The first aerosol retrieval result from MERSI onboard Fengyun-3F satellite

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Fengyun-3(FY-3) is the second generation of polar orbit series meteorological satellite built by China, with the capability of global observation. In May 2008, the first experimental satellite of FY-3A was launched, and the B, C and D satellites were successively launched in November 2010, September 2013 and November 2017, respectively. Recently (August 2023), the operational satellite of FY-3F was launched, which was a morning satellite with a transit time of 10:30. The Medium-Resolution Spectral Imager (MERSI) is one of the main loads of the FY-3 series satellites, similar in design to MODIS. MERSI have the ability of aerosol retrieval. However, at present, there is no reliable operational aerosol products. Based on the principle of MODIS dark target (DT) algorithm [1], we build a globally applicable aerosol retrieval algorithm for MERSI [2]. Compared with the traditional DT algorithm of MODIS, our MERSI DT algorithm has been improved mainly in two aspects: MERSI's own surface estimation model are built and inland-water mask method are modified for haze extraction [3].

We have carried out aerosol retrieval tests on global data of FY-3D/MERSI in 2019 and 2020. Compared with the ground-based observation data of AERONET, the validation results show a high overall accuracy, which the number of points falling into the expected error EE=± (0.05+0.2τ) can reach the requirement of 2/3. Further, we compared the monthly average results with MODIS, and found that the spatial distribution of AOD was consistent with a high correlation coefficient of above 0.93. In addition, the similar error trends and error dependence of MERSI and MODIS AODs are revealed in the retrieval performance at site and regional scales. These analysis indicate that porting the DT algorithm to MERSI is highly successful [4].

In this presentation, we will present the first aerosol retrieval result by porting our MERSI DT algorithm to the newly launched FY-3F satellite. Preliminary tests have shown that the ocean AOD for both granule and monthly average are in good agreement with MODIS products, have a good validation accuracy against AERONET. While, the land AOD retrieval show some overestimation in low aerosol loading, indicating that a specified surface estimation model for FY-3F/MERSI needs to be established in the future when more observation data is accumulated.

References

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