SST short-term forecast bias in the coastal and marginal seas around China: pattern and correction

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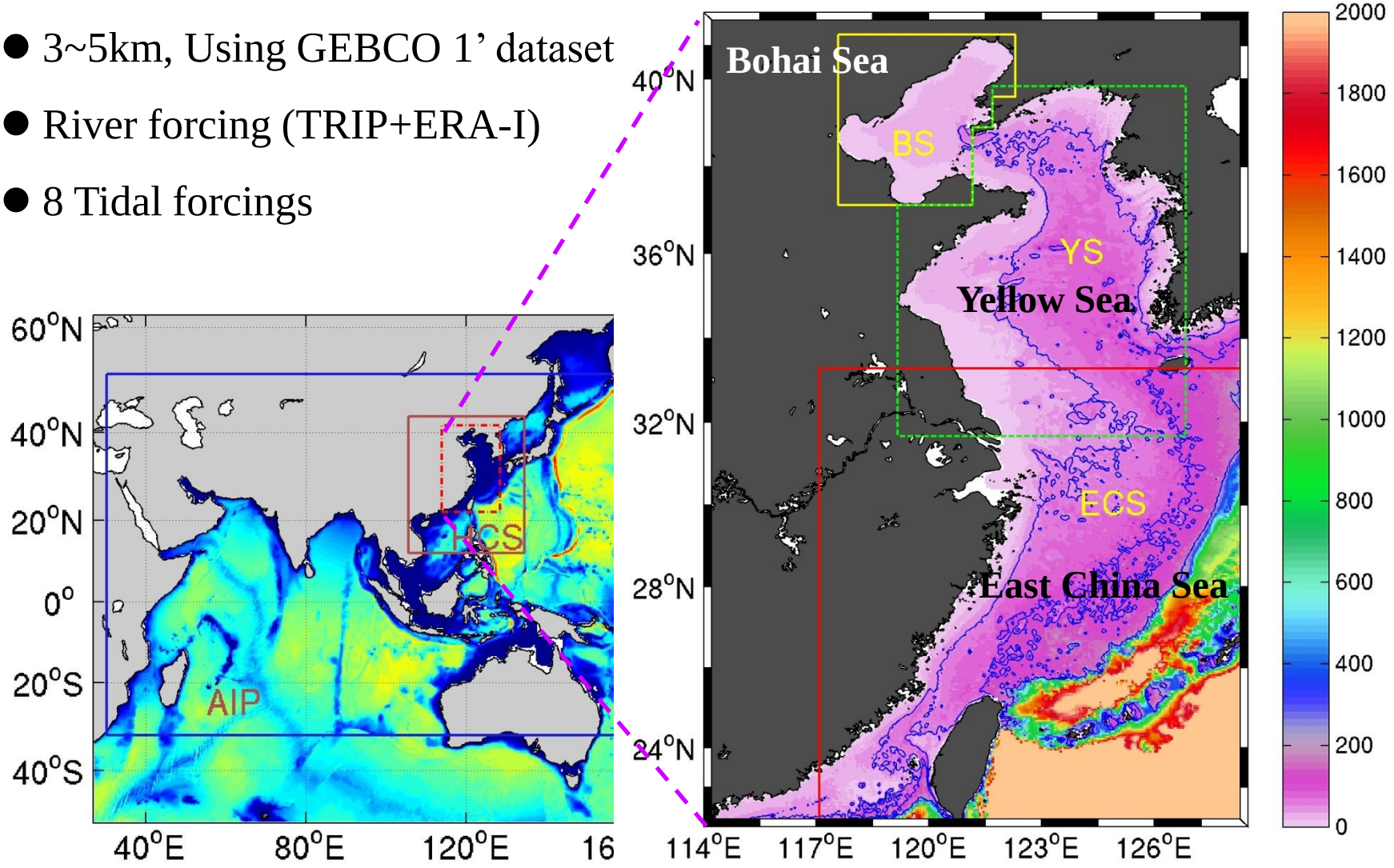
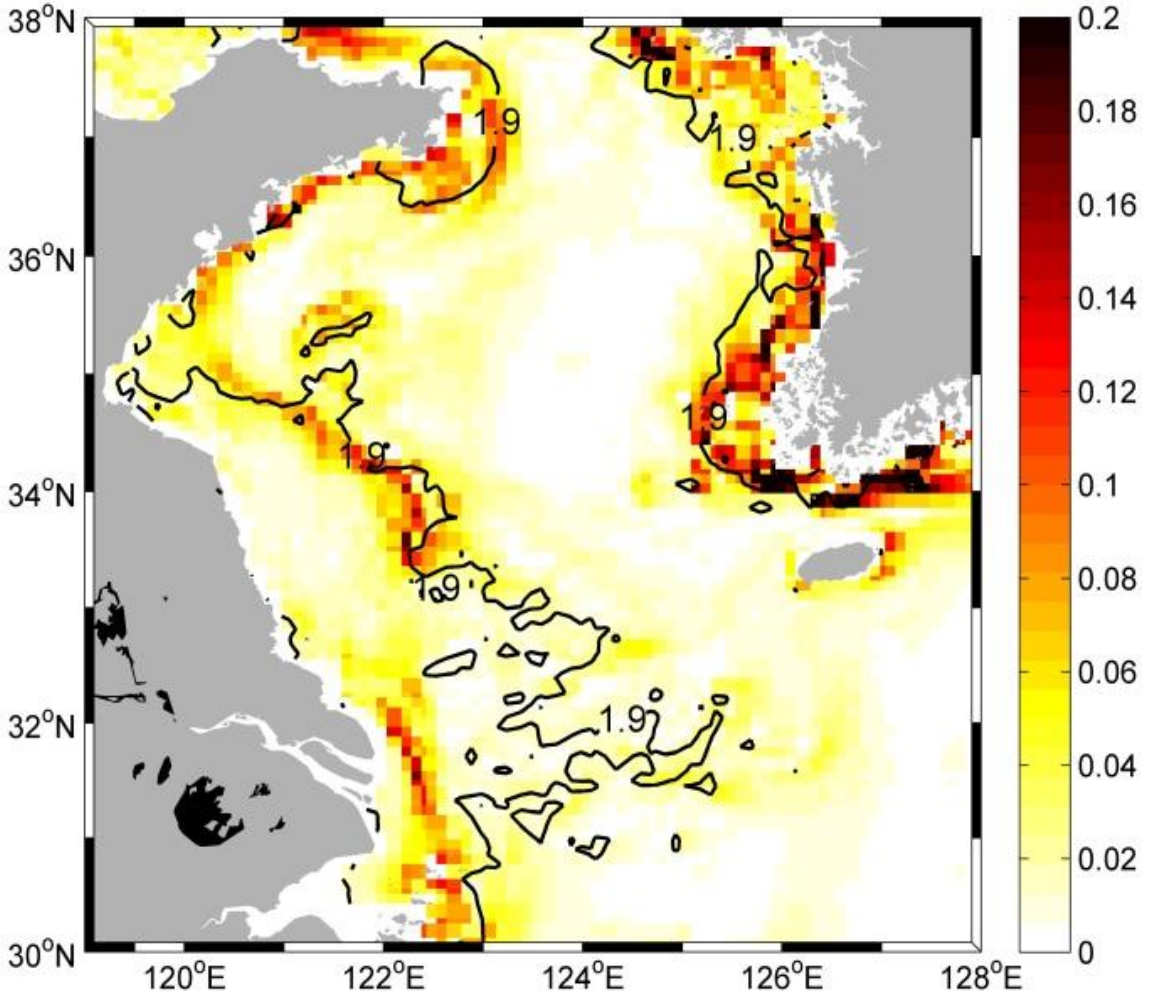
A high-resolution model in the coastal seas around China

