EMS Annual Meeting Abstracts
Vol. 15, EMS2018-247, 2018

Analysis and correction of the difference between the ascending and descending orbits of the FY-3C microwave imager

Miao Zhang, Qifeng Lu, Songyan Gu, Xiuqing Hu, and Shengli Wu
National Satellite Meteorological Center

The FY-3 Microwave Imager (MWRI) can provide important initial field for numerical weather prediction (NWP), and then improve its accuracy. In order to use the simulated brightness temperature as a reference for the MWRI observations, the basic atmospheric parameters of T639 was transformed into radiance space using a radiative transfer model known as RTTOV. And the data were screened for cloud before analysing O-B(observation minus simulation),using only data over ocean(since the estimates of surface emissivity and skin temperature tend to be more accurate over ocean) between 60°N and 60°S (to avoid including data over sea-ice), the FY-3C O-B show a clear bias difference between the ascending and descending orbits, the magnitude of this ascending –descending bias is approximately 2 K for all channels, restricting its operational application in NWP data assimilation systems. By analyzing the calibration equation, we found that the hot load and cold sky reflector is not a perfect reflector due to surface roughness in the reflector coating, the reflector is heated periodically by incident solar radiation and emits a variable radiation with space and time, then caused this ascending –descending bias. An estimate of the reflector emissivity in the prelaunch phase was not explored, so a methodology is developed to assess the antenna emission using the principle that the difference between the O-B of ascending and descending orbits to be minimum, and we find that the emissivity of the hot load and cold sky reflector is estimated to be about 0.03. The results show that bias difference between the ascending and descending orbits reduced from 2K to less than 0.5K, indicated that the research direction to estimate the emissivity is feasible and provided the condition for direct assimilation of MWRI radiance data.