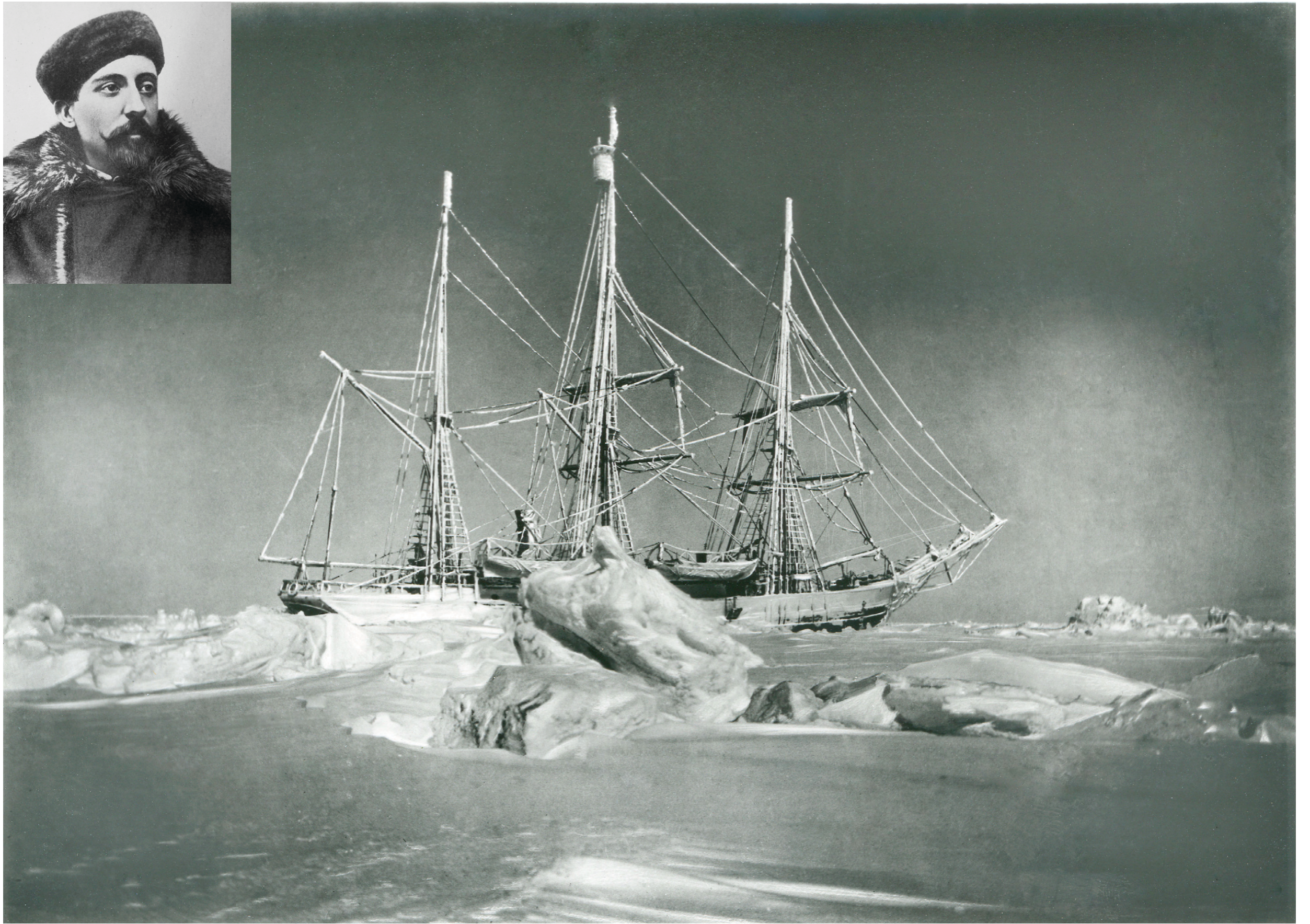


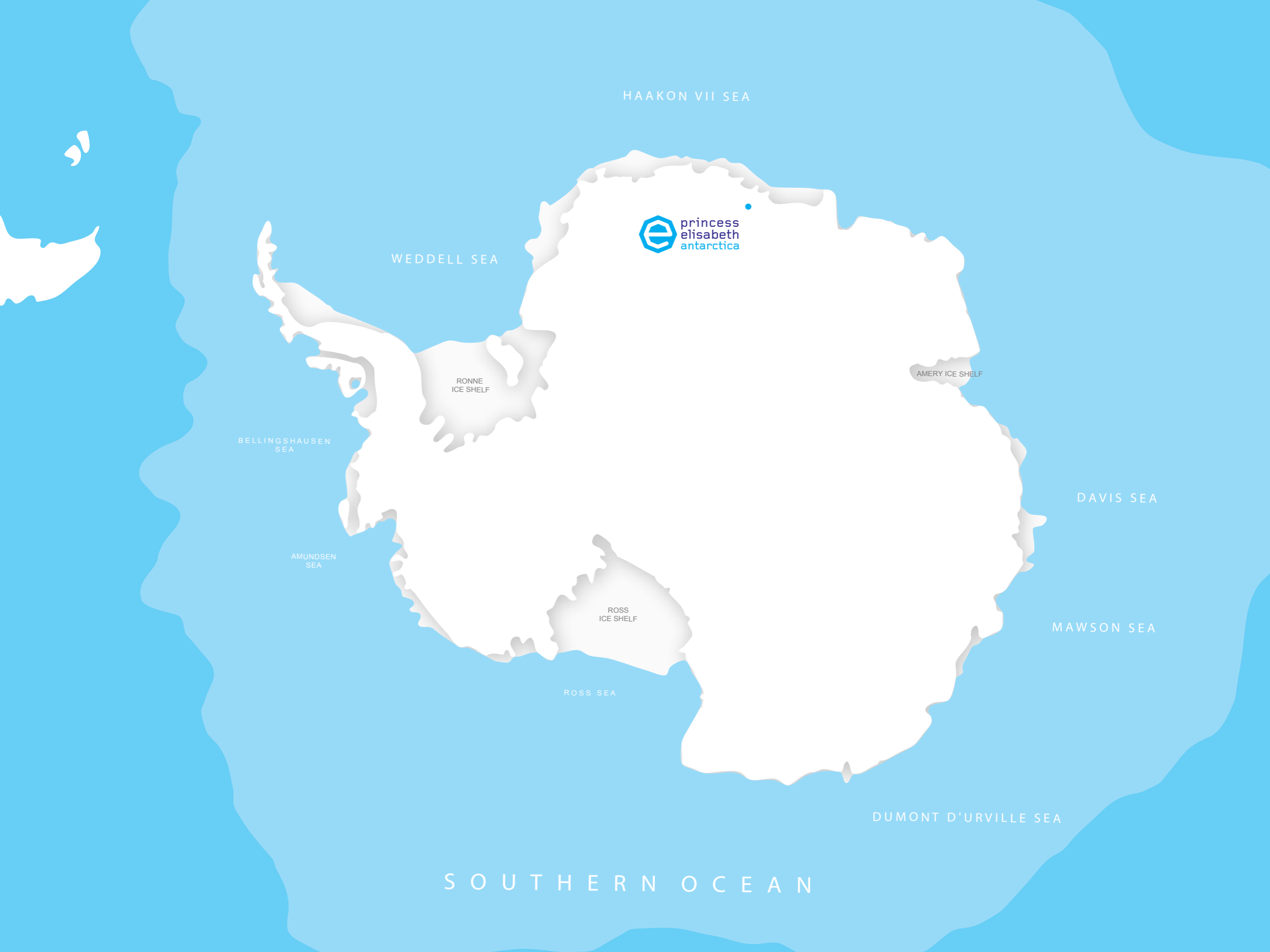
From an Adventure to a Venture... Princess Elisabeth Antarctica

FERMA Risk Management Seminar
Versailles, France - 23 October 2012









HAAKON VII SEA



WEDDELL SEA

RONNE
ICE SHELF

AMERY ICE SHELF

BELLINGSHAUSEN
SEA

DAVIS SEA

AMUNDSEN
SEA

ROSS
ICE SHELF

MAWSON SEA

ROSS SEA

DUMONT D'URVILLE SEA

S O U T H E R N O C E A N

Overcoming Challenges

Unprecedented - NGO leading project for a national station

Financial challenges: 16M€ (private sector) + 6M€ (public)

