Inversion and Preliminary Validation for Global Cloud Classification and Cloud Phase Products of Fengyun-3D in CMA-NSMC

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FY-3 is the second generation polar orbiting meteorological satellite in China. The visible (0.58-0.68 μm), near infrared (1.55-1.64, 3.55-3.93 μm) and two long-wave infrared channels (10.3-11.3 μm and 11.5-12.5 μm) of the FY-3D MERSI (Medium Resolution Spectral Imager) instrument can be used to retrieve cloud classification and cloud phase (hereinafter referred to as CTY and CPH) products.

CPH and CTY products of FY-3D are retrieved based on the MERIS L1 data and cloud mask product. By using the spectral and texture characteristics of visible, infrared and near infrared channels data of L1 as well as the surface type classification data, threshold method is used to identify cloud phases of cloudy pixels, and 1 km resolution CPH is obtained. Then, combined with the results of thin cirrus cloud and broken cloud identification results, high, medium and low cloudy pixels are identified by threshold method, and a CTY product with 1 km resolution is obtained.

The precision of CPH is higher for simple-structured clouds, and POD (probability of detection) as well as CR (Consistency rate) is slightly lower for complex clouds. In general, FY-3D has a better performance on identification of water clouds and a slightly lower accuracy for the identification of ice phase. Compared with MODIS, the algorithm of FY-3D MERSI can recognize more than 90% CPH of the total cloud pixels. It should be noted that due to the different algorithm, the methods and criteria for identifying mixed and uncertain phases are different, which results in some differences between FY -3D and MODIS CPH outputs.

Keywords: FY-3D/MERSI, Cloud Classification, Cloud Phase