

# “GNSs Research and Application for Polar Environment” (GRAPE)

*A joint SSG PS and GS Expert Group*

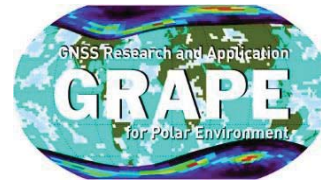
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XXXIII



Auckland, NZ, 25-28 August, 2014





# Agenda

- Report on the current status (summary from the presentation given during the SSG plenary session)
- Future activities
  - GRAPE and the SCAR Antarctic and Southern Ocean Science Horizon Scan (Priorities for Antarctic Sciences)
  - DemoGRAPE pilot project
  - Data management
  - GRAPE meeting at INGV, 9-10/11 October 2014
  - Contribution to the ISAES XII - 12th International Symposium on Antarctic Earth Sciences, Goa (India), 13 July - 17 July 2015
- AOB

ORAL CONTRIBUTIONS TO THE SESSION 11-GRAPE

**Sky Tower Convection Center** - Epsom Room 2

**26 August 2014, 1130 - 1330 - S11 Global Navigation Satellite System Research and Application for Polar Environment**

**Convenors: Giorgiana De Franceschi, Emilia Correia, Mike Terkildsen**

**1130 - 1150** Long term GPS monitoring of Precipitable Water Vapour in Antarctic coastal areas and validation with Radio Sounding Measurements, Monia Negusini

**1150 - 1210** The ionosphere response at Antarctica and SAMA region to the geomagnetic storm occurred on September 26, 2011, Emilia Correia

**1210 - 1230** Surface velocity field from repeat GPS Measurements around Dome Argus, Antarctica, Yuande Yang

**1230 - 1250** Interhemispheric comparison of GPS phase scintillation and proxy index during the geomagnetic storms of 7-17 March 2012, Pierre Cilliers

**1250 - 1310** Cloud computing infrastructure for Polar GNSS e-Science applications, Olivier Terzo

**1310 - 1330** Poker Flat Research Range GNSS scintillation array: First results, Allan Weatherwax

POSTER CONTRIBUTIONS TO THE SESSION 11 GRAPE  
25 August, Skye Tower Convection Centre

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[Data management and TEC calibration of the INGV ionospheric GNSS measurements in polar regions](#) Claudio Cesaroni

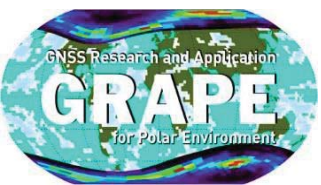
[Scintillation case studies at high latitudes on January 2014](#) Lucilla Alfonsi

[Characteristics of polar tropopause based on GNSS occultation observation](#) Jiachun An

[Investigating polar ionospheric signals using GPS virtual arrays](#) Demián Gómez

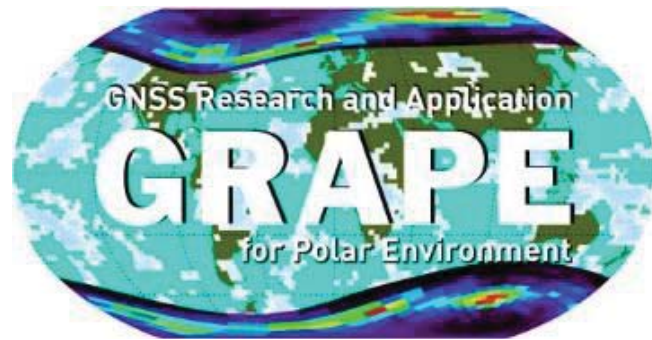
[Amplitude and Phase Scintillation proxies for ionospheric scintillation observed from southern high latitude stations](#) Pierre Cilliers

[Inverse modeling using GNSS data and novel scintillation model to characterize high latitude irregularities over Antarctica](#) Dr Allan Weatherwax

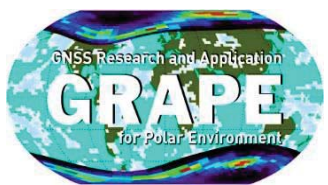


## GRAPE expenses 2013-2014 (SSG PS and GS)

Year	Meeting Organization (\$)	Publications (\$)	Web (\$)	Participation to conferences (\$)
2013		2500 GRAPE Special Issue on AG	1500 Update/maintenance	
2014	4000 GRAPE October 9-10 2014 meeting at INGV			2000 SCAR Travel Grants (#2)
<b>Total</b>	<b>10000\$</b>			



