

Program of the Antarctic Syowa MST/IS Radar

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Syowa Station is one of the distinguished stations where various atmospheric observations for research purposes by universities and institutes as well as operational observations by Japan Meteorological Agency and National Institute of Information and Communications Technology are performed continuously. National Institute of Polar Research plays a central part in the operations. The observation of the Antarctic atmosphere is important in two senses. First, it is easy to monitor weak signal of the earth climate change because contamination due to human activity is quite low. Second, there are various unique atmospheric phenomena in the Antarctic having strong signals such as katabatic flows, the ozone hole, noctilucent clouds, and auroras. The middle atmosphere is regarded as an important region to connect the troposphere and ionosphere. However, its observation is sparse and retarded in the Antarctic compared with the lower latitude regions; nevertheless the vertical coupling is especially important in the polar region.

Since 2000, we have developed an MST/IS radar which is operational in the Antarctic and have made feasibility studies including environmental tests at Syowa Station. Various significant problems have been already solved, such as treatment against low temperature and strong winds, energy saving, weight reduction, and efficient construction method. A current configuration of the planned system is a VHF (47MHz) Doppler pulse radar with an active phased array consisting of 1045 yagis. As an activity of JARE49 (the 49th Japanese Antarctic Research Expedition) and JARE50, a pilot radar system which consists of newly developed antennas and T/R modules is being installed at Syowa Station, to know the overall performance of the radar system. This pilot system is being used for IPY (International Polar Year) 2007-2008 as a meteor radar to monitor winds in the lower thermosphere which are hard to be performed by existing observation facilities.

The value of the PANSY project has been approved internationally and domestically by resolution and recommendation from international scientific organizations such as IUGG, URSI, SPARC, SCOSTEP, and SCAR. The scientific research objectives and technical developments have been frequently discussed at international and domestic conferences and at a scientific meeting at NIPR organized by the PANSY group every year. In this fiscal year, we will summarize the results of these discussions and feasibility studies as a few booklets. Special sessions for PANSY will be also organized at related scientific societies such as MSJ and SGEPS to deepen the discussion with an eye to submission of our proposal.