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

REPORT TO SCAR

No. 23 - 2011

Record of Activities July 1, 2010 - June 30, 2011

on behalf of
The Italian National Scientific Commission
For Antarctic Research

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MEMBER COUNTRY: National Report to SCAR for year 2011 (1st July 2010- 30th June 2011)	ITALY					
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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS:

Observatory activities - Italy runs since the '80s a set of observatories for long-term recording of physical variables. In time the initial set has been enlarged. The following quantities are some of those monitored: 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). Data are used for specific research as well as an input to international databases. Measurements are carried out at Terra Nova Bay, Dome-C and other stations in the framework of international cooperation. During summer season 2010-11, in spite of the reduced expedition size, attention was paid not to shrink the observatory activities so to avoid a gap in the historical series of data.

Geodesy - The extensive network VLNDEF, based on geodetic GPS stations, covers an area about 600 km long, 300 km wide of Victoria Land. The network, with repetitive measurements begun in 1999, aims at crustal deformation control and assessment of any continental drift. It comprises about 30 stations, in addition it is integrated with international networks such as TAMDEF and POLNET. GNSS receivers are progressively put beside the existing GPS stations.

Glaciology and Climate Studies - 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 mathematical model of the climate. They are monitored at Dome-C and Terra Nova Bay. At Dome-C, a station of the Baseline Surface Radiation Network (BSRN) is in operation. At Terra Nova Bay, where aerosols and solar radiation are monitored since decades, an automatic radiation operates also in winter. Local snowpack ablation/accumulation annual rates are part of a monitoring programme by stake fields at Talos Dome, High Priestley Glacier, Larsen Glacier.

Permafrost - Following a previous activity with a permafrost monitoring network in Victoria Land, a team of specialists moved to the Antarctic Peninsula and Sub-Antarctics as the guest of BAS' Rothera and Signy. The research is focused on understanding the system vegetation+permafrost and possible feedback mechanisms. The approach is mainly based on measurement of ground CO2 emission and electric tomography.

Geomagnetism and Ionospheric Phenomena - A number of scientific instruments are installed in the Antarctic auroral region for the study of ionosphere and magnetosphere. They include the Kerguelen's SuperDARN HF radar (a French-Italian collaboration for an ionosphere sounding network) and magnetometers at MZS and Concordia Station.

Glaciology - The microwave emission of deep ice sheets has been measured at Dome-C by means of a multifrequency radiometer. The programme (MAPME-DOMEX) is a contribution to the calibration of space-borne sensors and to the study of ice sheet stability.

Glaciology - The stability of the East Antarctic Ice Sheet is supposedly influenced by the topography, hydrology, geology of the coastal basal rocks. To that aim the airborne geophysical programme BABOC has been launched to investigate the Wilkes Subglacial Basin. BABOC is a joint effort of BAS and the Universities of Genoa, Edimburgh and Texas.

Subglacial lakes - In the framework of the programme WISSARD, a cooperation with NSF, an Italian team has carried out RES, active and passive seismics, GPS topography. WISSARD aims at the understanding of glacial and subglacial dynamics of Willans Glacier which flows into the Ross Ice Shelf. A subglacial lake (84°S, 154°W) is a major part of the system.

Biology - The environment, both marine and terrestrial, of Mario Zucchelli Station, Terra Nova Bay, gives the opportunity of developing several themes of research. Tardigrades are investigated with reference to criptobiosis, diatoms for the capacity of their citotoxines, endolythic fungi as indicators of environmental changes and teleosts in relationship to their immuno-system. Environmental and biological parameter of the marine protected area in front of MZS, ASPA n. 161, are monitored as well. In a totally different area, the Antarctic Peninsula, and with the support of the US Programme R/V Moana Wave, the population of the teleost *Chaenocephalus aceratus* has been investigated.

Meteorites - 112 specimens have been collected by a joint Italian-S.Korean team which camped ten days at Frontier Mountain. 5 more meteorites have been found elsewhere.

Astronomical observations at Dome-C - Low levels of atmospheric temperature, humidity and turbidity plus darkness in winter make Concordia Station the ideal place for any kind of astronomical observation. The main programmes carried on there are OASI-COCHISE, IRAIT and BRAIN. The first programme presently aims at the site qualification for the millimetric wave-lengths, a new photometer allowing the measurement of the atmospheric transmission and sky noise in that range. In the framework of the International Robotic Antarctic Infrared Telescope (IRAIT) a new camera (AMICA) has been set up and is presently obtaining (austral winter 2011) infrared images of sky. BRAIN may be seen as the continuation of the successful measurements carried out by the balloon-borne telescope (Boomerang experiments, 1998 & 2003) but benefits here of a ground based bolometric interferometer for the detection of non-uniformities in the microwave component of the CBR. Also in this case a preliminary assessment of all effects which may impair the ultimate sensitivity is essential. Additional projects carried out by French teams at Concordia to be accounted for by the French Report.

Gas hydrates - As a cooperation between the Italian Institution OGS and the Korean Programme, the presence of gas hydrates offshore the South Shetland Islands was investigated. Multibeam surveys and multichannel seismics were carried out onboard the ice-breaker Araon.

Seismology - Beside the seismic station at MZS and the one at Concordia, the Italian Programme jointly with the Argentinean Programme maintains a network of broad-band seismometers placed at Belgrano, Esperanza, San Martin, Jubany, Orcadas.