GRAPE future activities



# GRAPE future activities

Maintain and improve the networks

Encourage multi-instrument data approach

Disseminate the results

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*)

# COMMENT

**ART** Albrecht Dürer's 16th century depiction of melancholy **p.26**



**MENTAL HEALTH** Back evidence-based therapies for treating depression **p.27**

**EDUCATION** University admissions policies should champion diversity **p.28**

**RESEARCH ETHICS** Developing rules for assessing pain in lab animals **p.28**

STEFAN CHRISTMANN/CORBIS



The aurora australis over the German Antarctic research base, Neumayer-Station III.

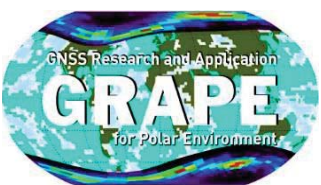
## Six priorities for Antarctic science

**Mahlon C. Kennicutt II, Steven L. Chown** and colleagues outline the most pressing questions in southern polar research, and call for greater collaboration and environmental protection in the region.



**Observe space and the Universe.** The dry, cold and stable Antarctic atmosphere creates some of the best conditions on Earth for observing space. Lakes beneath Antarctic glaciers mimic conditions on Jupiter and Saturn's icy moons, and meteorites collected on the continent reveal how the Solar System formed and inform astrobiology.

We have limited understanding of high-energy particles from solar flares that are funnelled to the poles along the Earth's magnetic field lines. **What is the risk of solar events disrupting global communications and power systems? Can we prepare for them and are they predictable?**

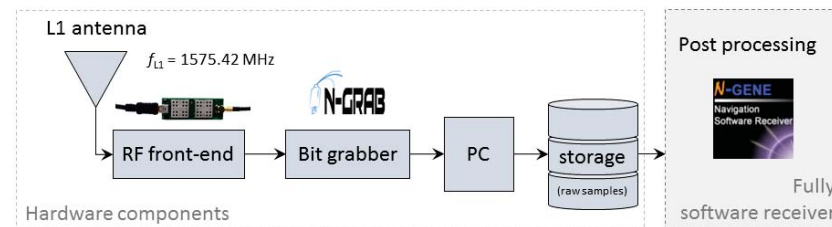
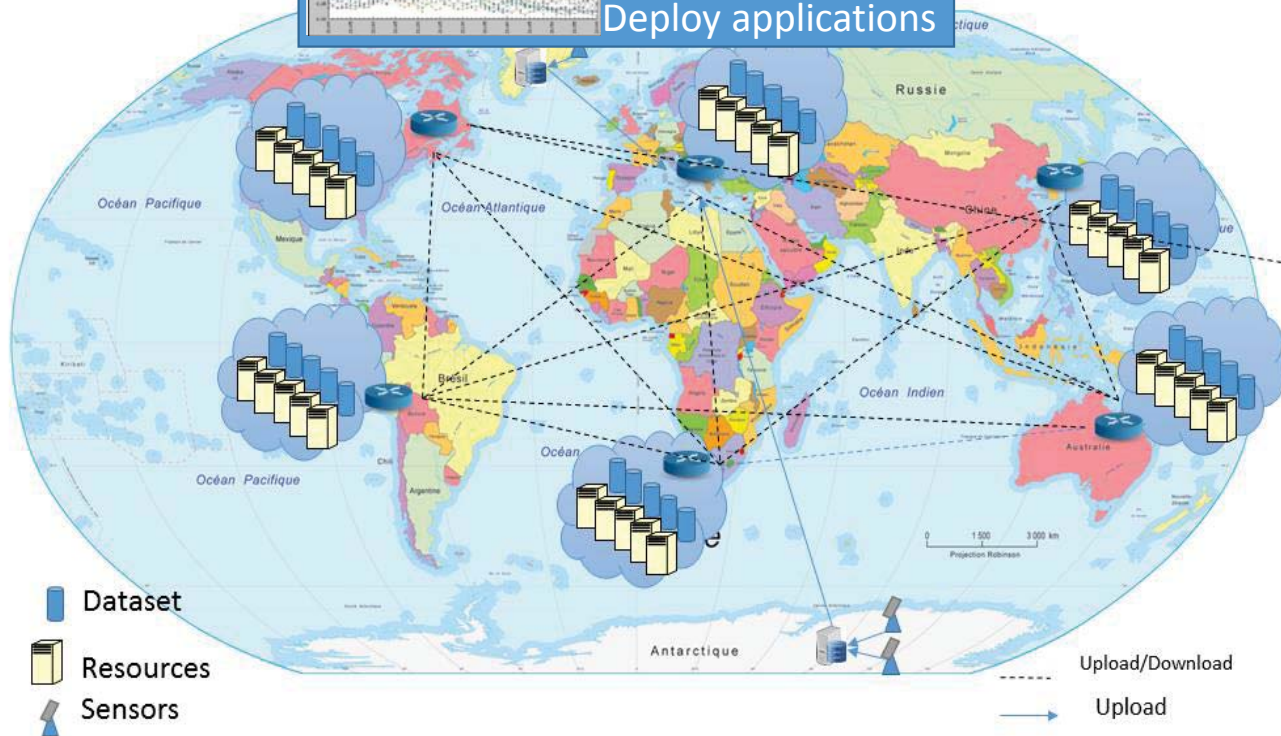


