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VHF coherent scatter radar observations of mid-latitude E- and F-region field-aligned irregularities over South Korea

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We examine the mid-latitude F-region field-aligned irregularity (FAI) activity during 2010 - 2012 by using the VHF coherent scatter radar data in Daejeon (36.2N, 127.1E; dip latitude 26.7N), South Korea. The VHF radar has been operated since December 2009 and provides a unique opportunity to investigate the variability of the FAI activity with local time, season, solar flux, and magnetic activity. Our preliminary results show that E- and F-region FAIs appear frequently: interesting daytime irregularities, continuous echoes during the post-sunrise period and Quasi-Periodic (QP) echoes at nighttime for E region; strong post-sunset and pre-sunrise FAIs for F region. For one event, we observed the association of the F-region FAIs with a medium-scale traveling ionospheric disturbance (MSTID). Additionally, we also present seasonal and local time variations of occurrence of mid-latitude E- and F-region FAIs during low solar activity period, January 2010 - April 2012. It is worth to note our occurrence result since long term observation over a year in the mid-latitude has not yet been carried out. Our study extends to the investigation of the correlations between the irregularities in the equatorial region and middle latitudes and between the conjugate F regions, and the causal linkage of the FAIs with the E-region perturbations. For this purpose, we analyze the VHF radar and C/NOFS data during 2010 - 2011.

Keywords: VHF ionospheric radar, FAIs, mid-latitude