

Italian activities in the Arctic: status of infrastructures and research plans

Vito Vitale

Institute of Atmospheric Sciences and Climate (ISAC-CNR)



Italian Long-term activities in the Arctic



Agencies: CNR, ENEA, INGV, INAF
Universities: Florence, Venice, Insubria, Perugia, ...



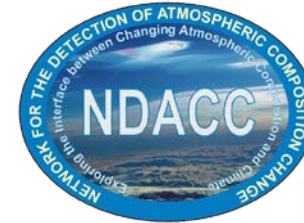
Research Overview:

Monitoring activities at Thule (since 1989)

✓ Atmospheric Physics : *surface radiation budget, aerosol properties and radiative effects, stratospheric ozone, stratospheric dynamics and Chemistry, Arctic climate.*

Part of the NDACC global Network

Cooperation with DMI, SUNY, UNI-Rome, INGV, UNI-Florence



Instruments:

Aerosol/temperature lidar (*aerosol/clouds trop. and strat. vertical profiles, temperature profiles in middle atmosphere*)

Solar/IR radiometers

Mm-wave spectrometer (*stratospheric and mesospheric chemical composition*)

Chemical samplers

Measured parameters:

Aerosol/cloud vertical profiles

Temperature profiles (25-70 km)

Stratospheric/mesospheric profiles of O₃, N₂O, CO, HNO₃

Solar and infrared irradiance

Aerosol mass and chemical composition

Most data available through the NDACC database (<http://www.ndsc.ncep.noaa.gov>)



