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The French contribution to the atmospheric and cryospheric component of an Arctic Observatory

Hans-Werner Jacobi, Philippe Ciais, Jean-Claude Gascard, Kathy S. Law, Valérie Masson-Delmotte, Jean-Daniel Paris, Marc Delmotte, J.-V. Lavric, Gérard Ancellet, Catherine Ritz, et al.

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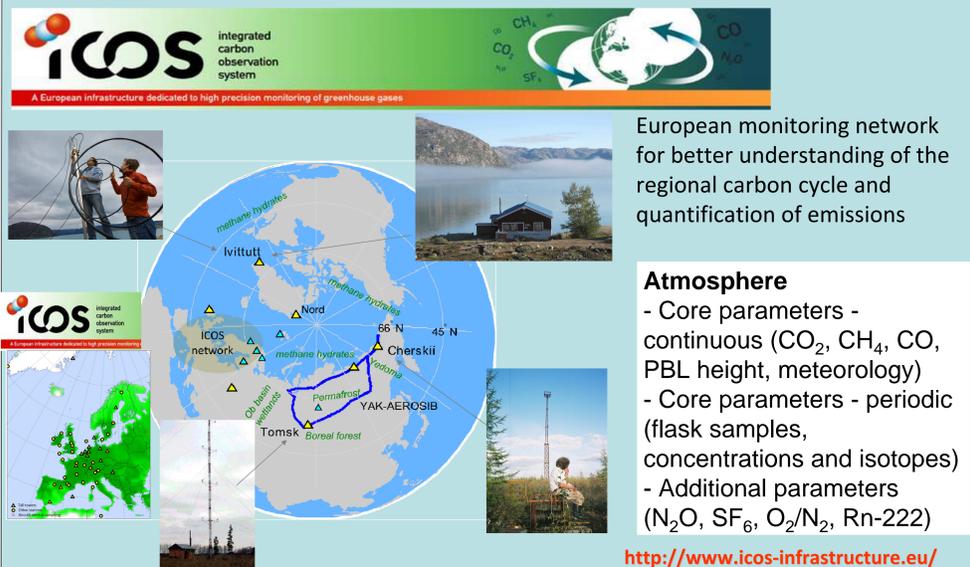
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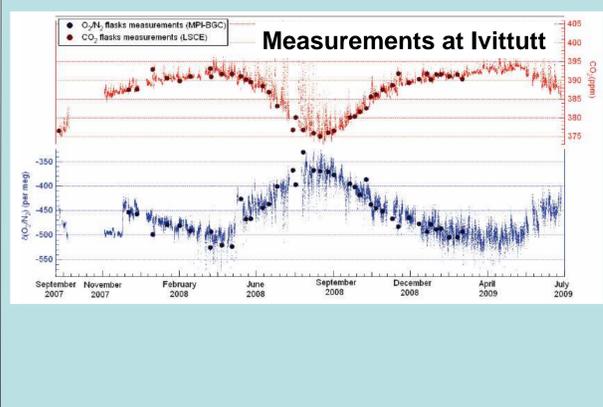
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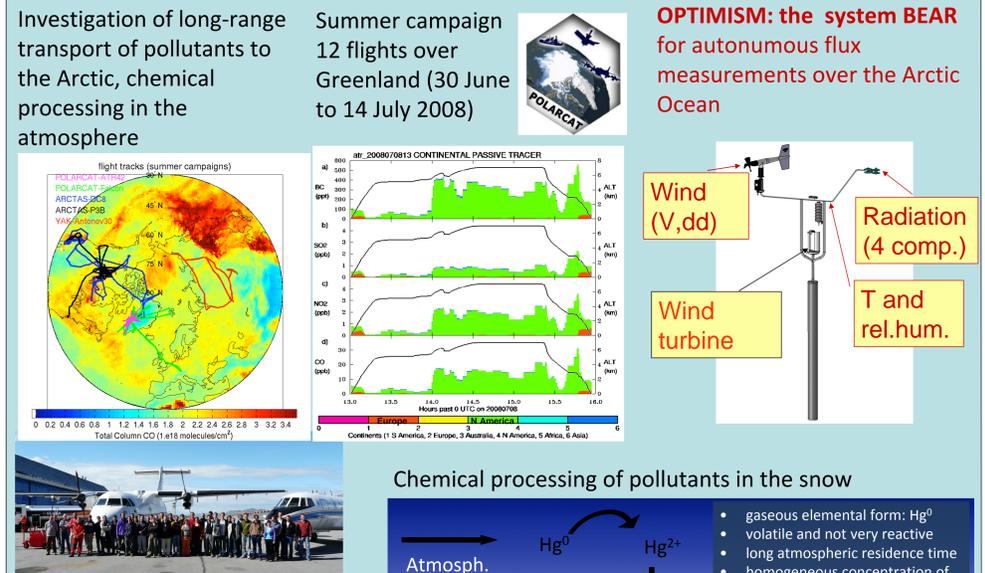
Long-term observations



Cooperation with international partners to extend the network to Siberia and Greenland (Station Nord and Ivittutt)



