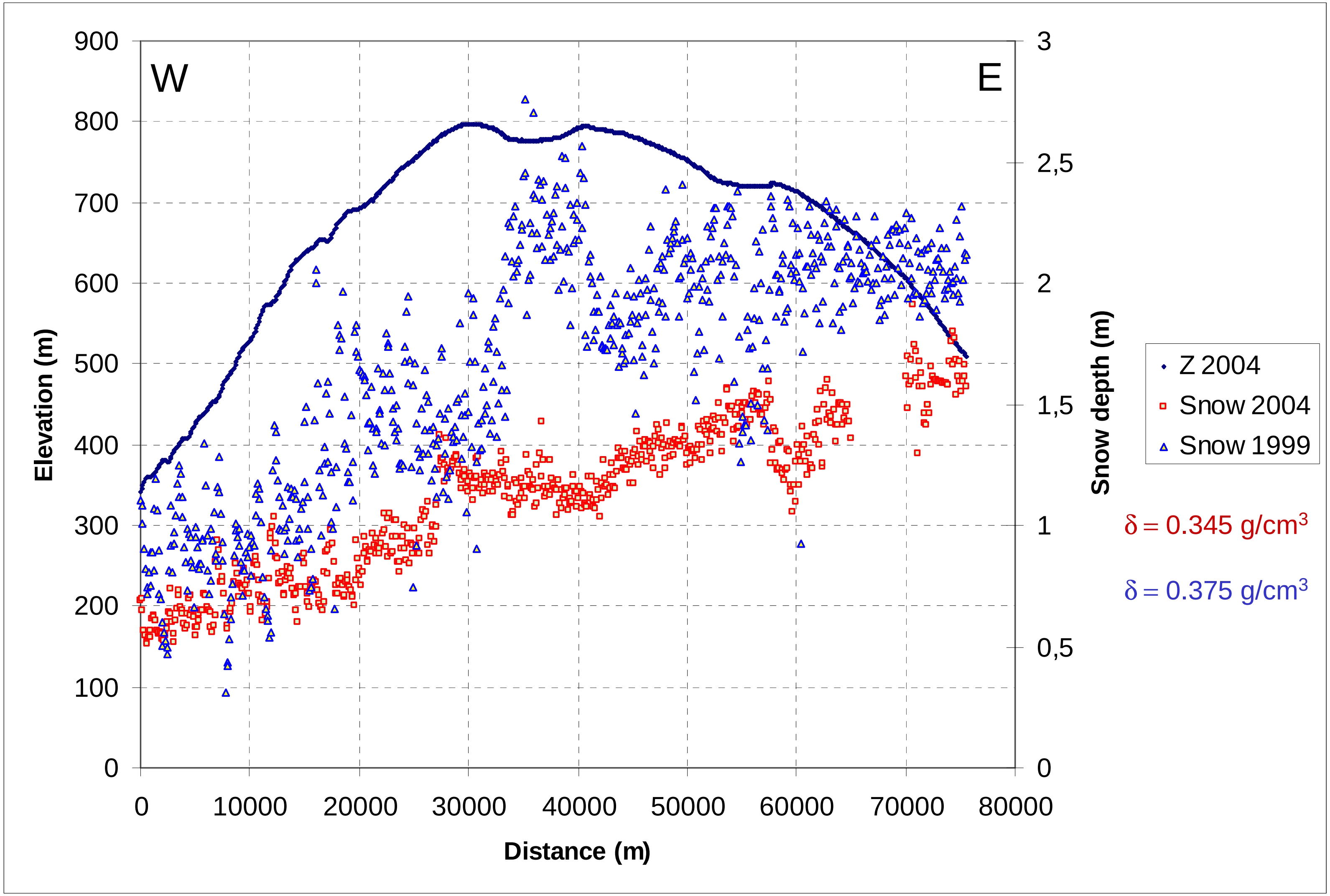


Sand, K., Winther, J.-G., Marechal, D., Bruland, O., Melvold, K., 2003. *Regional variations of snow accumulation on Spitsbergen, Svalbard, 1997-99*. Nordic Hydrology, 34(1/2), 17-32

Austfonna: snow accumulation (2004)



