

(#2013-29)

The MU (Middle and Upper atmosphere) radar, 1984

Proposer: IEEE Kansai Section with Kyoto University and Mitsubishi Electric Corp.

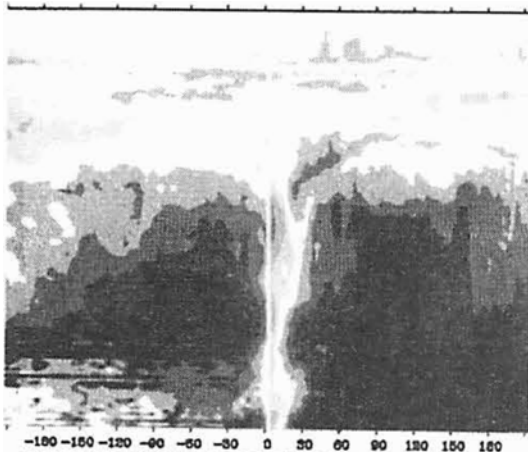
- Built in 1984 as the first large-scale MST (Mesosphere, Stratosphere, and Troposphere) radar with a two-dimensional active phased array antenna system.
- Continuous and flexible observation of the atmosphere.
- Contributed to the progress of atmospheric science and radar engineering.
- Observed actual structures and mechanisms of various meteorological phenomena.
- Explores the countermeasures to minimize damages of weather disasters and environment disruptions.
- The sonde (balloon) observed the lower layer, and the satellite observed the space, but the middle and the upper atmosphere had not been exploited much.

MU Radar (Shigaraki, Shiga):
Consists of 475 Yagi antenna

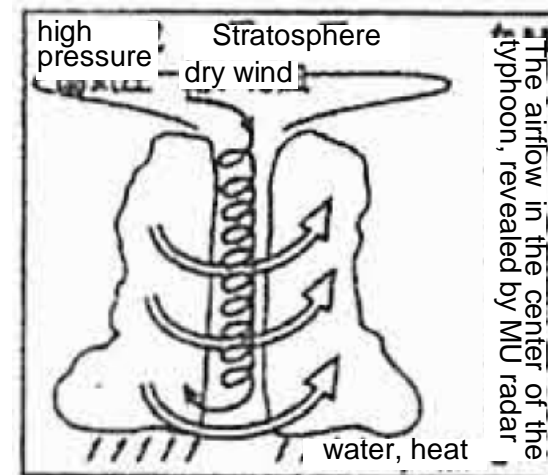


The Significance and the Social Impacts

- Both the raindrop and the airflow are captured. [A1]
- The precise typhoon structure (the eye cross-section) was observed for the first time (1994). [A2]
- The birth and growth processes of the violent raincloud causing the local downpour, etc. were revealed. [A1]
- Precise weather forecasting has been established. [A1] [A2]
- The greenhouse gas diffusion has been found to be much slower than had been believed. [A3]
- Numerous atmospheric radars constructed later utilized and followed its leading edge technologies. [A4]



The observed graphic of the typhoon-eye [A2]



The airflow inside the typhoon [A2]

Influences to the later systems

Established the technological basis for the following systems.

- WINDAS (Wind Profiler Network and Data Acquisition System) : Three-dimensional wind observation from about 30 locations in Japan, by the Japan Meteorological Agency.
- EAR (The Equatorial Atmosphere Radar) at West Sumatra (Indonesia)
- PANSY (Program of the Antarctic Syowa MST/IS radar) at Syowa Station (Antarctica)
- MAARSY (The Middle Atmosphere Alomar Radar System) at Andøya (Norway)
- AMISR (the Advanced Modular Incoherent Scatter Radar funded by the National Science Foundation) at mobile sites in the United States
- EISCAT_3D (next-generation radar project for atmospheric and geospace science conducted by the European Incoherent Scatter Scientific Association) in Tromsø (Norway), Kiruna (Sweden) and Sodankylä (Finland).

Citation

- In 1984, Kyoto University built the MU (Middle and Upper atmosphere) radar as the first large-scale MST (Mesosphere, Stratosphere, and Troposphere) radar with a two-dimensional active phased array antenna system, with the collaboration of Mitsubishi Electric Corporation. The MU radar enabled continuous and flexible observation of the atmosphere and has contributed to the progress of atmospheric science and radar engineering. (60 words)