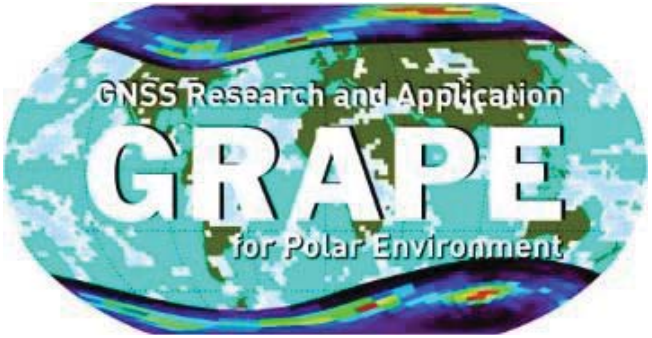
Istituto Nazionale di Geofisica e Vulcanologia

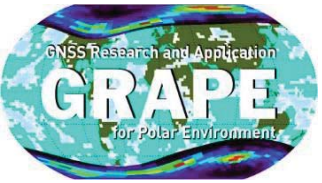


"GNSS Research and Application for Polar Environment" (GRAPE)

A joint SSG PS and GS Expert Group

Giorgiana De Franceschi, Istituto Nazionale di Geofisica e Vulcanologia, ***giorgiana.defranceschi@ingv.it***

XXXIII SCAR Auckland, NZ, 25-28 August, 2014



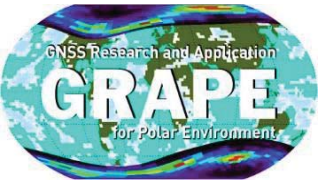
GRAPE main objectives:

• Create and maintain distributed **networks** of specialized **GPS/GNSS** Ionospheric Scintillation and TEC Monitors

• Identify and quantify mechanisms that cause **scintillation** and control **interhemispheric** differences, asymmetries and commonalities

• Develop **ionospheric** scintillation climatology, tracking and mitigation **models** to improve prediction capabilities of **space weather**.

• Retrieve **tropospheric PWV** for input to **weather forecast** models and to develop **regional PWV climatology** for atmospheric sensing in remote areas.



GRAPE structure

- **WG1**- Solar-Terrestrial interactions and ionospheric effects in the current solar-cycle
  (chair: Paul Prikryl- Canada, co-chair: Emilia Correia- Brazil)

- **WG2**-Lower atmosphere delay in GNSS based systems
  (chair: Monia Negusini – Italy)