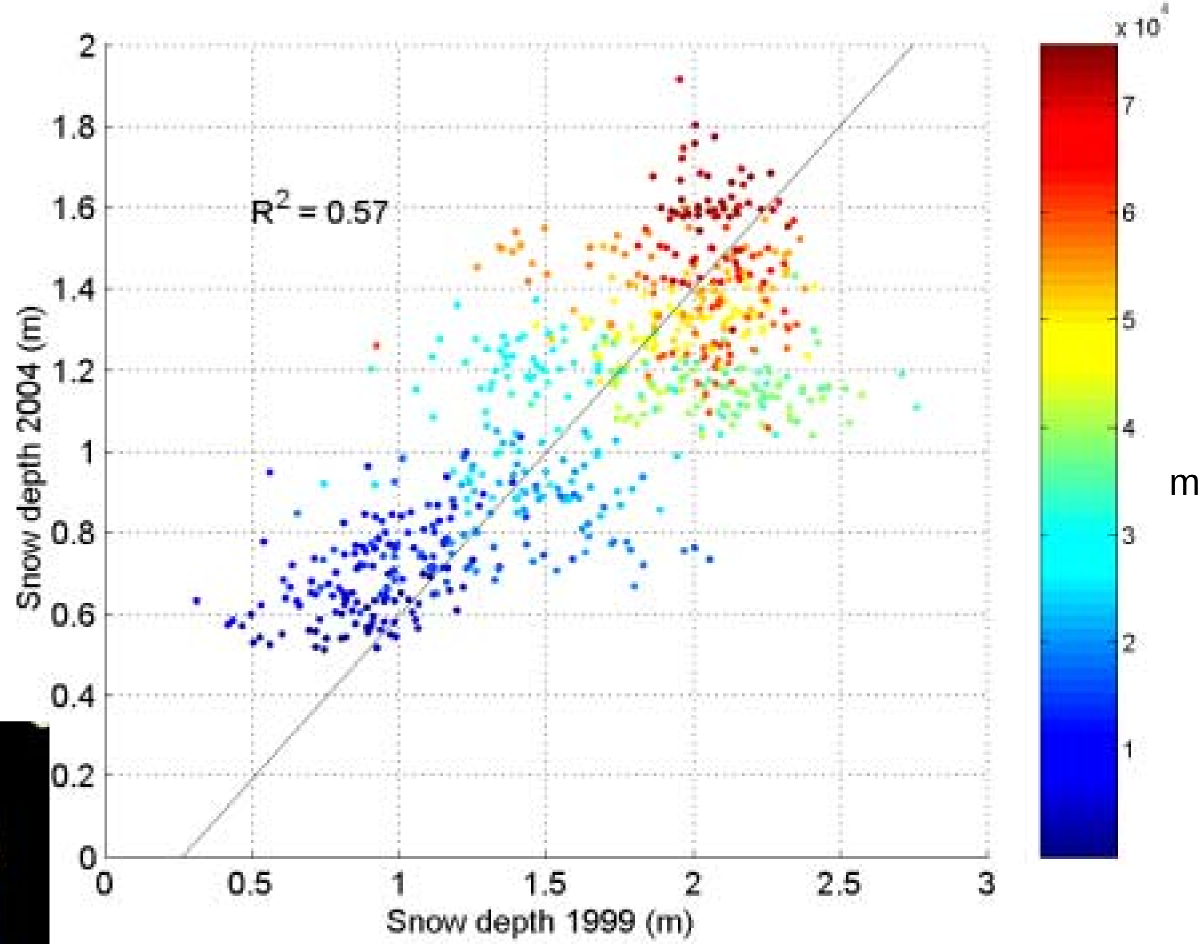
Austfonna: snow accumulation (1999 and 2004)

