

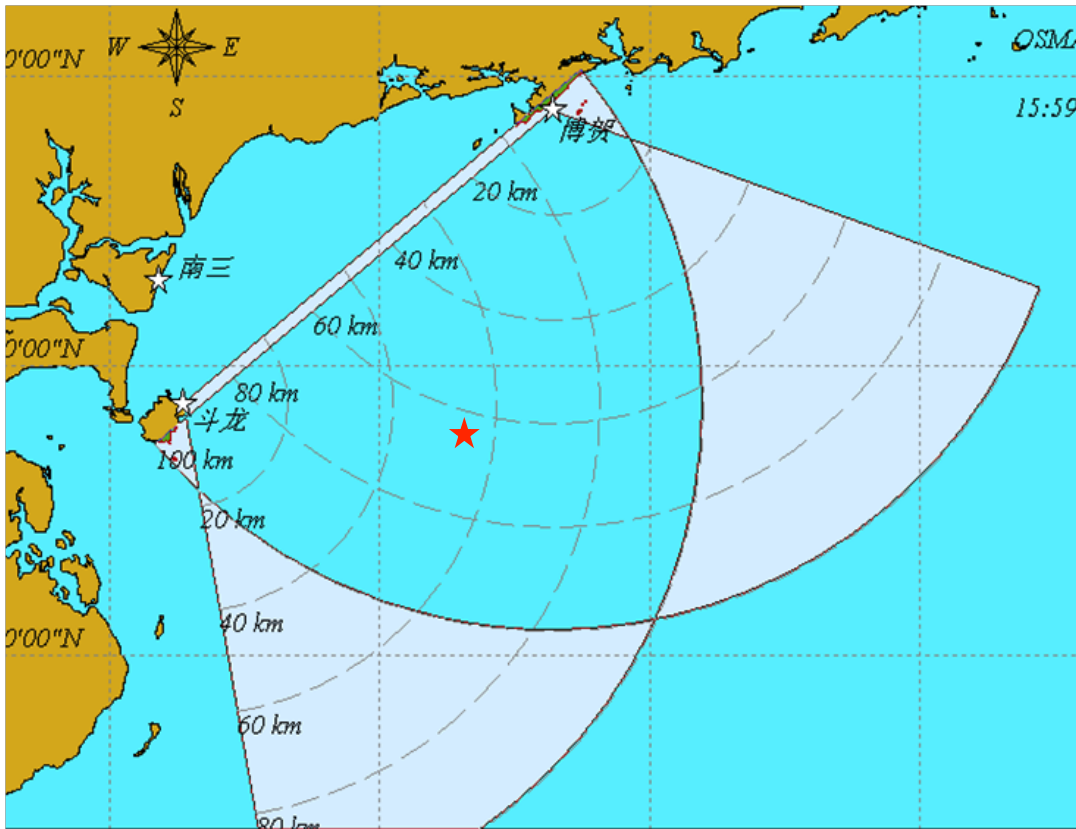
Coastal current observation and simulation in the western shelf of northern South China Sea

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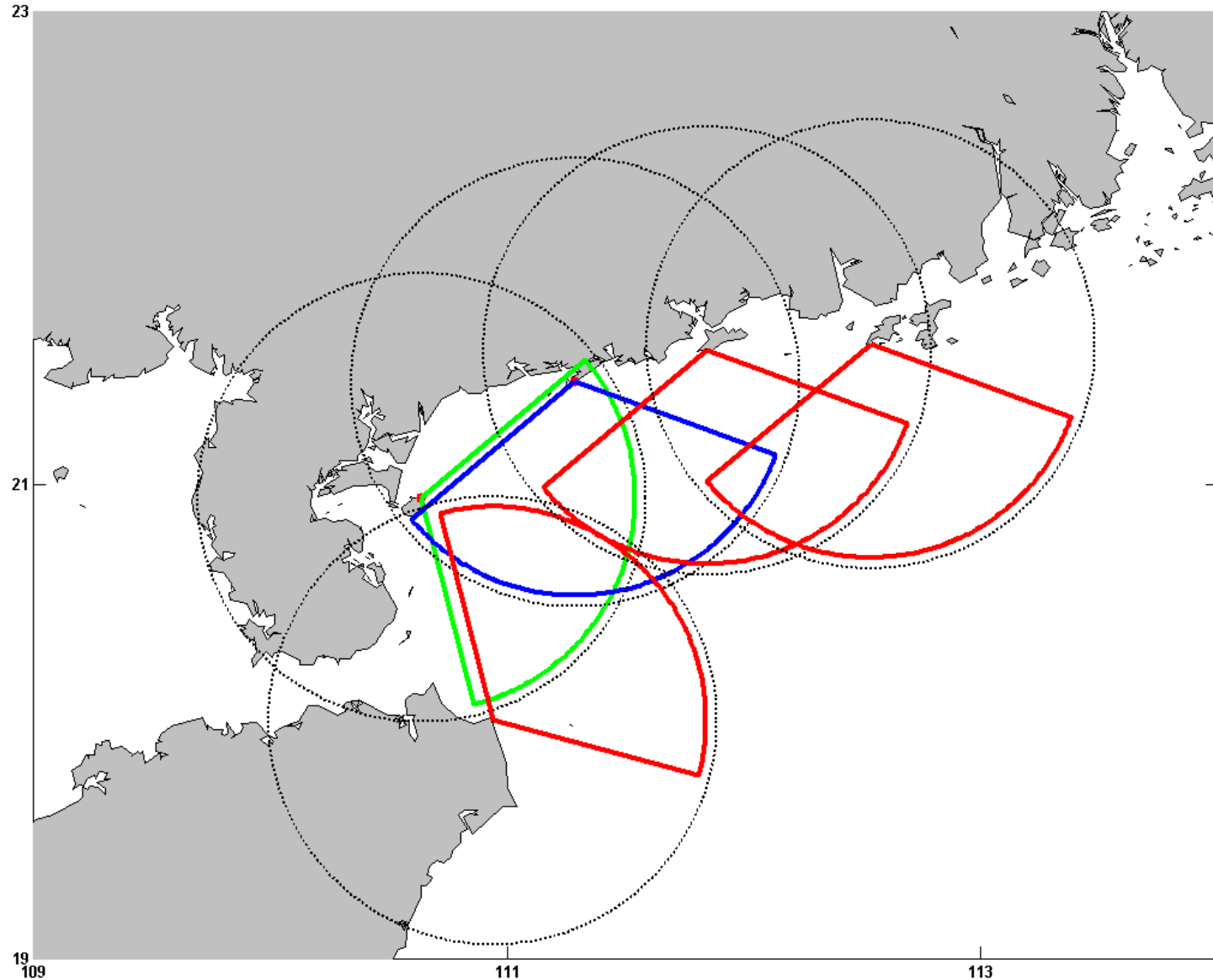
The first two HF-radar stations set up over the western coastal shelf of the Pearl River Estuary