# GRAPE future activities (1/2): a new initiative...

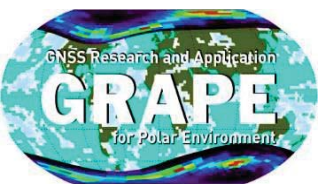
The project will realize a demonstrator, DemoGRAPE, to provide on selected case studies an empirical assessment of the delay and of the corruption induced by the ionosphere on satellite signals in the Antarctic regions. **Countries involved: Italy, South Africa and Brazil**

**DemoGRAPE-  
PNRA 2014-2016**

**WEB PLATFORM**  
Sharing data  
Sharing resources  
Deploy applications



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

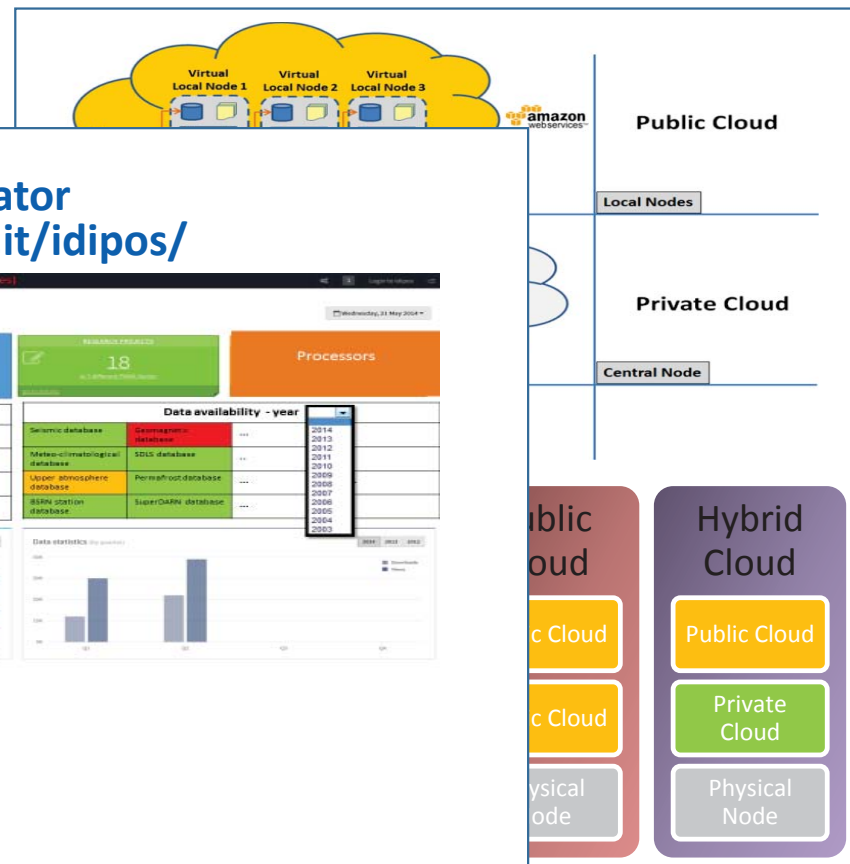


# GRAPE future activities (2/2): efforts for data strategy

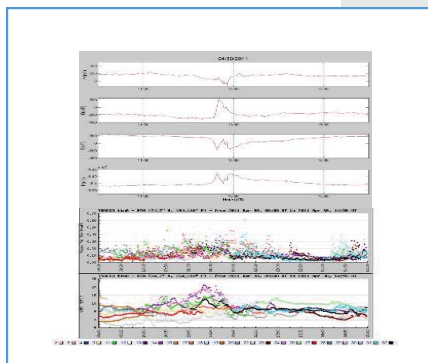
IDIPOS (PNRA): a feasibility study for an Italian Database Infrastructure for Polar Observation Sciences [www.idipos.pnra.it](http://www.idipos.pnra.it)

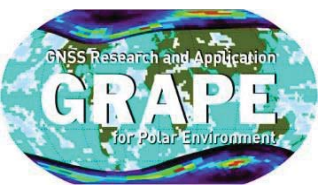
## The cloud idea for IDIPOS

### Infrastructure Architecture



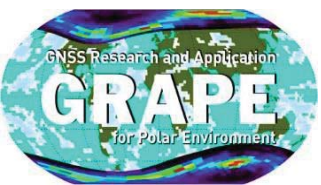
Demonstrator  
<http://www.uix.it/idipos/>





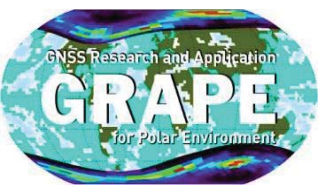
## GRAPE next meeting: GRAPE scientific challenges and data management strategy

- Venue: INGV, Rome headquarter, 9-10 October 2014
- Draft agenda:
  - Current status of the GRAPE network (GRAPE partners report on the status of their own GNSS network and any other instrument managed by them)
