



ARCA: Executive Summary

ARctic: present Climatic change and pAst extreme events

ARtico: cambiamento Climatico Attuale ed eventi estremi del passato

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OGS

MAECI

ARCA Final Conference, 11 October 2016

ARCA is an excellence project funded by the Italian **Ministry of Education, University and Research (MIUR)** through the mechanism of rewarding funds for specific projects proposed by the scientific research public institutions (EPR)



PARTNERS:



CNR, National Research Council (Coordinator)



OGS, National Institute of Oceanography and Experimental Geophysics



INGV, Istituto Nazionale di Geofisica e Vulcanologia

OBJECTIVE: *to study the mechanisms behind the release of large volumes of cold and fresh water from melting of ice caps, investigating the complex Arctic system from both paleoclimatic perspective (last 20,000 years) and present air-sea-ice interaction process points of view*

Structure:

- ✓ **WP1 - (coordinated by CNR):**
Atmosphere-hydrosphere and cryosphere integrated system
- ✓ **WP2 - (coordinated by INGV):**
Dynamics of large outlet glaciers in Greenland
- ✓ **WP3 - (coordinated by OGS):**
Extreme melt-water's events reconstruction
- ✓ **WP4 - (coordinated by CNR):**
Conceptual model and distributed system for the management, use and dissemination of data



WP1 - Atmosphere-hydrosphere and cryosphere integrated system

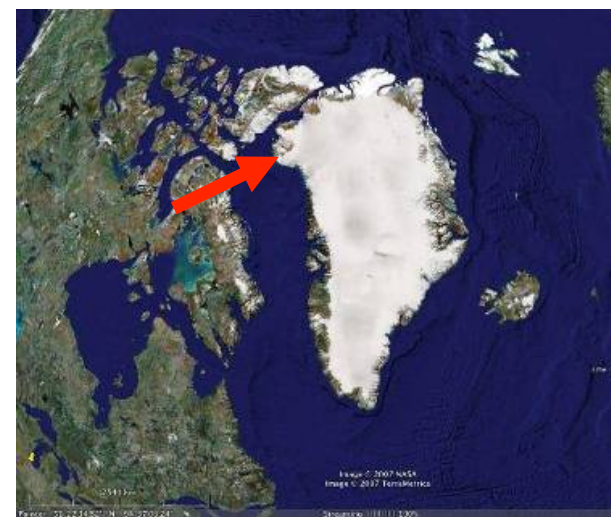
At the Italian station Dirigibile Italia, several instruments are installed to investigate the physical and chemical properties of the atmosphere, the fluxes, of heat radiation and chemicals within the interface atmosphere-ice-snow-ground. The scientific platform continuously operational can provide data of all the components of the energy balance at the surface, and all information on weather, cloudiness and turbulence. A key element of this station is the 32 m height Admundsen-Nobile Climate Change Tower (CCT), that has the capability to host and manage many sensors, allowing to carry out measurements and research in an optimal way. The measurements started in 2009 and further implemented in 2010. There are also parametric models to study the processes of the Arctic Atmosphere Boundary Layer and the complex interactions between the atmosphere-hydrosphere-cryosphere.



