

# Analysis of Sea Surface Salinity Spatio-temporal Differentiation in the Yangtze Estuarine Waters Using MODIS

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The Yangtze River estuary is located in the intersection of sea and land, and its salinity is affected by the Yangtze River, East China Sea and socio-economic activities of Delta. Salinity can directly reflect the distribution of freshwater plumes. Therefore, research on the spatial and time distribution and variation of Yangtze River salinity is significant to understanding the importance of freshwater plume, material transport and estuarine environment.

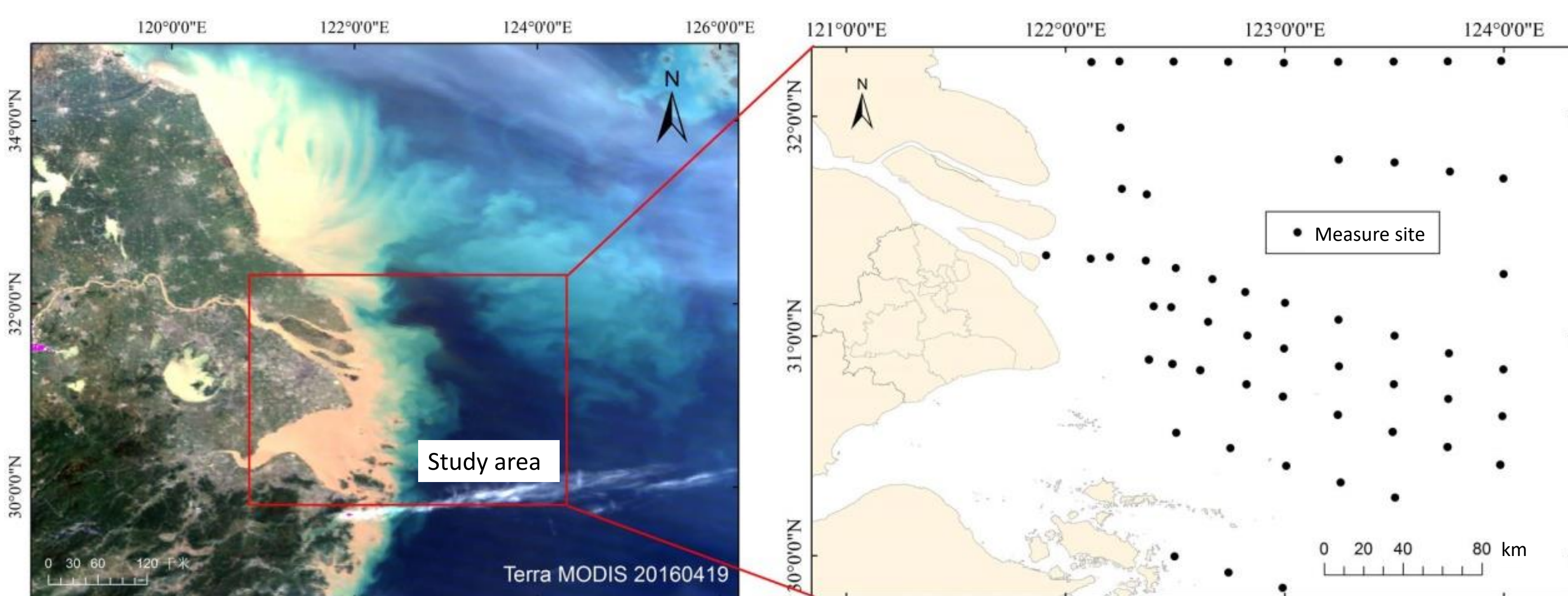


Fig.1 Study area field data site location distribution

Terra MODIS remote sensing reflectance/reflectance ratio and field data in dry/flood season are used to establish experienced retrieval models of Yangtze Estuary, RMSE of which are 0.45 psu and 0.88 psu.