  - State of the art of the GRAPE scientific investigations and future perspectives (GRAPE partners report on their main achievements and future scientific activities)
  - Discussion about coordinated efforts within GRAPE partners to face the scientific challenges focused on solar events impact on global communications and power systems and other linkages to the SCAR Horizon Scan questions.
  - DemoGRAPE pilot project
  - Data management strategy in compliance with SCADM guidelines
- Lunches and coffee-breaks offered by INGV
- Travel grants from SCAR for DemoGRAPE partners



## Contribution to the ISAES XII - 12th International Symposium on Antarctic Earth Sciences

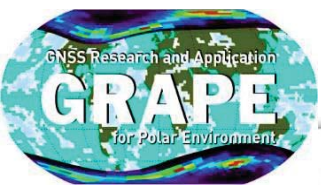
- Will be held at Goa (India), 13 July - 17 July 2015
- Contribution to the a workshop on data management with · Solid Earth Response and influence on Cryosphere Evolution (SERCE, SRP) and Geodetic Infrastructure of Antarctica (GIANT, EG)



## 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
<b>Total</b>	<b>16000\$</b>			

\*(Updating/maintenance)



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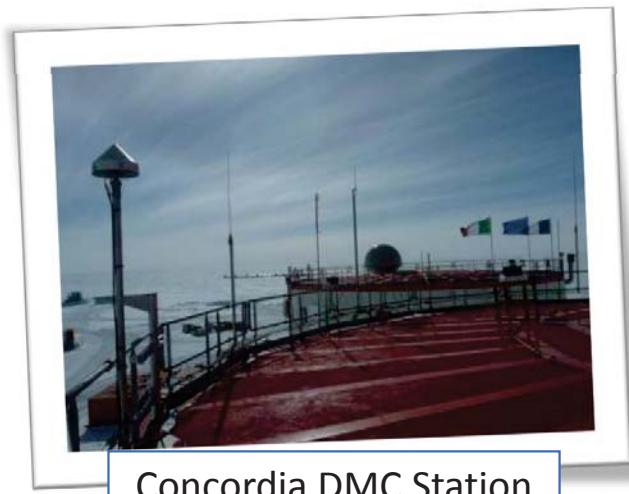
Comandante Ferraz



Yet Nuten



Mario Zucchelli Station



Concordia DMC Station