

Studies on dynamical processes in the tropical atmosphere with the Equatorial Atmosphere Radar (EAR)

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

Shoichiro Fukao, Hiroyuki Hashiguchi, and Masayuki K. Yamamoto

The equatorial Indonesia is the region where the most active cumulus convection occurs all over the world. Cumulus convection formed over the region works as an engine of the global circulation of the earth's atmosphere and a major source of atmospheric waves that transport momentum flux from the lower atmosphere into the middle and upper atmosphere. However, generation, propagation, and dissipation processes of these atmospheric waves are not well understood yet due to the scarcity of observations over the region.

Our research group took a leading role in the development and installation of the Equatorial Atmosphere radar (EAR) at the Equatorial Atmosphere Observatory (0.2S, 100.32E, 865 m above sea level) near Bukittinggi, West Sumatra, Indonesia in March 2001. EAR is an atmospheric radar operated with the center frequency of 47 MHz and the peak output power of 100 kW. EAR can observe winds in the troposphere and lower stratosphere, and ionospheric irregularities in the E- and F- regions [1]. Using results derived from EAR, our research group has revealed new convective features over the equatorial Indonesia in relation to atmospheric waves [2], ionospheric irregularities in the equatorial thermosphere [3], and coupling processes between the troposphere and the stratosphere [4][5].

EAR is a principal observational instrument used in a scientific project "Coupling Processes in the Equatorial Atmosphere (CPEA)" supported as Grant-in-Aid for Scientific Research on Priority Area by the Ministry of Education, Culture, Sports, Science and Technology of Japan. Using EAR and other observational instruments, the CEPA project has been producing innovative results that lead to the clarification of vertical coupling processes of the atmosphere over the equatorial Indonesia. As one of the international collaborative researches of RISH, part of the EAR operation time will be provided to domestic and international researchers from October 2005. Further explorations of the equatorial atmosphere will be carried out using observational data from EAR.



Figure 1: Picture of EAR installed at Koto Tabang, West Sumatra, Indonesia

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] Seto, T. H., Yamamoto, M. K., Hashiguchi, H., and Fukao, S. (2004), *Ann. Geophys.*, 22, 3899-3916, 2004.
- [3] Fukao, S., Ozawa, Y., Yokoyama, T., Yamamoto, M., and Tsunoda, R. T. (2004), *J. Geophys. Res.*, 109(a2), Art. No. A02304, doi:10.1029/2003JA010096
- [4] Fujiwara, M., Yamamoto, M. K., Hashiguchi, H., Horinouchi, T., and Fukao, S., *Geophys. Res. Lett.*, 30, 1171, doi:10.1029/2002GL016278, 2003.
- [5] Dhaka, S.K., Shibagaki, Y., Yamamoto, M.K., Hashiguchi, H., Yamamoto, M., and Fukao, S., *Geophys. Res. Lett.*, in press.