Technical challenges: prototype development from existing technologies

Logistic challenges: no existing infrastructures in Antarctica

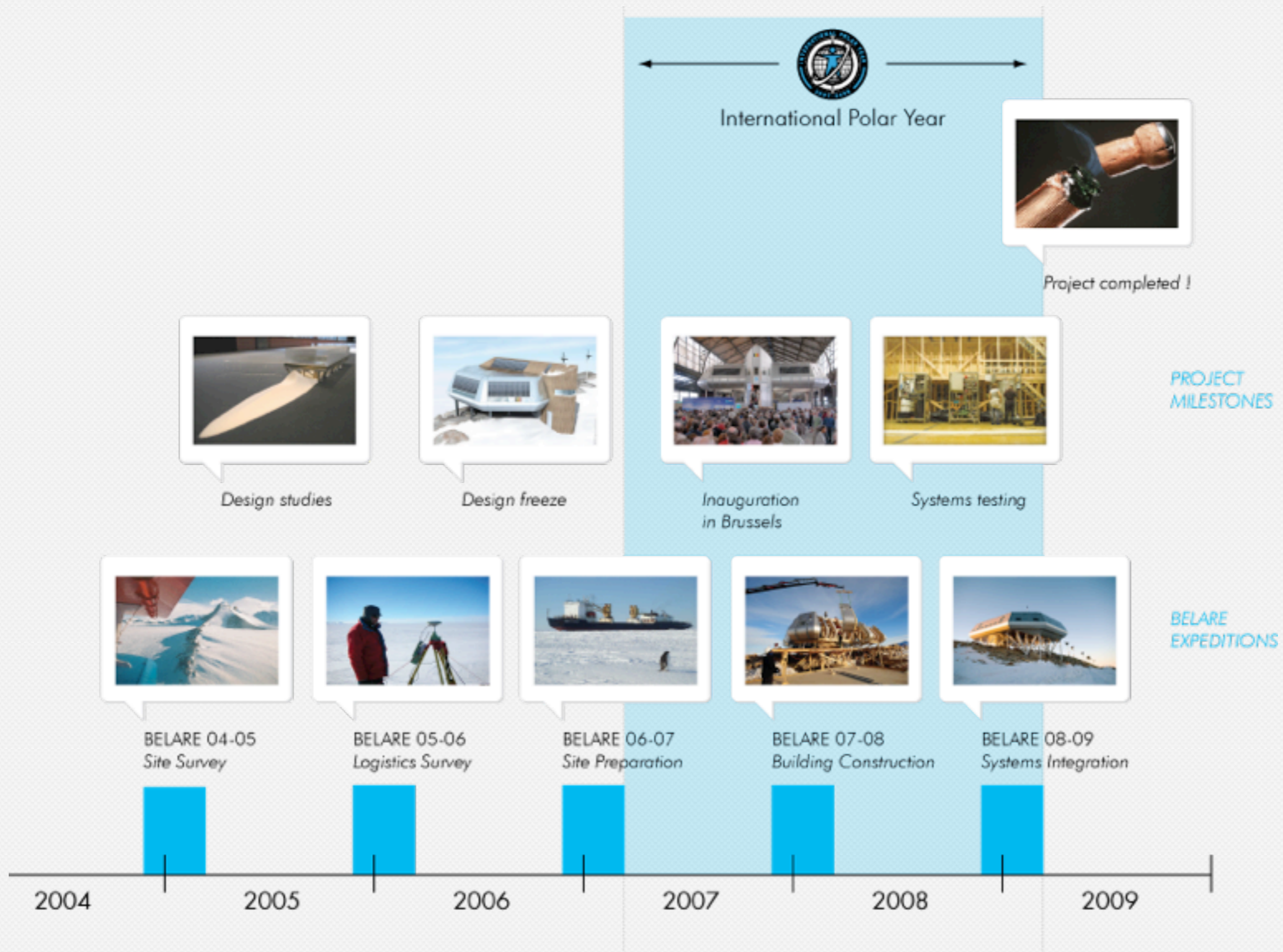
Building partner networks (tech, logistics, financial, best practice)

Foresee future management strategy

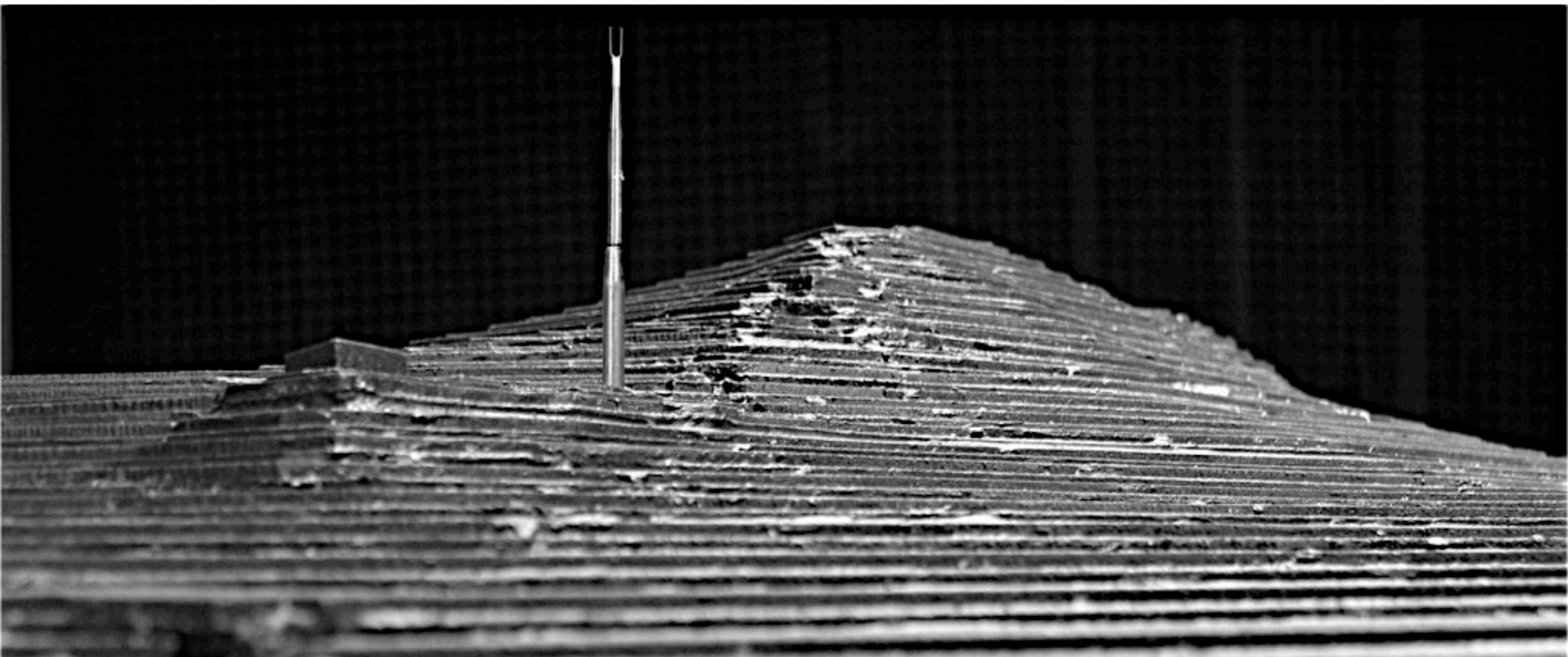
Continuous evolution towards Zero Emissions



