



GHRSSST 23<sup>rd</sup>, Session3: Calibration, Validation and Product Assessment-011, 27 June -1 July 2022 , online

# Validation of FY-3E/MERSI-LL Sea Surface Temperature

Sujuan Wang, Peng Cui , NA Xu

National Satellite Meteorological Center(National Center for Space Weather)/CMA Beijing,China. wangsj@cma.gov.cn



## 1. Introduction

The FengYun-3E(FY-3E) satellite is the first early-morning orbit satellite in China's polar orbiting meteorological satellite family. It was launched from the Jiuquan Satellite Launch Center of China on July 5, 2021. Its local time at descending node is 5:30 A.M. The split window data of Medium Resolution Spectral Imager-Low Light(MERSI-LL) onboard FY-3E is used to estimate SST(sub skin).

## 2. FY-3E/MERSI-LL SST(FY-3E SST)

FY-3E/MERSI-LL sensor's brightness temperature and buoy SST(iQUAM V2.1) pairs are included in the MDB if they are coincident within 1km in space and 1 hour in time. Least-Square Regression is used for estimating the coefficients of NLSST. First guess SST is daily OSTIA V2.0 ( $0.05^\circ \times 0.05^\circ$ ).

## 3. Validation

### 3.1 Validate SST against in situ data

Monthly MDB with monthly SST coefficients from Oct. 2021 to Apr. 2022 is used to assess the accuracy of FY-3E SSTs. Table 1 shows the monthly global mean biases and standard deviations(SDs) of FY-3E SST minus in situ(drifters and tropical moorings) and corresponding correlation coefficient and number of matchups, separately by day(Red) and night(Black). Figure 1 shows time series of monthly global mean biases and SDs of table 1. Figure 2 shows histograms and scatter plots of FY-3E SSTs with respect to in situ SSTs of Jan. 2022 (a,c: Day b.d: Night).

### 3.2 Validate SST against Global gridded L4 SST

Daily CMC V3.0( $0.1^\circ \times 0.1^\circ$ ) is bilinearly interpolated to MERSI-LL 1km pixels at nadir, L2P SST analysis is based on the 5-minute granule of FY-3E SST minus CMC. Figure 3 shows the time series of anomaly statistics of FY-3E SST for QL 5 from 7 Sep. 2021 to 28 May 2022,separately by day(a,c) and night(b,d), ascending(Red) and descending(Black) node.

## 4. Summary

Based on monthly MDB from Oct. 2021 to Apr. 2022 the global mean biases are ranging from -0.06K to 0.05K and the SDs are ranging from 0.4K to 0.49K by comparison with in situ buoy data. Comparison with FY-3E 5-minute granule SST(1km at nadir) and daily CMC from 7 Sept. 2021 to 28 May 2022, the monthly global mean biases of daytime are ranging from -0.31K to 0.06K and the SDs are ranging from 0.48K to 0.7K, the monthly global mean biases of nighttime are ranging from -0.25K to 0.01K and the SDs are ranging from 0.49K to 0.59K.

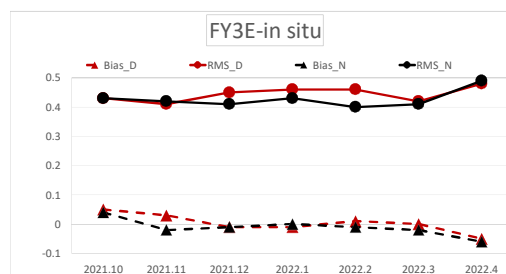


Fig. 1. Monthly global mean biases and SDs of FY-3E SST minus iQUAM(D+TM) SSTs.

Table 1. Monthly global mean biases and SDs of FY-3E SST minus in situ and corresponding correlation coefficient and number of matchups(Red: Day, Black: Night).

