

## Final project report

<i>Project ID</i>	2004/2.06
<i>Title</i>	Osservatorio Meteo-Climatologico Antartico ( <i>Meteo-Climatological Observatory</i> )
<i>Principal investigator</i>	Andrea PELLEGRINI
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<i>Duration</i>	3 years
<i>Assigned funding</i>	200.000,00 Euro

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### Activities and results

Systematic meteorological observations are made since 1987 in the area of Terra Nova Bay; in 1989, a ground station for High Resolution satellite imagery has been installed at the Italian Antarctic station. At present, a network of 15 automatic weather stations, two radiosounding stations and two receiving stations for NOAA, DMSP and SeaWIFS satellites have been installed.

This Research Project, therefore, continued the climatological monitoring of the area where the activities of the Italian Antarctic Program take place. Some activities are co-operative efforts with other Research Projects: the Observatory cooperates with Glaciologists to study the mass balance of the Antarctic ice cap and the atmospheric forcing of the active layer of permafrost. In addition, new instruments have been tested and some verification of numerical weather forecasting models has been done.

Surface weather stations and radiosounding stations are part of the Antarctic Basic Synoptic Network and of the Antarctic Basic Climatological Network of the World Meteorological Organization (WMO). The Observatory contributes to the SCAR MET-READER database.

By means of ENVISAT and AMSR-E satellite data, detailed sea-ice maps are produced in near-real time as an aid to navigation.

Great attention is paid to making data available to the broader science community through the Observatory's web site [www.climantartide.it](http://www.climantartide.it).

**Task 1** Continuous data acquisition and maintenance, year-round, of the Automatic Weather Stations Network (16 stations), 2 radiosoundings/day (summer only) at Mario Zucchelli Station, and 1 radiosounding/day year-round at Concordia Station.

Operation and HW/SW maintenance of satellite imagery ground stations, acquisition, processing and storage of imagery. Analysis and mapping of sea-ice and polynya's extent by means of AVHRR and SSM/I imagery.

**Task 2** In co-operation with Res.Proj. 2005/5.2 (Glaciology): measurement of the intensity of snow drift on the Antarctic Plateau.

**Task 3** Input of observed data into the databases of the World meteorological Organization. Validation of data and input into the web-accessible database [www.climantartide.it](http://www.climantartide.it). High resolution maps of sea-ice by means of ENVISAT and AMSR-E data.

**Task 4** Prototype of innovative humidity sensor.

**Task 5** Development of an innovative support system for meteorological equipment in extreme environment (patent ENEA RM2007U000244).

## Products

### A – papers in scientific magazines

1. **Bove, R., P. Grigioni**, "Convective Snowfalls Linked to the Interaction of a Boundary-Layer Front with a Mesoscale Cyclone Near Terra Nova Bay, Antarctica" [Boundary-Layer Meteorology Volume 131, Number 3 / June, 2009](#) DOI 10.1007/s10546-009-9374-6
2. **Claudio Scarchilli, Massimo Frezzotti, Paolo Grigioni, Lorenzo De Silvestri, Lucia Agnoletto e Stefano Dolci**, "Extraordinary blowing snow transport events in East Antarctica" *Climate Dynamics*, Published on line June 2009 DOI 10.1007/s00382-009-0601-0
3. **Strassmeier, K. G., K. Agabi, L. Agnoletto, A. Allan, M. I. Andersen, W. Ansoerge, F. Bortoletto, R. Briguglio, J.-T. Buey, V. Coud´e du Foresto, L. Dam´e, H. Deeg, C. Eiroa, G. Durand, D. Fappani, M. Frezzotti, T. Granzer, A. Gr¨oschke, P. Kabath, H. J. K¨archer, R. Lenzen, A. Mancini, C. Montanari, A. Mora, A. Pierre, O. Pirnay, A. Pellegrini, F. Roncella, F.-X. Schmider, I. Steele, J. W. V. Storey, N. F. H. Tothill, T. Travouillon, A. M. Varela-Perez, L. Vittuari, and M. Weber**, 2007. Telescope and instrument robotization at Dome C. *Astronomische Nachrichten*, 328 (6): 451-474.
4. **M. Adamo, G. De Carolis, S. Morelli and F. Parmiggiani**, "Synergic use of SAR imagery and high-resolution atmospheric model to estimate marine wind fields: an application in presence of an atmospheric gravity wave episode", *Rivista Italiana di Telerilevamento*, vol.35, 2006, 147-160.
5. **Barbini, R., Cabrini, M., Colao, F., Fantoni, R., Fiorani, L., Fonda Umani, S., Kolodikova, N. V., Lazzara, L., Palucci, A., and Parmiggiani, F.**, "Biogeochemical properties of the Ross Sea retrieved from in situ and remote optoelectronics devices during the Austral summer 1997-98". *J. Optoelectronics & Advanced Materials*, 2006, Vol.8 (4), 1565-1573.
6. **Cristofanelli, P., Bonasoni, P., Calzolari, F., Lanconelli, C., Lupi, A., Vitale, V., Agnoletto, L.**, 2006. Tropospheric ozone variations at Terra Nova Bay coastal station and Dome Concordia high altitude station (Antarctica). *Geophysical Research Abstracts*, Vol. 8, 08583.
7. **Parmiggiani, F.**, "Fluctuations of Terra Nova Bay polynya as observed by active (ASAR) and passive (AMSR-E) microwave radiometers", *Int. J. Remote Sensing*, 2006, vol. 27, pp. 2459-2467.
8. **Parmiggiani, F., and Fragiaco, C.**, "The calving event of the Drygalski Ice Tongue of February 2005", *Int. J. Remote Sensing*, 2005, vol. 26 (21), 4633-4638.
9. **De Carolis, G., Parmiggiani, F. and Arabini, E.**, "Observations of wind and ocean wave fields using ERS Synthetic Aperture Radar imagery", *Int. J. Remote Sensing*, Vol. 25, No. 7-8 (2004) 1283 - 1290.
10. **Wadhams, P., Parmiggiani, F.F., De Carolis, G., Desiderio, D., and Doble, M.J.**, "SAR Imaging of Wave Dispersion in Antarctic Pancake Ice and its Use in Measuring Ice Thickness", *Geophys. Res. Lett.*, vol. 31, No. 15 (2004), L15305.

