

# EVALUATION OF FY AND HY DATA FOR SEA SURFACE TEMPERATURE OBSERVATIONS

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## 1. INTRODUCTION

Sea Surface Temperature (SST) products have been available from a number of operational and experimental satellites. In China, the Fengyun (FY) and Haiyang (HY) series satellites have been designed with capability of SST measurements from space. Both the Visible and Infrared Spin Scan Radiometer (VISSR-2) onboard FY-2C, 2D, 2E and the Chinese Ocean Color and Temperature Scanner (COCTS) onboard HY-1A, 1B have infrared split window channels. Evaluation of performance of FY-2 infrared split window channels and HY-1B SST products are carried out in this study. The former part is described in the 2nd section. And the inter-comparisons of HY-1B COCTS SST with MODIS and AVHRR SST are shown in the 3rd section. Finally a summary of the results and future investigation is given.

## 2. EVALUATION OF FY-2 VISSR PERFORMANCE FOR SST OBSERVATIONS

The VISSR has five channels with split window channels at  $10.3\sim 11.3\mu\text{m}$  (IR1) and  $11.5\sim 12.5\mu\text{m}$  (IR2). The Noise Equivalent Delta Temperature (NE $\Delta$ T) of the sensor is  $0.4 \sim 0.2$  K with the temperature range of  $180 \sim 330$ K. The brightness temperature (BT) of the two split channel is analyzed. The VISSR BT images acquired at 5:30 (UTC) on 6 May 2009 are investigated. The Baihai Sea, Yellow Sea and most region of East China Sea are cloud-free. The IR 2 BT values are obviously higher than IR1 which indicates calibration problem of the IR channels. The VISSR split window measurements are compared with simultaneous BT data from the Imager onboard the Multi-functional Transport Satellite (MTSAT-1R). NOAA generates geostationary SST products toward near-global coverage which includes SST products from MTSAT (M). The comparison of the MTSAT-1R infrared channels against the Atmospheric Infrared Sounder (AIRS) super channels shows good agreement with the comparison against the Infrared Atmospheric Sounding Interferometer (IASI) super channels [1]. The results of Sohn et. al. indicate that MTSAT two split window channels are well calibrated and no serious systematic errors or biases are found [2]. The calibration performances of MTSAT-1R split window channels and shortwave IR channel seems to be comparable to MODIS calibration [2]. The MTSAT-1R IR1 and IR2 BT images at

corresponding time with FY-2D on 6 May 2009 are checked. The BT of IR1 minus that of IR2 values is positive in most area of the image. The variations of the FY-2D and MTSAT BT along a transect at 30°N are investigated. The difference of IR1 BT in the ocean is close to 10 K and the IR2 difference is about 5K. Similar difference values are shown for the satellite data acquired at 8:30 UTC and 12:30 UTC. The results mentioned above indicate that the calibration of FY-2D VISSR IR1 and IR2 is poor which are not capable of retrieving valid SST products.

### **3. EVALUATION OF HY-1B COCTS SST PRODUCTS**

The HY-1B COCTS SST products have been delivered by the National Satellite Ocean Application Service (NSOAS) of State Oceanic Administration (SOA). The daily 0.1 degree grid SST products are evaluated in this study. The SST products are compared with NOAA AVHRR and Terra MODIS products. HY-1B's Equator crossing local time is 10:30-11:30 (descending node). Terra's descending orbit crosses the equator at 10:30 a.m. local time during each orbit. NOAA-17 is the mid-morning satellite, with descending node passing at ~10:00 am. The temporal difference of the three satellite measurements is negligible. The NOAA-17 AVHRR LAC data are acquired and processed at Ocean University of China, using NOAA operational NLSST algorithms. Terra MODIS Global Level 3 Mapped Thermal IR SST products are provided by PO.DAAC, JPL. To avoid the registration error of the SST products, the COCTS, AVHRR and MODIS SST products are resampled into 0.5 degree grid. The AVHRR, COCTS, MODIS SST products on 26 March, 6 April, and 29 April 2009 are compared respectively. The results shown negative bias of COCTS around 1 K compared to MODIS and AVHRR. The standard deviations are relatively higher than the difference between AVHRR and MODIS.

### **4. SUMMARY**

The FY-2D infrared split window channels IR1 and IR2 are analyzed and compared with simultaneous brightness temperature data from MTSAT-1R. The results show poor calibration of FY-2D IR1 and IR2 channels, which are not capable of retrieving valid SST products. The HY-1B COCTS SST products are compared with AVHRR and MODIS SST products. The results show negative bias around 1K exists for COCTS SST.

### **5. REFERENCES**

- [1] Tahara, Y. and Koji Kato, New Spectral Compensation Method for Intercalibration Using High Spectral Resolution Sounder, Meteorological Satellite Center Technical Note, No. 52, 1-37, 2000..
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