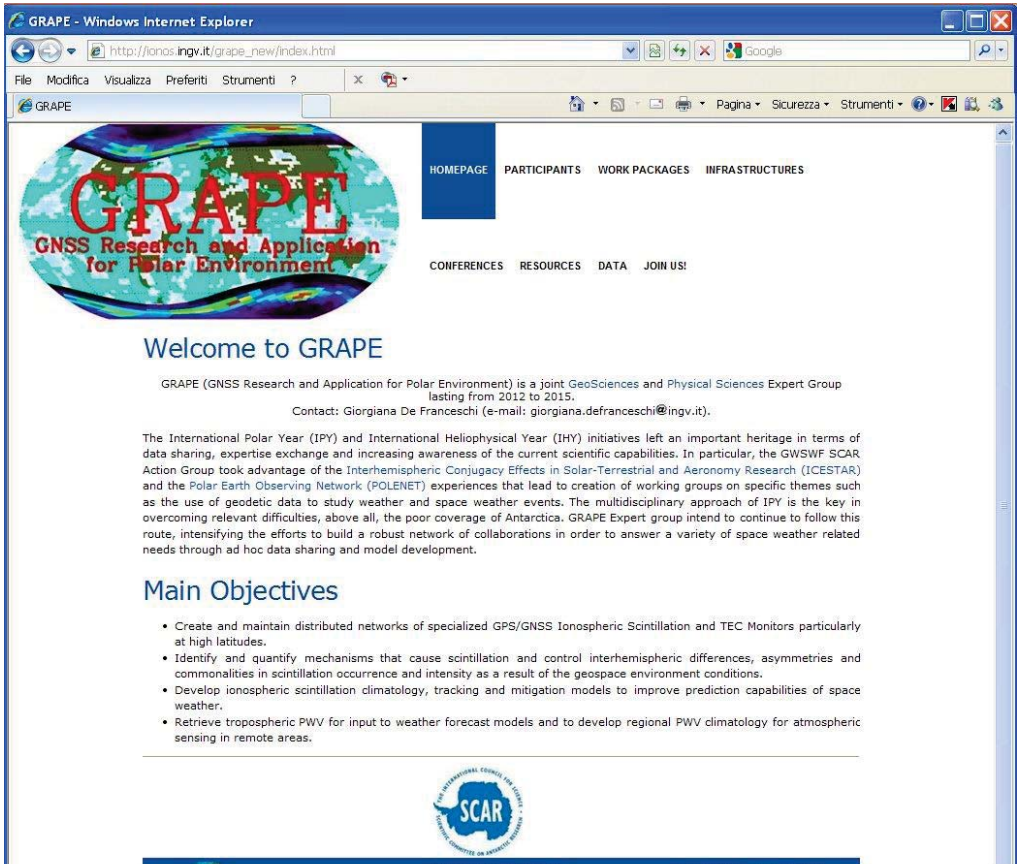
- **WG3**- Modelling and models testing
  (chair: Cathryn Mitchell UK, co-chair Marcin Grzesiak, Poland)

- **WG4**- GNSS Data management strategy.
  (chair: Vincenzo Romano-Italy, co-chair: Pierre Cilliers-South Africa**)**

- **WG5**-Coordination with other programs inside and outside SCAR
  (chair: Maurizio Candidi Italy**)**

GRAPE 2012-2014 RESULTS (1/2)

- **WEB** www.grape.scar.org , contribution to www.scar.org pages
- **Outreaches** –INGV



GRAPE 2012-2014 RESULTS (2/2)

- **Publications** (full list at www.grape.scar.org) about 20 papers

  - Grape, Solar Terrestrial Physics in an operational environment- Special Issue Annals of Geophysics Vol. 56, No2 (2013) DOI:10.4401/ag-6366 , Ed G. De Franceschi, M. Candidi,

  - Papers on *JGR, JASTP, Ann. Geophys., Space Weather, Adv. in Space Res., Radio Sci., etc.*

- **Conferences, Meetings, Workshops**

  - IPY 2012 Conference (Montreal, Canada)
  - XXXII SCAR OSC 2012 (Portland, Oregon - USA)
  - XXXIII SCAR OSC 2014 (Auckland, New Zealand):
    - GRAPE Oral Session 11 (Tuesday 26, 11.30-13.30-Epsom Room 2)
    - GRAPE Poster Session 11 (Monday 25 Poster Session A)
    - GRAPE Satellite Meeting (Tuesday 26, 13.45-14.45, Marlborough room 2)

(Convenors: Emilia Correia- BR, Mike Terkldisen-AU, Giorgiana De Franceschi-IT)