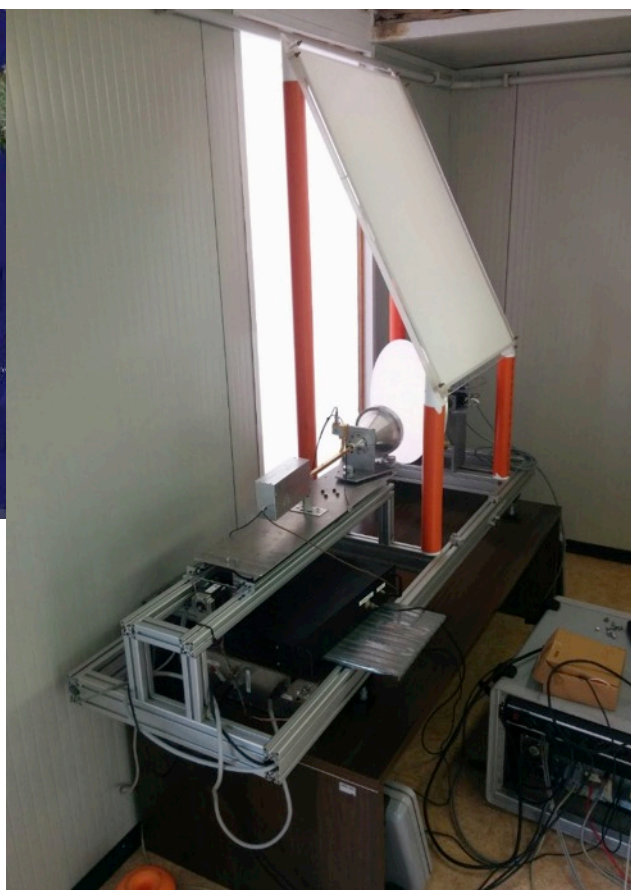
WP1-ATM: Atmospheric Radiation Budget

Impact of atmospheric parameters such as **water vapor**, aerosol and ozone concentrations on the **ground radiation budget** (at IR wavelengths in particular) and **temperature** by:

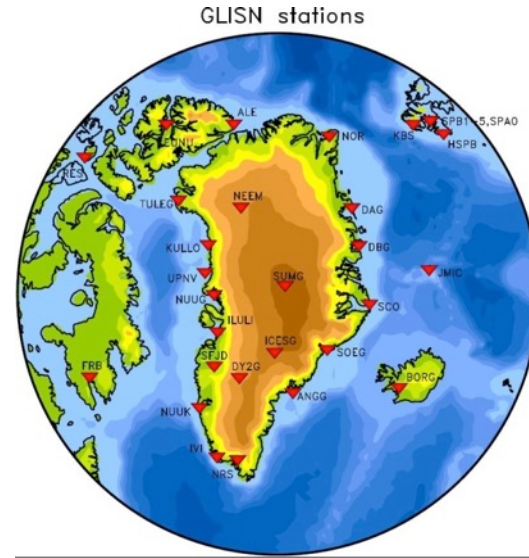
1) making use of existing datasets obtained at Thule Air Base (Greenland) during previous campaigns (2009-2015); 2) strengthening the observing capabilities in the Arctic; 3) carrying out an additional winter field campaign of atmospheric constituents at Thule.



Water Vapor
Spectrometer **VESPA-22**

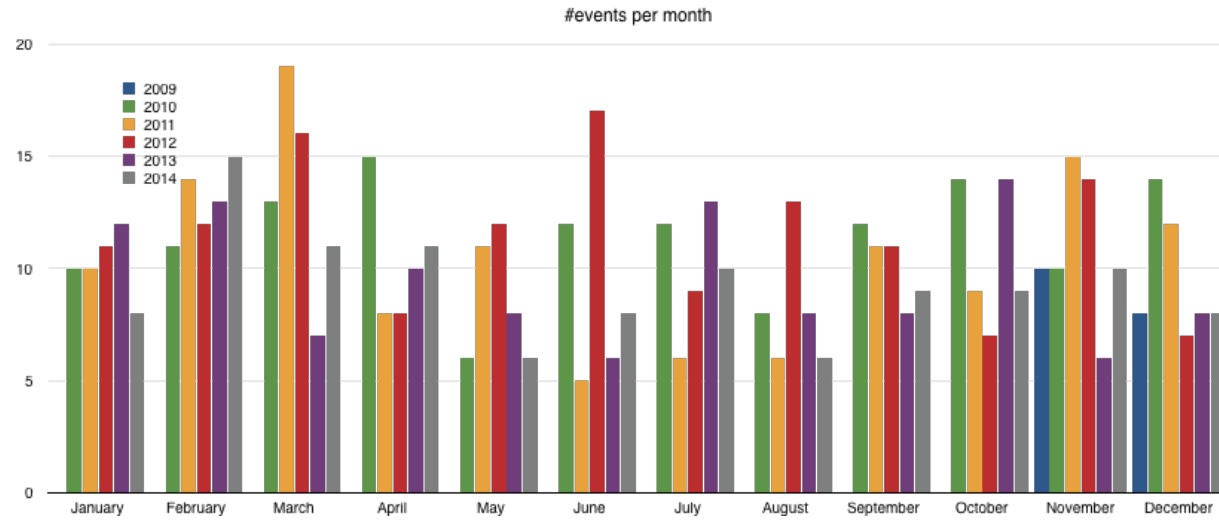
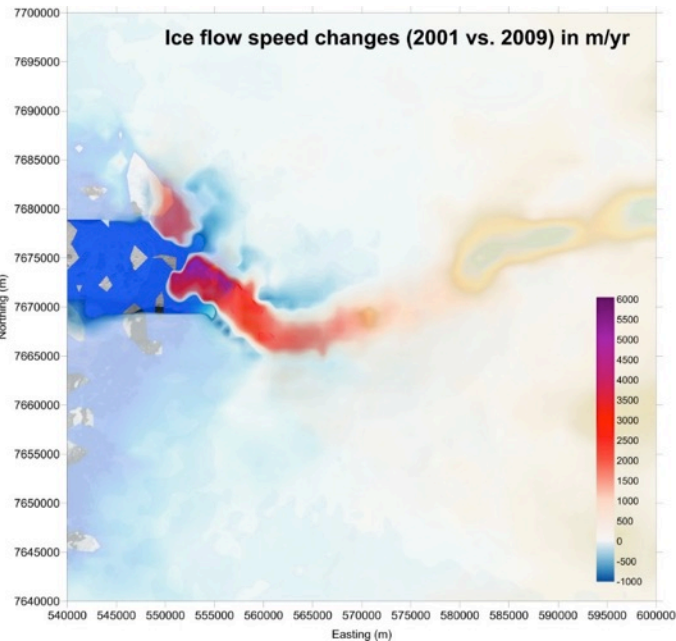


