



KOMPSAT-5 GNSS Radio Occultation Processing for NWP Applications

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The UCAR COSMIC Program is partnering with the National Oceanic and Atmospheric Administration, Korea Aerospace Research Institute, Korea Astronomy and Space Science Institute, and Joint Center for Satellite Data Assimilation to process Korea Multi-Purpose Satellite 5 (KOMPSAT-5) GNSS radio occultation (RO) data in near real-time for numerical weather prediction (NWP) applications. We present an overview of the spacecraft and GNSS sensor, ground system, and processing architecture now in place to support low latency data acquisition, RO retrieval, and product distribution. We evaluate precise orbit determination quality via metrics including postfit residuals, internal orbit overlaps, and satellite laser range residuals. Orbit overlap statistics are at the 7cm level (3D RMS), while SLR residuals vary between 5-15cm RMS depending on the ground site. We validate neutral atmosphere retrievals by comparing bending angle profiles to a climatological model, and differencing refractivity and temperature profiles with global NWP analysis products. In general, the retrieved atmospheric product quality is comparable to COSMIC-1. For example, refractivity profiles compared to global NWP analyses yield negligible biases and standard deviations below 1% for tangent point altitude altitudes between 10-30km. Finally, we show results evaluating the impacts of KOMPSAT-5 RO profiles on NWP using NOAA's global data assimilation and forecast system.