Process studies in the troposphere



Process studies in the stratosphere

Dynamics, aerosol and bromine in the polar stratosphere in summer

Investigation of

- the change in large scale transport
- the coupling between the troposphere and the stratosphere
- the aerosol content and the impact on the radiative budget
- bromine species in the stratosphere

payload, SWIR-Balloon : 500kg

Balloon-borne instruments involved in the project

Instrument	Measurement technique	Measurements used	Retrieval altitudes provided & vertical resolution
SPIRALE (LPCZE)	In situ Direct infrared absorption	O ₃ , CH ₄ , H ₂ O, HCl, CO, HNO ₂ , NO ₂ , OCS	9km - 35km 5m
SWIR Balloon (LPCZE)	Remote sensing Infrared radiance and ratio	CO ₂ , CH ₄ , CO, OCS	Partial columns
LPM (LPCZE)	Remote sensing Infrared solar Doublon	O ₃ , HNO ₂ , NO ₂ , CH ₄ , N ₂ O, HCl	15km - 25km 1km
DOAS Univ Heidelberg	Remote sensing UV Solar irradiance	SO ₂	15km - 25km 1km
SALOMONZ (LPCZE)	Remote sensing UV-visible solar scattering	O ₃ , NO ₂ , BrO, Aerosol extinction	15km - 35km 1 km
STAC (LPCZE)	In situ aerosol counter	Size distribution of aerosols	10km - 25km 10m
MicroRADICAL (LPCZE)	Remote sensing Scattering and polarization by photometry	Nature (liquid, solid), size distribution of aerosols	15km - 25km 1km

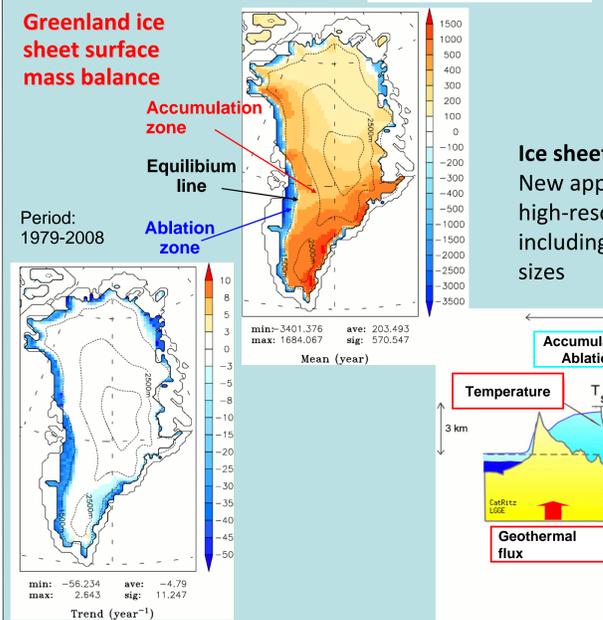
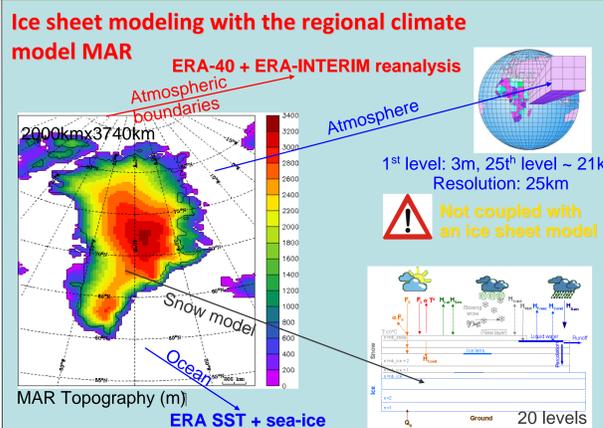
balloon deployment provides :
In situ and remote sensing measurements
vertical profiles from UT to stratosphere
partial column in the troposphere

Development of new instrumentation

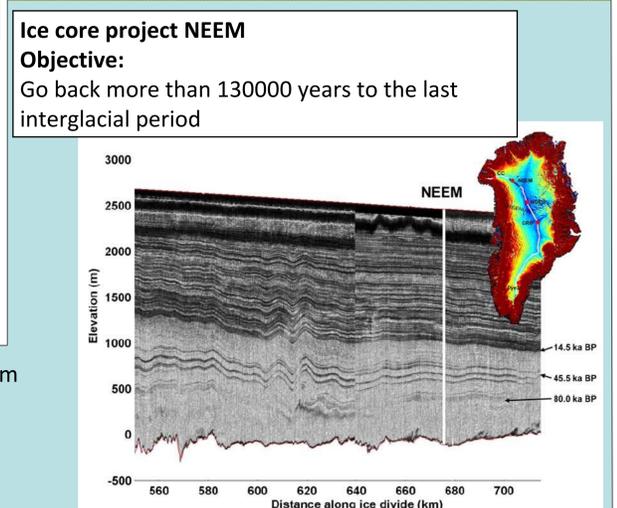


Development of new instrumentation

Modeling



Paleoclimate



- Depth reached in 2009: 1757.84 m
- covering past 38000 years
- average temperature -28 °C
- accumulation 20 cm WE year⁻¹
- most fresh snow in summer

