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50-year Trajectories of Antarctic Research Expedition and Program of the Antarctic Syowa MST/IS Radar (PANSY)

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The first Japanese Antarctic Research Expedition (JARE) started in 1956 with the first ice breaker Soya leaving Tokyo. Under the International Geophysical Year (IGY), observations at Syowa Station were started in the items of meteorology, aurora, ionosphere, cosmic rays, seismology, geomorphology, geography, geology and oceanography. Following the reopen of Syowa Station in 1966 by the 7th JARE, meteorological research and upper atmosphere physics have been started together with routine observations of meteorology, ionosphere and geophysics (aurora and noctilucence, magnetism, seismology). Intensive observations were done in the upper atmosphere physics with optical measurements of aurora, balloon and rocket observations, at Syowa Station which was just under the aurora oval. In the meteorological research, ozone sonde observation was started together with aerological observation and total ozone observation by routine meteorology. From 1982 (JARE-23), Middle Atmosphere Program (MAP) covering over the troposphere, stratosphere, ionosphere and magnetosphere was started and ozone hole was discovered, FTIR, lidar, balloon, rocket and satellite observations were conducted. However, due to the limit of observational procedure, combined observation of lower and upper atmosphere was not realized.

Now, a new Program of the Antarctic MST/IS Radar, PANSY, is to be deployed at Syowa Station, which covers the whole altitude range of the atmosphere from 1 km near the surface up to 500 km in the upper atmosphere. Numbers of scientific subjects are to be handled, such as stratosphere-troposphere exchange, ozone hole and SAM (Southern Annular Mode) with suppressing the warming, katabatic wind with atmospheric circulations, polar stratospheric clouds, polar mesospheric clouds, atmospheric gravity wave propagation, aurora and high energy particles, and so on. After the 50 years of JARE since the beginning, a new concept of Antarctic expedition is to be started. From the 52nd JARE, 6-year VIII-th term plan will be launched, with prioritized observation program, Global Warming from the Antarctic, including PANSY as a core project. The project might become the largest legacy of the IPY 2007-2008.

Keywords: Antarctic Research Expedition, MST/IS Radar, meteorology, upper atmosphere physics, global warming