- HYCOM2.2 with two-level nesting
- 3~5km, Using GEBCO 1’ dataset
- River forcing (TRIP+ERA-I)
- 8 Tidal forcings

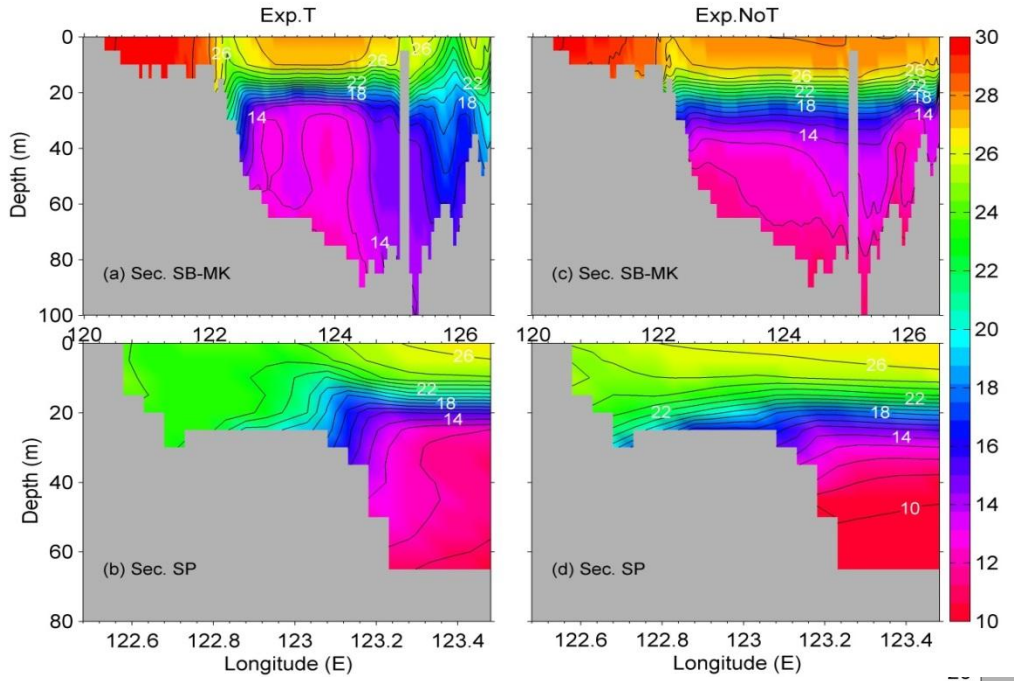


Importance of tides



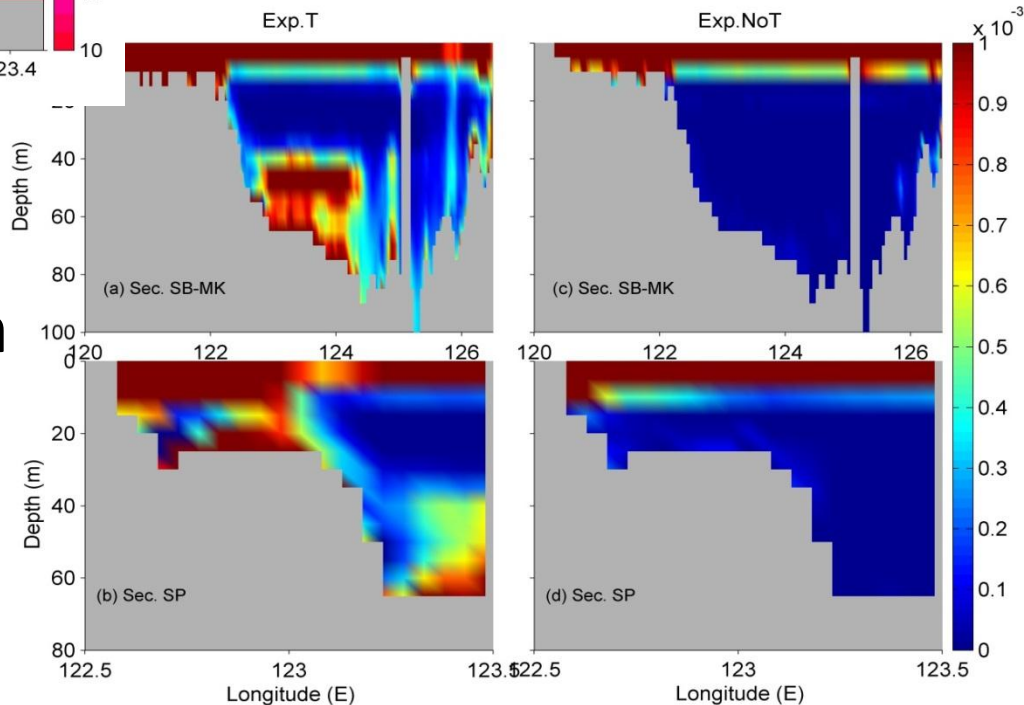
Location of tidal front based on Simpson-Hunter (SH) index (solid line represent SH=1.9) and model results of SST gradient ($^{o}C\ km^{-1}$, in color).