Date	Day						Night					
	Bias (K)	Median (K)	SD (K)	RSD (K)	R	Nobs	Bias (K)	Median (K)	SD (K)	RSD (K)	R	Nobs
2021.10	0.05	0.06	0.43	0.4	0.998	17508	0.04	0.05	0.43	0.4	0.998	20217
2021.11	0.03	0.02	0.41	0.35	0.998	11466	-0.02	0	0.42	0.4	0.997	23918
2021.12	-0.01	-0.02	0.45	0.38	0.998	11373	-0.01	0	0.41	0.39	0.997	25058
2022.1	-0.01	0	0.46	0.41	0.997	19319	0	0.02	0.43	0.4	0.997	25260
2022.2	0.01	0.02	0.46	0.38	0.998	29683	-0.01	0	0.4	0.36	0.998	28049
2022.3	0	0.02	0.42	0.38	0.998	34016	-0.02	0.02	0.41	0.37	0.998	21341
2022.4	-0.05	-0.02	0.48	0.47	0.996	47630	-0.06	-0.05	0.49	0.46	0.998	13064

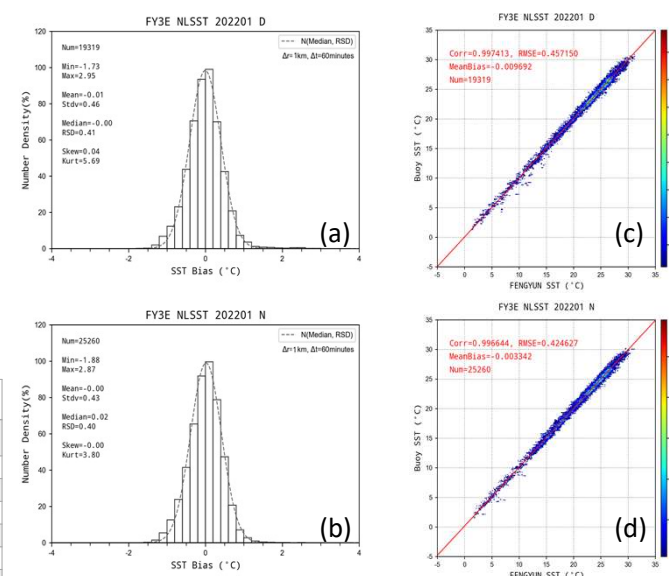


Fig. 2. Histograms and scatter plots of FY-3E SSTs with respect to in situ SSTs of Jan. 2022 (a,c: Day b.d: Night).

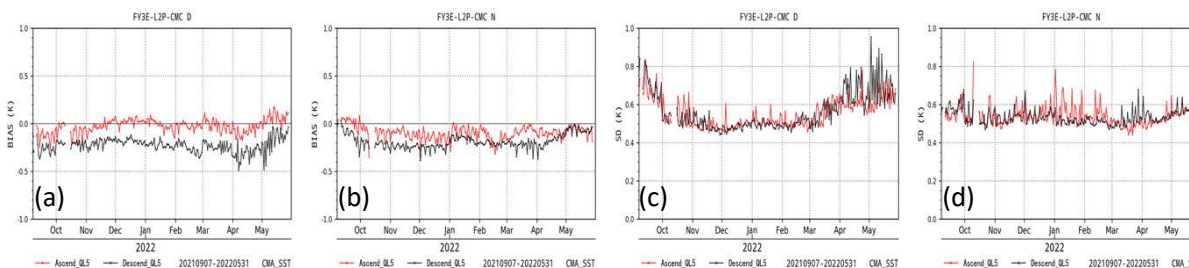


Fig. 3. Daily global mean biases and SDs of FY-3E minus CMC(a,c: Day b.d: Night Red:Ascending Black: Descending).

**Acknowledgements :** This work is supported by the FY3-03 Project and Fengyun Application Pioneering Project(FY-APP-2021.0505). We would like to thank NOAA/NESDIS/STAR for providing iQuam data, and UKMO for providing OSTIA data and CMC for providing CMC data.