Two HF Radar stations equipped with OSMAR-S100 (developed by Wuhan University), were located in Bohe and Doulong, and established in 2014. their distance is about 100km



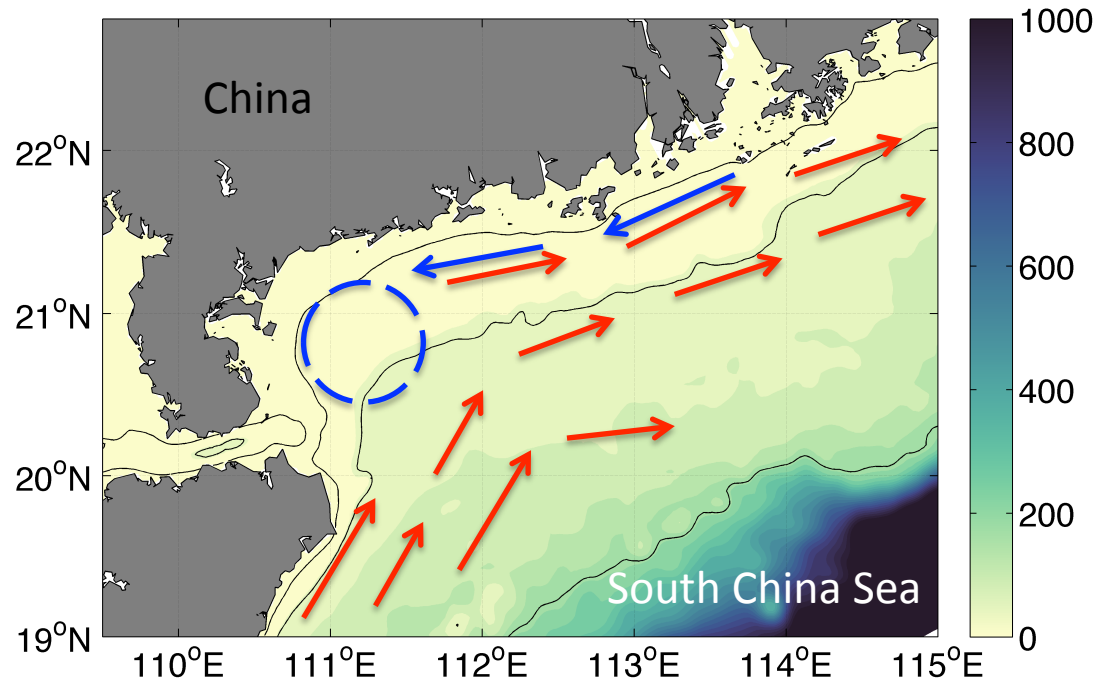
More HF-radar stations to be set up along the western shelf of the northern South China Sea



Why we are interested in this region?

- **High resolution numerical model shows complex circulation structures with cyclonic and anticyclonic eddies in the western shelf in the northern SCS, which might be closely related with the spreading of Pearl River plume.**
- **The current structures are much more complicated than that shown by the previous in-situ observation**
- **Important for the transportation and redistribution of fresh water (Pearl River plume), oceanic and terrestrial materials over the shelf**

Topography (color contour), sketch of the coastal currents (red arrows) over the western shelf of the Northern SCS according to previous limited resolution observation. Blue arrows and dash line circle show the alongshore coastal current and cyclonic circulation in the Guangzhou Bay in winter, which could be reverse in summer.

