VILLUM RESEARCH STATION, STATION NORD, NORTH GREENLAND

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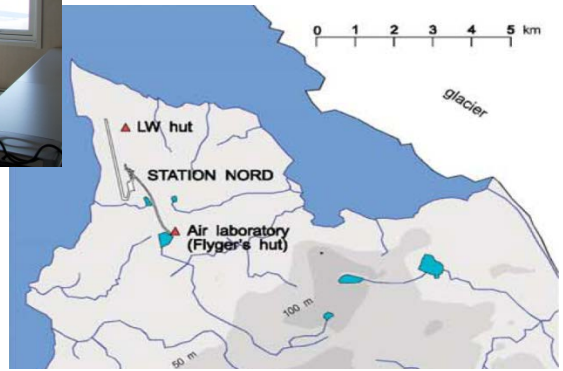
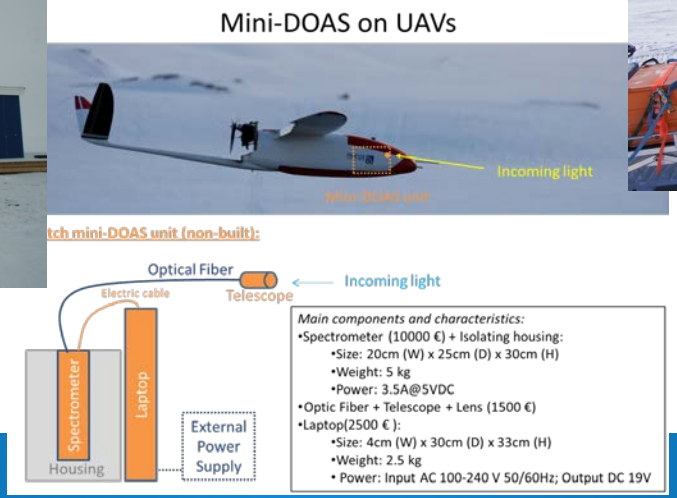
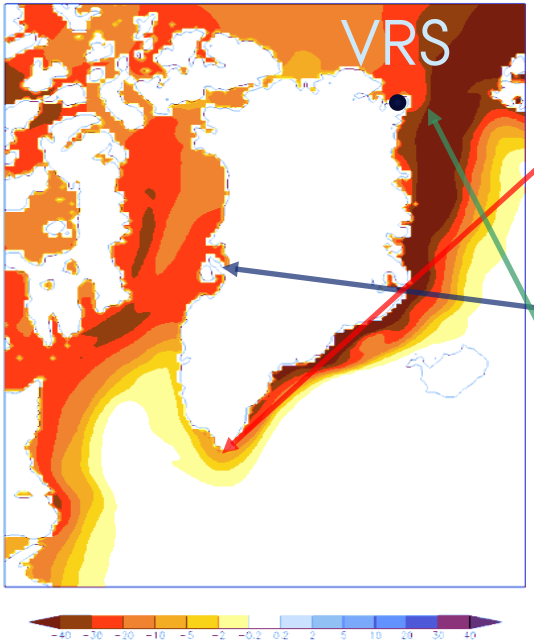
The Royal Danish Air Force is acknowledged for providing free transport to Station Nord, and the staff at Station Nord is especially acknowledged for excellent support

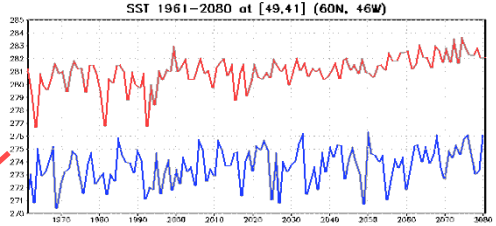
VILLUM RESEARCH STATION, GREENLAND
81° 36'N 16°39' W



