

## **Atmospheric Diurnal Cycle Observed From GPS Radio Occultation Soundings**

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Diurnal cycle is one of the fundamental modes among many different scales of atmospheric variations in the weather and climate system. Adequately sampling the diurnal cycle is critical for detecting and monitoring subtle trends in climate change. The six-satellite COSMIC (Constellation Observing System for Meteorology Ionosphere and Climate) radio occultation (RO) provides rather uniform global coverage with high vertical resolution, all-weather and diurnal sampling capability. Over two-year (2007~2009) RO temperature and refractivity observations reveal distinct vertical structure of diurnal and semi-diurnal variations from the upper stratosphere down to the atmospheric boundary layer. The RO observations reveal both vertically propagating and trapped structures of diurnal and semi-diurnal variations, including transition regions near the tropopause where high vertical resolution is critically needed. In the tropics, the upward migrating diurnal tides with vertical wavelength of about 25 km is clearly captured by the monthly RO measurements. The polar stratosphere and the lower troposphere at low latitude demonstrate large diurnal variations with strong seasonal and some interannual variations, of which the cause(s) requires further investigations. COSMIC RO retrievals provided by JPL shows remarkable consistency with the UCAR (CDDAC) retrievals below ~ 30 km. But noteworthy difference above this level is found, which is likely due to the different upper boundary condition applied on bending angle at each data center and could have important implication on the wave and climate study with RO data.