NDACC Lidar

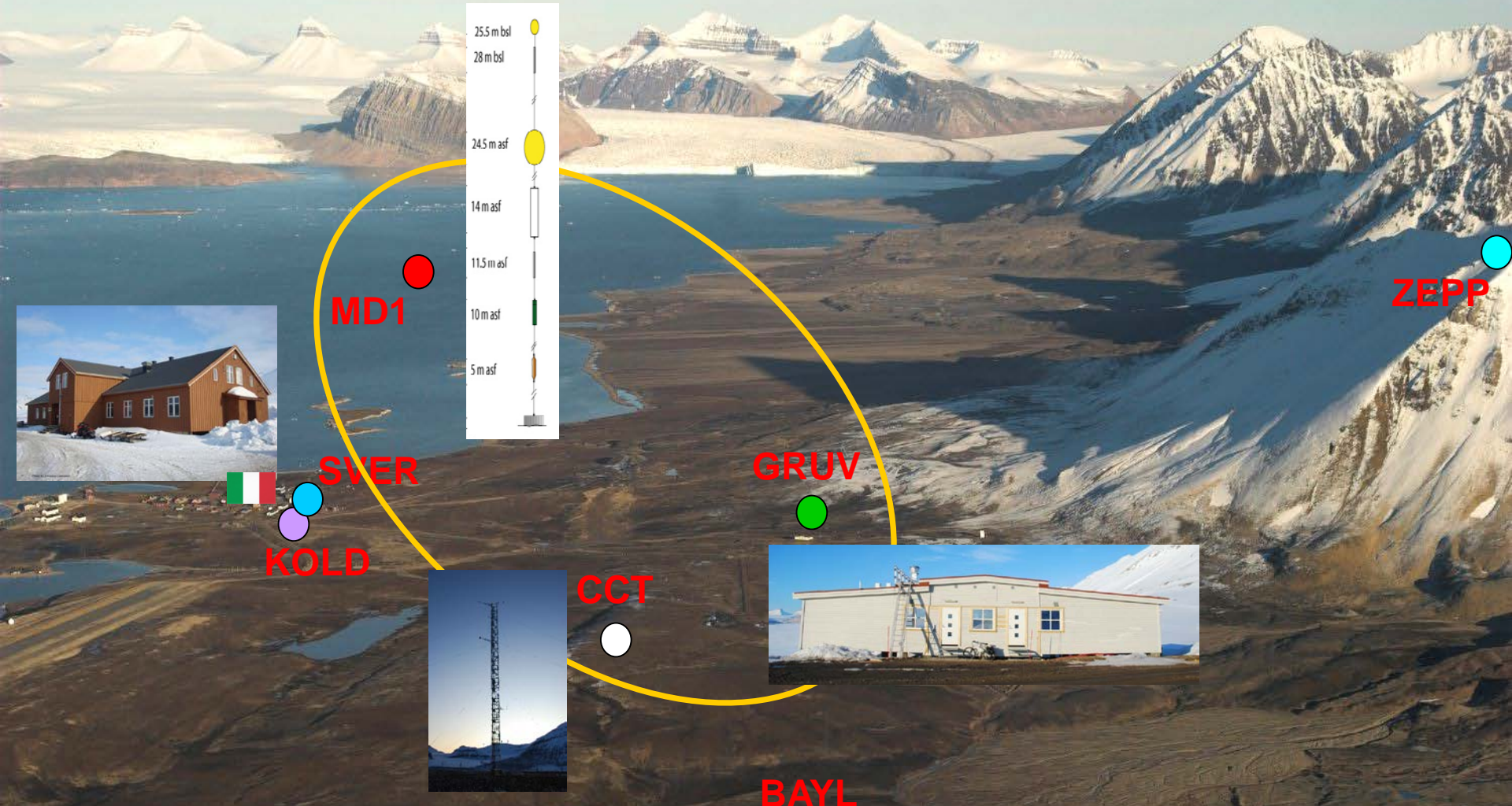


PM10 sampler



Dirigibile Italia Station

500 m



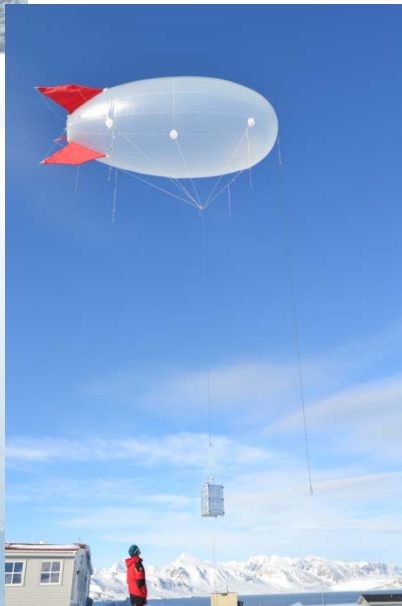
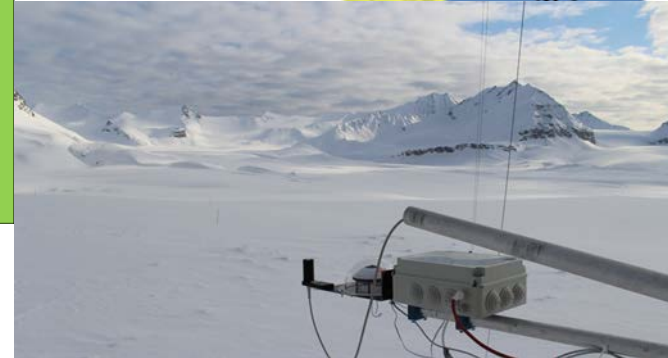
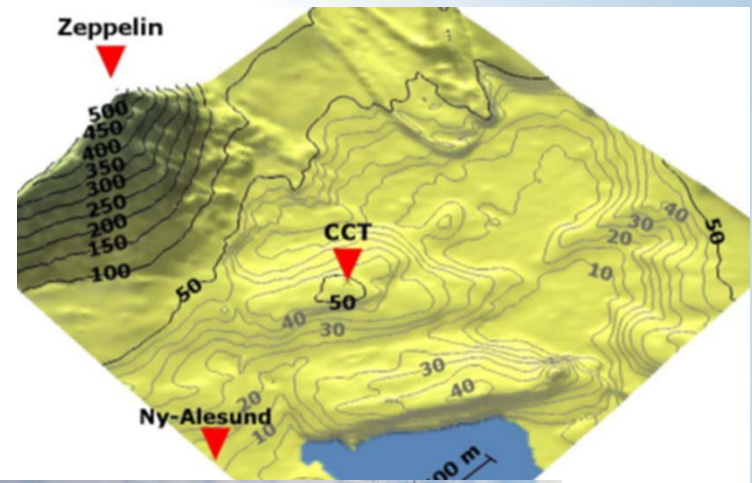
Since 2009, several observing platforms have been implemented mainly to address in a comprehensive way coupling processes at interfaces and in ABL.

courtesy of Julia Boike, AWI

Instrumentation set up

COMPLETE CCT INSTRUMENTATION SETUP

- K&Z CNR 1 net radiometer [33 m]
- K&Z CM11 and CGR4 upwelling first class radiometers [25 m]
- Young propeller anemometer [33m, 10m, 5m and 2m]
- Vaisala HMP45 thermo-hygrometers [33m, 10m, 5m and 2m]
- Campbell CSAT3 sonic anemometers [21 m]
- Campbell EC150 fast hygrometer [21 m]
- CH4 and CO2 open path analyzers [21 m]
- CRDS inlet for gas measurements [21 m]
- Gill R50 Solent sonic anemometer [7.5 m]
- Campbell Kh-20 fast hygrometer [7.5 m]
- Gill R50 Solent sonic anemometer [3.7 m]
- Campbell Kh-20 fast hygrometer [3.7 m]
- IR120 infrared sensor for snow skin temperature [5m]
- SR50 sonic range sensor for the snow height [5m]
- Flux plate at the interface soil-snow [at surface]
- PT100 in the snow layer and into the ground [15 , 5, -5, -15 cm]



