Status of Image Registration and Navigation for FY-2C Meteorological Satellite

Summary and purpose of paper

This paper introduces the status of FY-2C image navigation in CMA.

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Image registration and navigation is bottom work for geostationary observation. They are extreme important for product processing and image interpretation.

FY-2C image registration and navigation are based on the solution of a mathematical model. Through careful work, image registration and navigation quality for FY-2C was greatly improved. Between orbital and attitude control, after the navigation parameter is derived, even in VIS images, the coast lines well match the image. For the convenience of product processing, all full disk images are remapped into nominal projection. Suppose FY-2C satellite is at 104.5ºE equator with height 35800km, the spin axe is perpendicular to the orbital plane, the observation image is called nominal. For individual pixels in the nominal images, the following parameters are added: observation time, Sun zenith angle, satellite zenith angle, Sun-satellite azimuth angle, Sun glint angle. Atmospheric correction is made for each 8X8 pixel square.

In 2 days after orbital and attitude control, image navigation quality need to be improved. Based on the previous image navigation performance for those periods, diagnosis is made. At present, we have the following recognitions for poor navigation quality after orbital and attitude control:
1. Inappropriate dispatch procedure, for example, immediately after orbital control, new calculated orbital parameters are even worse than the parameters before orbital control.
2. Inappropriate initial value of orbital and attitude parameters, for example, 24 hours after attitude control, initial values of attitude parameters do not affect solution of the navigation equations. The value of (0, 0, -1) in J2000 coordinate system is simply used. But immediately after attitude control, initial values of attitude parameters have great influence to the solution. Initial values of attitude parameters should be chosen carefully.

In the future, the following measures will be adopted:
1. In 18 hours after orbital control, orbital parameters before orbital control will be used.
2. In case no attitude control is performed, original attitude parameters before attitude control will be used.
3. In case attitude control is performed and orbital plane is not adjusted, vertical

direction of the original orbital plane will be used as initial value of the attitude.

4. Before orbital and attitude parameters get convergence, those parameters will be broadcasted as they are. There is no tendency to optimize them. But simplified grids will be adjusted.

5. To avoid possible mistakes of dispatch procedures and operations.

In the discussion, FY-2C image navigation results and animation will be shown.