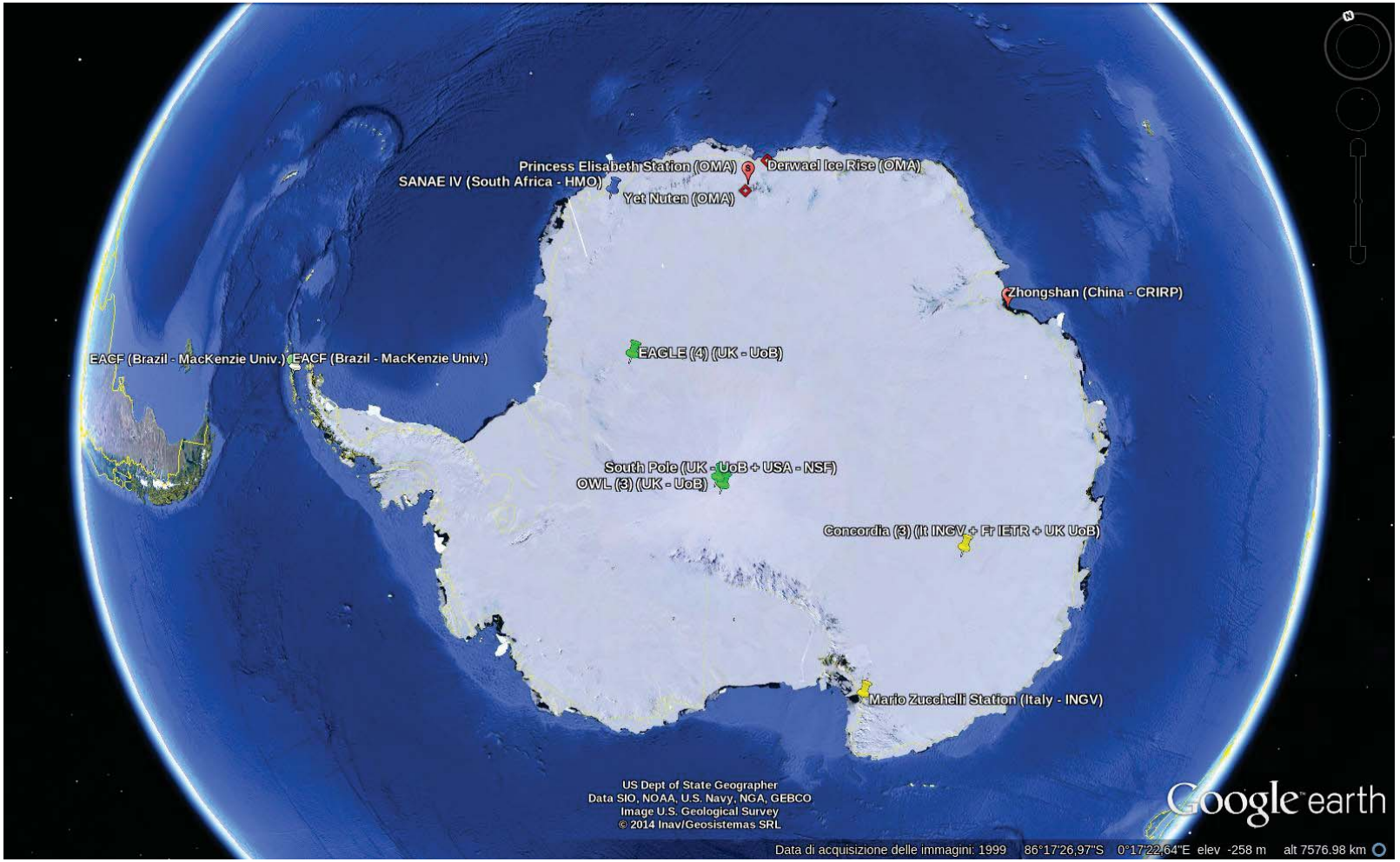
GPS network – Northern hemisphere

GISTM receivers

CJW-1 receiver

PolaRxs receivers

GPS network – Southern hemisphere