Contribution to the Atmospheric Flagship Program

Gruvebadet aerosol laboratory/building (GVB)



NY ALESUND CALM GRID

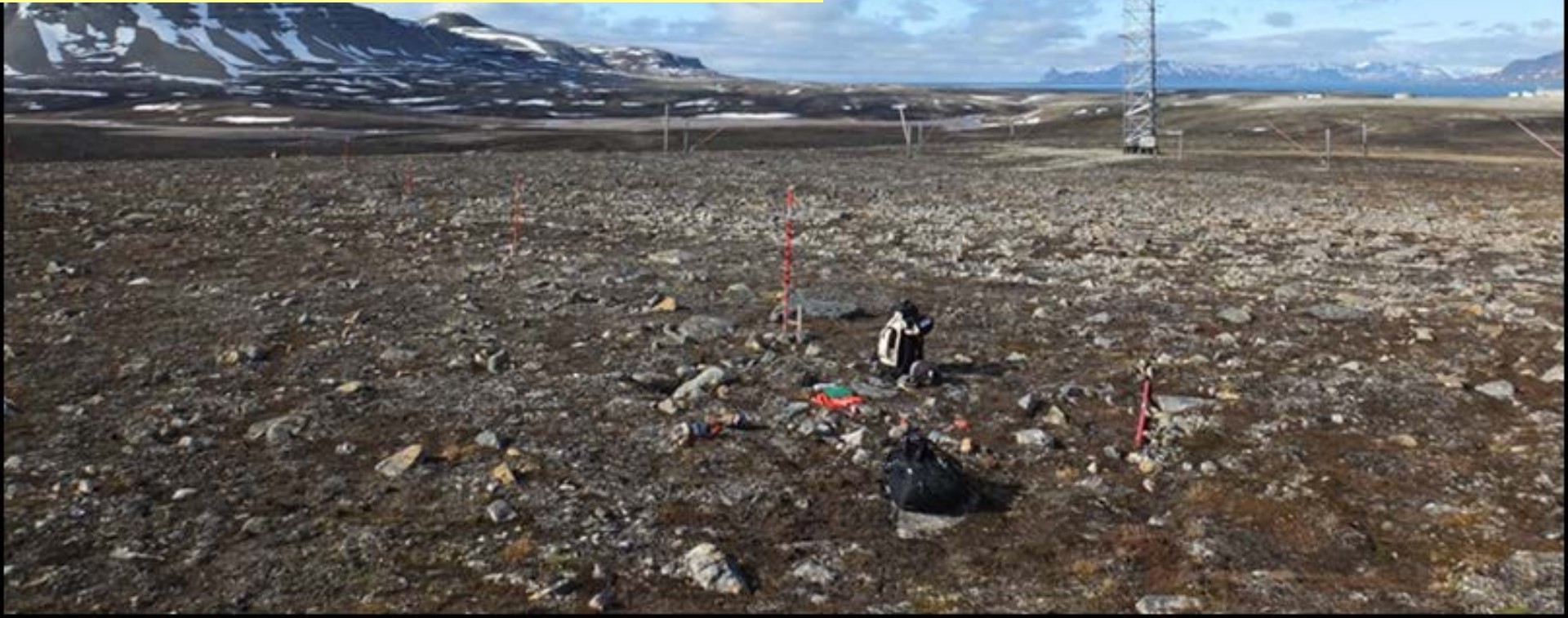
Size: 100x100 m; Snow Height; Ground Surface Temperature; ALT, Surface Heave are monitored within the GRID since 2015

DEEP BOREHOLE (48.5 m)