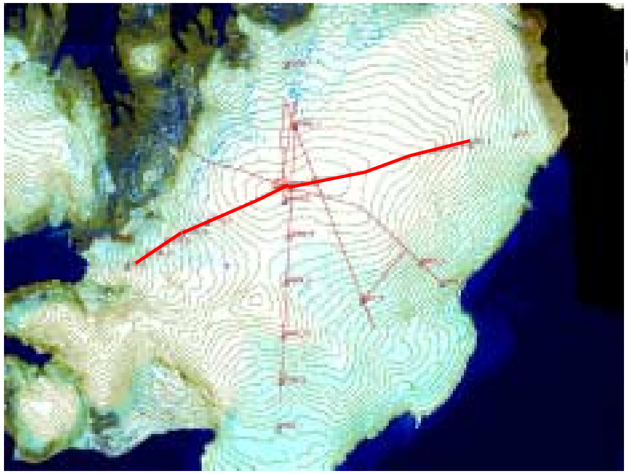


$\delta = 0.345$ g/cm^3

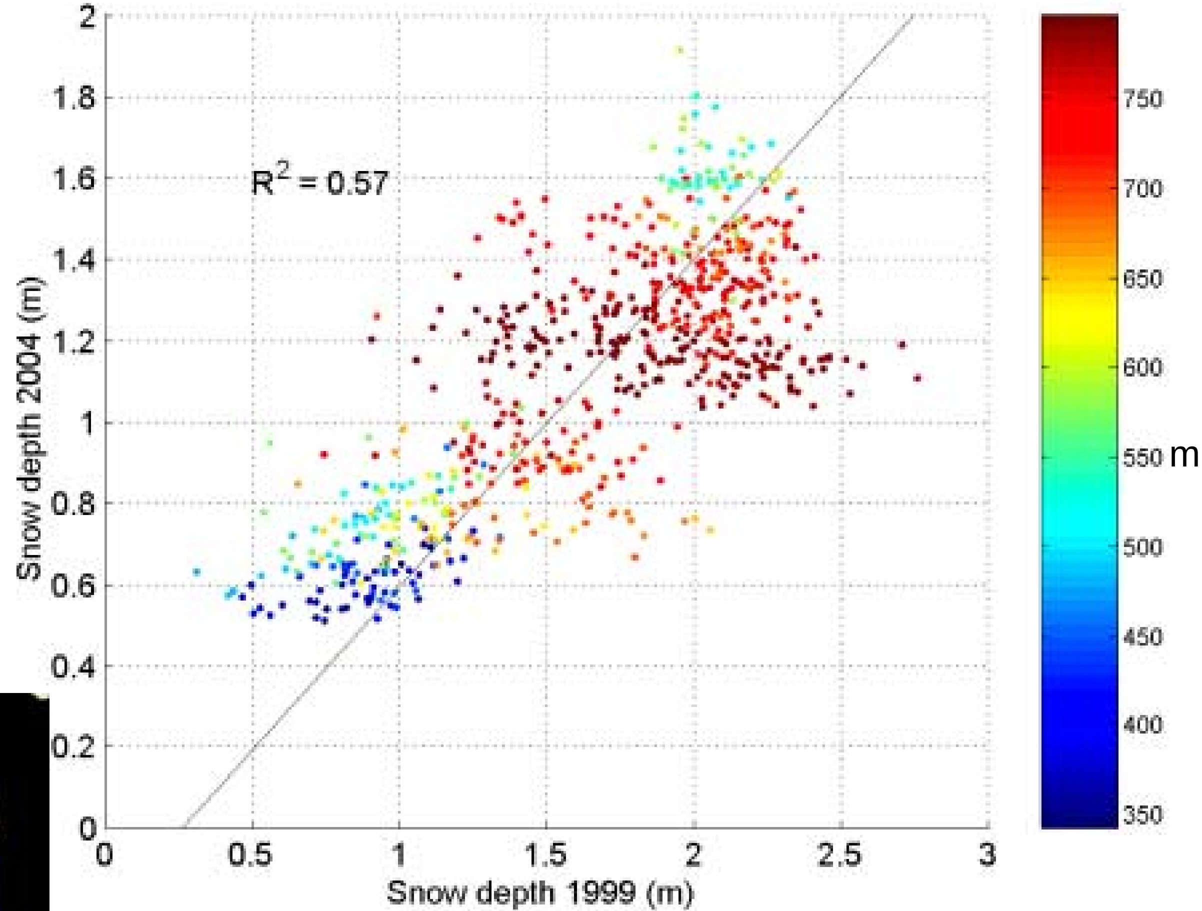
$\delta = 0.375$ g/cm^3

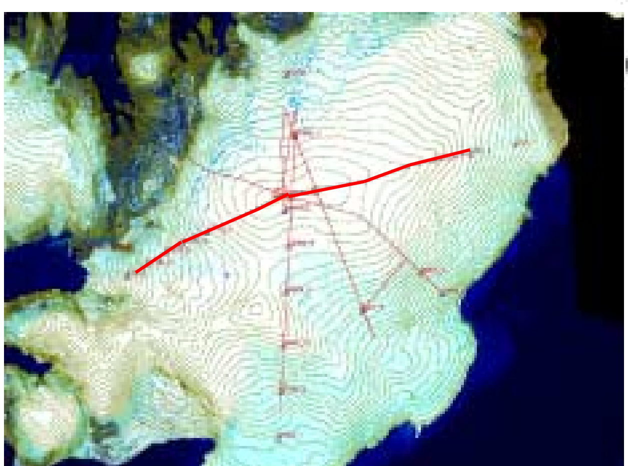
Austfonna: snow accumulation, 1999 vs. 2004 vs. distance along profile