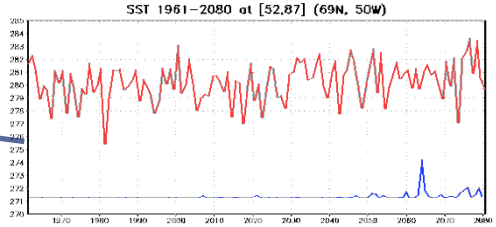
THREE SUBSTATIONS OF A MULTI-DISCIPLINARY RESEARCH INFRASTRUCTURE



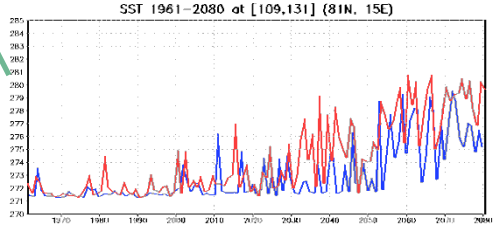




3-4°C



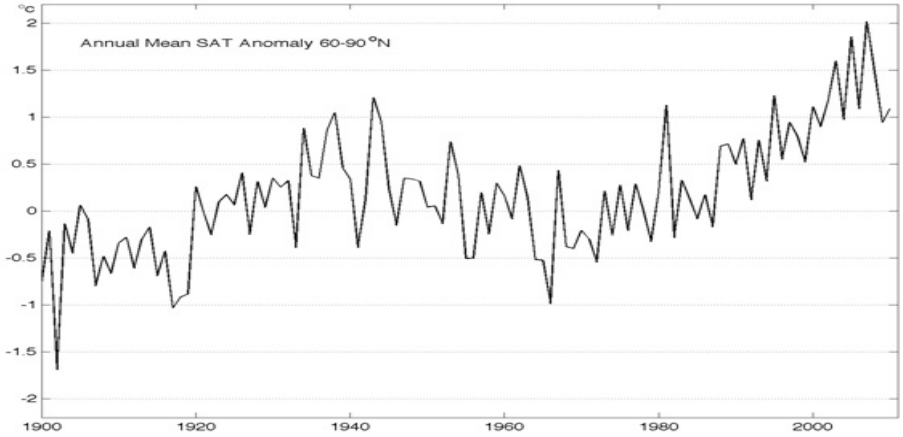
1-2°C

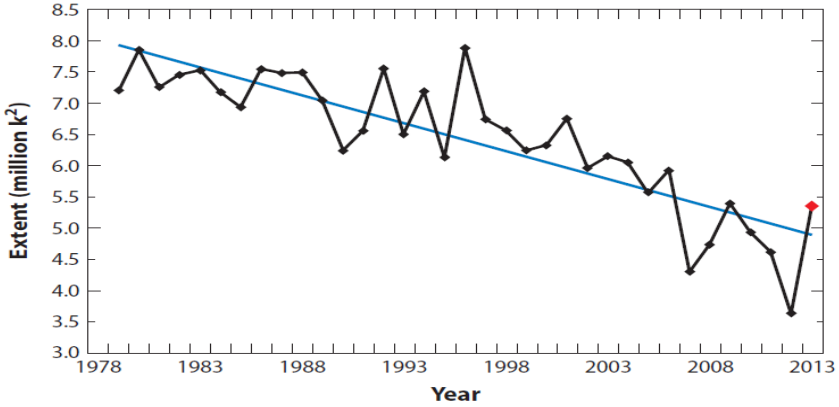