20 PT100/3 at different depth according to TSP protocols

CR1000 Campbell datalogger near the hole

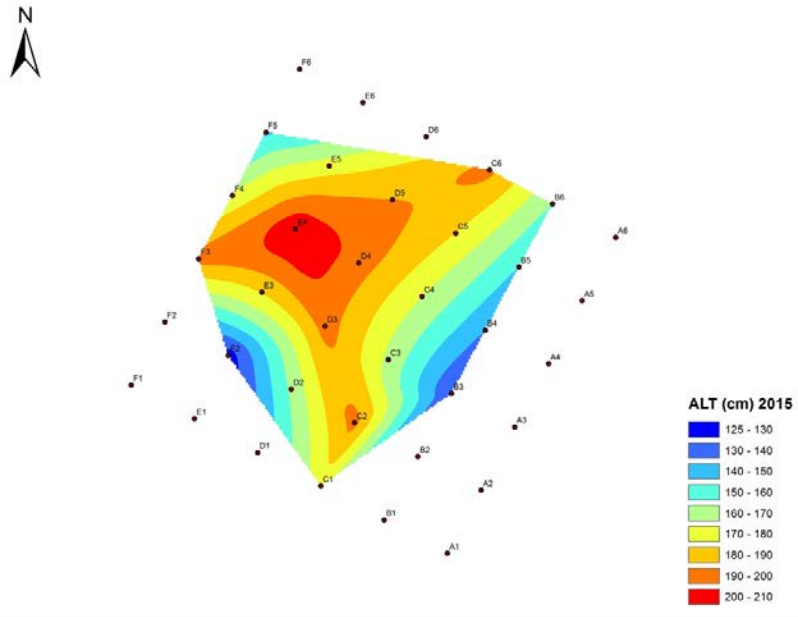
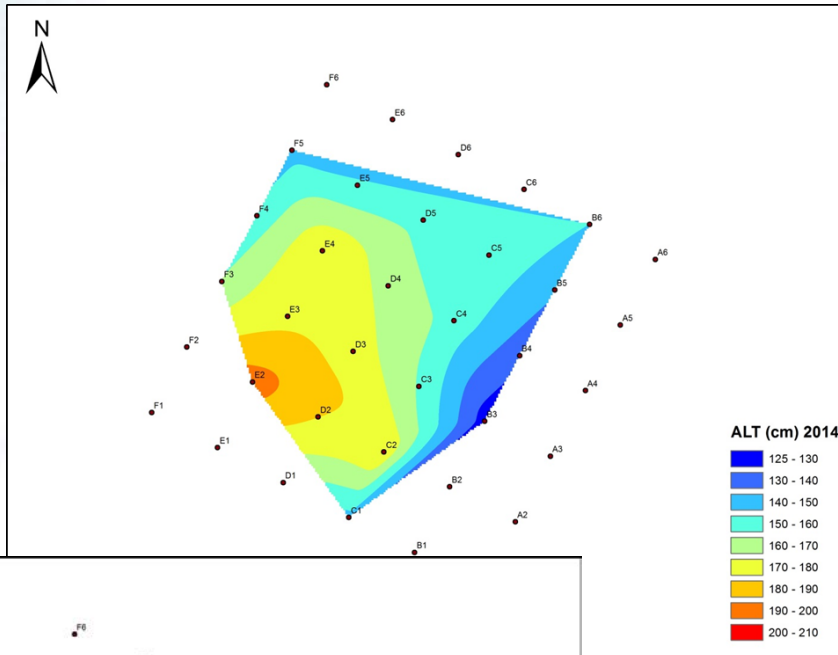
data since January 2016



Active Layer Thickness



2014





2015

spatial variability of the ALT related mainly to the snow and vegetation differences

From Guglielmin et al., 2017 in prep.



Home • Contact Us

 **Browse Volumes & Issues**  Search within this journal 

Rendiconti Lincei
All Volumes & Issues

Volume 27, Issue 1 Supplement, September 2016

Environmental Changes in the Arctic: an Italian Perspective

Issue Editors: David Cappelletti, Roberto Azzolini, Angelo Viola, Leonardo Langone, Stefano Ventura

ISSN: 2037-4631 (Print) 1720-0776 (Online)