Importance of tides

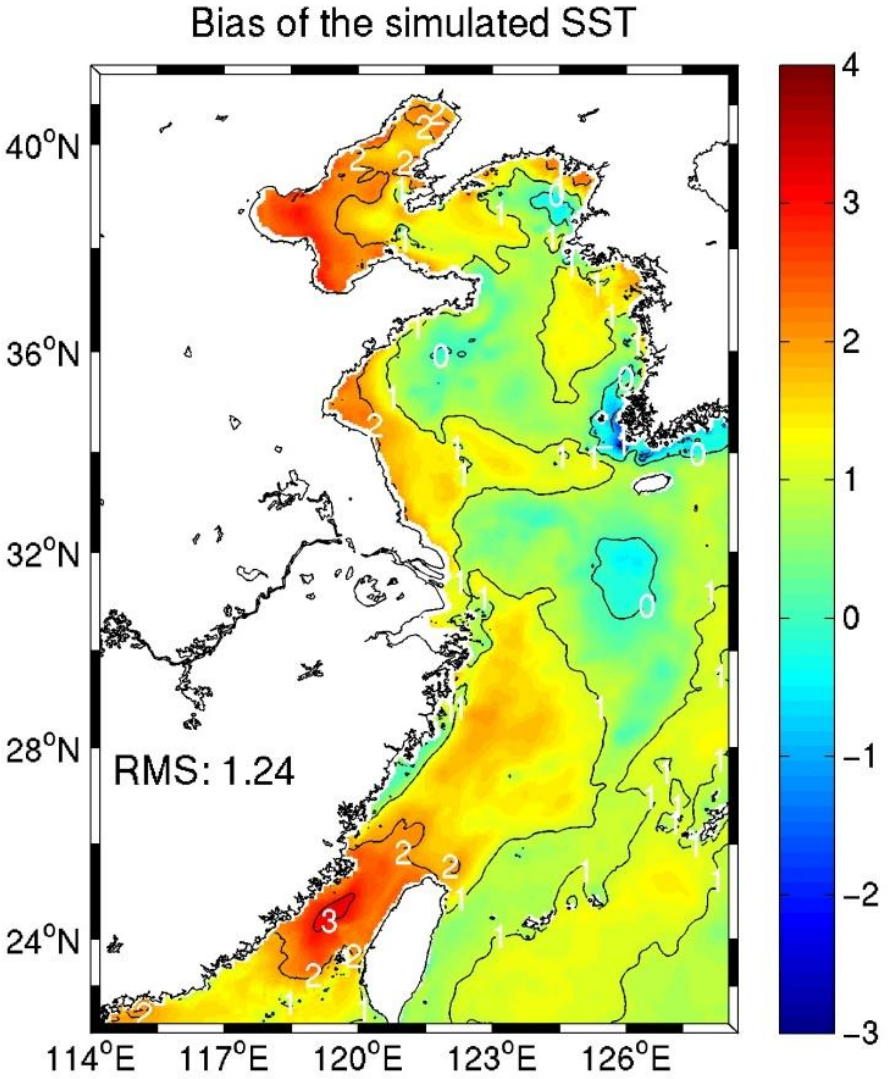


Temperature

Vertical diffusion coefficient



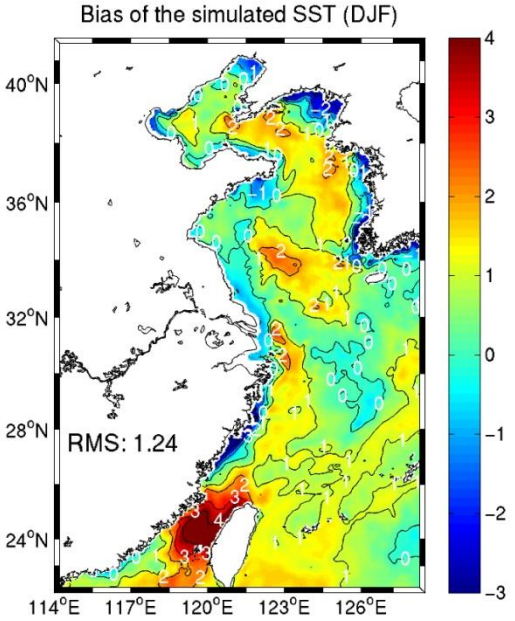
SST Bias: Model free run vs OSTIA in 2006



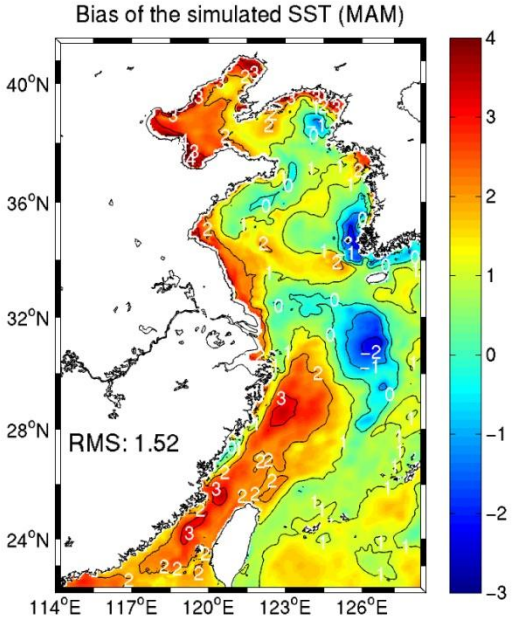
SST Data: the Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA, ~5km) produced by the UK Meteorological Office

