[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-TT Technology &Techniques

[A-TT32]Brand-new geoscientific observations by GNSS-Reflectometry

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GNSS-Reflectometry (GNSS-R) dares to use indirect GNSS signals reflected by an object, which cause multi-path errors in the positioning system, and extracts status information of the reflecting surface itself. It requires low-power and light-weight GNSS receivers alone, so that any platform can be adopted, including microsatellites or UAVs. This session will present various observations using GNSS-R, such as sea surface wind speeds, waves, sea surface height, soil moisture and ice detection.
In addition, possible scientific impacts are discussed with unprecedentedly frequent global observations by multiple satellites, such as NASA's eight-microsatellite CYGNSS GNSS-R mission.

[ATT32-P03]Wind-independent periodic variations of signal intensity of a geostationary GNSS satellite observed at an ocean observation tower

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GNSS-R receivers were deployed to the Shirahama Oceanographic Observatory Tower owned by Kyoto University (33deg 42’32”N, 135deg 19’58”E) at the height of 20 m. The signal intensity, measured as signal-to-noise ratio (SNR), of a geostationary GNSS satellite (Beidou #2) was observed every second for both directly-received signals and signals reflected at the sea surface. In general, the SNR of the reflected signal fluctuates larger than that of the direct signal. Even after removal of high-frequency fluctuations by 3-minute smoothing, the SNR of the reflected signal shows larger changes, and these changes tend to be inversely correlated with the wind speed, which are consistent with less reflection by rougher sea surface. However, the SNR of the reflected signal intermittently shows significant periodic variations whose cycle is about one hour. These variations are not synchronized with variations of the wind speed, and they are observed only when the wind is weaker than 4m/s. Furthermore, similar variations were commonly found even in the direct signal. Therefore, they are considered mutual effects between direct and reflected signals, or interferometric intensity variations. Since the phase of the reflected signal depends on the path length, the tidal sea level changes would cause the path length, and thus interferometric SNR intensity. The path length change calculated from the sea level observed by a tide gauge at the tower provides consistent interferometric variation as the observed SNR.