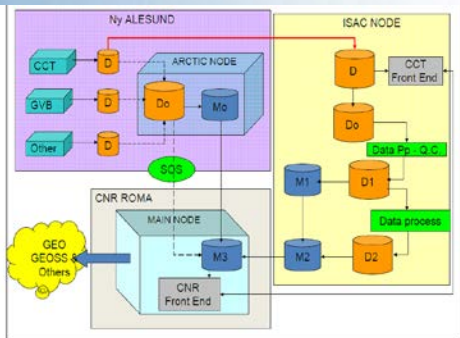
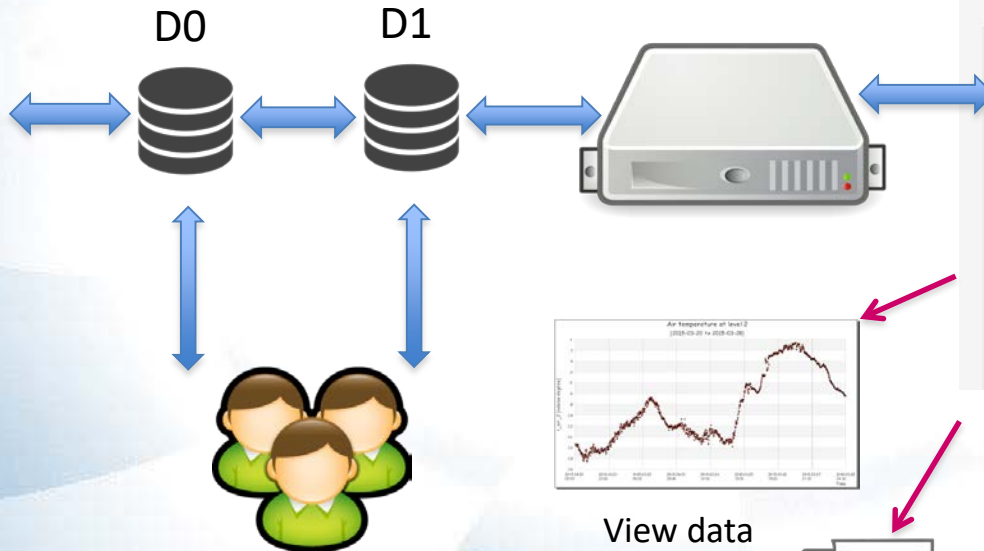


In this issue (27 articles)

Page 1 of 2

 Environmental Changes in Arctic

<http://link.springer.com/journal/12210/27/1/suppl/page/1>



Download data

Metadata data

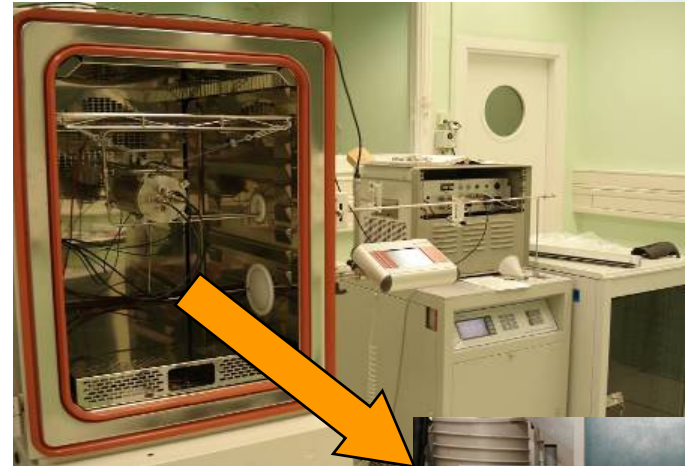
Register data

Toward a permanent calibration laboratory at Ny Alesund.

Unique standard calibration procedures for instrument operating in the same peculiar environment