Austfonna: snow accumulation, 1999 vs. 2004 vs. elevation





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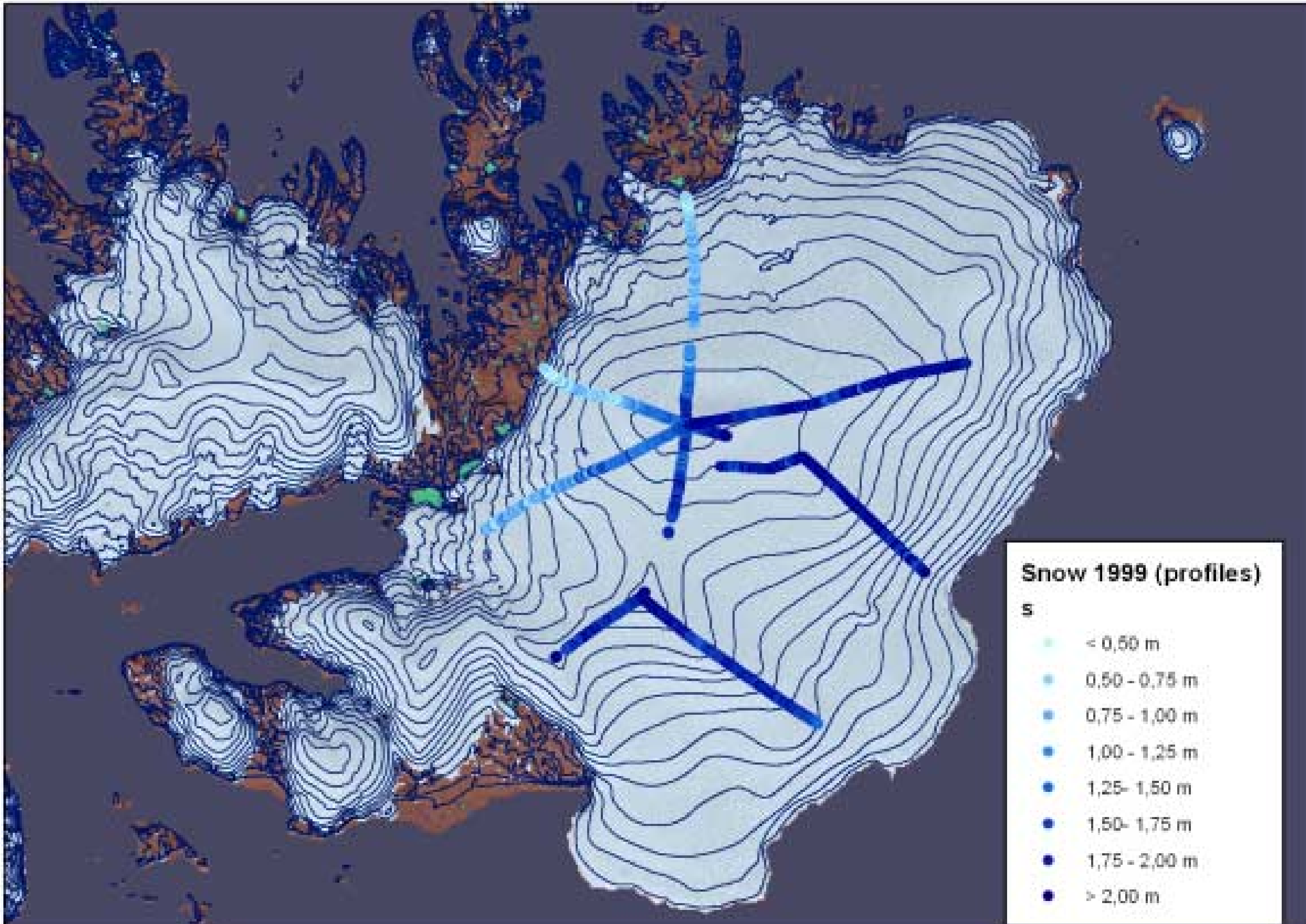
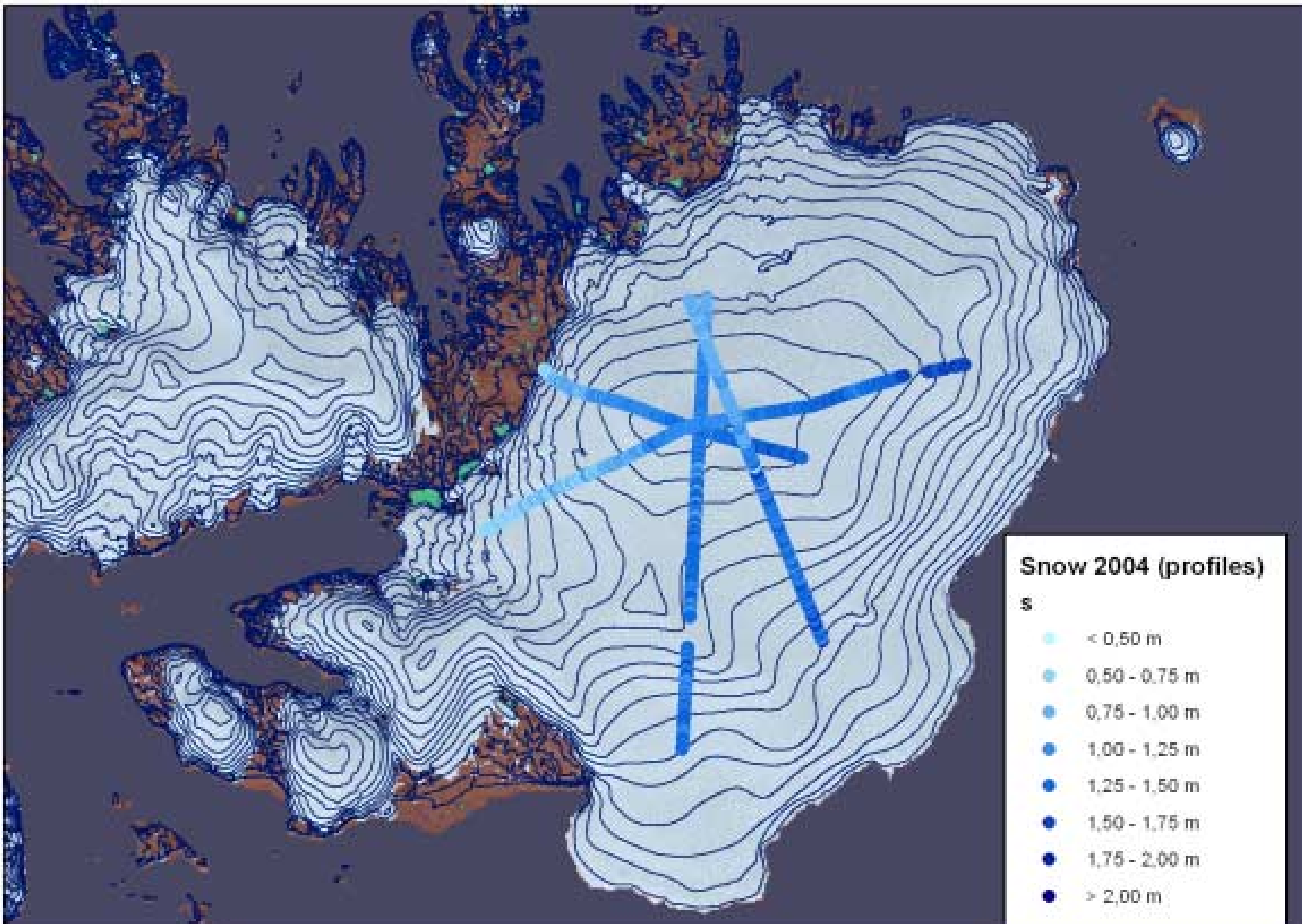