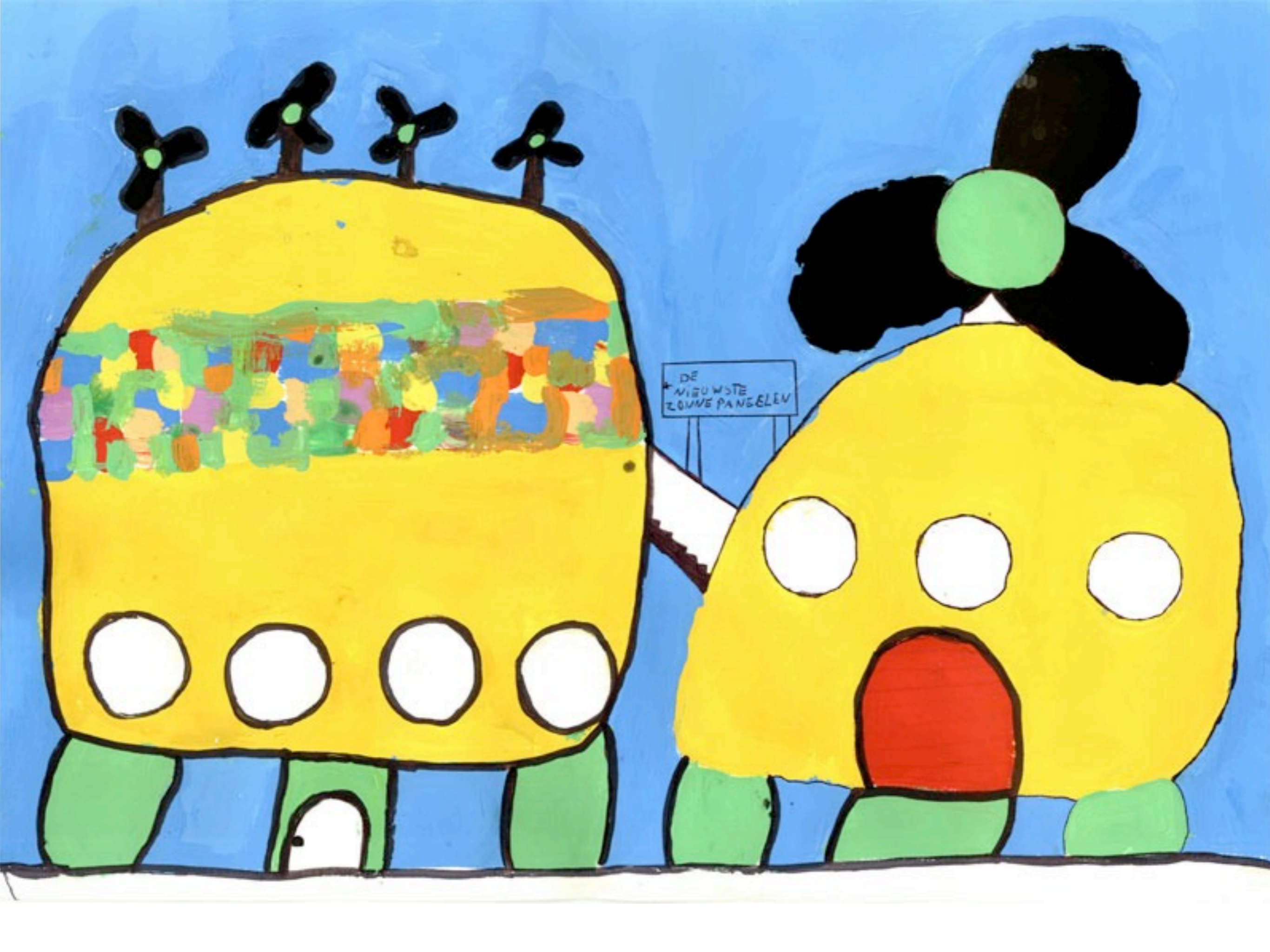
Princess Elisabeth & IPY











DE NIEUWSTE ZOUVE PANGELEV

First
Zero Emission station



The Challenges



Offloading the material on sea ice



A non stop working



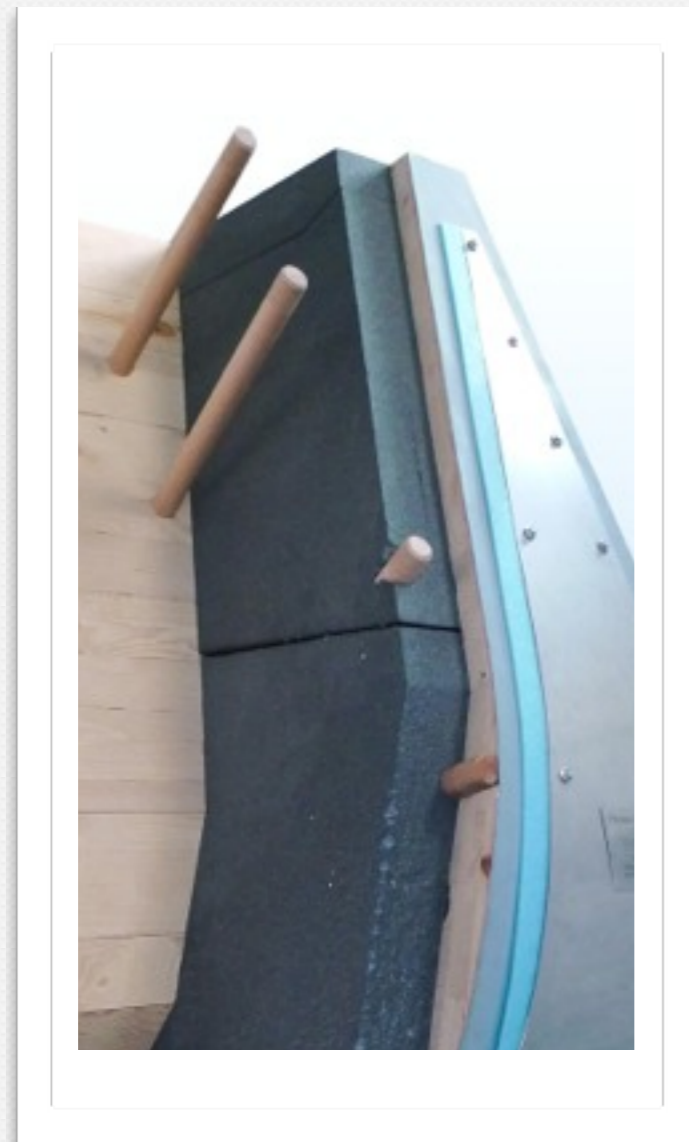
Extreme weather conditions



Travelling through hazardous terrain with crevasses

Innovating towards Zero Emissions

Material choice: the skin



Wall thickness: 53cm

8 layers (inside to outside):

Felt

Vapor barrier

Massive wood (lamellate)

Polystyrene (40 cm graphite-polystyrene)