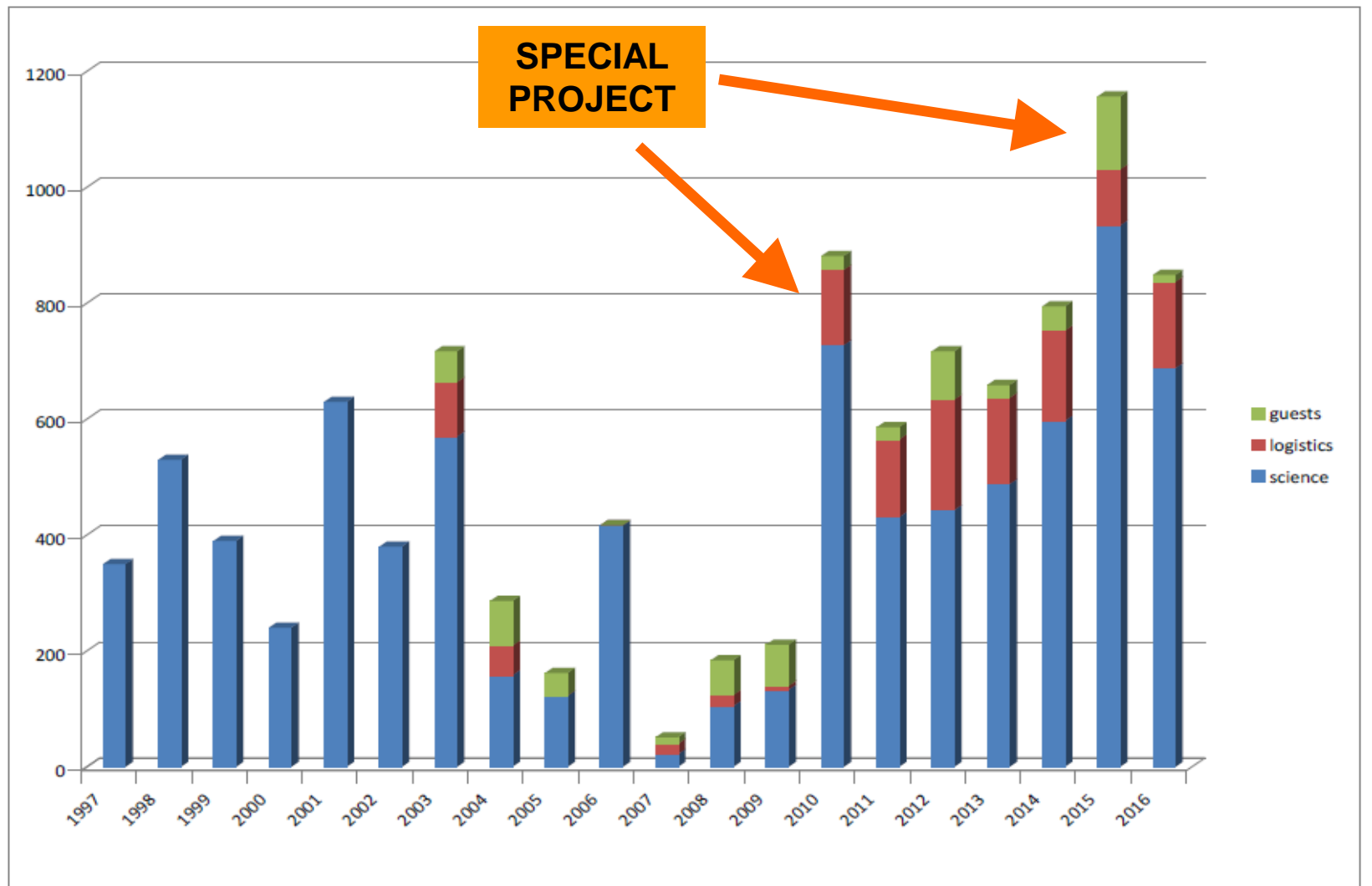
avoid different national approaches to introduce further discrepancies and uncertainties, incrementing the comparability of the instruments response.

A central infrastructure to benefit all researchers operating in the area, with a common implementation plan.