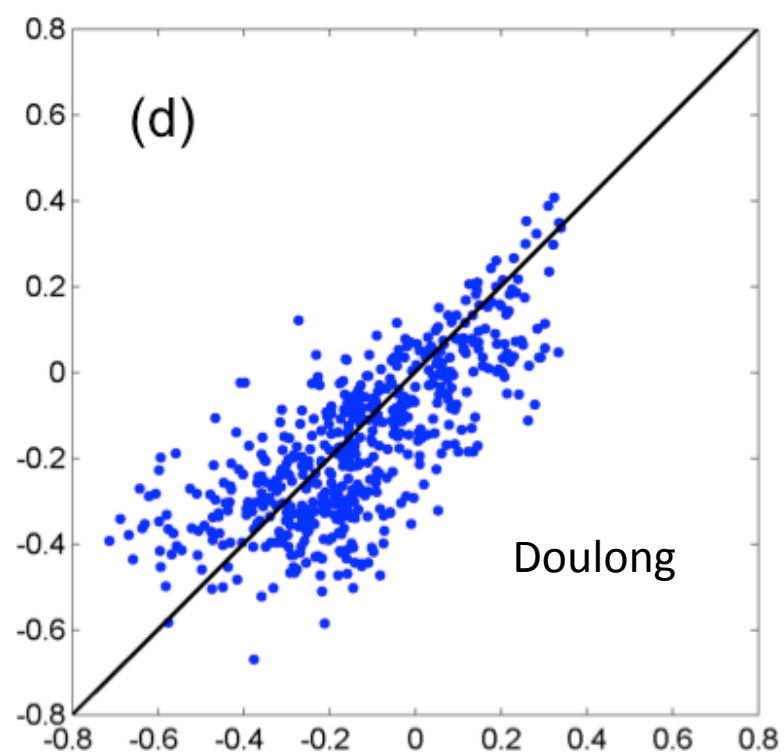
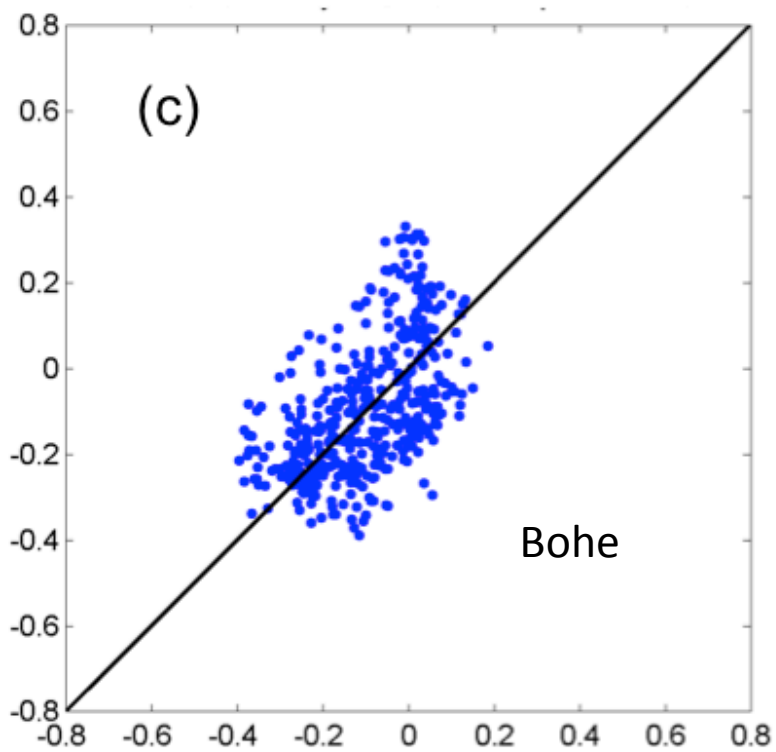
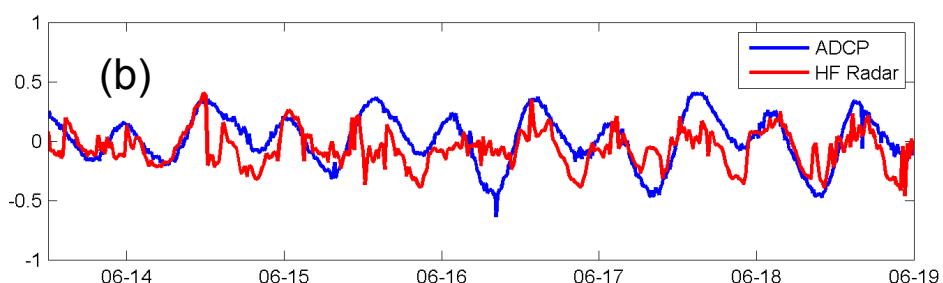
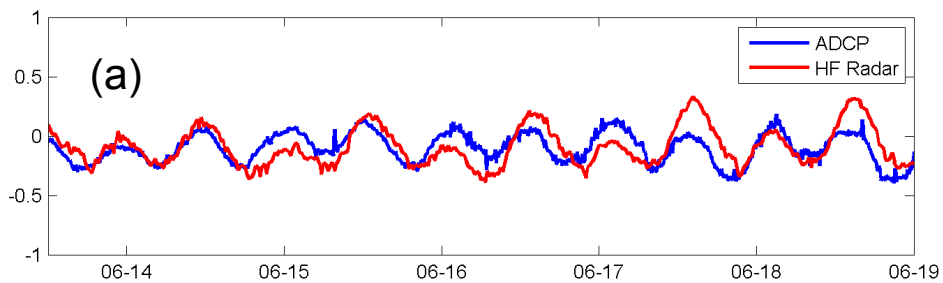