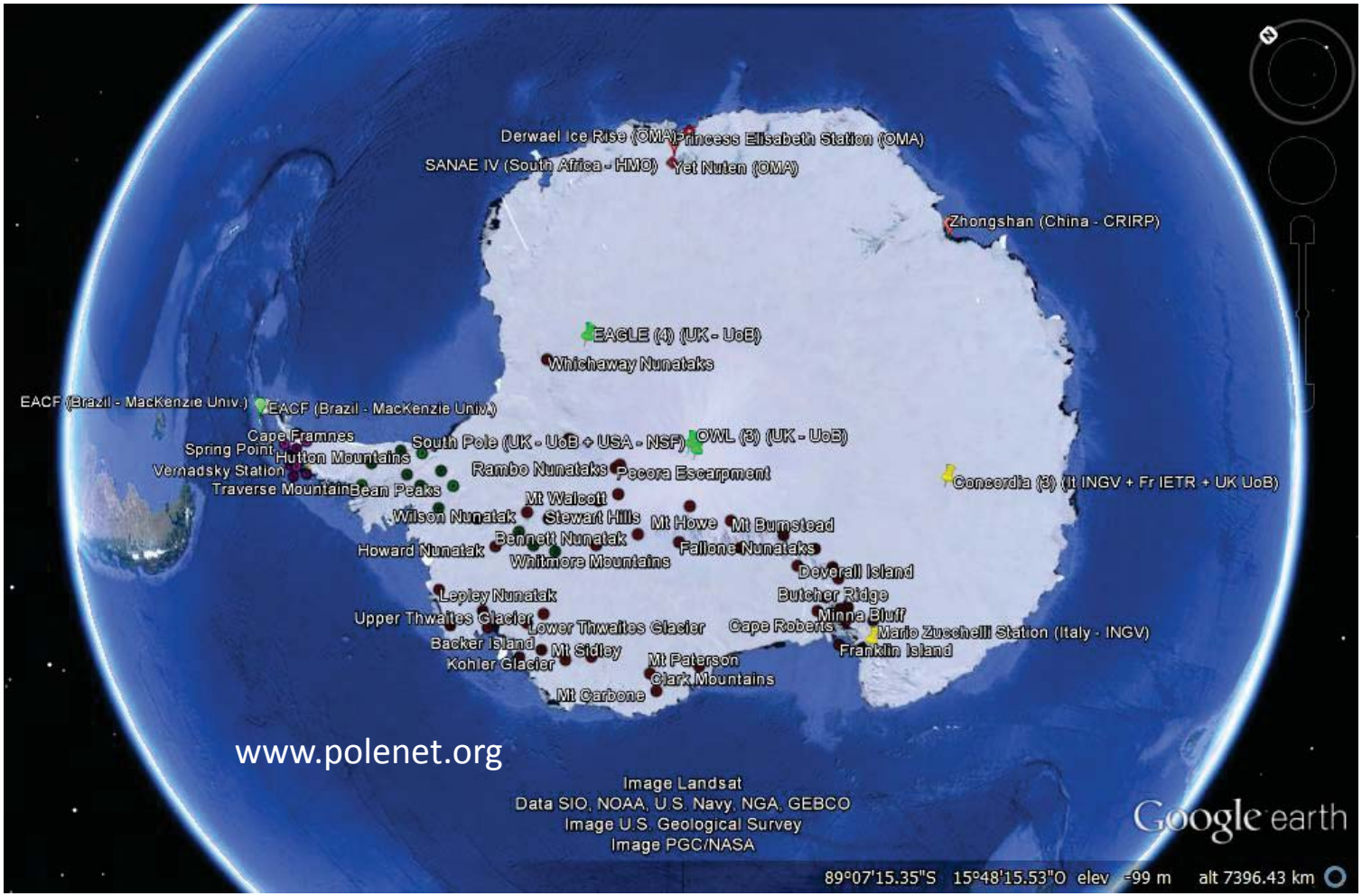
GISTM receivers | CJW-1 receiver | Javad receiver | PolaRxs receiver | Trimble receivers