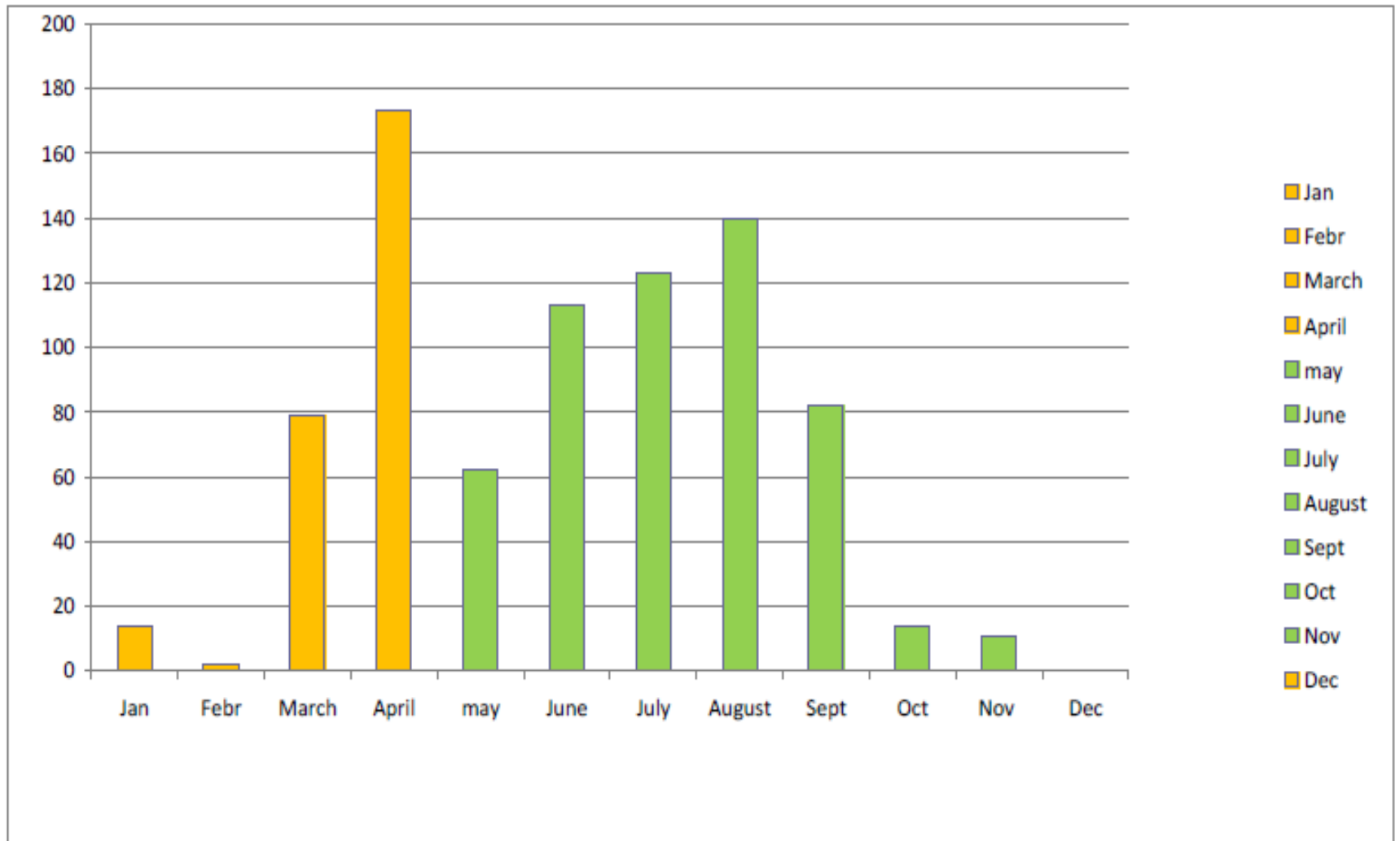


Italian research in NYA (1997 – 2016)

man-days



Distribution along 2016



THE RESET PROJECT

Inspiring students through an authentic polar science expedition

RESEt project drove a whole class through a set of activities focusing on planning, organizing, funding, performing and communicating an authentic scientific polar expedition at the Svalbard islands (Arctic Ocean) during summer 2016

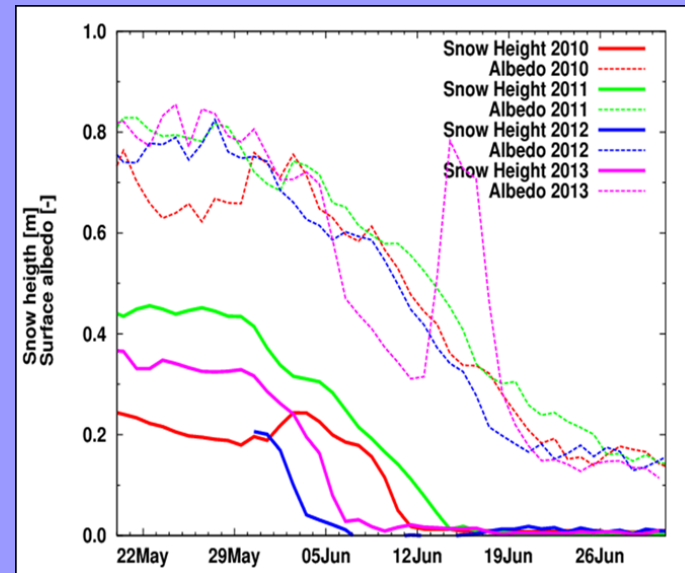
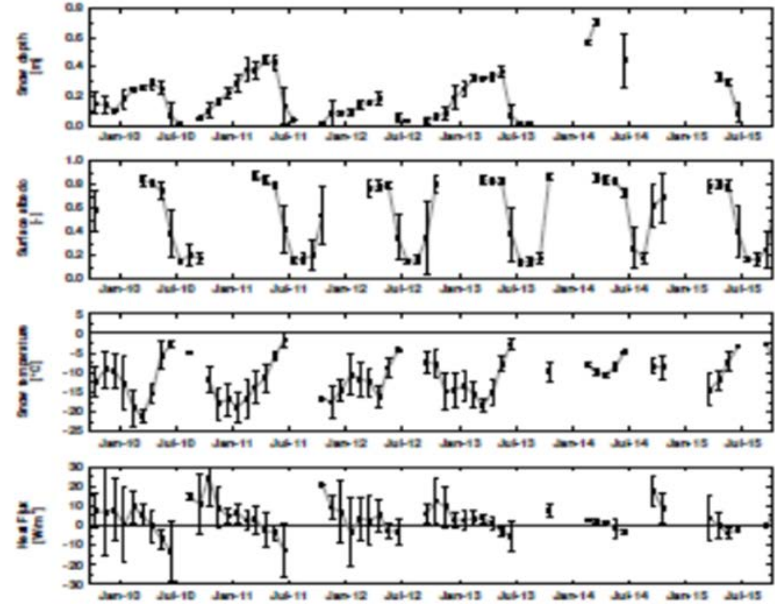
*Research and
Education Svalbard
Experience*

