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MAARSY - The new MST radar on Andøya/Norway

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The Leibniz-Institute of Atmospheric Physics in Kühlungsborn, Germany (IAP) is installing a new powerful VHF radar on the North-Norwegian island Andøya (69.30°N, 16.04°E). The new **M**iddle **A**tmosphere **A**lomar **R**adar **Sy**stem (MAARSY) replaces the existing ALWIN radar which has been operated continuously on Andøya for more than 10 years. The new system is a monostatic radar operated at 53.5 MHz with an active phased array antenna consisting of 433 Yagi antennas. The 3-element Yagi antennas are arranged in an equilateral triangle grid forming a circular aperture of approximately 6300 m^2. Each individual antenna is connected to its own transceiver with independent phase control and a scalable output up to 2 kW. This arrangement allows very high flexibility of beam forming and beam steering with a symmetric radar beam of a minimum half power beam width of 3.6°, a maximum directive gain of 33.5 dB and a total transmitted peak power of approximately 800 kW. The IF signals of each 7 transceivers connected to each 7 antennas arranged in a hexagon are combined to 61 receiving channels. Selected channels or several combination of IF signals are sent to a 16-channel data acquisition system with 25 meter sampling resolution and 16-bit digitization specified which will be upgraded to 64 channels in the final stage. The high flexibility of the new system allows classical Doppler beam swinging as well as experiments with simultaneously formed multiple beams and the use of modern interferometric applications for improved studies of the Arctic atmosphere from the troposphere up to the lower thermosphere with high spatiotemporal resolution. The installation of the antenna array was completed in August 2009. The radar control and data acquisition hardware as well as an initial expansion stage of 217 transceiver modules will be installed in Spring 2010. The full extension of the system is scheduled for spring 2011 with the goal to observe the 2011 PMSE season with full power.