WP2: Study of the seismic signal for the detection of seiche waves originated by iceberg calving at outlet glaciers (Radio Echo Sounding & GLISN).



Greenland Ice Sheet Monitoring Network
www.glisn.info

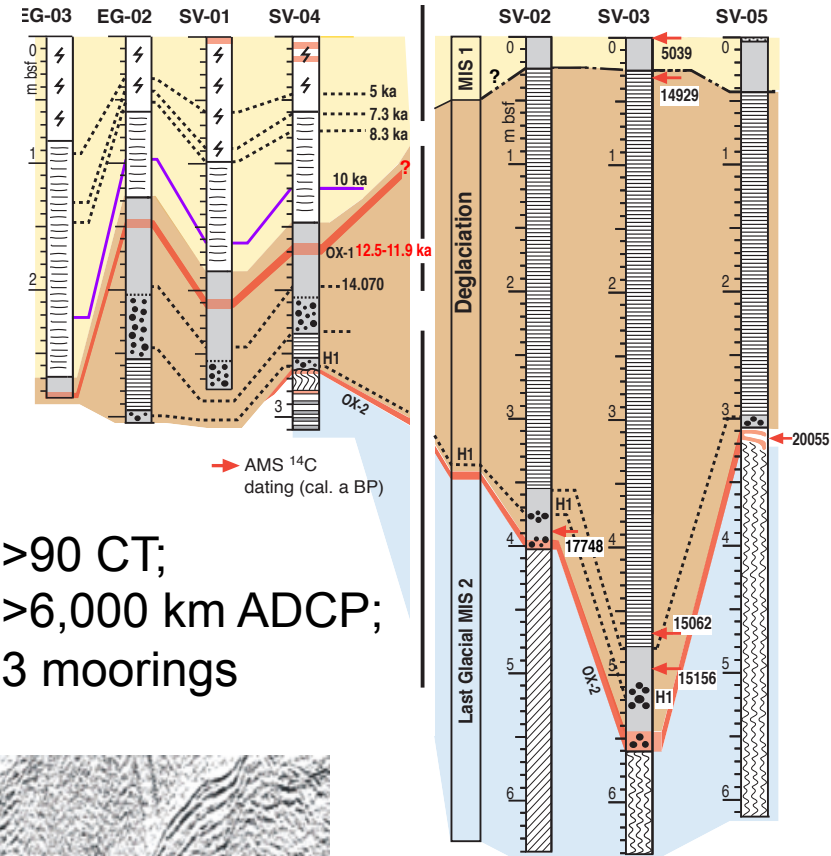
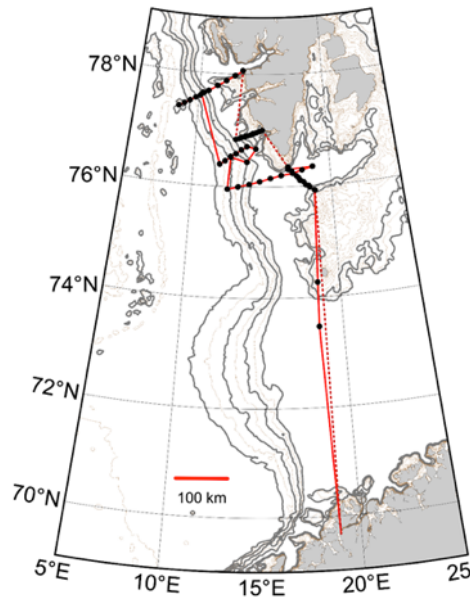
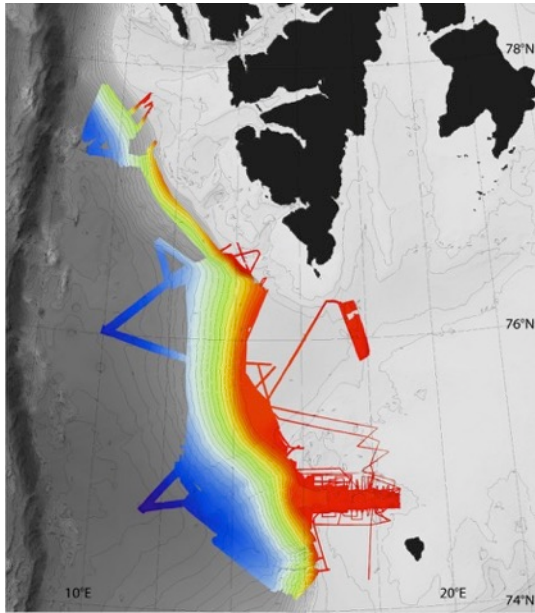
Number of calving events detected at station ILULI – monthly variation from 2009 to 2014.



