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Daytime Es layer structures revealed by the MU radar ultra-multi-channel imaging during the partial solar eclipse

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During the partial solar eclipse that occurred on 22 July 2009 near Shigaraki, Japan, the MU radar observed quasi-periodic radar echoes from the E region. Ultra-multi-channel imaging of the radar echoes with multi-beam experiment revealed spatial structures of the daytime Es layer. This is a rare observation that shows daytime Es layer structure in detail. Short-lived ripple-like structures with a wavelength of about 10 km were observed, suggesting modulation by breaking atmospheric gravity waves. Polarization effect associated with sudden disappearance of the conducting E region on QP echo generation is further examined.

Keywords: ionosphere, sporadic E layer, MU radar, radar imaging, QP echo, solar eclipse