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

REPORT TO SCAR

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Record of activities July 1, 2013 – June 30, 2014

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

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MEMBER ITALY
COUNTRY:
National Report to SCAR
for year: 2014

1st July 2013 - 30 June 2014

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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS*:

Marine biology - As a coastal Station "Mario Zucchelli" hosts several Projects aimed at the knowledge of marine habitat and life. Among others: ciliates and diatoms diversity and applications; endoparasites; epiphytic diatoms; carbon 13, nitrogen 15 and fat acids in the trophic chain; genes and proteins in connection with oxygen in biological evolution; biodiversity assessment and barcoding. Other Projects detailed below.

Biology of the Sea Ice - Seasonal dynamics of the sea-ice, regarded as a huge habitat of microalgae and microfauna, is studied at Terra Nova Bay and Wood Bay, with attention focused on the flux of carbon through the trophic chain.

Fish Biology - Antarctic fishes are sensitive to climatic changes. Life cycle of *Pleuragramma antarcticum* from the egg and larval stage to the adult stage is investigated. Sampling areas are the sea-ice at Gerlache Inlet, Cape Washington, Silverfish Bay. Additional studies on teleosts immunosystem.

Marine Biology Protected Area - Environmental and biological parameters of the marine area in front of MZS, ASPA n. 161, are monitored.

Geodesy - An extensive network (VLNDEF) presently based on geodetic GNSS L1/L2 stations covers since 1999 an area about 600 km long, 300 km wide. The network aims at the crustal deformation control and the assessment of continental drift. It comprehends about 30 stations. VLNDEF is integrated with international networks such as TAMDEF and POLENET. GNSS receivers are progressively put in operation beside the existing GPS stations.

Seismology - In addition to a seismic station at MZS and one at Concordia, the Italian Programme maintains a network of broad-band seismometers jointly with the argentinean Programme. Stations are at Belgrano, Esperanza, San Martin, Jubany, Orcadas. Seismometers have been operated between Vostok and Concordia Stations for the assessment of deep earth structure.

Geology - Magmatic and sedimentary events in Victoria Land during Jurassic/Triassic eras

Permafrost - Research is focused on the system "permafrost + vegetation" and the feedback mechanisms involving the air temperature regime and snow blanket. Studies on permafrost are also carried on at Signy Station.

Meteorites - Several promising meteorite "traps" have been visited or spotted. 111 specimens have been collected for a total weight exceeding 10 kg. Some of surveys and collection carried on in cooperation with KOPRI personnel.

Astronomy at Dome-C - Low levels of atmospheric temperature, humidity and turbidity plus darkness in winter, make Concordia Station the ideal place for astronomical observations. Outstanding programmes are IRAIT and BRAIN. In the framework of IRAIT (International Robotic Antarctic Infrared Telescope) the telescope equipped with the camera AMICA obtains infrared images of sky objects.

BRAIN is the ideal continuation of the successful balloon-borne Project Boomerang.

The telescope at Dome-C is equipped with a bolometric interferometer (Qubic) for the detection of non-uniformities in the microwave component of the cosmic background radiation.

Other projects carried out by French teams, such as Astroconcordia, to be accounted for by the French Report to SCAR.

Chemistry - Accurate techniques of sampling and analysis allow the study of microcomponent fluxes and geological trackers relevant to climate changes from present to Cainozoic era. Persistent Organic Pollutants (POP) as well as the aerosol particle content of the atmosphere are monitored.

Atmospheric Physics - The ice mass balance in Antarctica is fundamental to monitor the stability of the mean sea level and climate. A contribution to this field is the evaluation of the amount of falling snow, as distinguished from snow accumulated by blowing wind. To this purpose a microwave instrument is used. On a bi-polar (Arctic and Antarctic) perspective the Planetary Boundary Layer and the radiative effects of thin clouds and aerosols are both studied at Dome C.

Meteorology/atmosphere physics - Meteo monitoring is fundamental for climatic studies and for field operation and safety as well. A large network of Automatic Weather Stations (AWS) is maintained in Victoria Land since 1986. Additional atmosphere monitoring activities which include radio-sounding are carried on at Dome-C.

Glaciology and Climate Studies - Antarctic climate has an outstanding importance both locally and on a planetary scale. Solar radiation balance and atmosphere composition at ground level are the input for any climate model. 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. In addition snow accumulation rate and atmospheric aerosols are monitored also in connection with the EPICA ice core. An INGV radar detector mainly meant for crevasse detection allows accurate bedrock surveys. Reflectance of snow is measured at Dome C for application to remote sensing. At Terra Nova Bay, where aerosols and solar radiation are monitored since decades, an automatic instrument measures sky radiation also in winter. Snow ablation/accumulation annual rates are part of a monitoring programme by means of stake fields at Talos Dome, High Priestley Glacier, Larsen Glacier, Dome C. Ice-drilling down to 500 m at the site GV7 jointly planned with Korean scientists are shifted to the coming season and the equipment assembled.

Observatory Activities - Italy runs since the '80s a set of observatories for long-term recording of geophysical parameters. In time the initial set has been enlarged. The following quantities are among those continuously monitored: geomagnetic field, remote and local seismic activity, meteorological data, lower atmosphere composition, special attention being paid to aerosols and ozone. Some of the activities have been mentioned just above. Common to all observatory activities is the emphasis not to interrupt the historical series of data. Measurements are carried out at Mario Zucchelli Station (MZS, Terra Nova Bay), Concordia Station (Dome-C) and other stations all year round, mostly in the framework of international cooperation. In particular at Dome C observatories for seismology, geomagnetism and meteo parameters are continuously in operation.