

Range imaging observation of the equatorial atmosphere by the Equatorial Atmosphere Radar

YAMAMOTO, Masayuki^{1*}, HASHIGUCHI, Hiroyuki¹, YAMAMOTO, Mamoru¹, FUKAO, Shoichiro²

¹RISH, Kyoto University, ²Fukui University of Technology

Range imaging is a technique that improves radar range resolution using frequency diversity. The Equatorial Atmosphere Radar (EAR), a 50-MHz band atmospheric radar operated with a 100-kW peak output power, has a function necessary for range imaging. In a range imaging observation mode, the EAR transmits five frequencies which range from 46.50 to 47.50 MHz with 0.25 MHz spacing. The frequencies hop every transmission. At radar subranges which have smaller interval than that determined by the transmitted pulse width, the received time series collected at each frequency are synthesized with optimized weight. For determining the weight, the Capon method, an adaptive signal processing which attains both reduced calculation cost and high accuracy, is used. Though the typical transmitted pulse width of the EAR is 1 μ s (i.e., 150 m range resolution), by using the range imaging, the range resolution can be increased up to several ten meters. In the presentation, an overview of range imaging using the EAR is shown. Especially, measurement results of Kelvin-Helmholtz instability in the tropical tropopause layer are focused.

Reference: Mega, T., M. K. Yamamoto, H. Luce, Y. Tabata, H. Hashiguchi, M. Yamamoto, M. D. Yamanaka, and S. Fukao, Turbulence generation by Kelvin-Helmholtz instability in the tropical tropopause layer observed with a 47 MHz range imaging radar, *J. Geophys. Res.*, 115, D18115, doi:10.1029/2010JD013864, 2010.

Keywords: Equatorial Atmosphere Radar, atmospheric turbulence, range imaging, equatorial atmosphere