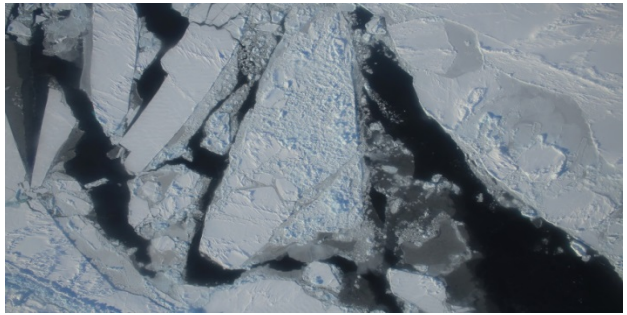
9-10°C

Stendel et al. (2008) Advances in Ecological Research vol 40

WHY IMPORTANT





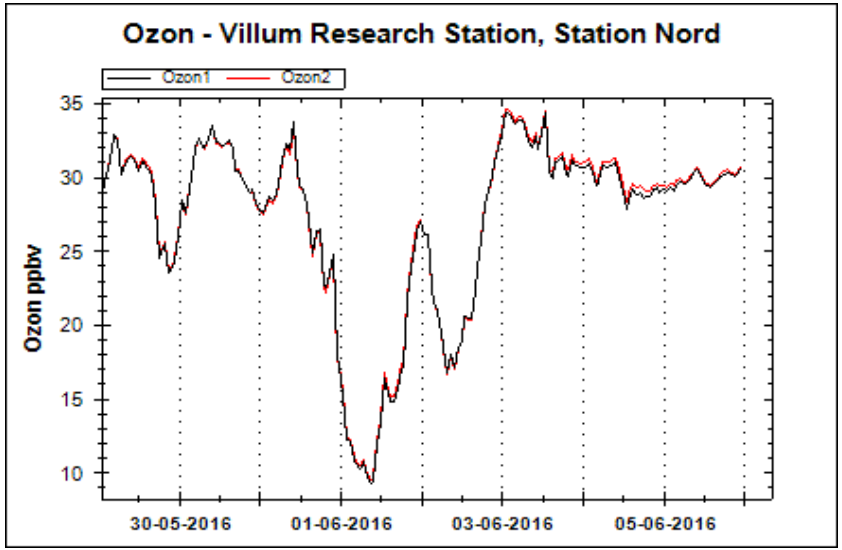


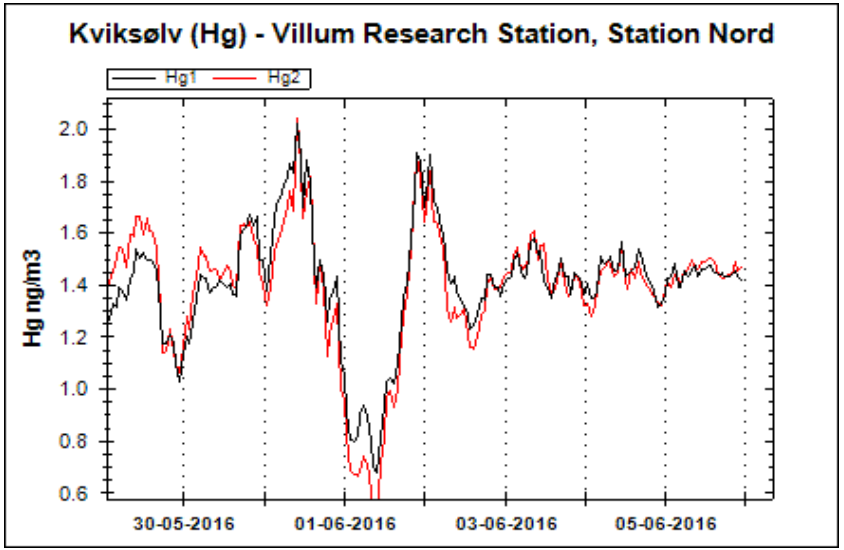
March, 2016, First year sea ice and leads (http://nsidc.org)

