Richard
Anthes
UCAR COSMIC Program
Jeremiah Sjoberg, UCAR COSMIC Program
Therese Rieckh, UCAR COSMIC Program
Tae-Kwon Wee, UCAR COSMIC Program
Zhen Zeng, UCAR COSMIC Program
Oral
We consider the accuracy and precision of COSMIC-2 (C2) radio occultation retrievals of temperature, specific humidity, and precipitable water in Hurricane Dorian (30 August-5 September 2019) and the larger-scale tropical and subtropical environment by comparing them with ERA5, MERRA-2, and JRA-55 reanalyses from the surface to 15 km. We first compute biases and standard deviations of temperature and specific humidity differences between the C2, MERRA-2, and JRA-55 and ERA5. We then estimate the standard deviation of random errors of C2 and the three reanalyses using the three-cornered hat (3CH) method.
Because of its high signal-to-noise ratio, more than 70% of the C2 soundings penetrate to within 1 km of the surface, even in the extremely moist hurricane atmosphere. The C2 profiles of mean temperature and specific humidity agree closely with ERA5 above 2 km, with a temperature bias of less than 0.3 K and a specific humidity bias of less than 0.3 g/kg or 15%. Below 2 km, C2 shows a dry bias of up to 2 g/kg relative to ERA5, which is likely related to factors other than super-refraction (SR). The 3CH estimates of C2 temperature error standard deviations are less than 0.5K throughout most of the troposphere. The 3CH error estimates of C2 and ERA5 specific humidity are similar and smaller than those of MERRA-2 and JRA-55 and are less than 1.0 g/kg or 25%. The C2 estimates of precipitable water agree closely with those from ERA5. Overall, C2 provides accurate and precise measurements of temperature and water vapor in the hurricane and its environment.

(The full results in this presentation will presented in a paper submitted to a special issue devoted to COSMIC-2 early results in “Terrestrial, Atmospheric and Oceanic Sciences”(TAO), which is planned for publication in late 2021.)

Presentation file
anthes-presentation.pdf
Download to PDF