

On the Relationship between Sporadic-E and ENSO Observed by FORMOSAT-3/COSMIC

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Sporadic E (Es) refers to dense layers of metallic ions that can form in the ionospheric E region due to the effects of vertical neutral wind shear, influencing terrestrial and satellite radio propagation. The effects of Es can be observed by means of GPS scintillation in the E region, parametrized as the S4 phase fluctuation index. Here we present a report on the long term variation of Es using S4 indices and the zonal mean tropopause height measured by the FORMOSAT-3/COSMIC satellite constellation from 2007 - 2014. We find that the monthly global median S4 index in the E region shows a prominent dependence on variation of the El Nino-Southern Oscillation (ENSO) in the troposphere that has not been previously reported. The ENSO related variation of the E region global median S4 indices varies in phase with that of the zonal mean tropopause height, with both parameters lagging the Oceanic Nino index by four months. Taken together, these results indicate that ENSO signatures can be transmitted to Es formation mechanisms, potentially through modulation of the atmospheric waves and tides that alter lower thermospheric neutral wind shears by vertically propagating and breaking in that region.

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