GNSS Research and Application

GRAPE

for Polar Environment

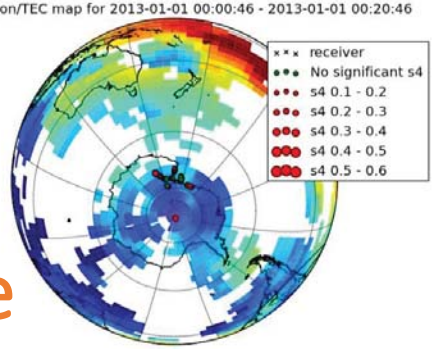
GPS network – Southern hemisphere



GISTM receivers | CJW-1 receiver | Javad receiver | PolaRxs receiver | Trimble receivers

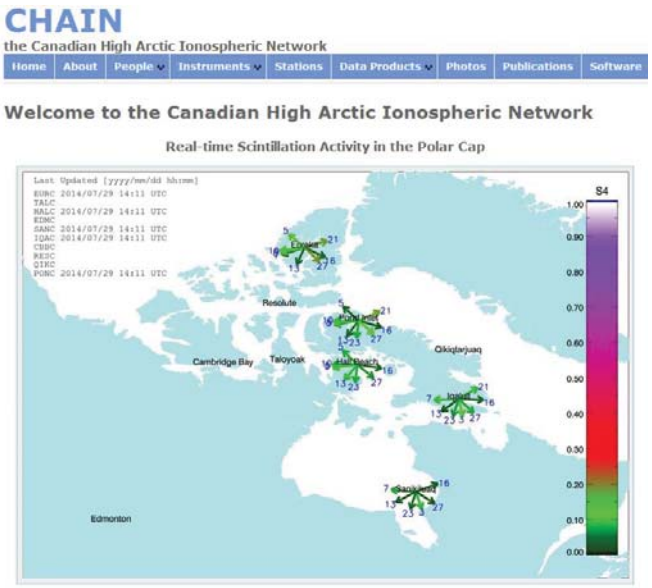
eSWua

www.eswua.ingv.it



Madrigale

http://cedar.openmadrigal.org/

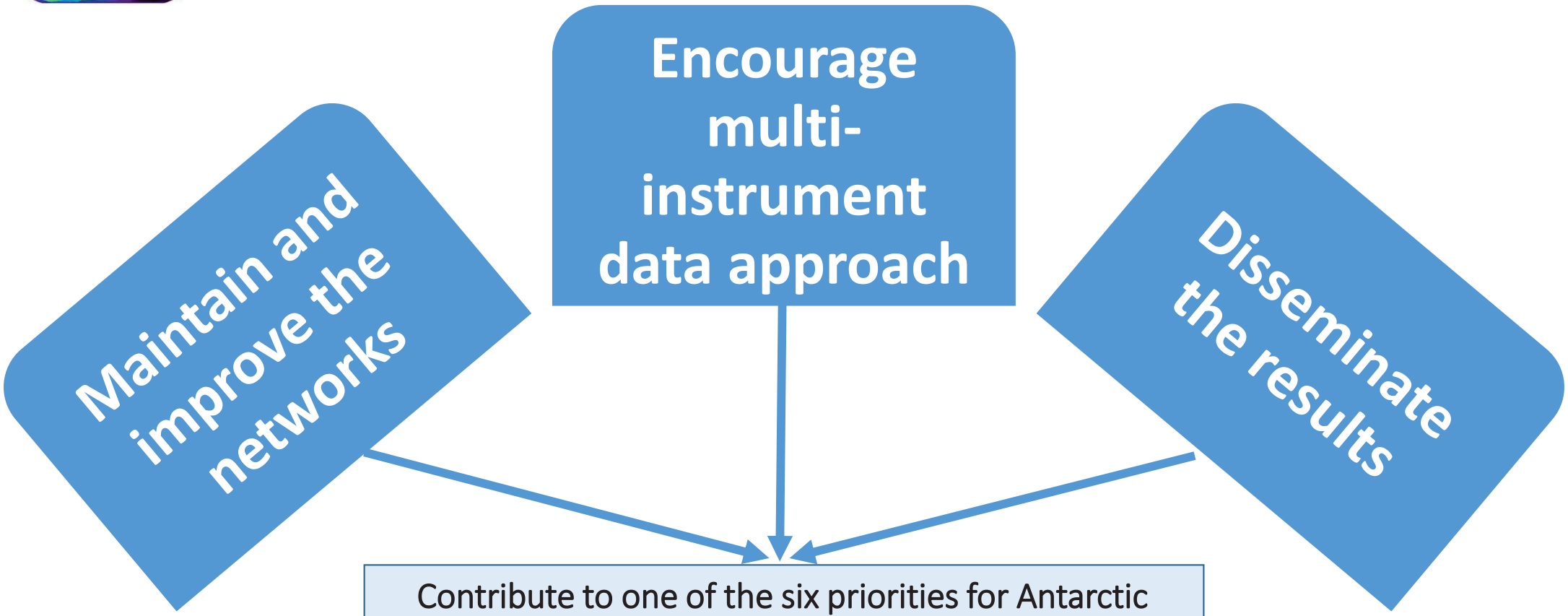


