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The Constellation Observing System for Meteorology, Ionosphere, and Climate-2 (COSMIC-2) Global Navigation Satellite System (GNSS) Radio Occultation (RO) microsatellites represents the follow-on to the highly successful COSMIC-1 GNSS-RO program. GNSS-RO-based temperature and moisture soundings have been a sizable boon to weather forecasting, climate monitoring, and space weather research. In addition, due to the highly stable character of their measurements, the GNSS-RO soundings from COSMIC-1 and Korea Multi-Purpose Satellite-5 (KOMPSAT-5) have been utilized to monitor long-term NOAA operational microwave sounding instrument product data quality. After COSMIC-2 soundings began to be integrated into this critical quality monitoring system, a need was triggered to analyze and characterize any system changes brought about by COSMIC-2.

Relative to COSMIC-1/KOMPSAT-5, COSMIC-2 is found to increase the monthly sounding number available to match with the microwave radiometer data from the order of 10^4 to 10^5. The observed minus background-simulated (O-B) antenna temperature (Ta) bias computed using the COSMIC-2 soundings have largely reduced monthly standard deviation values. The COSMIC-2 soundings cause time-series average and standard deviation of O-B Ta bias monthly mean to be negatively shifted and substantially reduced, respectively. Inter-satellite Ta bias differences, computed from the “double difference” of O-B Ta bias estimates from different microwave radiometers, are largely not affected after COSMIC-2 soundings are added to the analysis. This reveals the stability of microwave radiometer data between the COSMIC-1/KOMPSAT-5 and COSMIC-2 radio occultation generations. From these analyses, COSMIC-2 has been shown to mostly augment the robustness of microwave radiometer data quality assessment using GNSS RO soundings and to adequately fill the need created by the flagging COSMIC-1/KOMPSAT-5 missions.
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