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Enhancement of ionospheric sporadic E layer during May 2025 super magnetic storm: global distribution and mechanisms

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SporadicE(Es)layerplaysaprominentroleinrevealingbothupwardanddownwardatmosphere‐
ionosphere coupling process. This study investigates the responses of Es layers to the May 2024 super geomagnetic storm by using 37 ground‐based ionosondes distributed globally and space‐based COSMIC‐2 radio occultation observations. The results show that Es layers were significantly enhanced during the recovery phase of geomagnetic storm. In addition, the enhanced Es layers mainly occurred over Southeast Asia, Australia, the South Pacific and the East Pacific. The temporal evolution of foEs disturbances over the Asian‐Australian sector clearly shows the“wave propagation” characteristics from high to low latitudes, indicating that the enhancements of the Es layers are most likely caused by the disturbed neutral winds in the E region.This study presents observational evidence for the downward impacts of the geomagnetic storm on the E‐region. Results published in Qiu & Liu (2025), GRL, https://doi.
org/10.1029/2025GL115154.