Model configuration

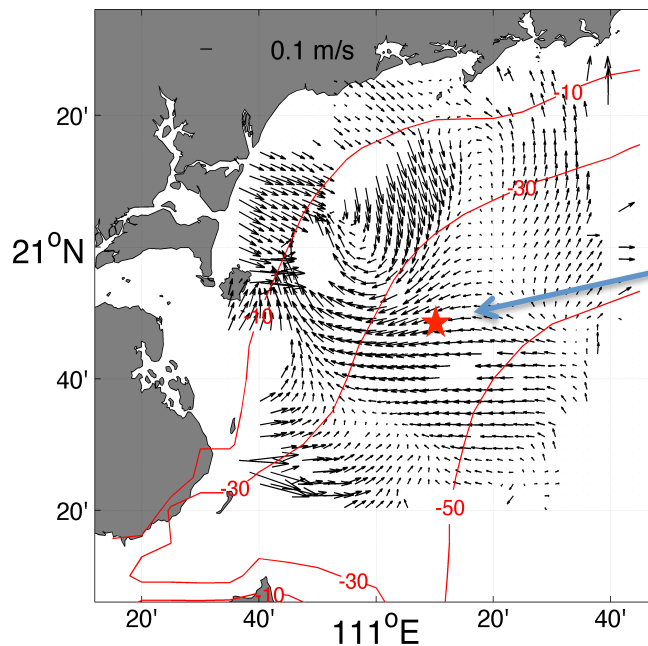
- **The Regional Ocean Modeling System (ROMS) is used**
- **Model domain covers the northern SCS shelf, and is similar to that in Gan et al., (2009)**
- **The model is forced by the 3 hourly atmospheric data from ECMWF Re-analysis Interim (ERA-Interim) products**
- **Its lateral open boundary information is provided from HYCOM +NCODA Global 1/12 Analysis (GLBa0.08) data.**
- **Tidal forcing is from OTPS8**



Comparison of the HF-radar radial velocity with the radial component of current observed by ADCP mooring



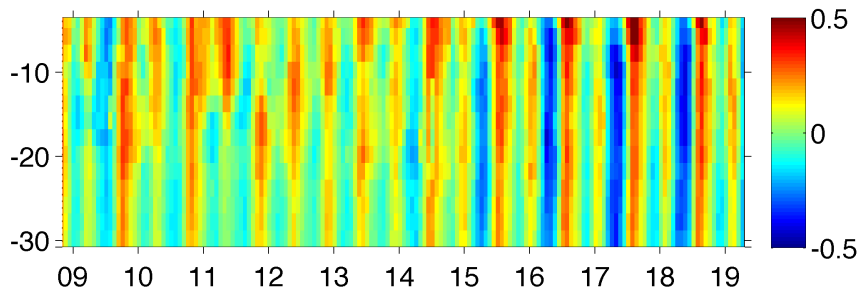
HF-residual (20150619)