The seasonal bias of SST in free run

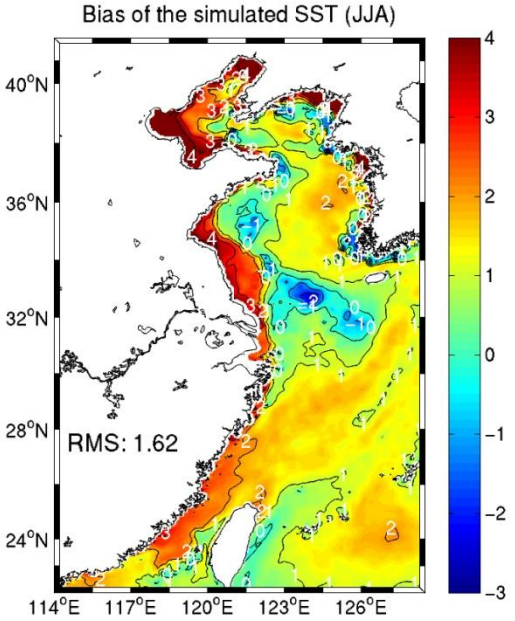
Winter



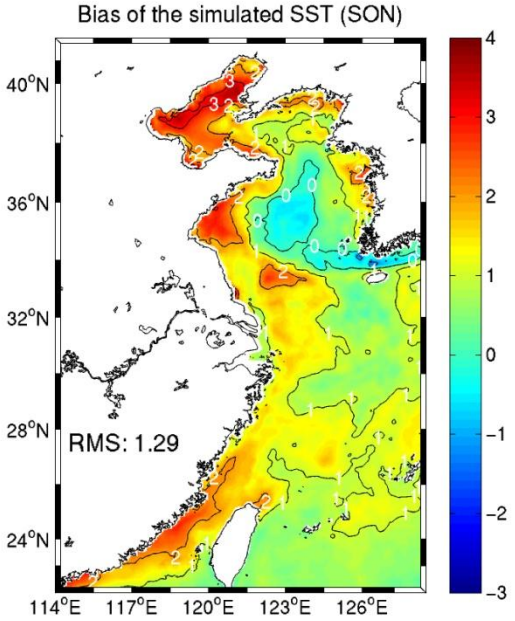
Spring



Summer

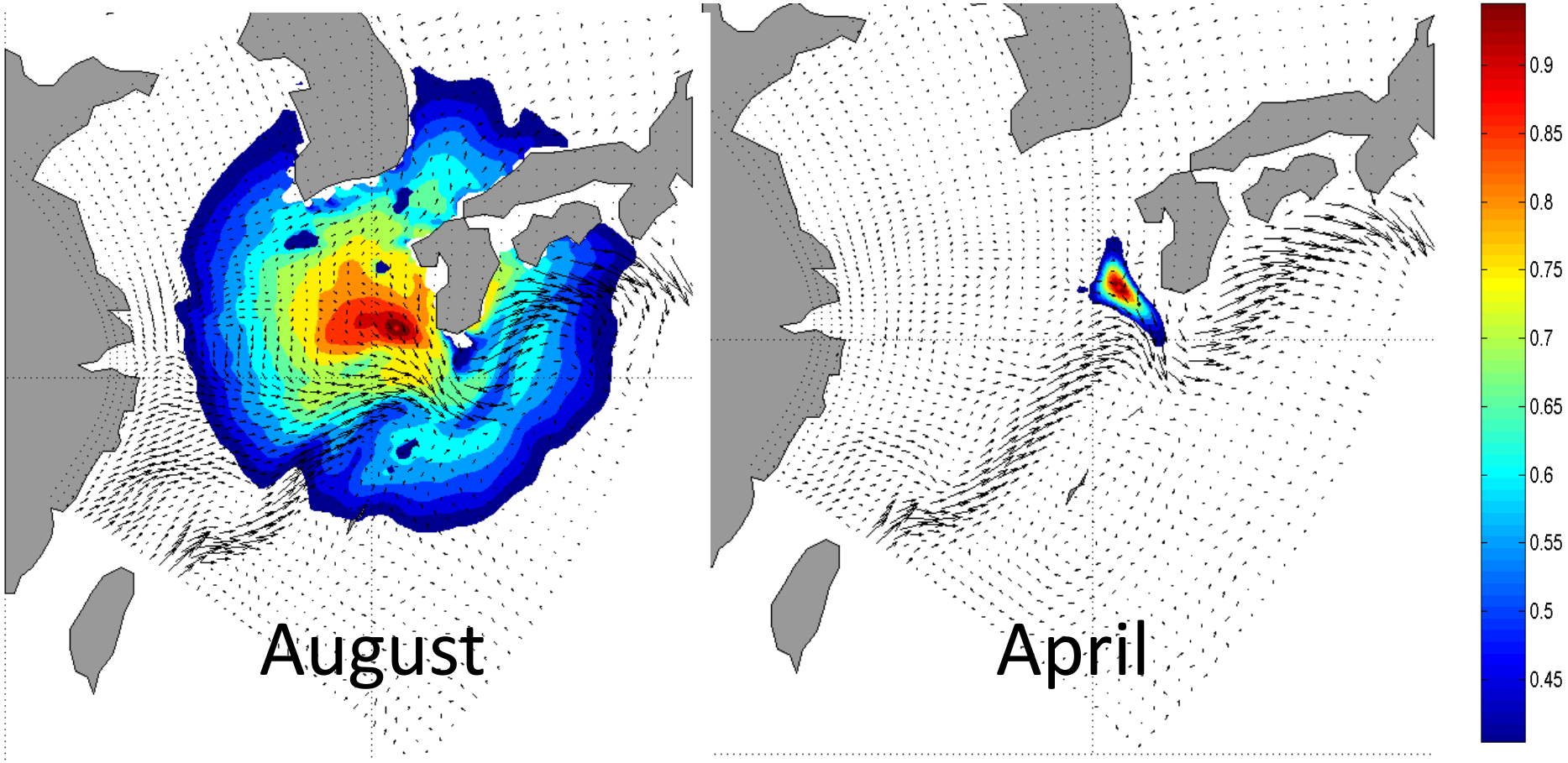


Autumn

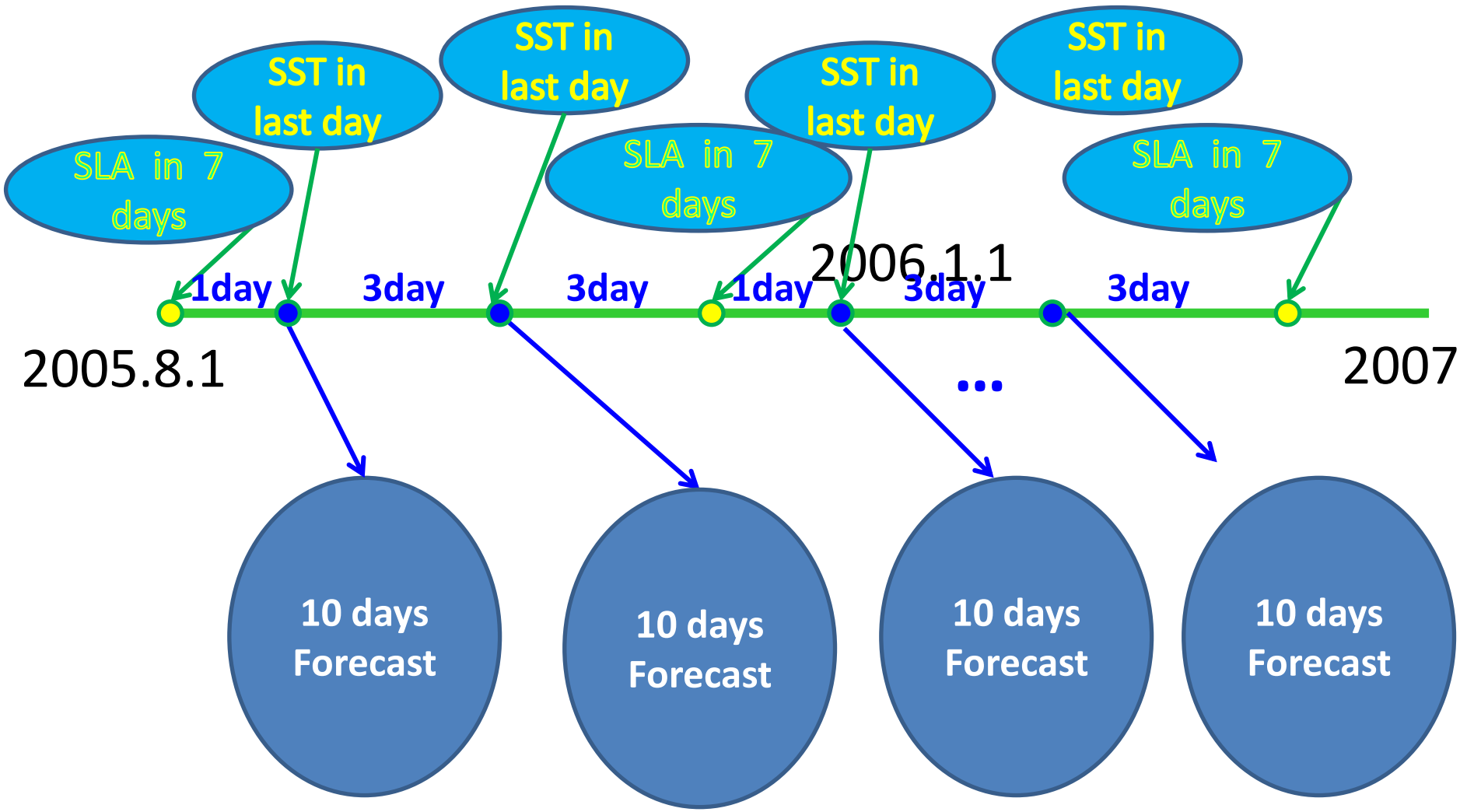