Large consequences for

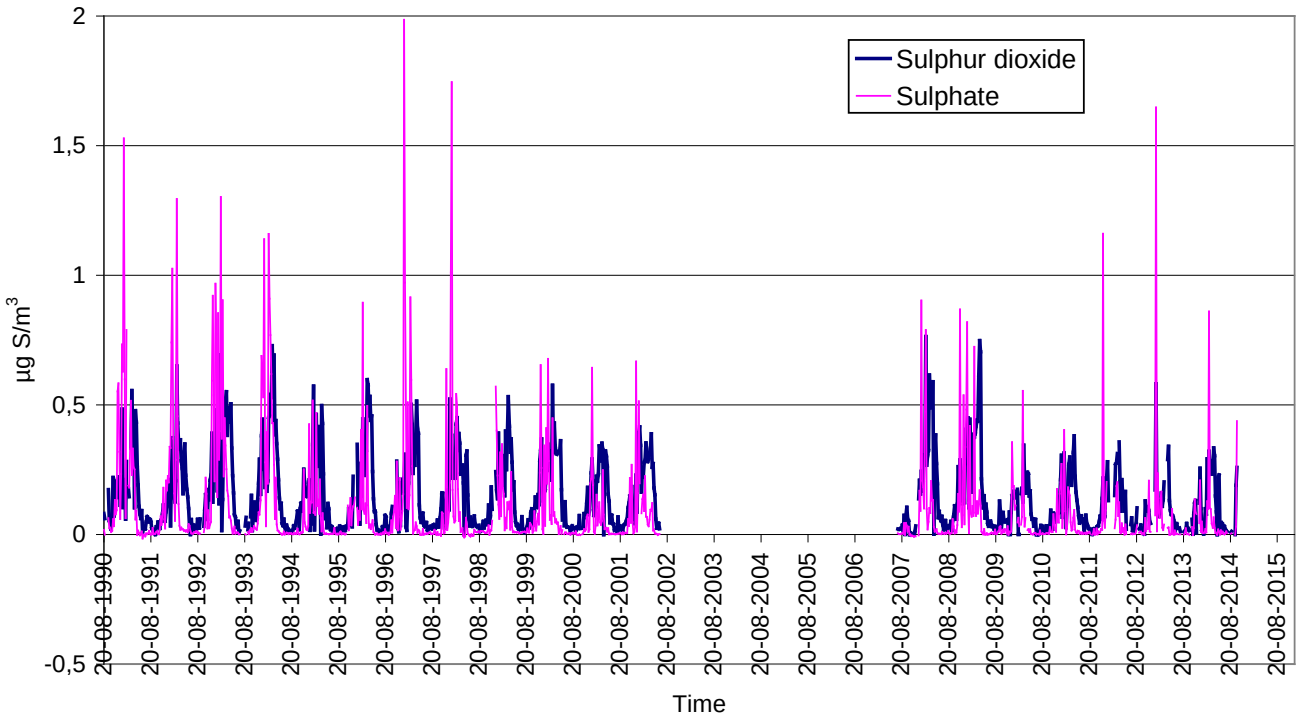
- Biological system
- Pollution
- Feedback on climate
- Geo-chemical cyclus