CHAIN

http://chain.physics.unb.ca/chain/

DATA from the network are available on request; visit the GRAPE web

GRAPE future activities

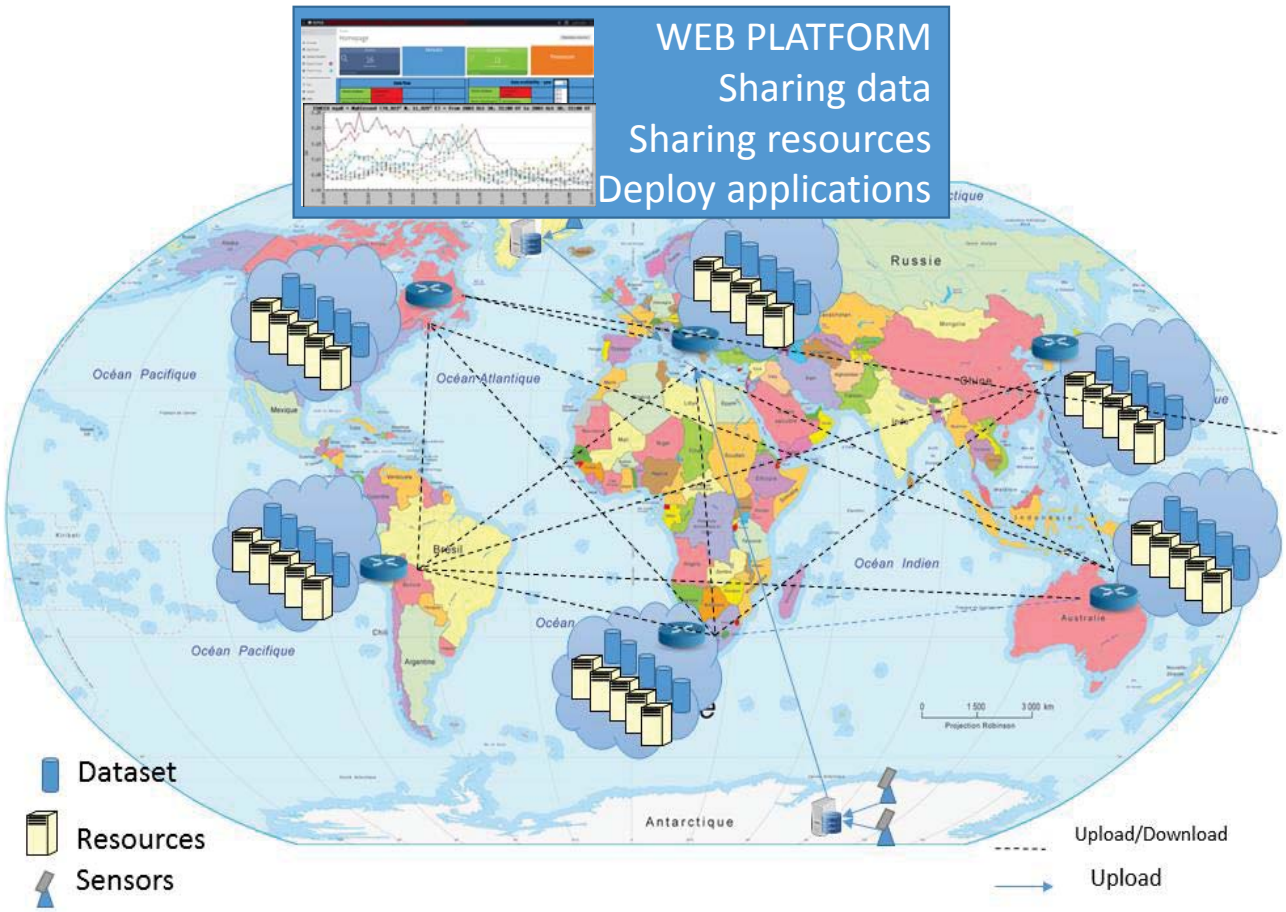


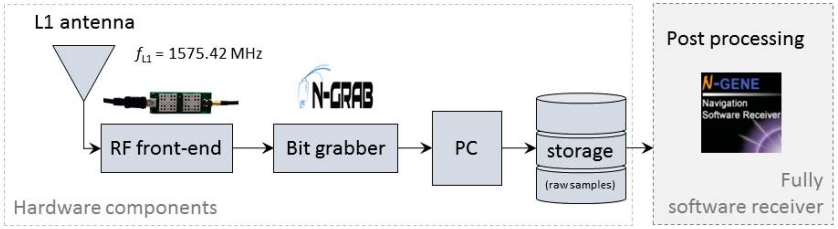
Contribute to one of the six priorities for Antarctic Science
(Theme: Observe space and the Universe - *Solar events impact on global communications and power systems*)

GRAPE future activities (1/2): a new initiative…

DemoGRAPE-PNRA 2014-2016

The project will realize a demonstrator, DemoGRAPE, to provide on selected case studies an empirical assessment of the delay and of the corruption induced by the ionosphere on satellite signals in the Antarctic regions. **Countries involved: Italy, South Africa and Brazil**