$$SSS = 34.147e^{-0.285 \times R(555)/R(443)} \quad \text{flood season}$$

$$SSS = 98.984e^{-1.056 \times R(555)/R(469)} \quad \text{dry season}$$

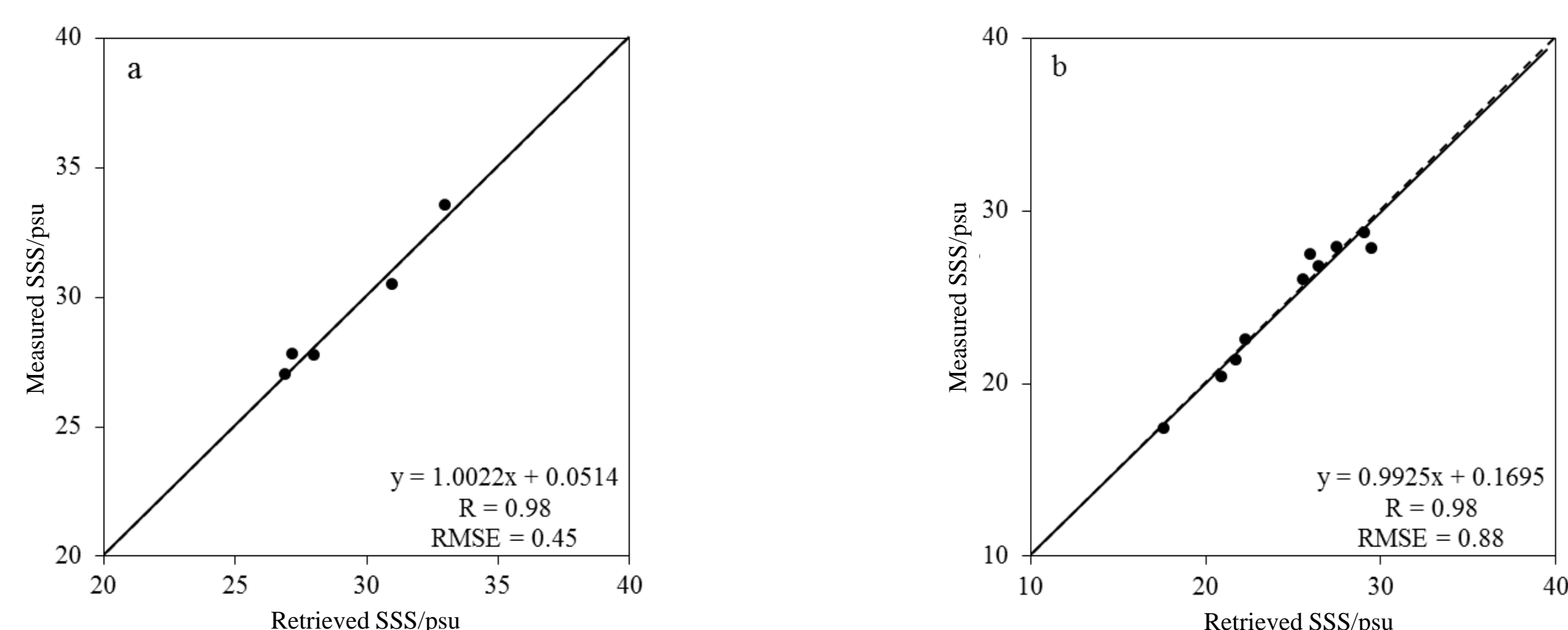


Fig.2 Correlation between retrieved SSS and field SSS in dry season (a) and flood season (b)

The applicability of the model in time scale is also analyzed. The models are used to retrieve SSS in Yangtze estuarine waters from 2007 to 2016, combined with the runoff observational data from Datong gauging station, to analyze the temporal and spatial variations of SSS.