Massive wood

EPDM

Expanded foam

Stainless steel

Energy production

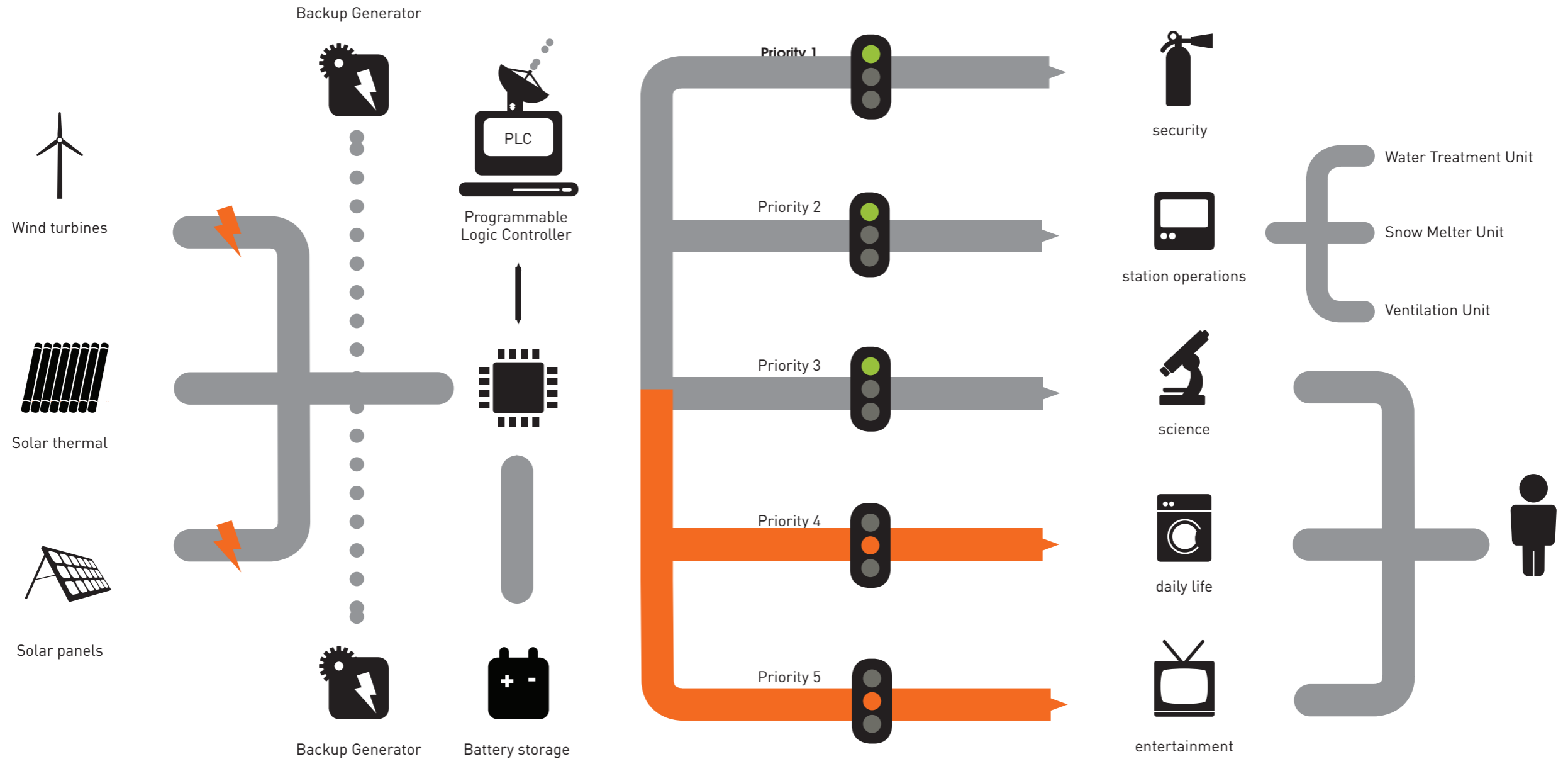
Limited production capacity

Control & Supply

Balance available energy & cumulated request
Dynamic prioritization

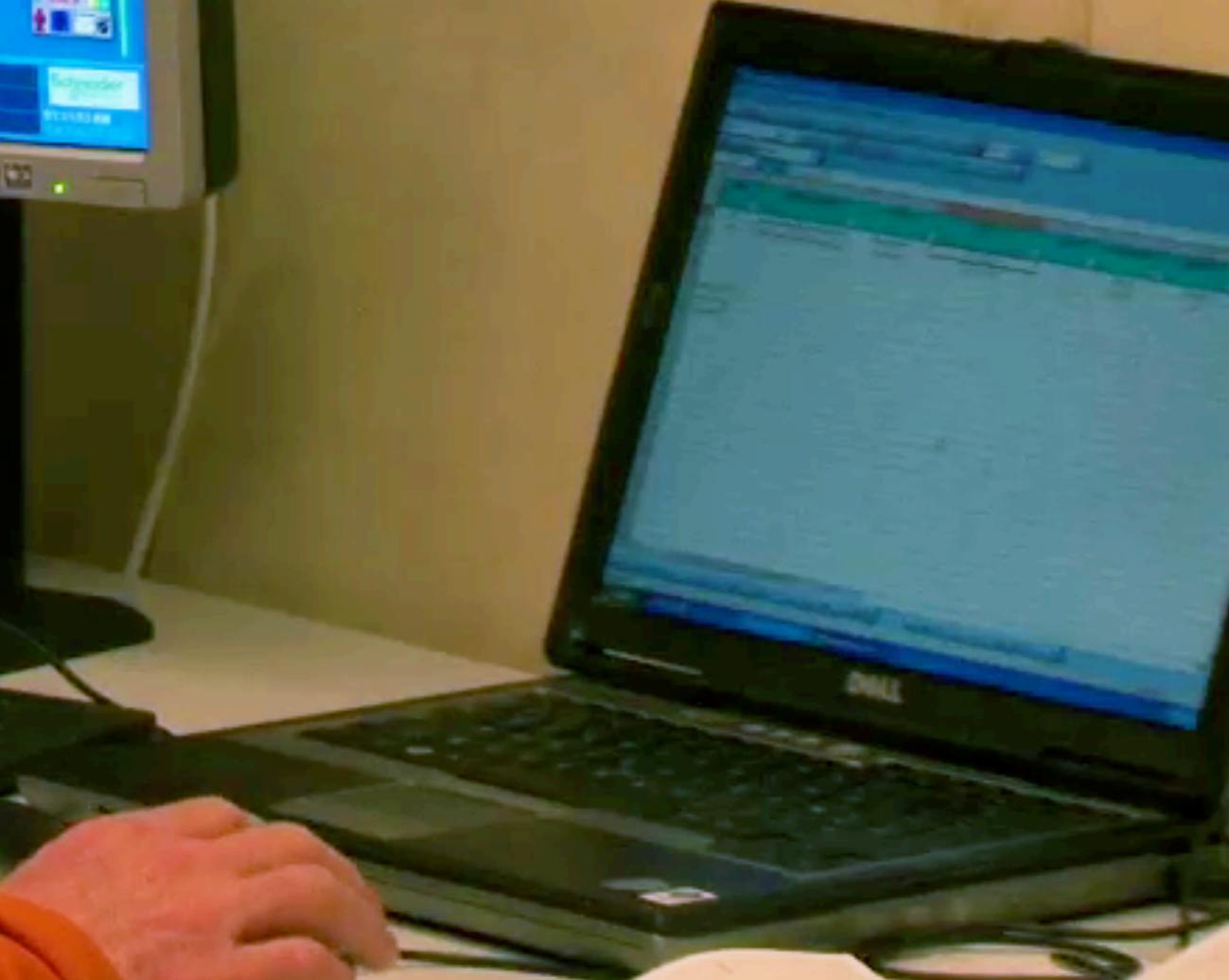
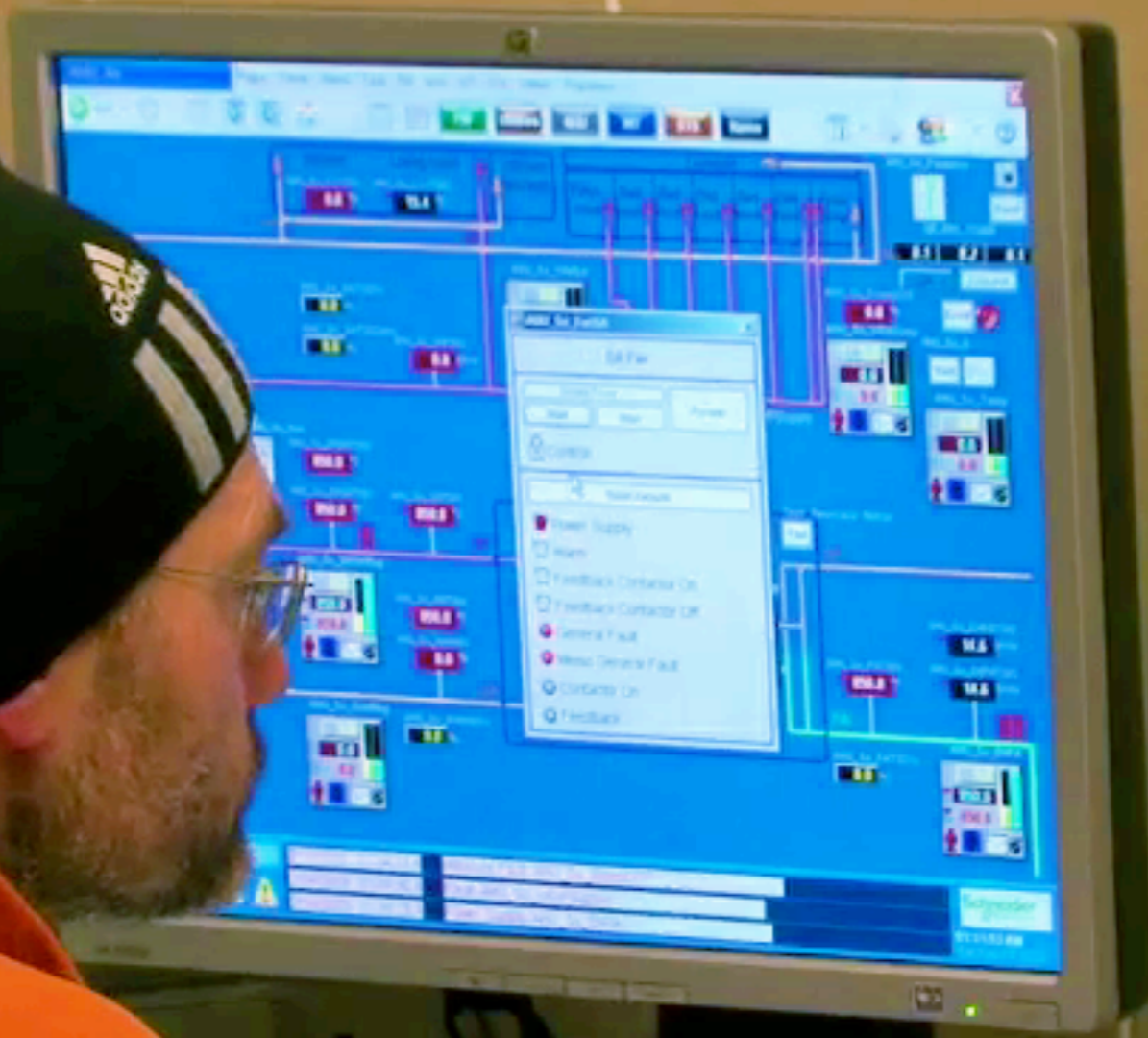
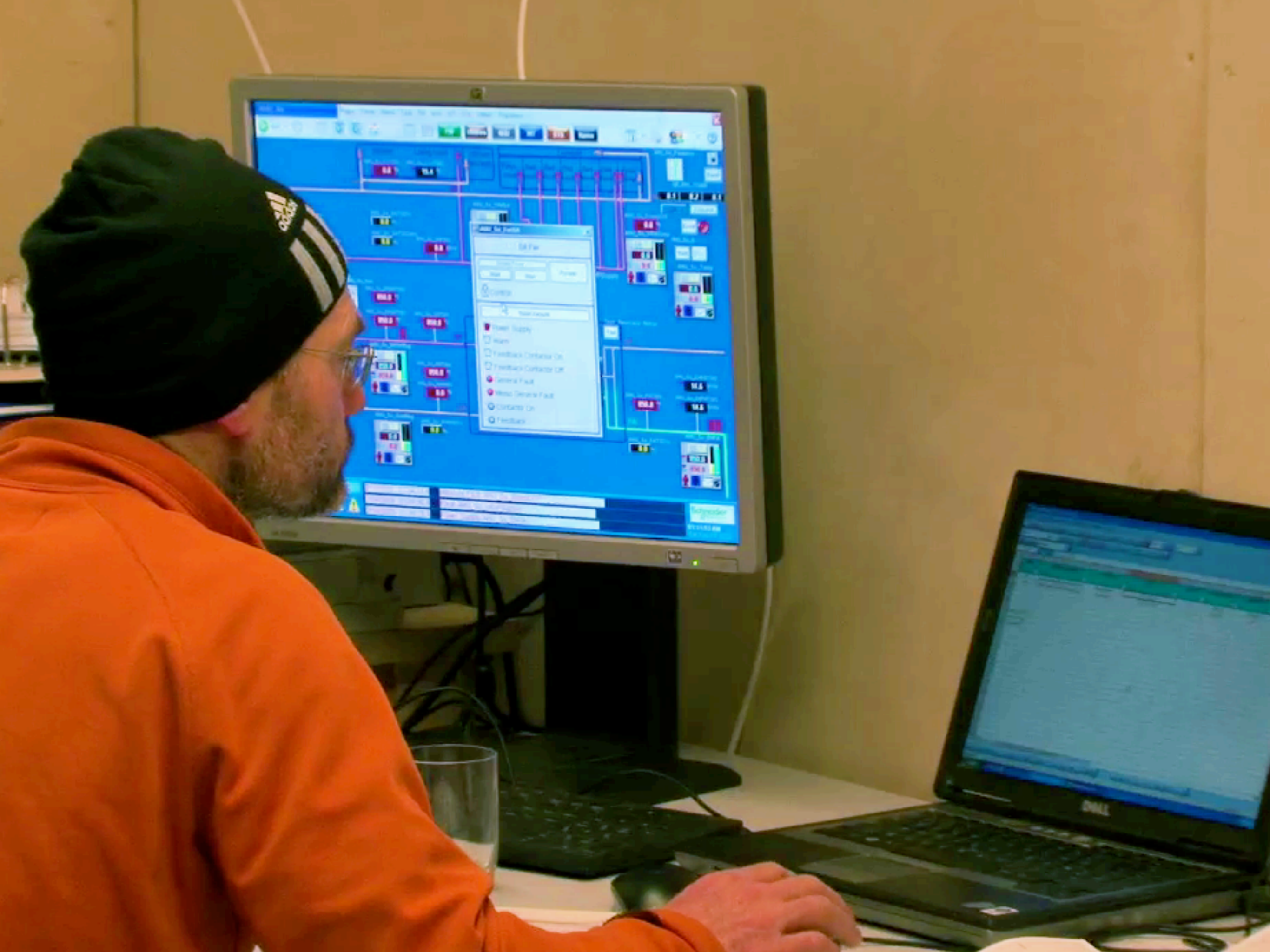
Variable Demand

Energy request



Renewable Energies: Batteries as buffer





Life inside the Station





Sponsors that have made the Princess Elisabeth Station possible:

Founding Partners



Main Partners



Premier Corporate Partners



Corporate Partners



Government Partners





GDF Suez

Schneider
Electric





princess
anna maria

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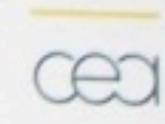