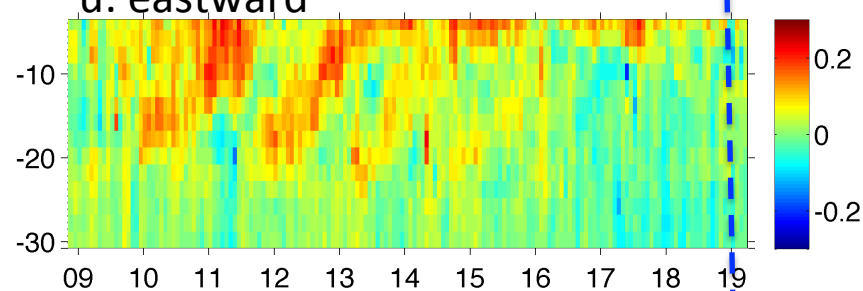
ADCP mooring

Total current

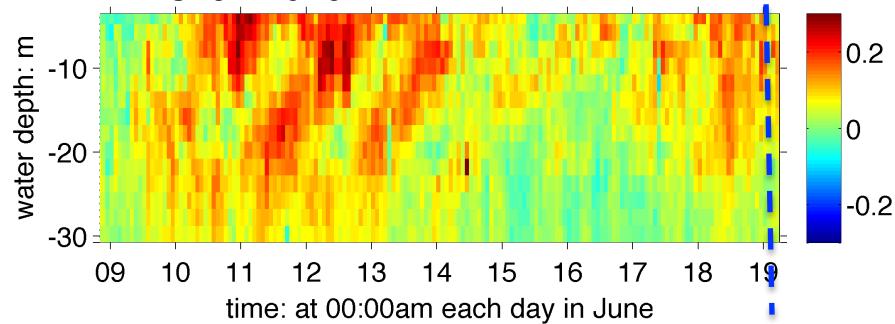
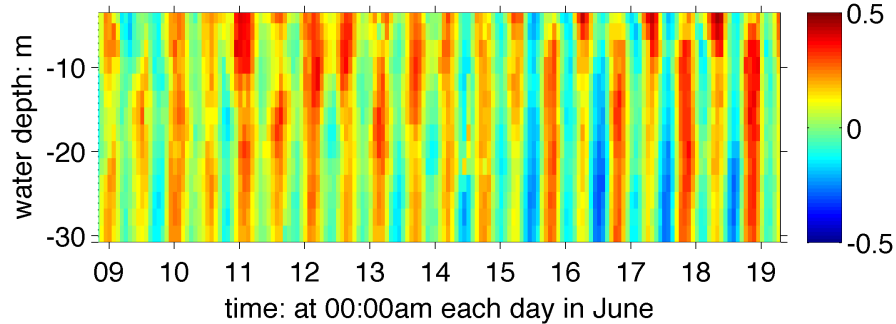
Residual current



u: eastward



v: northward



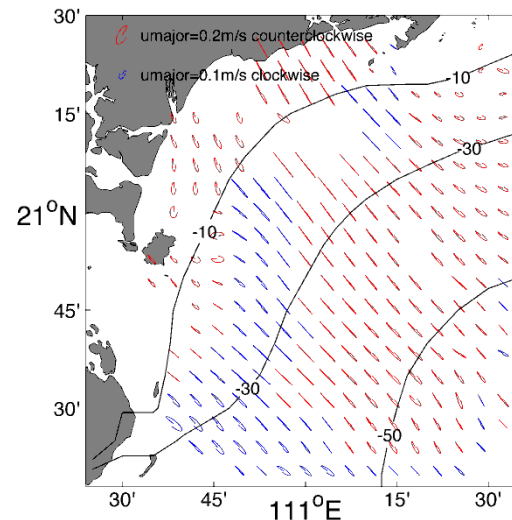
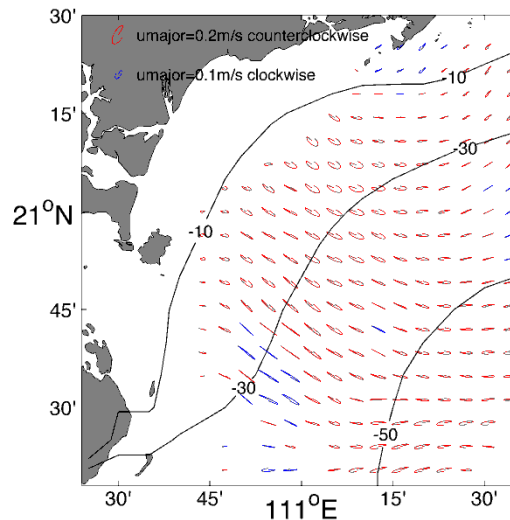
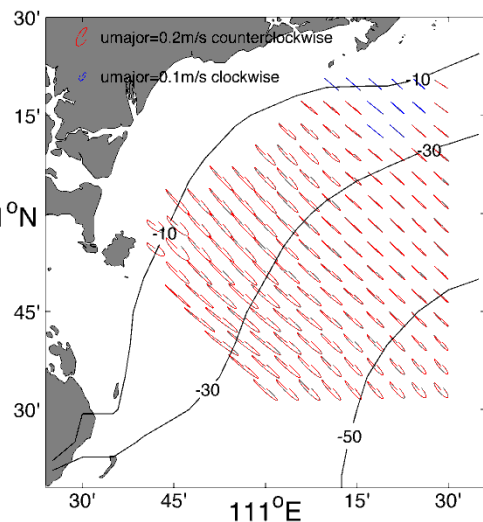
Tidal current ellipses obtained from HF radar observation in different time or season