WP3: Extreme melt-water's events reconstruction in the Barents Sea

A wealth of **geological and geophysical data** have been collected in a series of international scientific marine expeditions within the ARCA project (**CORIBAR and PREPARED cruises**) and associated (SVAIS, EGLACOM, GLACIBAR, EDIPO, DEGLABAR, and BURSTER cruises) also on board the **Italian OGS Explora vessel**.

>30,000 km² of bathymetry



>90 CT;
>6,000 km ADCP;
3 moorings

>450 m of
sedimentary cores



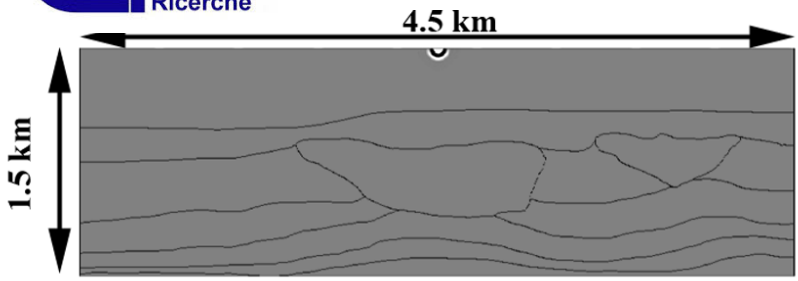
>2,000 km of seismics

WP3: Extreme melt-water's events reconstruction

The data have been analyzed in collaboration with many national and international institutes:

Logos of collaborating institutions:

- OGS
- INGV (Istituto Nazionale di Geofisica e Vulcanologia)
- Consiglio Nazionale delle Ricerche
- AWI
- UNIVERSITÄT TRIESTE
- UNIVERSITÀ POLITECNICA DELLE MARCHE
- GEUS
- marum
- UNIVERSITÄT BREMEN
- UNIVERSITETET I TROMSØ
- UiO (Universitetet i Oslo)
- UNIVERSITY OF GOTHENBURG
- UNIVERSITÀ DELLA SAPIENZA
- UNIVERSITAT DE BARCELONA
- UNIVERSITÄT ZÜRICH
- UNIVERSITÄT WÜRZBURG
- UNIVERSITÄT WÜRZBURG
- UNIVERSITÄT WÜRZBURG