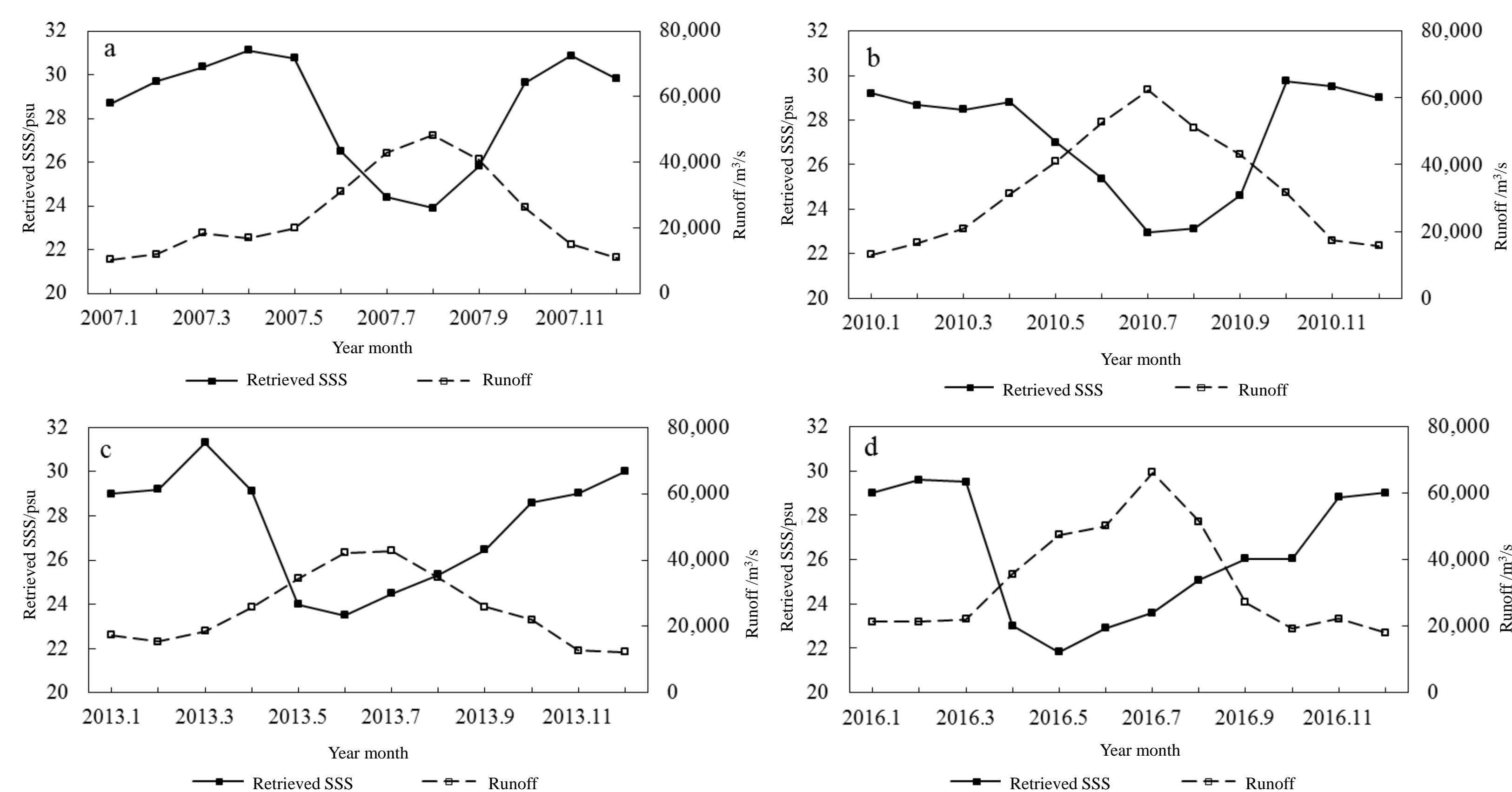


Fig.3 Comparison of retrieved monthly average SSS and Datong gauging station runoff in 2007(a), 2010(b), 2013(c), 2016(d)