**RESETTARE
RICOMINCIARE
RIPARTIRE**



<http://resetsvalbard.altervista.org/>

Snow measurement at the CCT

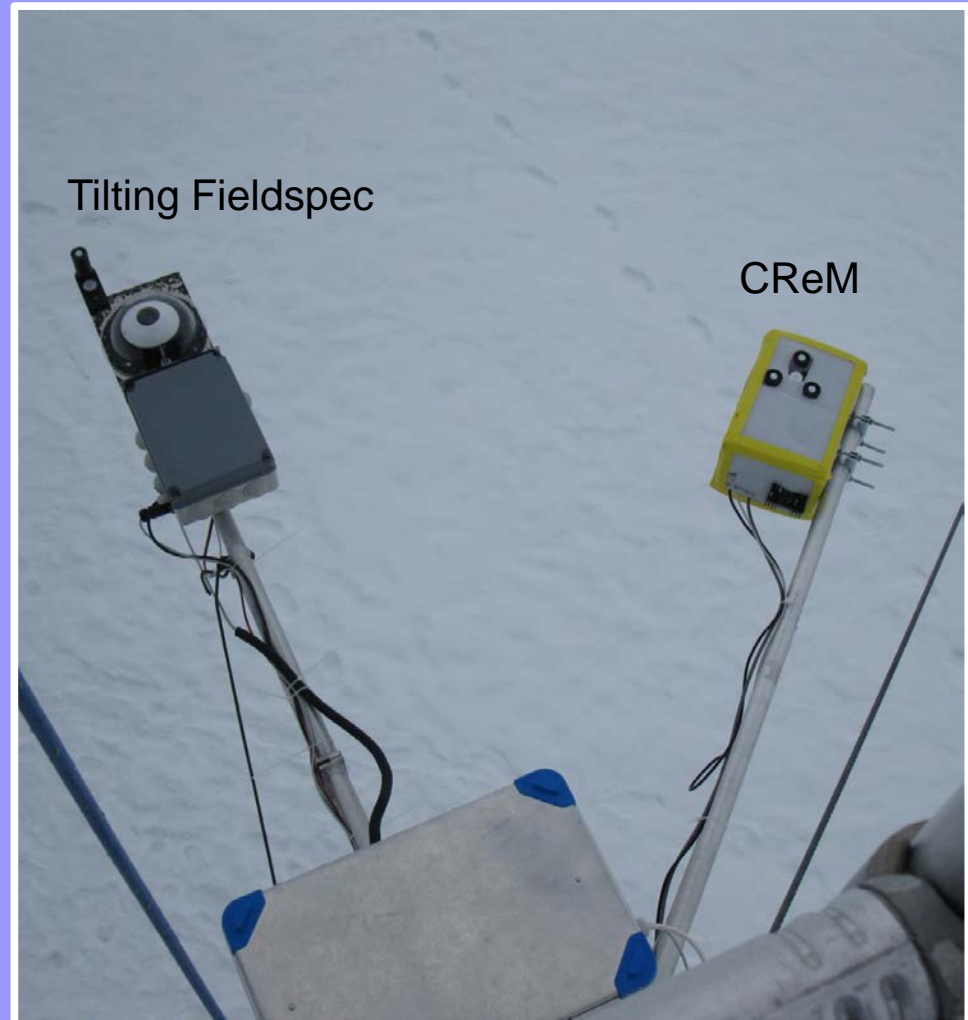


Snow/Ice Continuous Reflectance Monitor (CReM)

Different setups have been developed in order to monitor the snow surface.

The final prototype is a Multi-band system operating at different wavelengths (840, 1260 and 1640 nm).

It is characterized by a bi-hemispherical geometry with six Si and InGaAs photodetectors.



Relevant elements of 2017 planning

- **calibration campaign in cooperation with INRIM (moving towards a permanent facility at NYA)**
- **restart full operation of Brewer spectrometer (in cooperation with NILU)**
- **improve ABL observations re-installing a minilidar (at AWIPEV ?) and a mini-sodar system (at CCT)**
- **develop cooperation with KOPRI in respect integration of wind lidar measurements with CCT**
- **perform field campaign in the Kongsfjorden integrating use of MAV with several science activities**
- **support INTERACT TNA programme in cooperation with NPI and BAS**

Thank you for your attention



FARO Annual meeting, ASSW, Prague, April 1, 2017 Czech Republic

