

REPUBBLICA ITALIANA
MINISTERO DELL'ISTRUZIONE, DELL'UNIVERSITA' E DELLA RICERCA

REPORT TO SCAR

No. 21 – 2009

Record of Activities July 1, 2008 - June 30, 2009

**on behalf of
The Italian National Scientific Commission
for Antarctic Research**

ANT 09/09

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**A BRIEF SUMMARY OF
SCIENTIFIC HIGHLIGHTS:**

Observatory activities - Italy maintains since the '80s a set of observatories for long-term recording of physical variables. In time the initial set has been enlarged. Among the monitored quantities are the following: geomagnetic field, remote and local seismic activity, meteorological data, lower atmosphere composition, special attention being paid to aerosols and ozone, ionosphere and stratosphere characteristics, mean sea level (tide). The stratosphere has been mainly sounded by LIDAR. Data are used for specific research as well as for collection into international databases. Measurements are carried out at Terra Nova Bay, Dome-C and other stations such as McMurdo, Jubany, Esperanza and San Martin Stations, South Orkney Islands. During summer season 2008-09, in spite of an overall contraction of the expedition size, attention has been paid not to shrink the observatory activities thus interrupting the historical series of data.

Geodesy - As an integration of the existing Italian geodetic network in Antarctica two new stations have been installed. The extensive network based on GPS stations covers a large area of Victoria Land (about 700 km long, 300 km wide) aimed at repetitive crustal deformation control and assessment of continental drift. The network, called VLNDEF, comprises about 30 stations and is integrated with other international collaborations such as TAMDEF and IPY's POLENET. The new GPS stations have been located at Cape Phillips and Cape Hallett.

Glaciology and Climate Studies - The climate of the Antarctic continent has an outstanding importance both locally and at planetary level. The solar radiation balance and the atmospheric composition at ground level are the necessary input for any climate mathematical model. They are monitored at Dome-C. Here a station of the Baseline Surface Radiation Network (BSRN) has been implemented. A permafrost monitoring network operates along the Victoria Land Transect. Permafrost and CO₂ outgassing has also been monitored in the framework of BAS at Rothera and Signy. In order to assess some local snowpack ablation/accumulation annual rates, three stake fields have been installed at Talos Dome, High Priestley Glacier, Larsen Glacier.

MABEL - A Multidisciplinary Antarctic Benthic Laboratory (MABEL) had been deployed in 2005 at 69°24'S, 5°32'W (Weddell Sea) and at about 2000 meter depth. MABEL, a joint project of INGV and AWI, is equipped with seismometers and oceanographic recording instruments. The Laboratory has been retrieved on 16.12.09 by means of a purposely designed module MODUS (Mobile Docker for Underwater Sciences) and taken onboard the supporting vessel Polar Stern. All instruments seem to have operated properly.

Geomagnetic and Ionospheric Phenomena - A number of scientific instruments are installed in the Antarctic auroral region for the study of ionosphere and magnetosphere. Those include: the Kerguelen SuperDARN (French-Italian collaboration), an all-sky camera at Mario Zucchelli Station (MZS), magnetometers at MZS and Concordia Station, an ionosonde and a relative ionospheric opacity (rio-) meter at MZS. The ionospheric scintillation monitored by GPS receiver at Concordia Station is correlated with similar measurements carried out at MZS and at northern latitudes (Svalbard I.)

Astronomical observations - A precision interferometer for accurate measurement of the microwave component of CBR has been installed at Concordia Station. It continues the measurement carried out by the balloon-borne instrumentation of the Boomerang experiments (1998 & 2003) but benefits of the darkness and low atmospheric temperature and turbidity at Dome-C during winter. Astronomical activities at Concordia Station included: the implementation of new structures for the planned new instruments IRAIT (International Robotic Antarctic Infrared Telescope) and Star Photometer; the continuation of the project OASI-COCHISE for the detection of non-uniformities in the cosmic background radiation. Several projects carried out by non-Italian teams at Concordia are to be accounted for by other National Reports.