Austfonna: snow accumulation (2004)

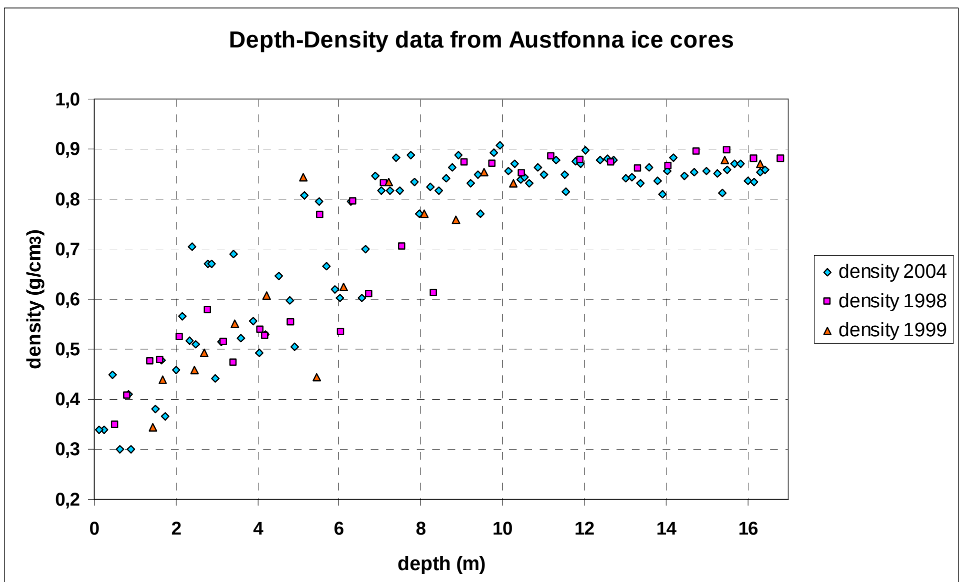


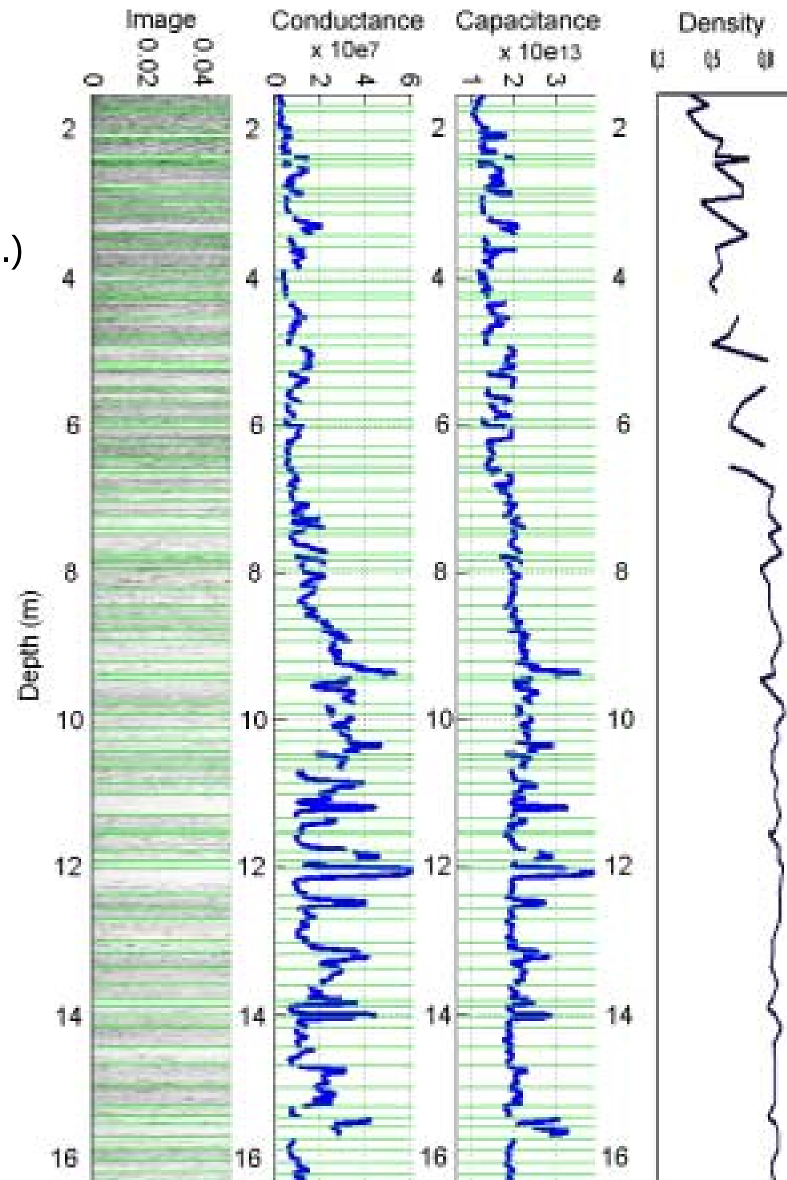
Austfonna: accumulation from ice cores

- a 16.4 m ice core was drilled in 2004 near summit

- $\delta^{18}O$ seasonal cycles for counting annual layers (5cm res.)