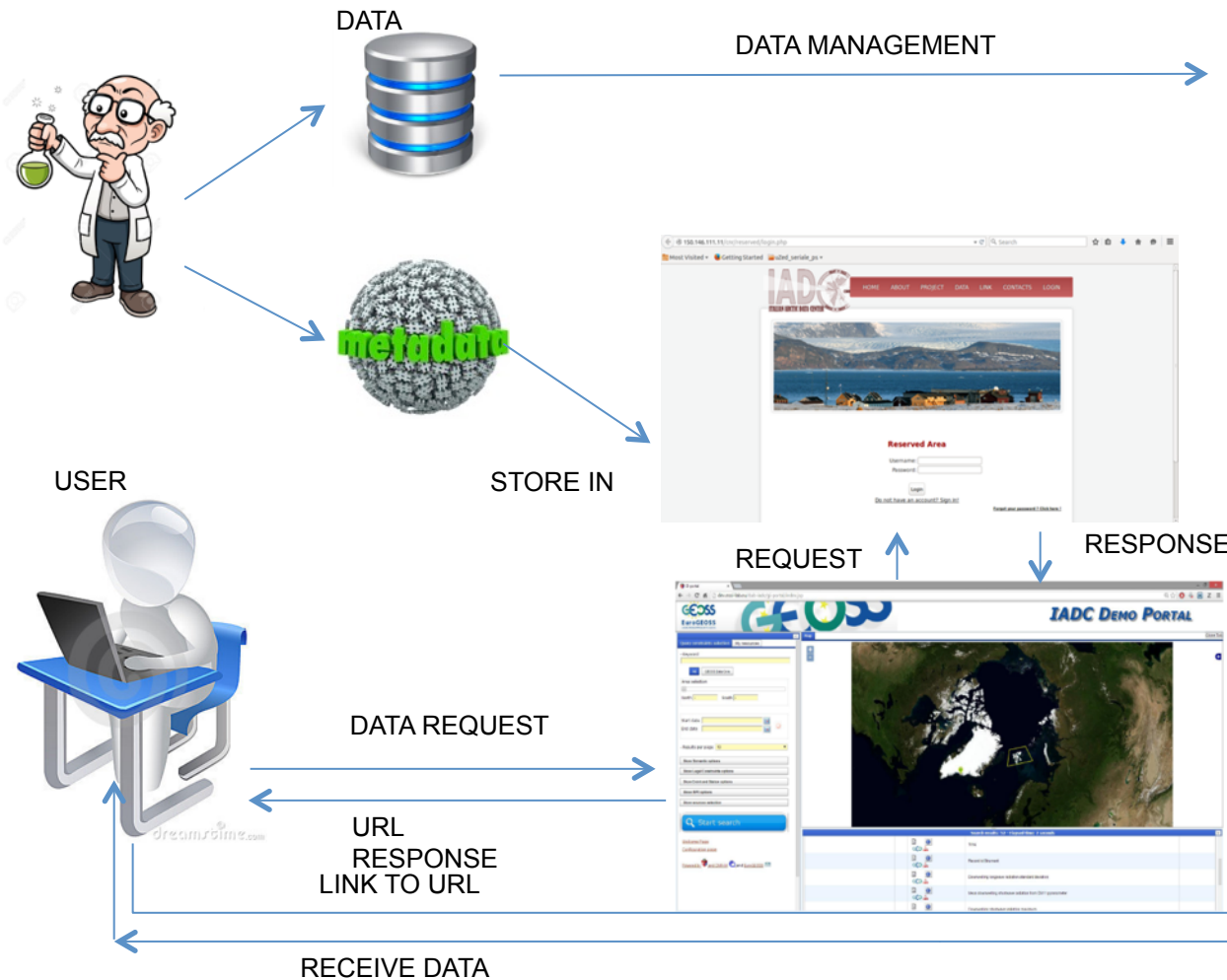
Logos of collaborating institutions:

- GOBIERNO DE ESPAÑA / MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD
- CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS (CSIC)
- UNIVERSIDAD DE SALAMANCA
- BGR
- UNIS
- UNIVERSITAT DE BARCELONA
- HAVFORSKNINGSINSTITUTTET





Conceptual Model



Arca in OGS Arctic Data Repository

**CLOUD
INGV**

**CNR
INFRASTRUCTURE
AND BROKER NODE**

WP4 - Dissemination



- Graphic design, including logo and corporate.
- Website portal: www.arcaproject.it
- ARCA Final Conference side by side with the “Arctic Council and the Italian Perspective Conference” (10 and 11 October 2016).
- Several papers on different ARCA topics have been presented. Additional papers are in preparation and will be soon submitted for publication.

Thanks for your attention