Data assimilation: Ensemble optimal interpolation

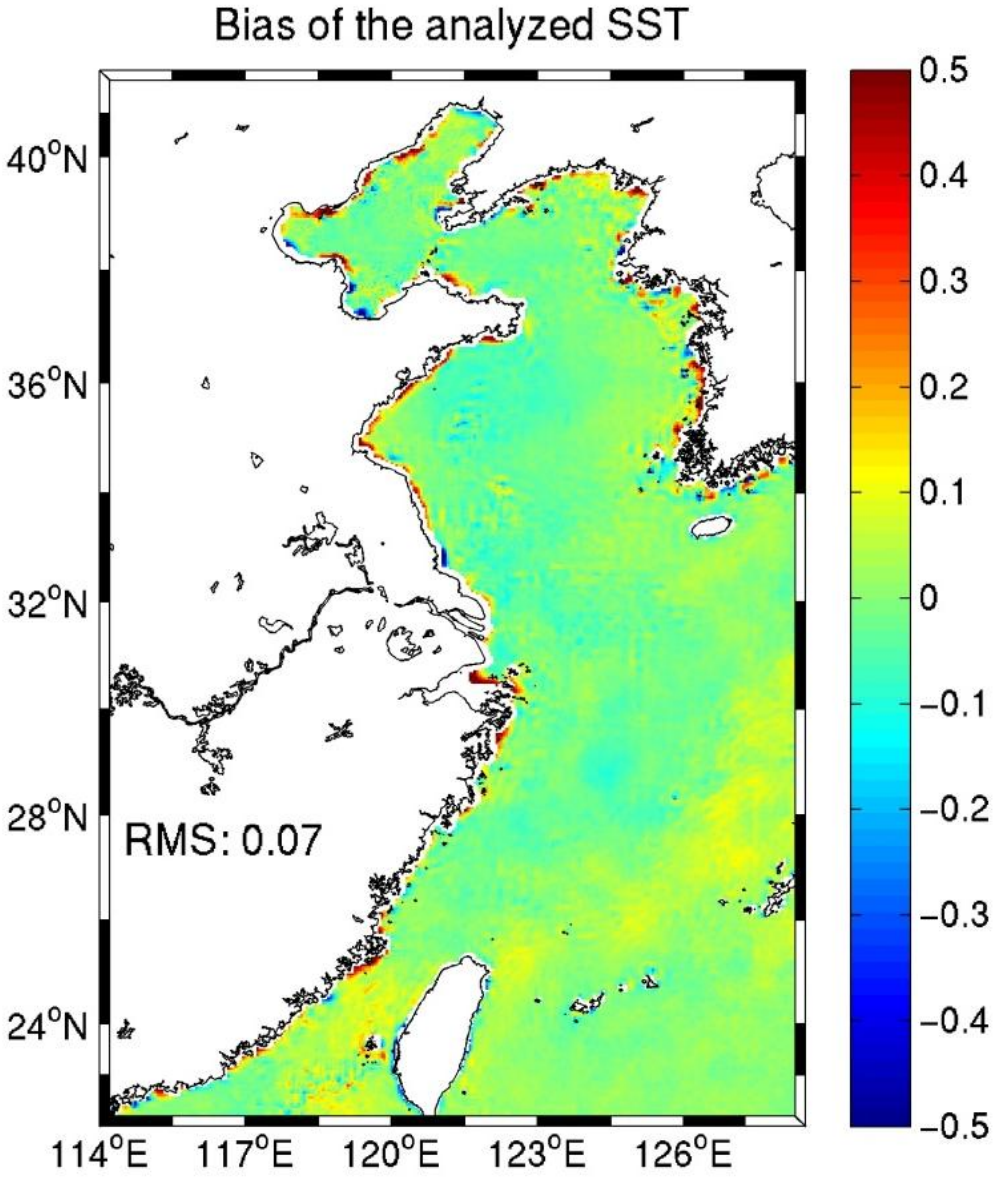
SST correlations: flow-dependence with seasonality



Assimilative hindcast: 2005/08/01-2006/12/01

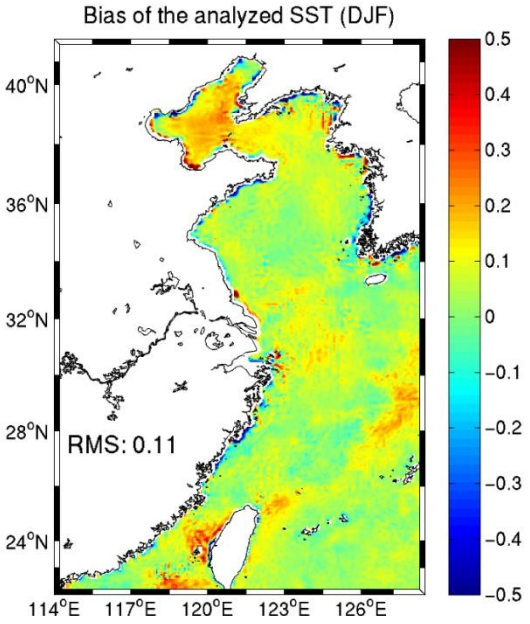


Bias of SST analysis (over 2006)