OZONE AND GASEOUS ELEMENTAL MERCURY

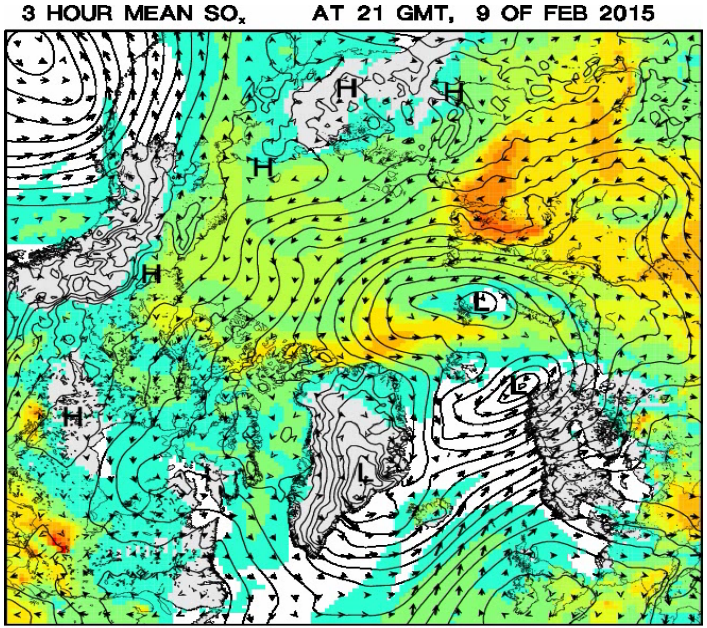




Sulphate and Sulphur dioxide at VRS



DEHM MODEL OUTPUT SHOWING TRANSPORT FROM EURASIA TO VRS



> 15.0
10.0 - 15.0
5.0 - 10.0
3.0 - 5.0
2.0 - 3.0
1.5 - 2.0
1.0 - 1.5
0.5 - 1.0
0.2 - 0.5
= 0.2

25 m/s:→

NETWORKS

- **AMAP,** WMO-GAW, IASOA, IASC, EMAP; ICOS, PEEX.....
- Copernicus Atmosphere Monitoring Service CAMS84; Aarhus University is coordinator for organisation of data from Arctic stations for validation and for data assimilation of CAMS84 models

PARAMETERS MEASURED AT VILLUM RESEARCH STATION

Meteorology (by AU-ENVS, DMI, and Asiaq)

- Temperature (T)
- Relative humidity (RH)
- Wind direction (WD) measured by wind vane (Sonic anemometer)
- Wind speed (WS) measured by anemometer (Sonic anemometer)
- Precipitation (electronic sensor)
- Snow depth
- Radiation (upwelling and down welling short-waved and long-waved radiation) – full surface energy budget

Permafrost (by AU-ENVS + UNIS)

- 2 permafrost cores with 20m depth and temperature sensors

PARAMETERS MEASURED AT VILLUM RESEARCH STATION

Particle physics (by AU-ENVS)

- Particle number size distribution (10 - 900nm, SMPS)
- Particle number size distribution (0.5 - 32µm, OPC)
- Absorption coefficient / Black carbon mass concentration (MAAP)
- Scattering coefficient at three wavelengths (Nephelometer)

Remote sensing (DTU-RISØ)

- Boundary layer height (Ceilometer)

Particle Chemistry (AU-ENVS)

- ACSM: (PM_1) including OC, SO_4^{2-}, NO_3^- and NH_4^+

PARAMETERS MEASURED AT VILLUM RESEARCH STATION

Particle Chemistry (by AU-ENVS) – weekly time res.

- Filter Pack Sampler (Elements by ICP-MS: Sb, Ba, Ga, Zn, As , Se, Co, Pb, Na, Mg, Al, K, Ca, Ti, Rb, Sr, Mo, Cd, V, Cr, Mn, Ni, Cu, Fe
- Filter Pack Sampler (Inorganics by IC: Na, Br, Cl, NH_3, HNO_3, SO_2, SO_4^{2-}, NO_3^-, NH_4^+)
- High Volume Sampler (Carbonaceous: EC/OC by Thermo-optical method)
- High Volume Sampler (Persistent Organic Pollutants) OC, Brominated flame retardant, Fluorinated species

Gasses (by AU-ENVS)

- GEM, O_3, NOx, CO, CH_4, CO_2

Snow samples of Hg and POPs

MODELLING ACTIVITIES AT VILLUM RESEARCH STATION

Modelling (by AU-ENVS)

- COPREM (COnstrained Physical REceptor Model) for source apportionment

Available for a selection of species measured over a longer period (e.g. Filter Pack Sampler)

- PMF (Positive Matrix Factorization) for source apportionment

Available for a selection of species measured over a longer period (e.g. Filter Pack Sampler)

- DEHM (Danish Eulerian Hemispheric Model) for estimate of various gas phase and particle compounds (e.g. BC, sulfate, etc.)