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SCAR DATABASE						
insert name of database for which your country has responsibility						

A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS*:

Selected Highlights of the Japanese Antarctic Research Expedition, 2010-11

JARE 51 Winter

1. Meteorological observations and monitoring of atmospheric GHGs, stratospheric O₃, etc. at Syowa

Year-round meteorological observations of the surface and upper atmosphere have been carried out by the Japan Meteorological Agency at Syowa Station, and some other monitoring observations, including those pertaining to upper atmospheric physics, atmospheric sciences, geophysics, and biology have also been carried out by governmental agencies and the National Institute of Polar Research (NIPR), Tokyo. Total ozone measurement has been carried out to monitor the thickness of the ozone layer with a Dobson spectrophotometer since 1960 at Syowa, which resulted in the first report of a decrease in total ozone in the Antarctic. Atmospheric greenhouse gases (GHGs) such as CO₂, methane (Fig. 2), and CO have been monitored continuously since 1984, 1988, and 2000, respectively. Monitoring and routine observations cover physical, chemical, and biological oceanography carried out along the cruise track of the RV Shirase, including the 110° E and 150° E meridians, as well as sea-level observation at Syowa. Ecological monitoring includes annual observations of terrestrial flora at fixed sites around Syowa and in the Yukidori Zawa and Adélie penguin census at rookeries near Syowa

JARE 52 Summer

1. A success in the first observation with PANSY large-scale atmospheric radar at Syowa

A large atmospheric radar system named PANSY (Program of ANtarctic SYowa Meso-, Strato-, and Troposphere/Incoherent Scatter [MST/IS] Radar, cf. IP63/XXXIII ATCM) was installed at Syowa Station in the 2010–2011 austral summer season. The first observation was carried out successfully on March 25 to receive backscatter echoes from the clear-air turbulence in the lower troposphere and 3-dimensional wind velocities up to 5–6 km were profiled. The system was designed to obtain dynamical information for understanding how the atmospheric system from the surface up to 500 km works, with precise measurement of winds and plasma parameters, and to contribute to improving the global atmospheric model for better forecasting the future global climate.

With additional installation work in the next Antarctic season, the system will become fully operational for observing the Antarctic atmosphere, where a number of unique phenomena such as the ozone hole, katabatic winds, polar stratospheric clouds (PSCs), polar mesospheric clouds (PMCs), and auroras occur.

2. Responses of penguins to environmental variability

A JARE-52 biology team conducted field observations in the Lützow-Holmbukta region. One worthy of noting is a research program on the ecological responses of penguins to regional climate change. The researchers deployed various data loggers on Adélie penguins breeding near Syowa Station and examined the at-sea behavior and ecology of the penguins. The obtained data include novel video images of penguin feeding behavior under fast ice (<http://www.nipr.ac.jp/info/penguin>), detailed foraging locations in relation to sea-ice conditions, and so on. The program will be continued over the next two austral summers and will examine the effect of changing sea-ice conditions and climate on penguin ecology.

3. Development of infrared and terahertz astronomy at Dome Fuji Station

The Antarctic inland plateau is an ideal place for astronomical observatories on earth because of its very dry air and low air temperature. An astronomical research project at Dome Fuji Station has been developing in the JAREs, and the first unstaffed year-round observation system for extrasolar planets was installed in the last austral summer. This system was designed in collaboration with an Australian university and contains special generators with solar batteries that can supply electric power to the observation equipment for two years without a supply.

A telescope of 40 cm in diameter was installed for the summer season for observation of Venus in the infrared, daytime brightness of the atmosphere, and atmospheric fluctuation. The data obtained should give important feedback for a full-scale astronomical observatory in the near future.

* Please include any scientific activities you believe might be considered bioprospecting (<http://www.scar.org/treaty/atcmxxxiii/> see WP2)