

## Occurrence climatology of *E*- and *F*-region field-aligned irregularities in the middle latitudes as observed by the Daejeon 40.8 MHz coherent scatter radar in South Korea

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Electron density irregularities in the ionosphere interrupt the propagation of electromagnetic waves and are problematic for navigation and communication systems. For this practical importance, significant efforts have been made to establish information on the occurrence climatology of such irregularities, to understand the onset conditions of such irregularities, and to predict or avoid the impact of these irregularities on the society. While the irregularities occur in all latitudes, less attention has been paid to the irregularities in middle latitudes. This may be because the irregularities in middle latitudes are not as severe as those in other latitude regions. However, middle latitudes are also the place where various forms of irregularities occur. A new 40.8 MHz coherent scatter radar was built in Daejeon, South Korea (36.18° N, 127.14°E, dip latitude: 26.7°N) on 29 December 2009, and has since been monitoring the occurrence of field-aligned irregularities (FAIs) in the northern middle latitudes. We report on the occurrence climatology of the *E*- and *F*-region FAIs as observed by the Daejeon radar between 2010 and 2016. We examine the occurrence types of the irregularities and the dependence of the irregularities on geophysical conditions (local time, altitude, season, solar cycle, and magnetic activity). These results can be used as a tool for investigating the onset conditions of the middle-latitude irregularities.

Keywords: VHF coherent scatter radar, *E*- and *F*-region field-aligned irregularities, middle-latitude ionosphere