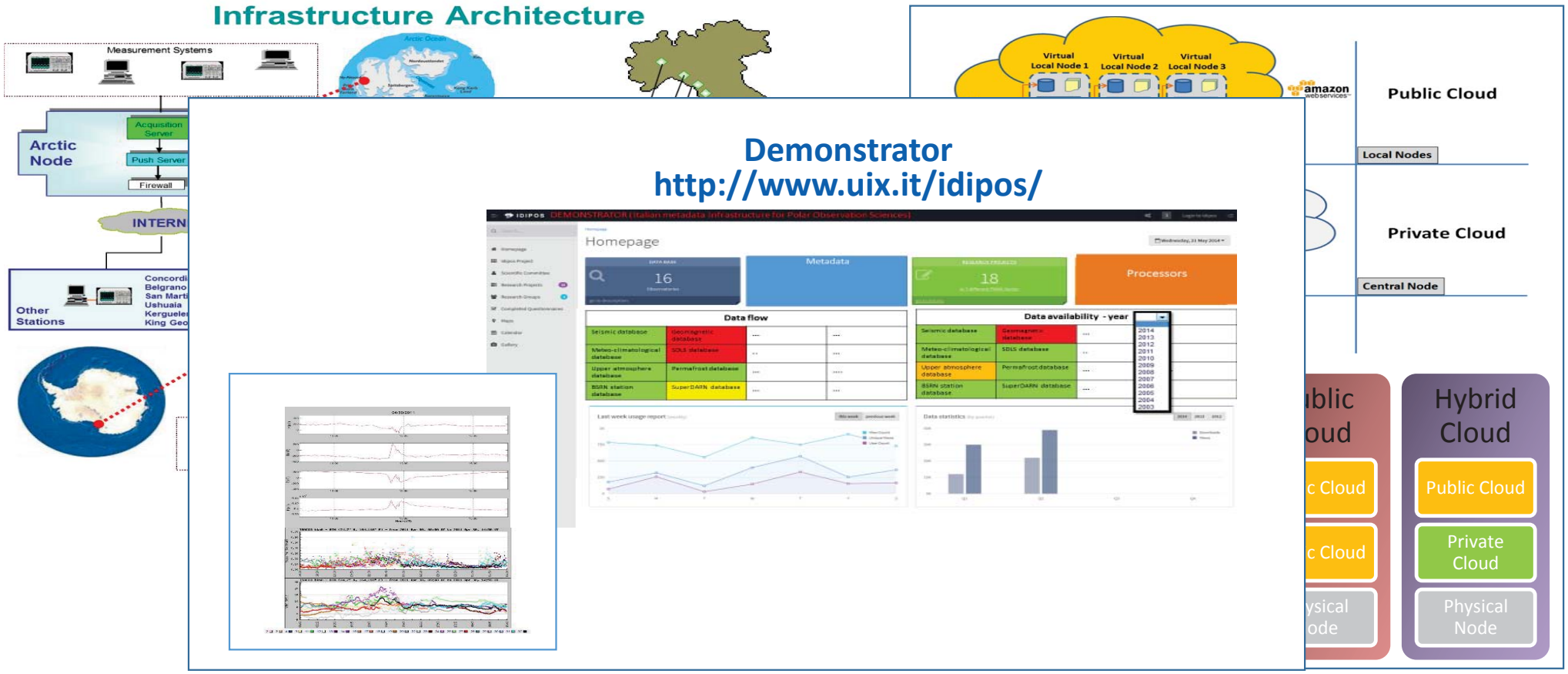


- Strong potentialities offered by fully **software GNSS receivers** for **scientific purposes**:
  - flexibility
  - configurability
  - block structure: capability to test different algorithms

GRAPE future activites (2/2): efforts for data strategy

IDIPOS (PNRA): a feasibility study for an Italian Database Infrastructure for Polar Observation Sciences *www.idipos.pnra.it*

The cloud idea for IDIPOS



GRAPE-Financial support requested (SSG PS and GS)

Year	Meeting Organization ($)	Publications ($)	Web ($)	Participation to conferences ($)
2015	3000 (SSG GS)		1500* (SSG PS)	
2016		1000 (SSG GS)		3000 (SSG PS)
2017	3000		1500*	
2018				3000
Total	16000$			

*(Updating/maintenance)

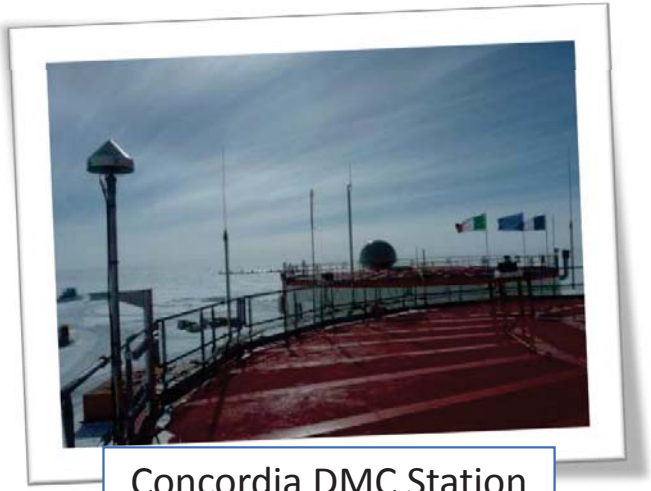
GNSS Research and Application
GRAPE
for Polar Environment

THANKS

Comandante Ferraz

Yet Nuten

Mario Zucchelli Station



Concordia DMC Station