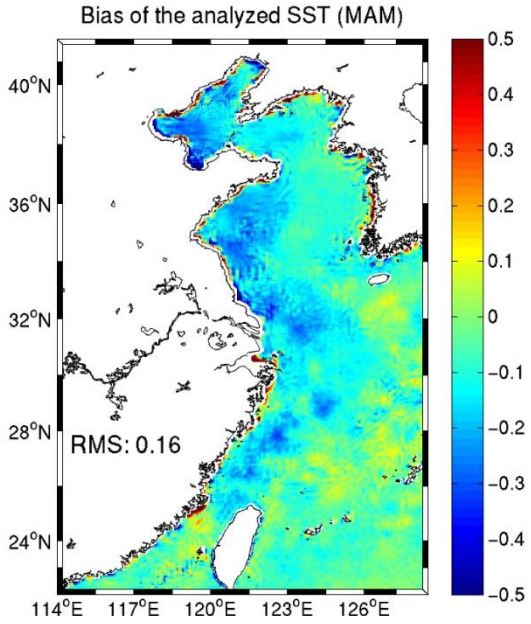


The seasonal bias of SST in analysis

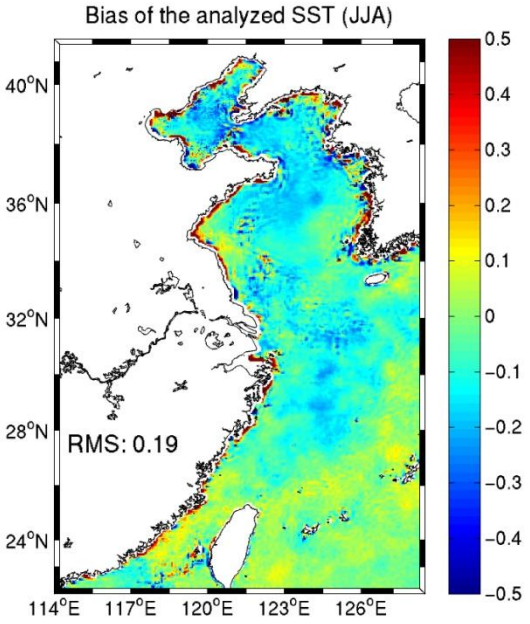
Winter



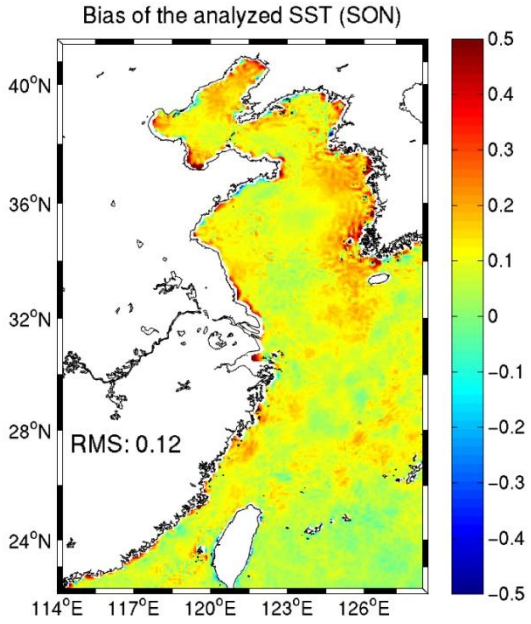
Spring



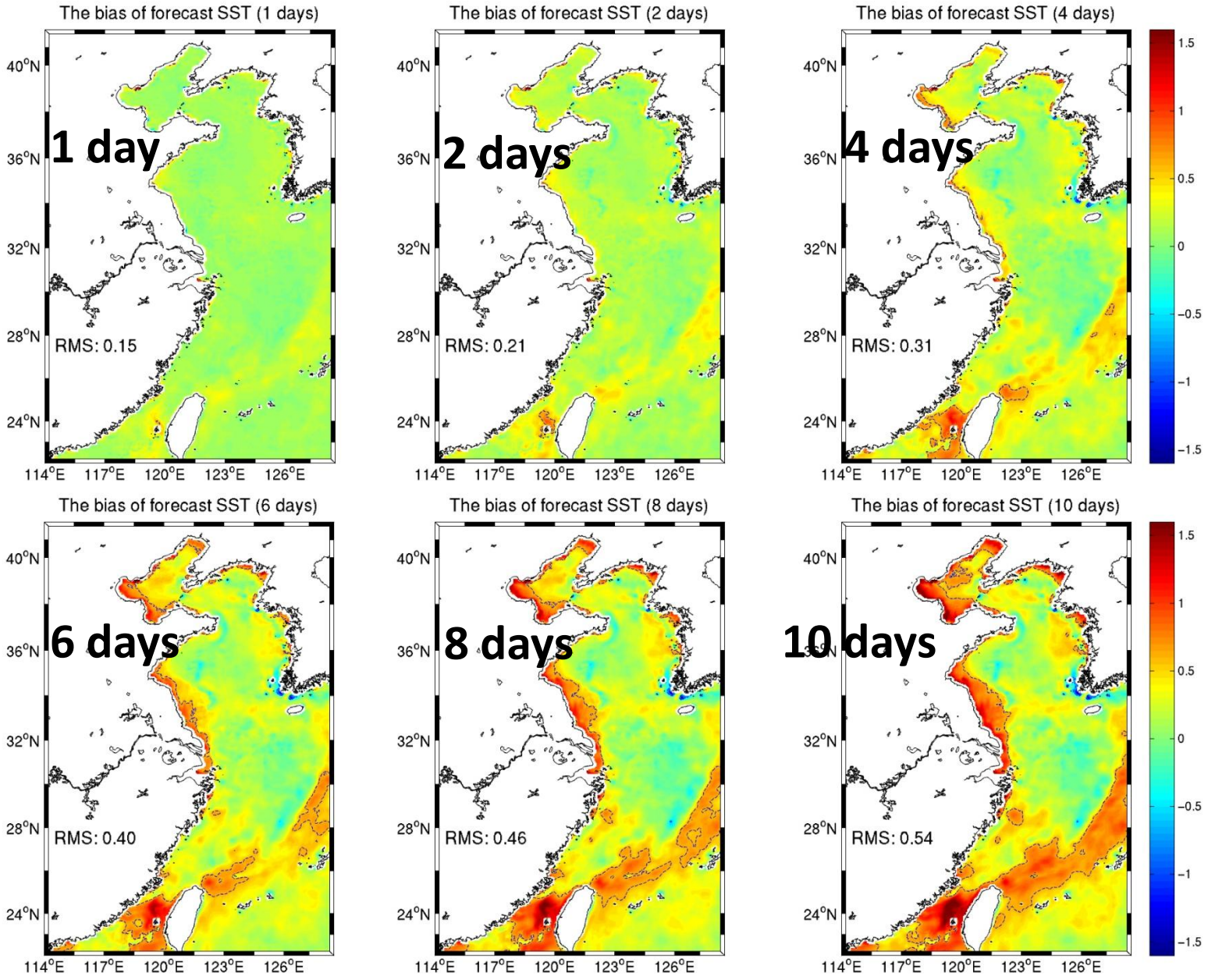
Summer



Autumn

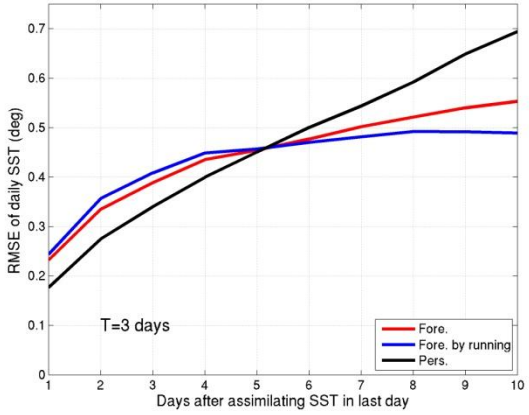


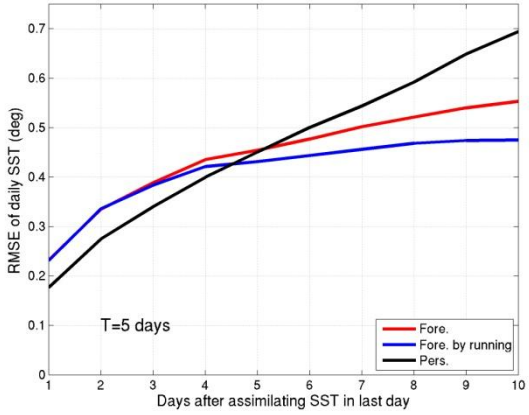
Bias growth as a function of lead time

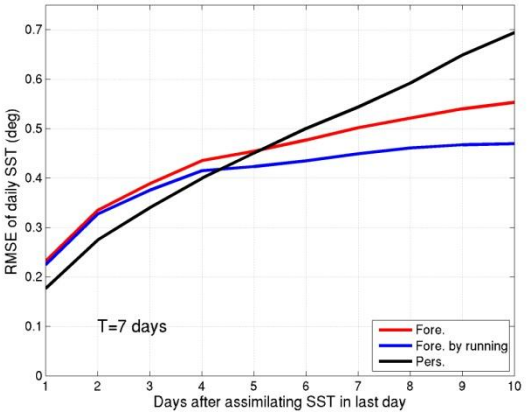


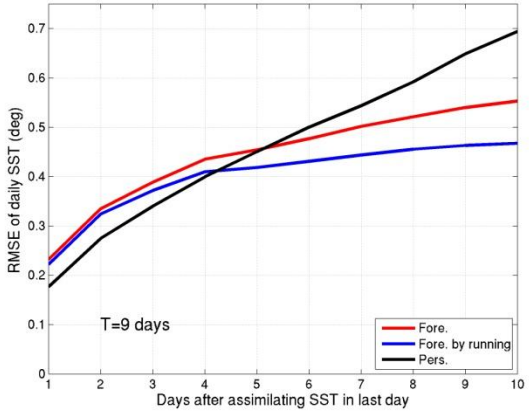
A running-mean bias correction of SST forecasts