July, 2014年
8 days

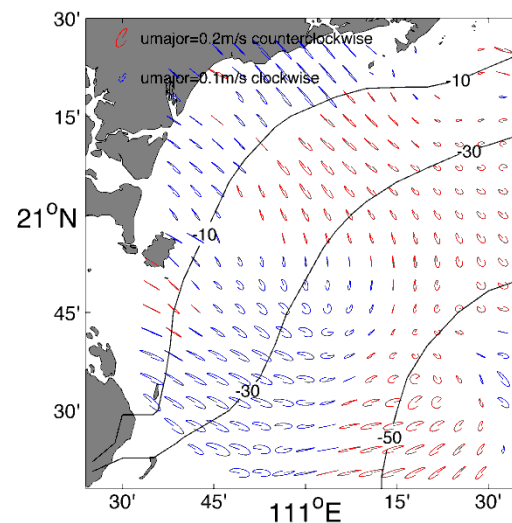
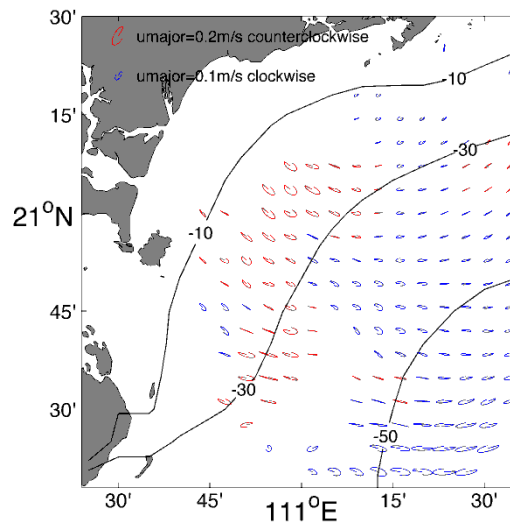
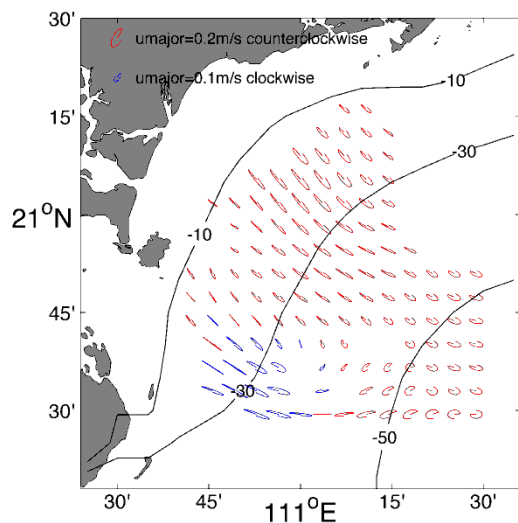
Nov, 2014
30 days

June, 2015
15 days

M2



K1

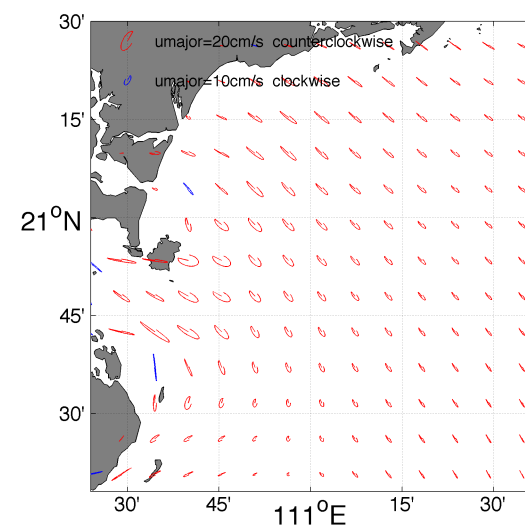
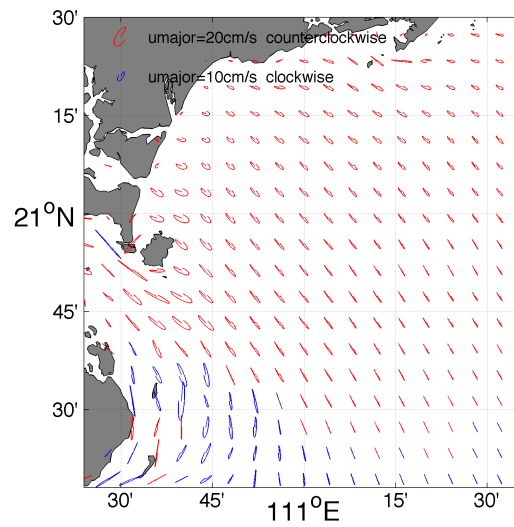
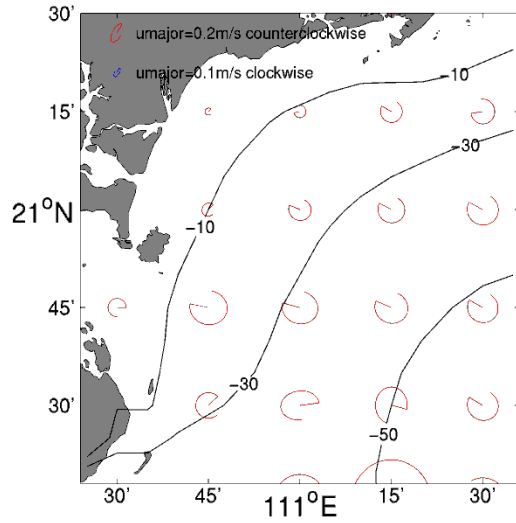