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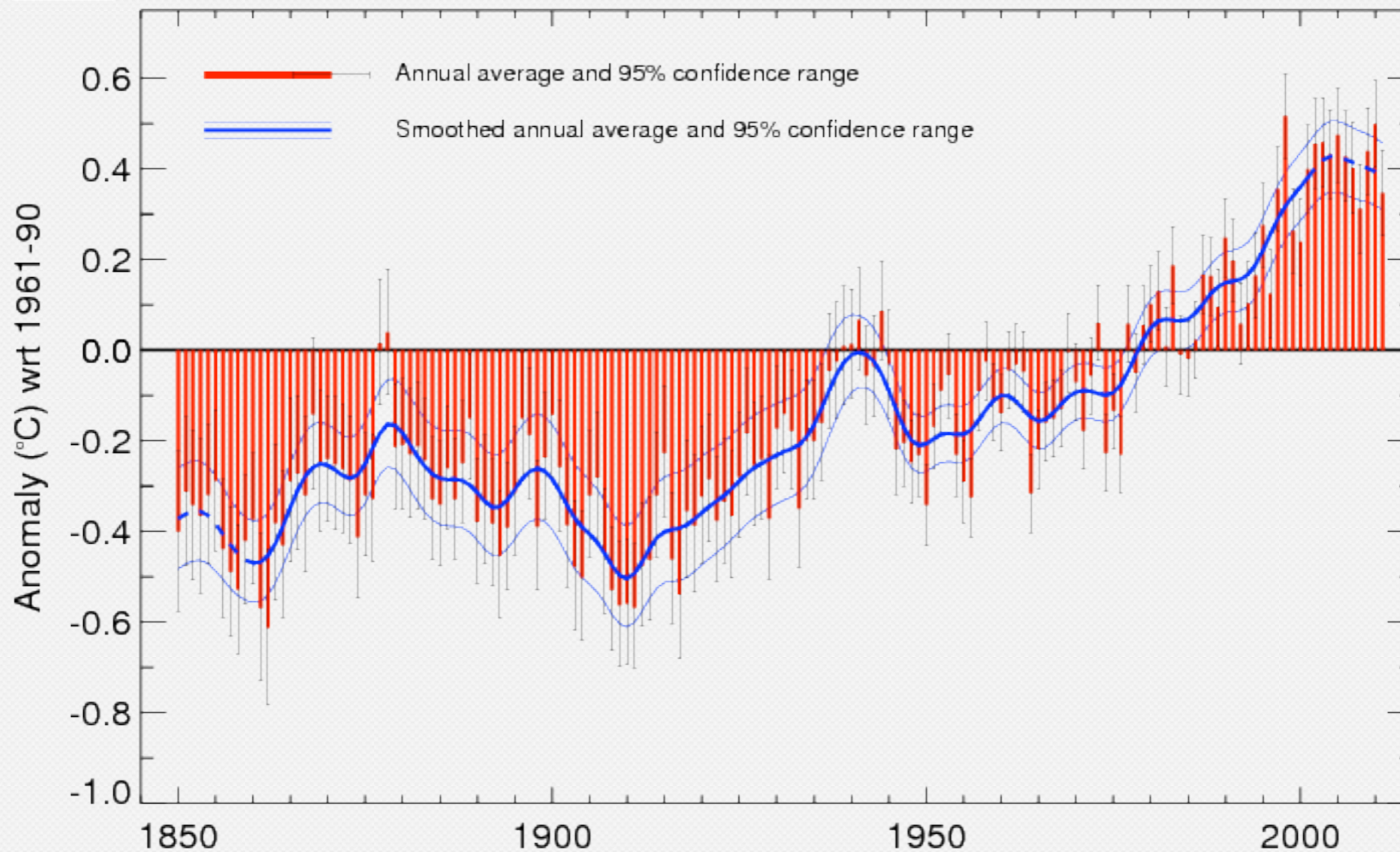


Polar Regions & Climate Change

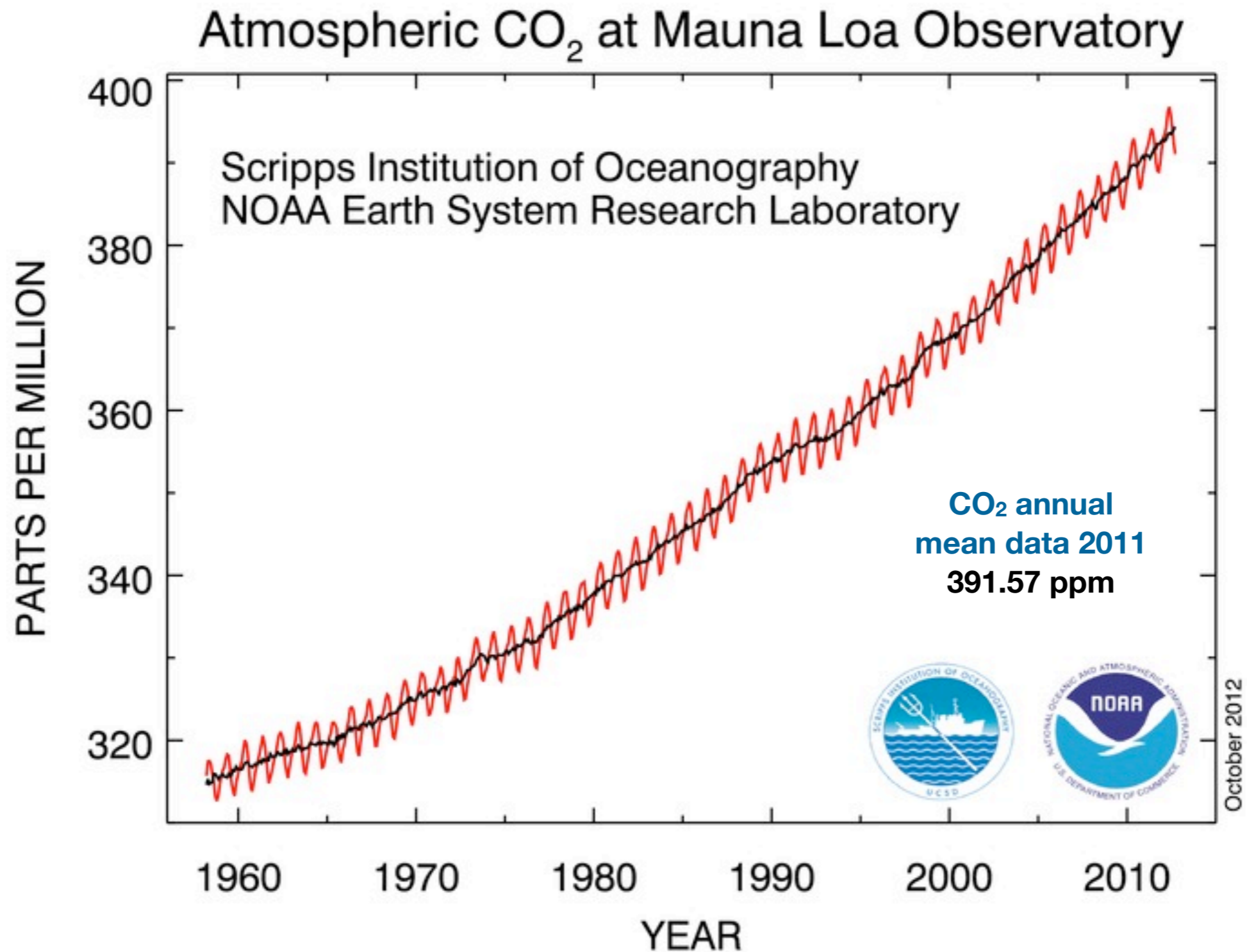
What We know about Temperature



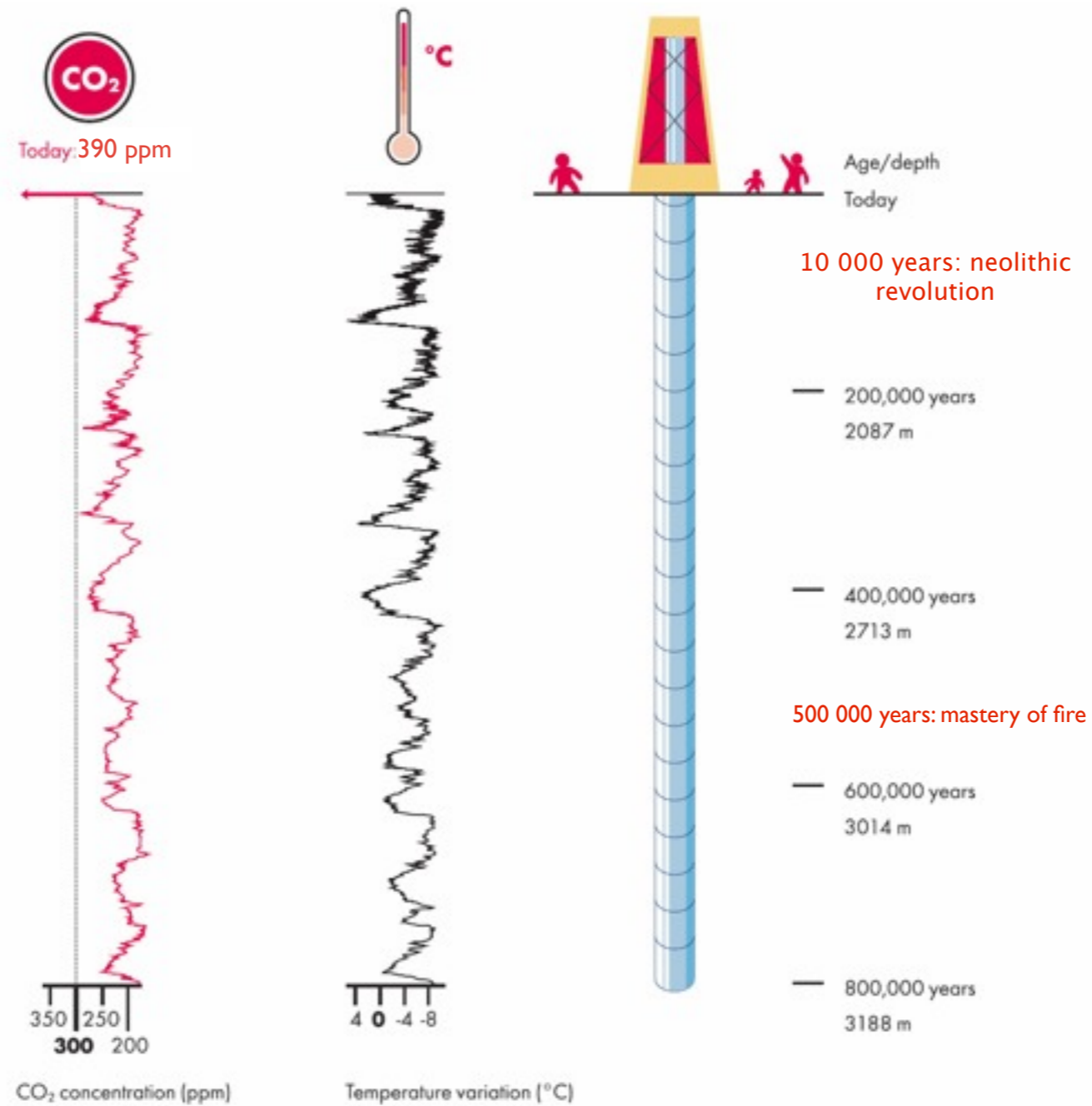
Global average temperature 1850-2011
Based on Brohan et al. 2006