### B – book chapters

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### C - proceedings of international conferences

1. **Cristofanelli, P., L. Agnoletto, M. Busetto, F. Calzolari, M. Maione, A. Marinoni, U. Bonafe and P. Bonasoni**, 2007. Surface ozone measurements at Dome Concordia (75.1° S, 123.3° E; 3233 m a.d.l.): Preliminary results. *Conference Proceedings "Italian Research on Antarctic Atmosphere"*, Porano, 2007.
2. **Parmiggiani, F., Morales, D., and Moctezuma, M.**, "Surface signature of ocean convection in the Greenland Sea as detected by SAR and enhanced by statistical pattern analysis", *Proc. Int. Geosci. and Remote Sensing Symposium*, 2007. July 2007 Page(s):879 – 881
3. **M. Adamo, G. De Carolis, S. Morelli and F. Parmiggiani**, "Monitoring atmospheric gravity waves by means of SAR, MODIS imagery and high-resolution ETA atmospheric model: a case study". In: *Proceedings of the SeaSAR 2006 Workshop 'Advances in SAR Oceanography from Envisat and ERS missions'*, ESA/ESRIN, Frascati, Italy, 23-26 Jan. 2006.
4. **Flavio Parmiggiani**, "The near-real time high-resolution ice map service for the ships of the Italian Antarctic Program". In: *Proceedings of OceanSAR 2006 - The Third Workshop on Coastal and Marine Applications of SAR*, St. John's, NL, Canada, October 2006.
5. **Cristofanelli, P., P. Bonasoni, F. Calzolari, C. Lanconelli, A. Lupi, V. Vitale and L. Agnoletto**, 2006. Tropospheric ozone variations at Terra Nova Bay coastal station and Dome Concordia high altitude station (Antarctica). *EGU, European Geosciences Union General Assembly, Vienna, Austria, 02– 07 April 2006*, *Geophysical Research Abstracts*, Vol. 8, 08583.
6. **Lanconelli, C., L. Agnoletto, V. Vitale, R. Stone, A. Lupi, M., Nardino, T. Georgiadis**, 2006. Implementation of the BSRN Station at Dome C (Antarctica) and First Measurements of Radiation Fluxes and AOD (Vito Vitale, ISAC-CNR), comunicazione presentata al 9th BSRN Scientific and Review Workshop, Lindenberg (Germania), 29 Maggio-2 Giugno 2006. Abstract pubblicato sul WCRP Informal Report No. 1/2007, p. 6.

## Programma Nazionale di Ricerche in Antartide (PNRA)

### D – proceedings of national meetings and conferences

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### E – thematic maps

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### F – patents, prototypes and data bases

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### G – exhibits, organization of conferences, editing and similar

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### H - formation (PhD thesis, research fellowships, etc.)

1. **Lucia Agnoletto**, "Verifica dei modelli meteorologici: verifiche di punto e di area dei modelli operazionali a scala globale e mesoscala utilizzati per le previsioni meteorologiche in Antartide nella Terra Vittoria." 2009, Ph.D. Thesis, Univ. of Siena.

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### Research units

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List of investigators in the Research group:

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