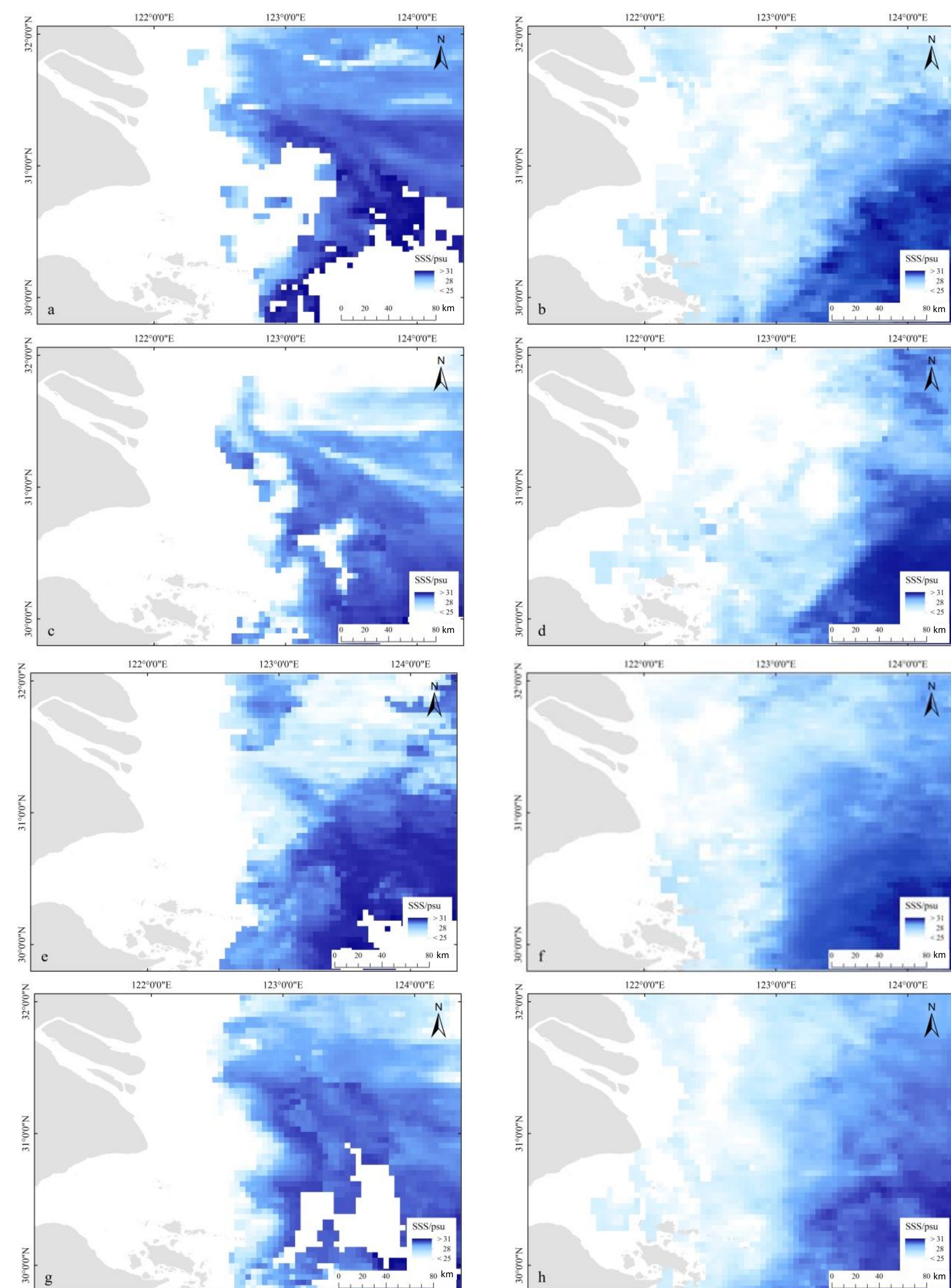


Fig.4 Comparison of retrieved monthly average SSS and Datong gauging station runoff in 2007.3 (a), 2007.8 (b), 2010.3 (c), 2010.8 (d), 2013.3 (e), 2013.8 (f), 2016.3 (g), 2016.8 (h)

The off-shore SSS appears higher in dry season, and high SSS waters reaches northward  $31.5^\circ$  N and westward  $123^\circ$  E, around the bifurcation of the south and the north branch of Yangtze Estuary. There is also a boundary of low and high SSS waters in the north of Yangtze estuarine in dry season. Diluted water influences larger area in flood season, which causes the high SSS waters gathering in eastward  $123^\circ$  E and southward  $31^\circ$  N, along with a low SSS area in the north of Yangtze estuarine.