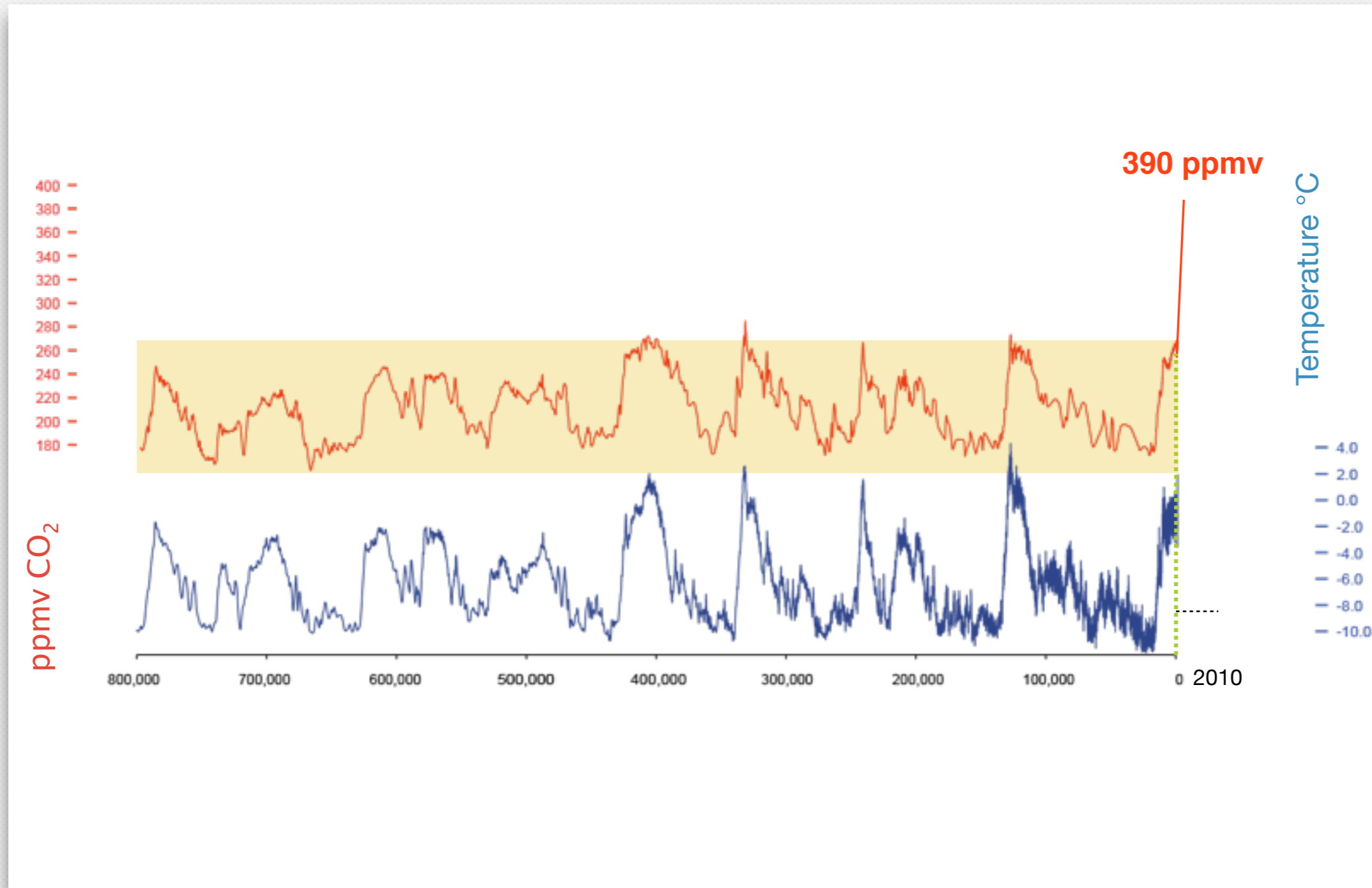
What We Know About CO₂ Concentration



Climate Archive, Earth Observation

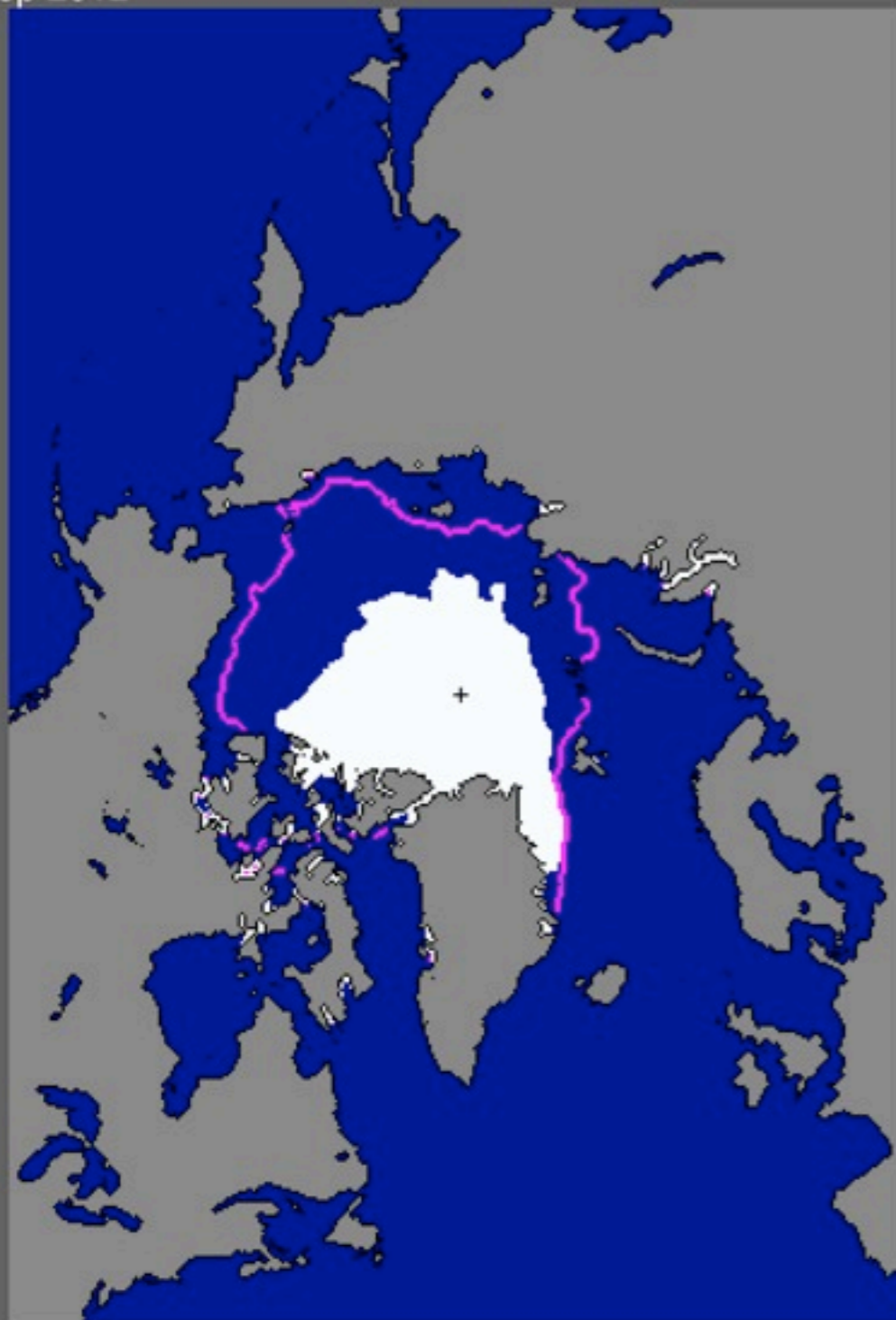


EPICA Ice Core Proxy Temperatures & CO₂



Sources: Jouzel, J., et al. 2007. and Lüthi, D., et al.. 2008

Sea Ice Extent
Sep 2012

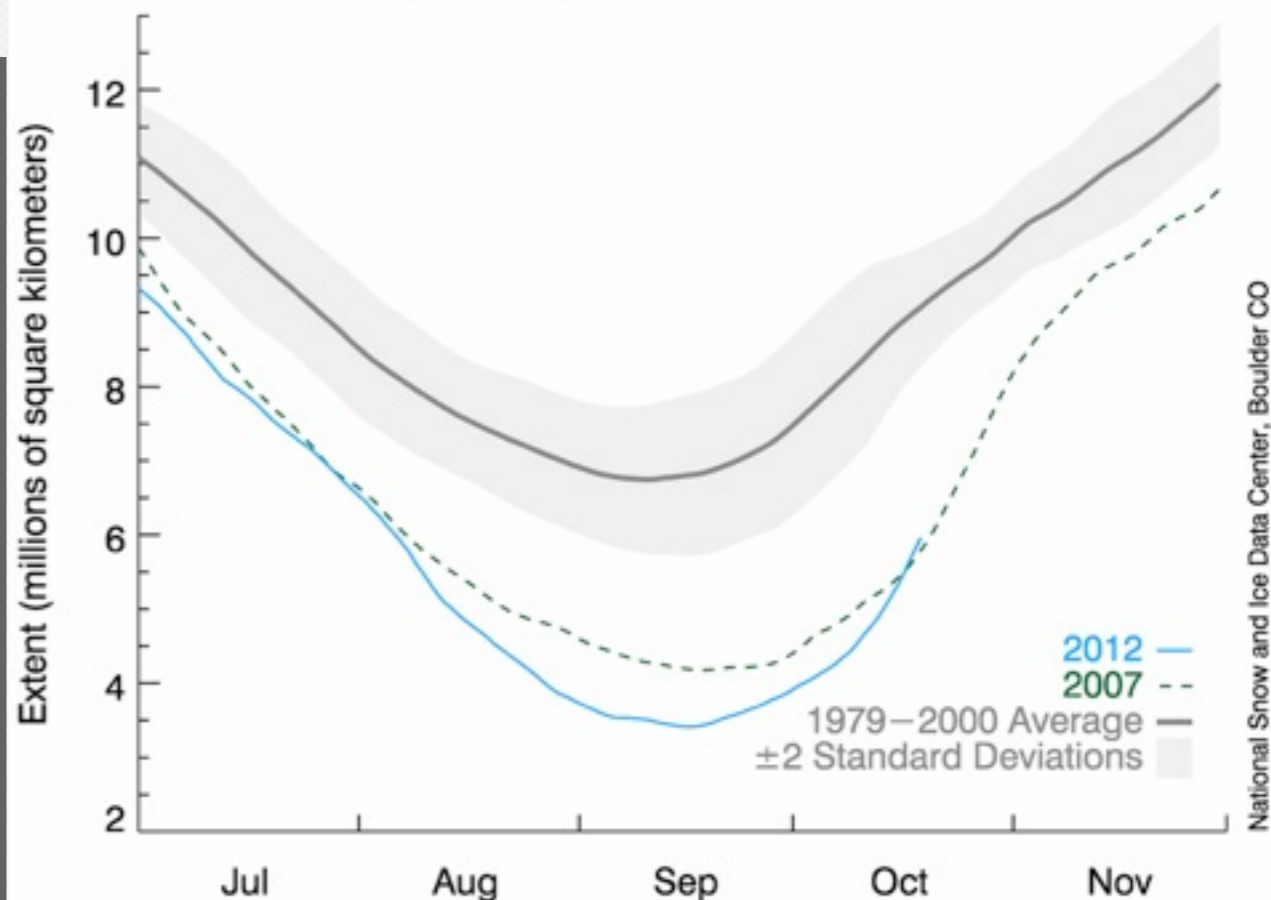


National Snow and Ice Data Center, Boulder, CO

Total extent = 3.6 million sq km

median
ice edge

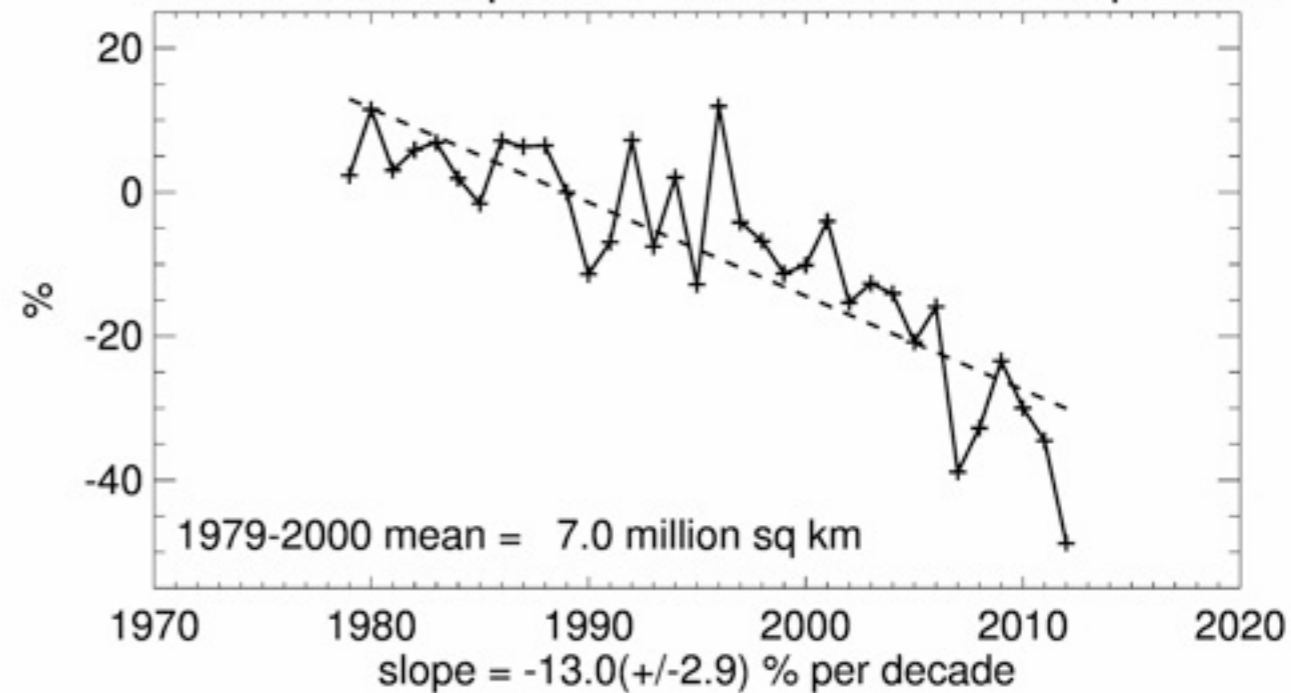
Arctic Sea Ice Extent
(Area of ocean with at least 15% sea ice)