Tidal current ellipse from different resolution tidal model

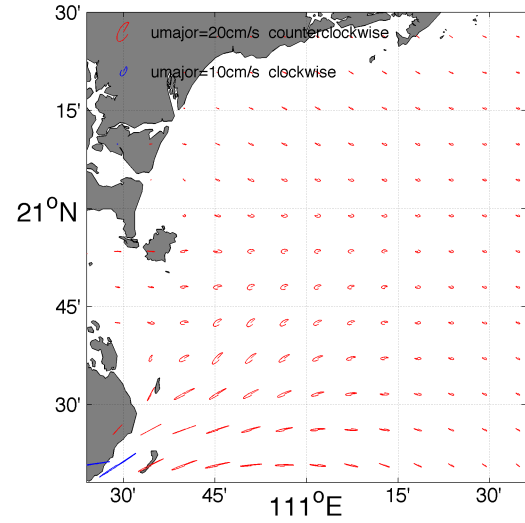
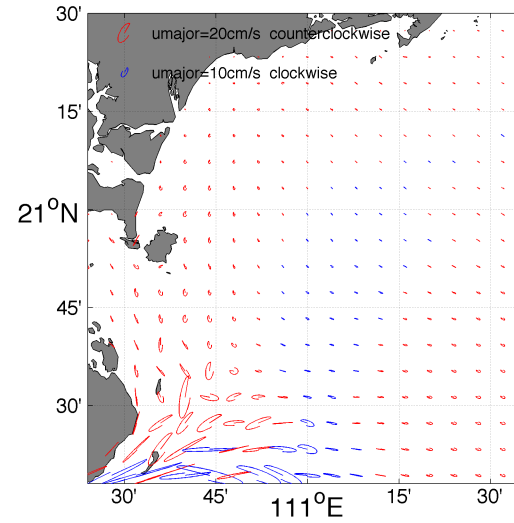
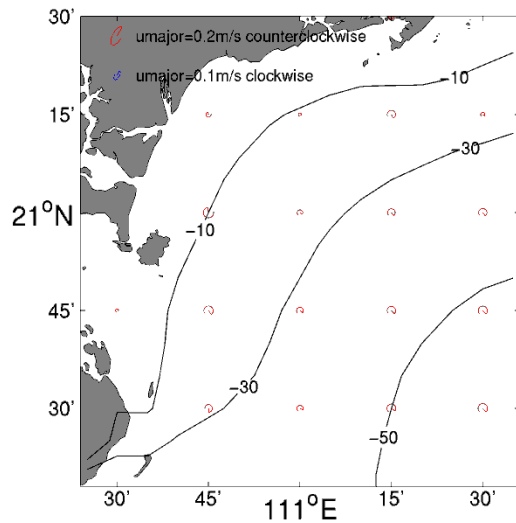
M2 global (TPXO7.2, 1/6)

China Sea (YS, 1/30)

South China Sea (1/12)