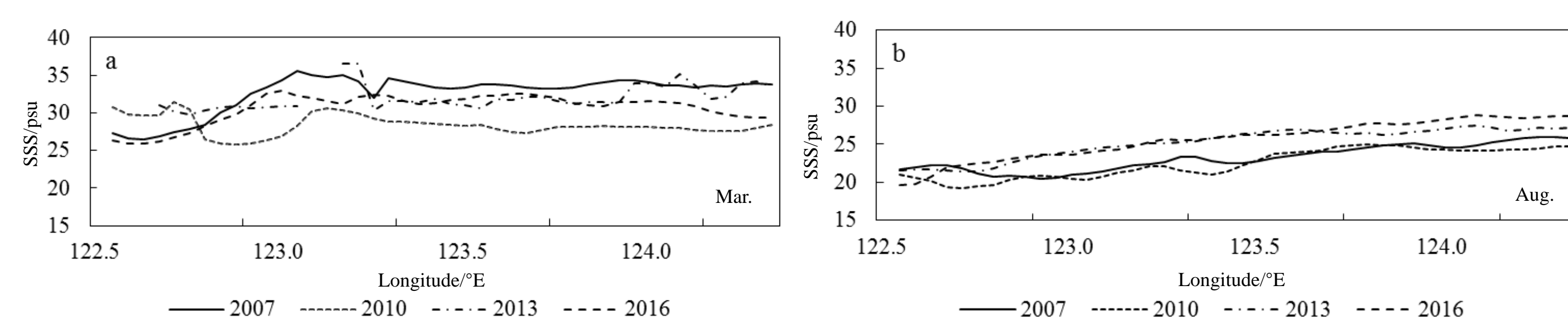


Fig.5 SSS variations of 31.25 SSS varia section in Yangtze estuary in Mar. (a) and Aug. (b)

The SSS variations during 2007 to 2016 have negative correlation with runoff.

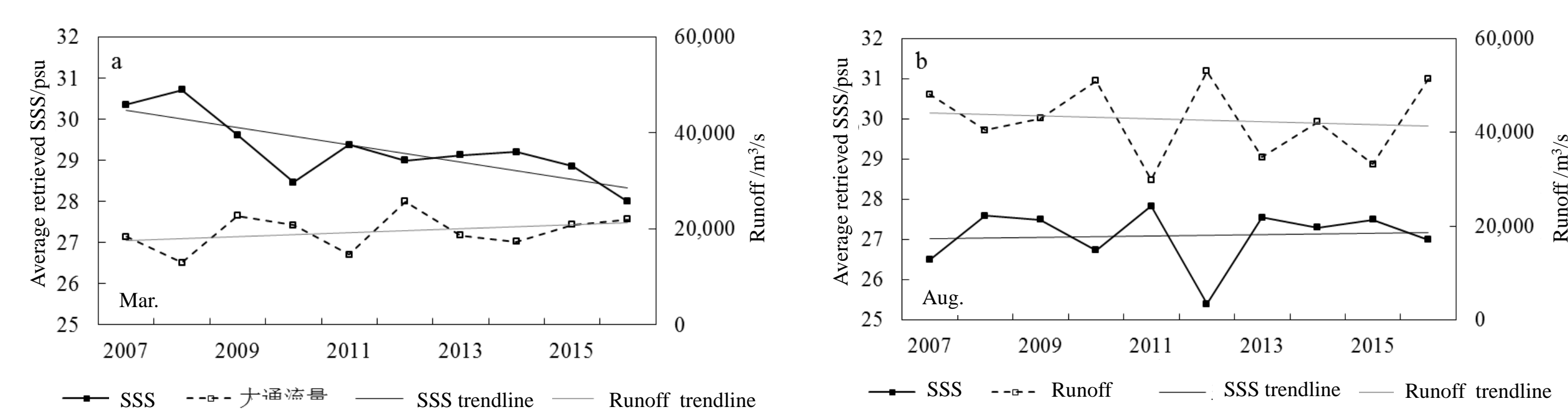


Fig.6 Comparison of retrieved SSS and Datong gauging station runoff during 2007-2016 in Mar. (a) and Aug. (b)