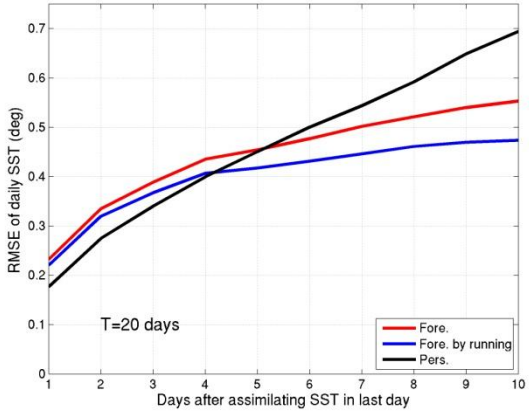
$$SST_{t_0}^{c} = SST_{t_0}^{f} - \sum_{t_0 - T \le t < t_0} (SST_t^{f} - SST_t^{o})$$

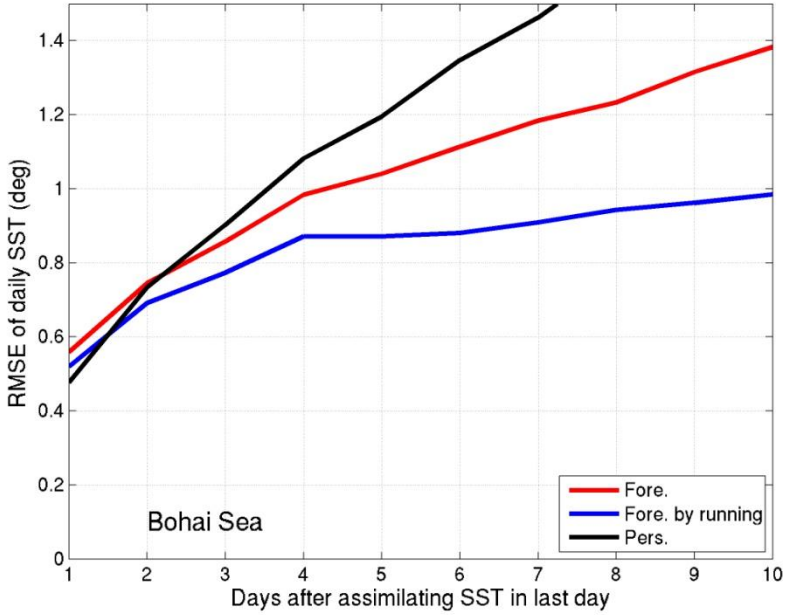


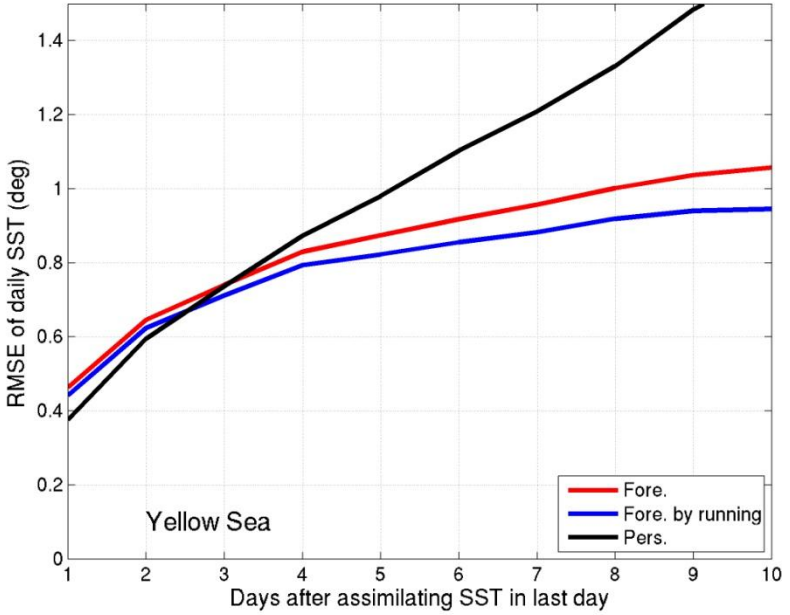




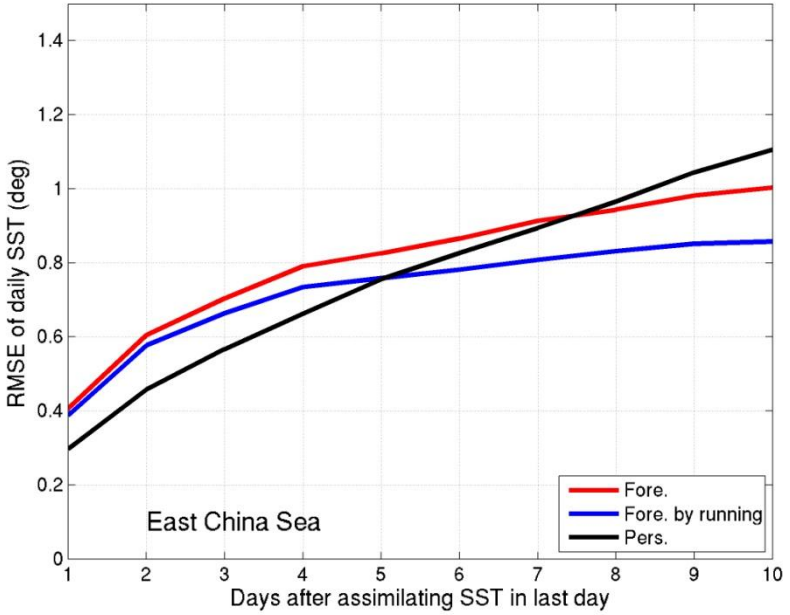






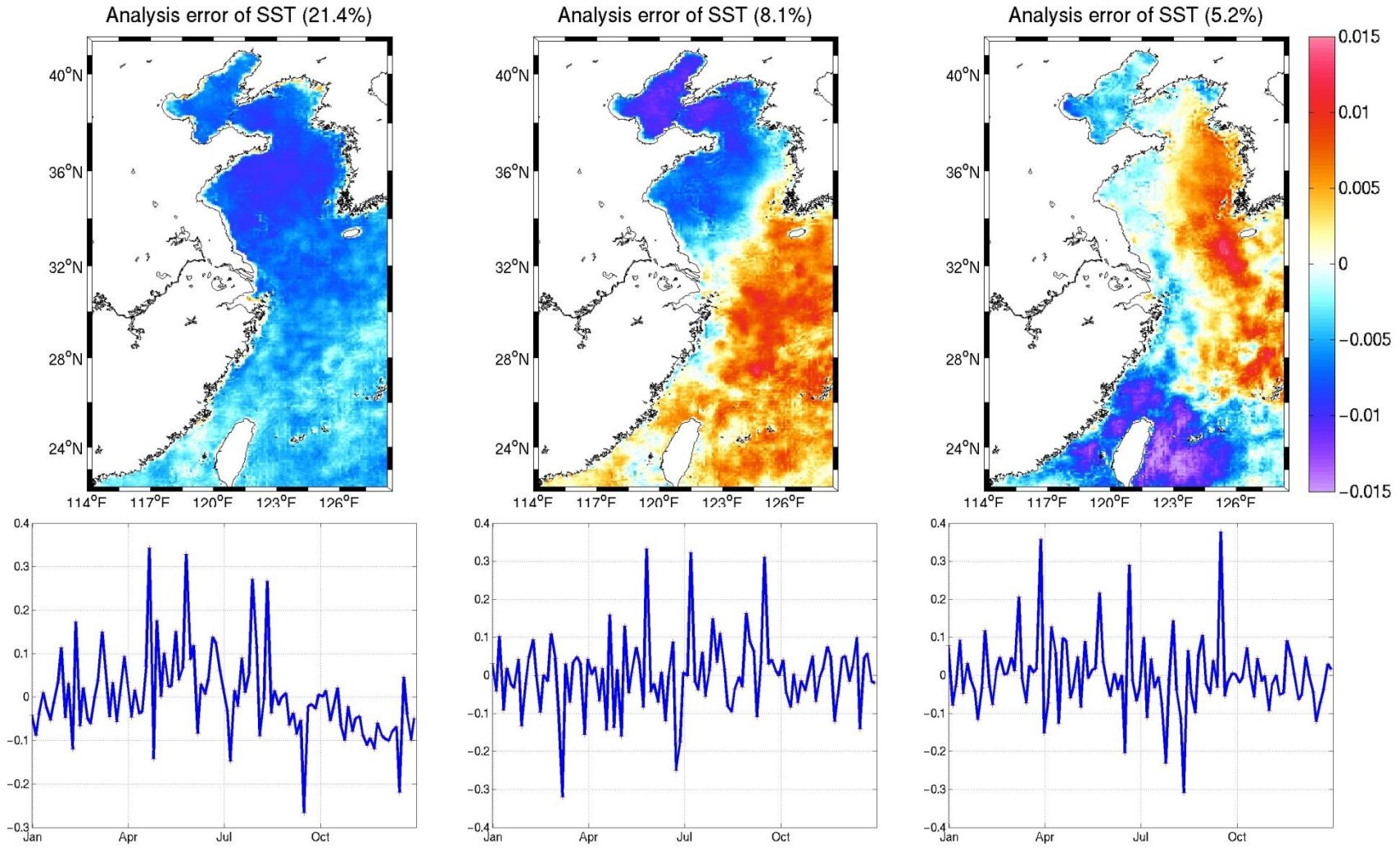


Running window = 20 days

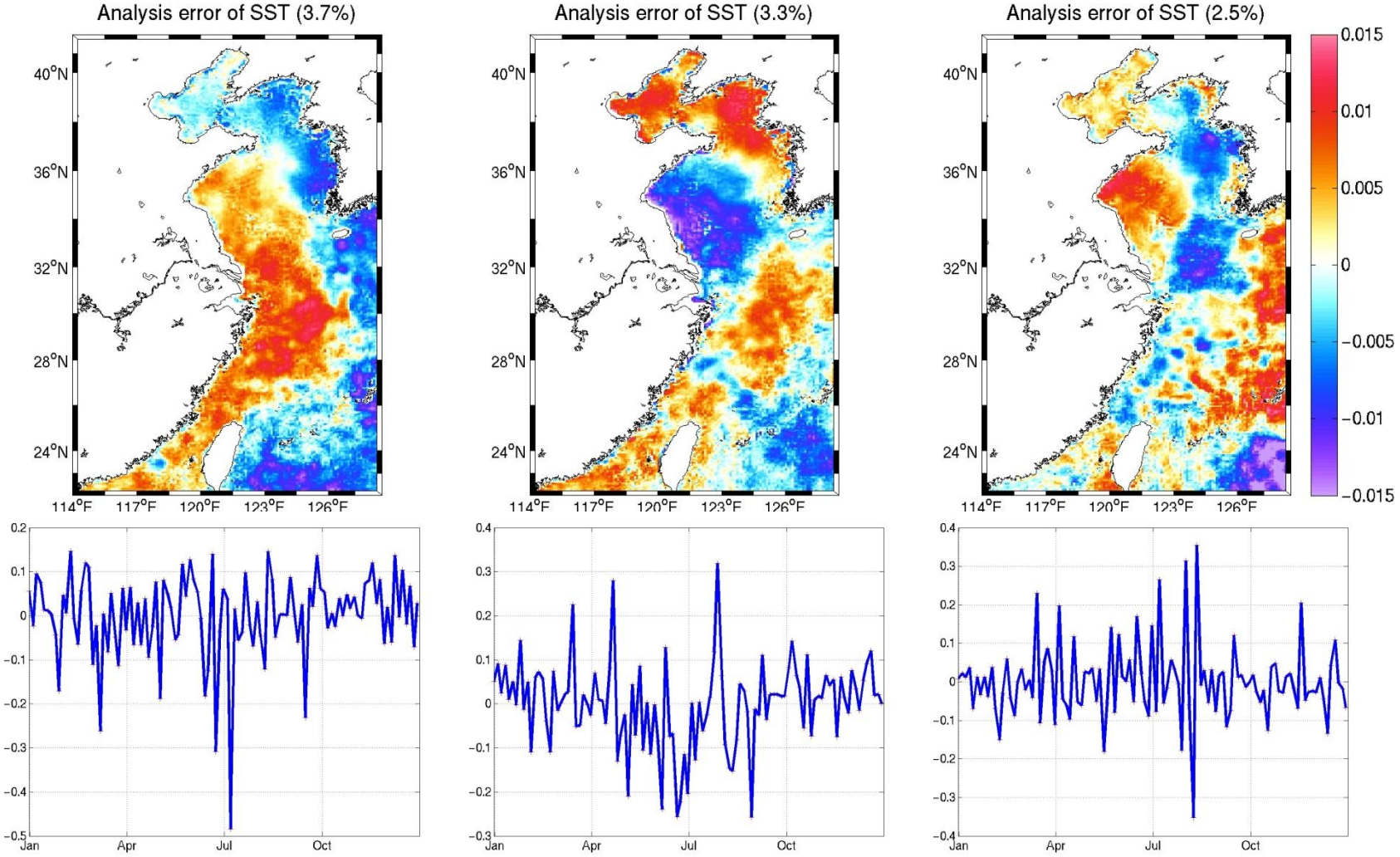


Thank you

The principal components and time coefficients through SVD



Based on the differences between the analyzed SST and the observed SST (about 105 fields), the SVD procedure is done after normalization.


Analysis error of SST (3.7%)
Analysis error of SST (3.3%)
Analysis error of SST (2.5%)
40°N
36°N
32°N
28°N
24°N
114°F
117°F
120°F
123°F
126°F
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
Jan
Apr
Jul
Oct