Title	Cirrus cloud observation in the tropical upper troposphere by the Equatorial Atmosphere Radar (EAR) and 95-GHz cloud radar(RECENT RESEARCH ACTIVITIES)
Author(s)	Fukao, Shoichiro; Hashiguchi, Hiroyuki; Yamamoto, Masayuki K.
Citation	Sustainable humanosphere : bulletin of Research Institute for Sustainable Humanosphere Kyoto University (2006), 2: 7-7
Issue Date	2006-08-31
URL	http://hdl.handle.net/2433/51088
Right	
Type	Departmental Bulletin Paper
Textversion	publisher

Cirrus cloud observation in the tropical upper troposphere by the Equatorial Atmosphere Radar (EAR) and 95-GHz cloud radar

(Laboratory for radar atmospheric sciences, RISH, Kyoto University)

Shoichiro Fukao, Hiroyuki Hashiguchi, and Masayuki K. Yamamoto

Cirrus clouds are high- and thin-tropospheric clouds composed predominately of ice particles. Tropical cirrus clouds cover a significant part of the tropics and have a key effect on the Earth's radiation budget. They occupy an area much greater than the deep convection that produces them. Modeling and observational studies have been carried out to understand the complete life cycle of tropical cirrus clouds and basic processes responsible for their persistence. However, observational studies on the interactions among radiation, dynamics, and microphysics remain too sparse. Especially, dynamical processes of tropical cirrus clouds are not understood well, because wind observation in and around tropical cirrus clouds with high temporal and vertical resolution has not been carried out.

A VHF-band wind profiler called the Equatorial Atmosphere Radar (EAR) can observe winds in both clear and cloudy regions by receiving echoes from atmospheric turbulence [1]. A 95-GHz cloud radar can detect ice particles within cirrus clouds due to its short wavelength (3.2 mm) [2]. Therefore, the combination of the EAR and the 95-GHz cloud radar enables us to observe fine wind structure in and around cirrus clouds. In November 2005, our research group has carried out the observation campaign using the EAR and 95-GHz cloud radar to understand how background wind affects dynamical and microphysical processes of cirrus clouds. The observation campaign was carried out as a joint project by RISH and National Institute of Information and Communications Technology (NICT). The 95-MHz cloud radar is installed close to the EAR at the Equatorial Atmosphere Observatory (0.2S, 100.32E, 865 m above sea level) near Bukittinggi, West Sumatra, Indonesia.

From the preliminary data analysis, our research group has already obtained several new findings: a linkage between falling velocity of ice particles and background vertical air motion, enhanced turbulence near the cloud bottom caused by evaporative cooling, and so on. Other than the EAR and the 95-GHz cloud radar, many instruments such as weather radars, lidar, and radiosondes were under operation during the observation campaign. Using these data, the dynamical and microphysical processes of tropical cirrus clouds will be further investigated.

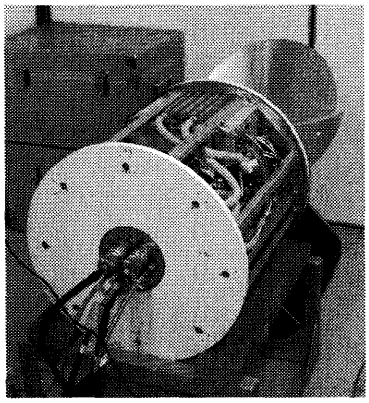

Figure 1: Picture of the 95-GHz cloud radar

Figure 2: A view of the EAR

REFERENCES

[1] Fukao, S., Hashiguchi, H., Yamamoto, M., Tsuda, T., Nakamura T., Yamamoto M. K., Sato, T., Hagio, M., and Yabugaki. Y. (2003), Radio Sci., 38(3), 1053, doi:10.1029/2002RS002767.

[2] Horie, H., T. Iguchi, H. Hanado, H. Kuroiwa, H. Okamoto, H. Kumagai (2000), IEICE TRANS. COMMUN., 83, 2010-2020.