19 Oct 2012

National Snow and Ice Data Center, Boulder CO

Northern Hemisphere Extent Anomalies Sep 2012



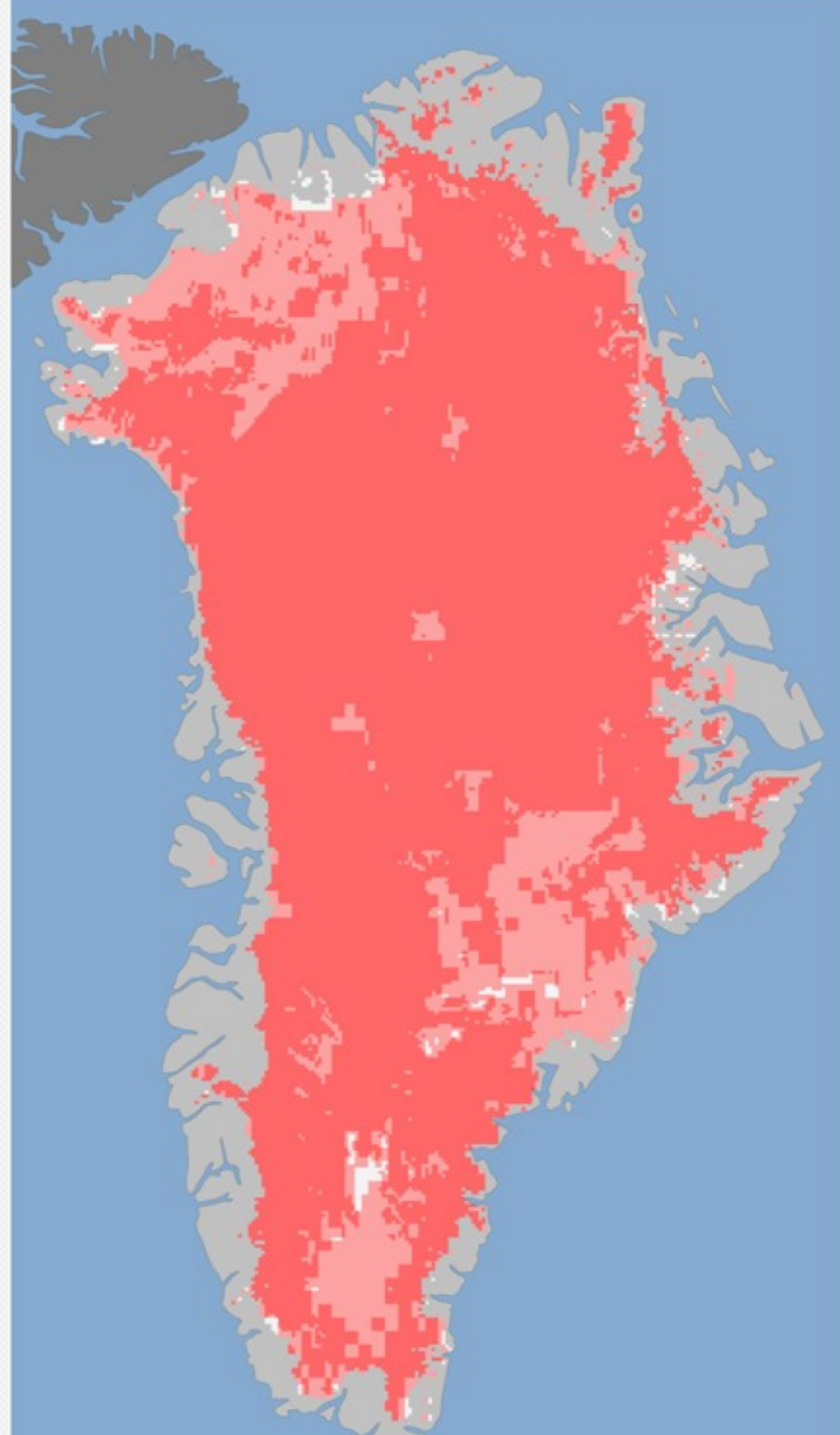
1979-2000 mean = 7.0 million sq km

slope = -13.0(+/-2.9) % per decade



8 Jul 2012

Credit: Nicolo E. DiGirolamo, SSAI/NASA GSFC, and Jesse Allen, NASA



12 Jul 2012

Climate Tipping Points

A climate 'tipping point' occurs when a small change in forcing triggers a strongly nonlinear response in the internal dynamics of part of the climate system, qualitatively changing its future state.