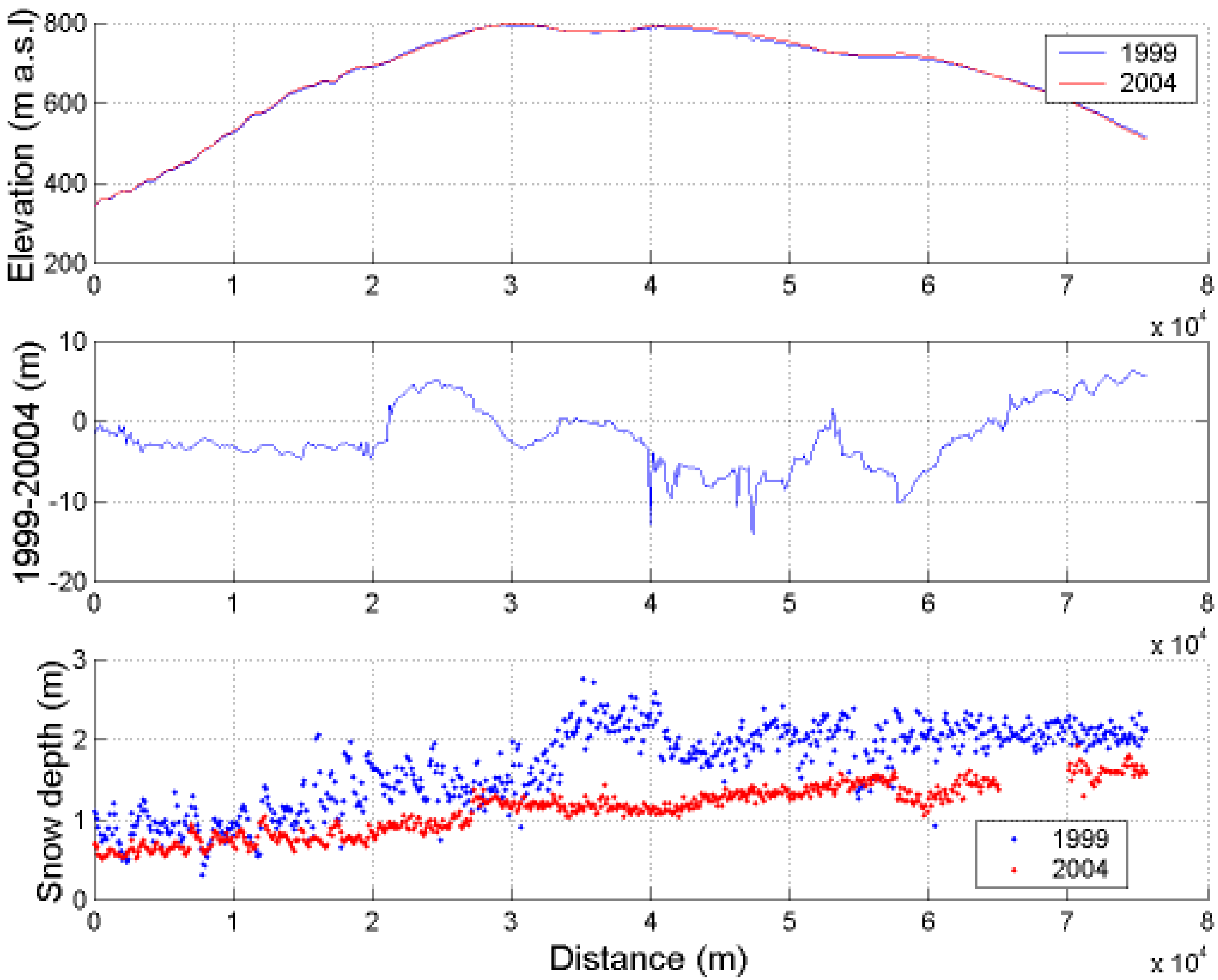
- Cs analysis at 20 cm resolution





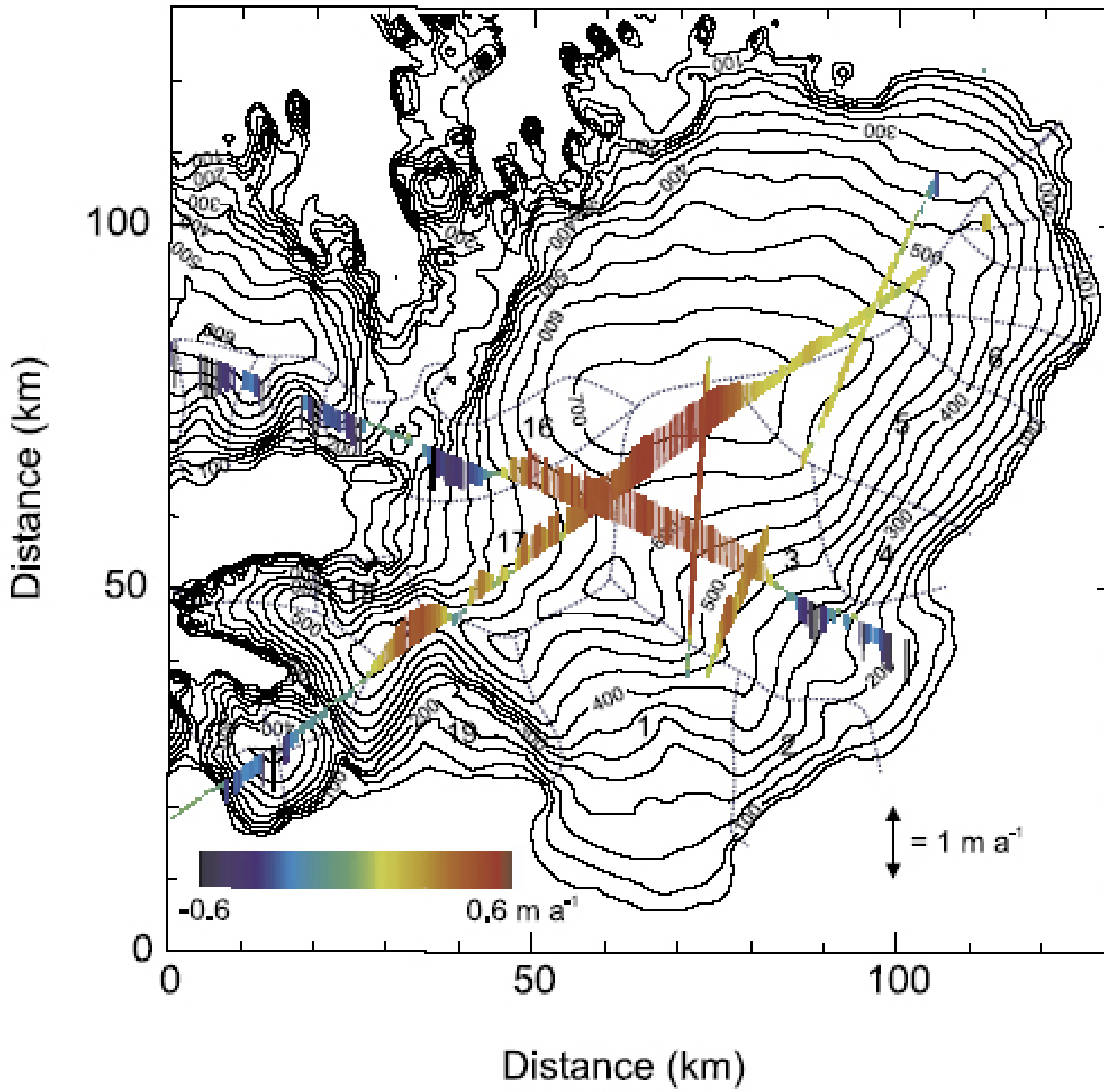
<u>Data 1998 and 1999</u>: Watanabe, O., Motoyama, H., Igarashi, M., Kamiyama, K., Matoba, S., Goto-Azuma, K., Narita, H., Kameda, T., 2001. *Studies on climatic and environmental changes during the last few hundred years using ice cores from various sites in Nordaustlandet, Svalbard*. Mem. Natl. Inst. Polar Res., Spec. Issue, 54, 227-242.

Austfonna: accumulation variability and elevation changes



Austfonna: elevation changes

- Repeated airborne laser altimetry 1996-2002 (NASA)
- Thinning (<0.6m/yr) at low elevations and thickening (>0.6m/yr) above 500 m asl
- The central thickening is interpreted as possible result of increased precipitation (not shown by meteo data)



Bamber, J., Krabill, W., Raper, V., and Dowdeswell, J., 2004. *Anomalous recent growth of part of a large Arctic ice cap: Austfonna, Svalbard*. Geophysical Research Letters, 31.