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Temporal variability of sporadic E layer occurrence obtained from GPS radio occultation measurements

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Sporadic E layers are thin areas of enhanced electron density appearing predominantly in the midlatitude summer hemisphere in an altitude range between 90 km and 120 km. The strong vertical electron density gradients associated with the occurrence of sporadic E affects the propagation of electromagnetic waves and, e.g., could cause strong fluctuations in signals of the Global Positioning System (GPS). Such disturbances in the GPS signals amplitudes obtained from radio occultation (RO) measurements aboard Low Earth Orbiting Satellites are used to identify sporadic E layers on a global scale.

The GPS RO technique is introduced as a valuable method for sporadic E observation. The data base for our investigation includes RO measurements from CHAMP (2001 - 2008), GRACE-A (2006 - 2009) and FORMOSAT-3/COSMIC (2006 - 2009). This multi-satellite data set allows for global investigations with high spatial resolution.

In this study we focus on the variations of sporadic E occurrence rates on different time scales. We will present the diurnal, annual and interannual variability of sporadic E layers and show their connection to other geophysical parameters like solar tides and meteor influx.