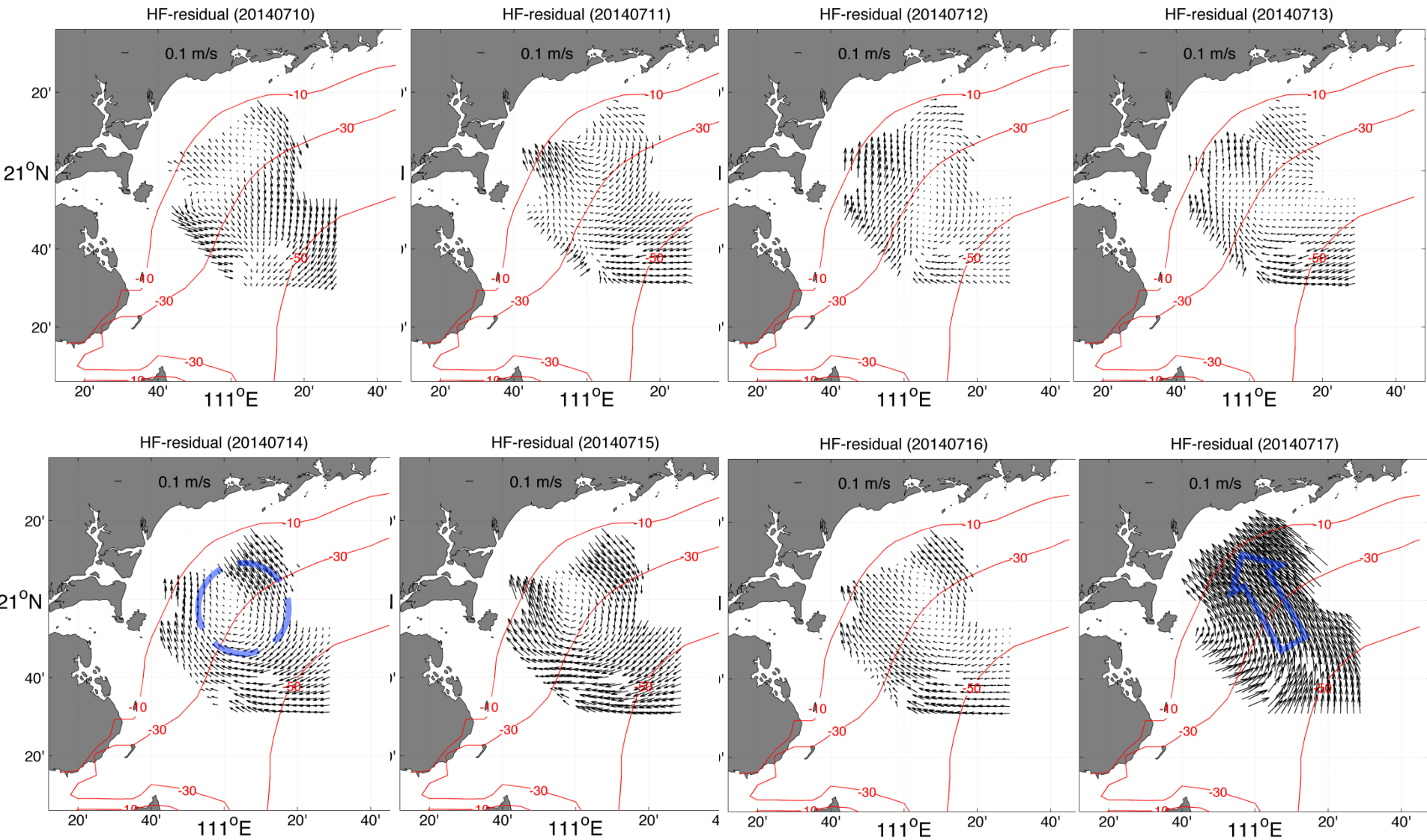


K1

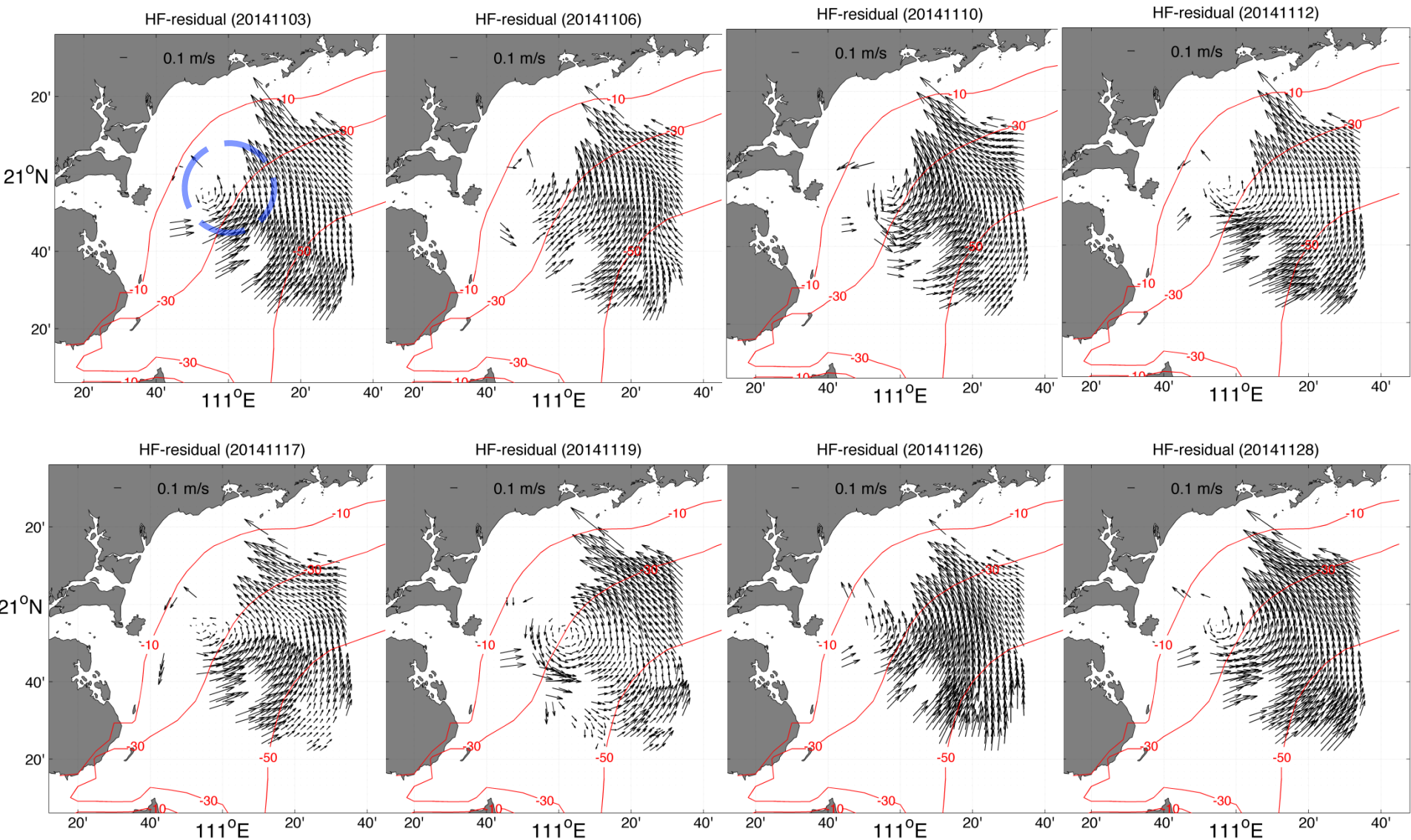


Comparisons show that HF-radar could reasonably capture the surface current features

Daily residual current: anticyclonic eddy with variation in July 2014



Daily residual current: cyclonic eddy with variation in November 2014



Surface current derived from HF-radar observation also show complicated variation of the current with eddies