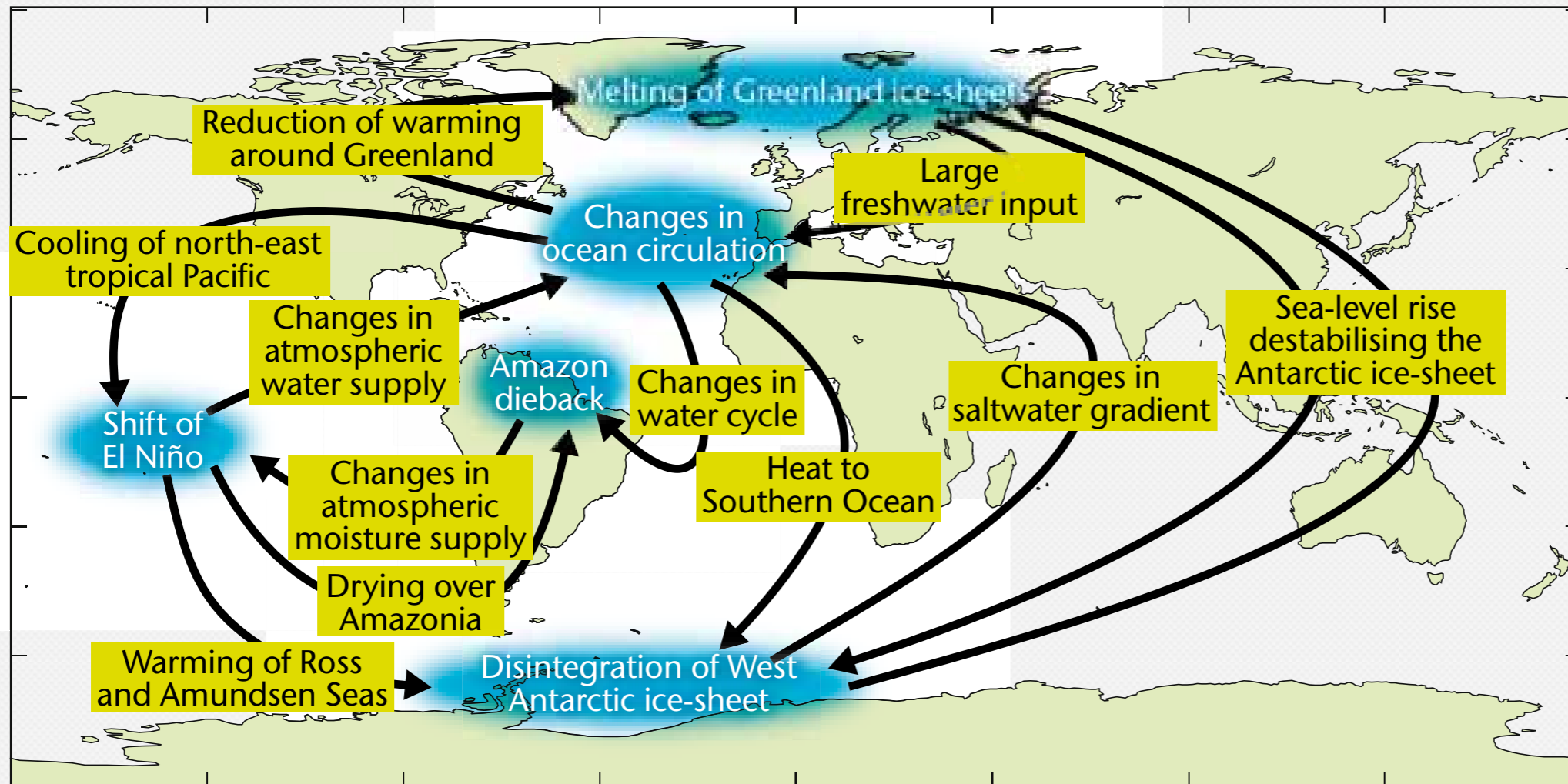
Climate Tipping Points (Allianz 2011)

Drought, Ice Melting, Changing Oceans, Dying Forests, Changing Ecosystems

Ice melting: Arctic Sea Ice, Continental Ice Caps, Greenland Ice Sheet, Permafrost, West Antarctic Ice Sheet

Arctic Opening: Opportunity and Risk in the High North (Lloyd's 2012)
Climate Protection and Adaptation to Global Warming (Munich Re)

Main Interactions between Thresholds



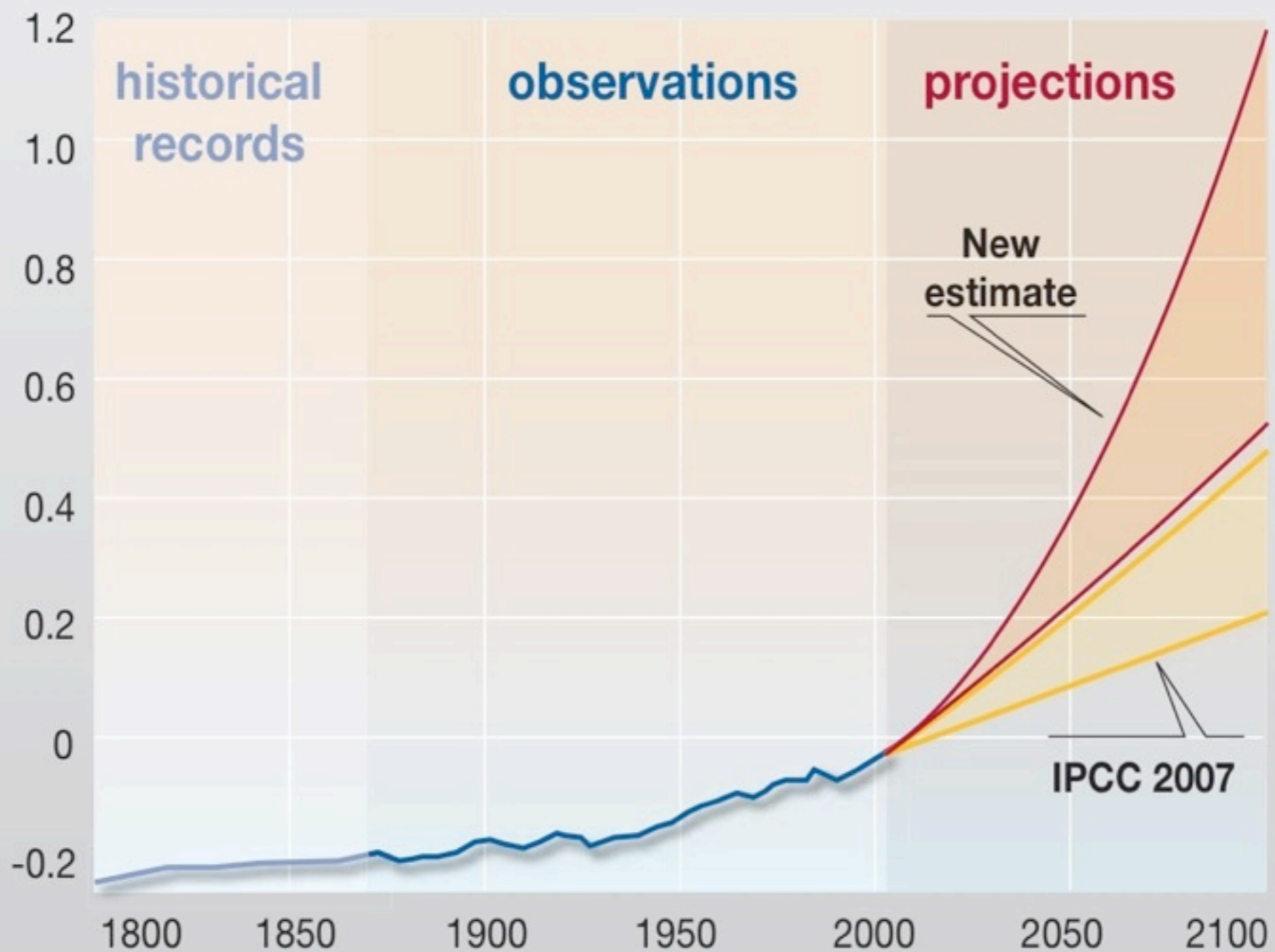
Sketch of the main interactions (in green) between potential thresholds (in blue)³.

Source: Met Office Hadley Centre, Walker Institute, Tyndall Centre and Grantham Institute for Climate Change. (2010). *AVOID Flyer: Risks of dangerous climate change*.

³ Adapted from expert consultation study: Kriegler E, Hall JW, Held H, Dawson R and Schellnhuber HJ. 2009: Imprecise probability assessment of tipping points in the climate system. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA. Volume: 106, Issue: 13, Pages: 5041-5046.

Global sea-level rise

Metres



Areas of Europe within 1 m of sea level



Adaptation?



Adaptation to Climate Change

EU

European Climate Change Programme
Climate Adaptation Platform

European Environment Agency EEA

Urban Adaptation to Climate Change in Europe (2012)

UK

Climate Change Risk Assessment (Jan 2012)

National Adaptation Programme (2013)

and many more National Adaptation Strategies...



**Understanding the Poles...
...to Build a Sustainable Future**

Thank You!

