

Development of Phased Array Weather Radar and Doppler Lidar Network Fusion Data System

SATOH, Shinsuke^{1*}; YASUI, Motoaki¹; MAENO, Hideo¹; HANADO, Hiroshi¹; TAKAHASHI, Nobuhiro¹; IWAI, Hironori¹; KAWAMURA, Seiji¹; KOJIMA, Shoichiro¹; AMAGAI, Jun¹; TANAKA, Kenji¹; OCHIAI, Satoshi¹; KUBOTA, Minoru¹; IGUCHI, Toshio¹

¹National Institute of Information and Communications Technology

At National Institute of Information and Communications Technology (NICT), we promote advanced research and development of remote sensing technology, to reduce the damage of severe weather disasters caused by localized heavy rainfalls or tornadoes. An industry-academia-government team consisting of Toshiba, Osaka University, and NICT developed one-dimensional phased array weather radar (PAWR) that it is possible to seamless 3D observation in 10 ? 30 seconds. In May 2012, we installed PAWR at Osaka University Suita Campus, and started test observation. From the observation, a first echo appeared in an isolated cumulonimbus cloud was falling to the ground for about 10 minutes. In order to predict the generation point of the cumulonimbus cloud, we need other data which includes wind fields before cloud generation, distributions of water vapor and aerosol, and so on. For that reason, we develop a sensor fusion system with PAWR, Doppler lidar, and others. We install the systems to both NICT Advanced ICT Research Institute (Iwaoka, Nishi-ku, Kobe, Hyogo) and NICT Okinawa Electromagnetic Technology Center (Onna, Kunigami, Okinawa), and install the network data system to NICT headquarters (Koganei, Tokyo).

The sensor fusion system consists of the PAWR antenna in a radome installed on the roof of a 20 m tower, Doppler lidar (Leosphere 400s) on the deck at the height of 15 m of the tower, microwave radiometer to measure water vapor, and sky-radiometer to measure aerosol. Also, temperature, humidity, wind speed components (u, v, w), pressure, rainfall amount, radiation budget, and cloud images (4 directions and whole sky) are measured. All sensors are connected by network for remote operation and automatic data acquisition. The observation data are transferred in real-time through the fast network lines (JGN-X) from Kobe and Okinawa to Koganei for data processing to make a composite map, and so on. The processing data are displayed on a big 4K display TV, and are published using a web server.

We will start test observation after the system completion in March, 2014. At NICT, we also promote research and development of network data system using advanced ICT for big-data processing, transfer, visualization. We give this system a nickname of PANDA: **P**hased **A**rray weather radar and **D**oppler lidar **N**etwork fusion **D**Ata system, and will publish the data from <http://panda.nict.go.jp/>.

Keywords: phased array weather radar, Doppler lidar, network data system, remote sensing, localized heavy rainfall