Analyses of surface currents around Taiwan derived from the TORI HF-Radar Observations

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1 Introdution & Motivation

- Different dynamics around the island
- Kuroshio Current in the East
- Seasonal varying Monsoon winds
- Strong tidal dynamics

-> Is CODAR surface current data showing these signals and/or something new?
-> What is the relative influence of wind and geostrophic flow on different spatial and temporal scales?

2 Data & Methods

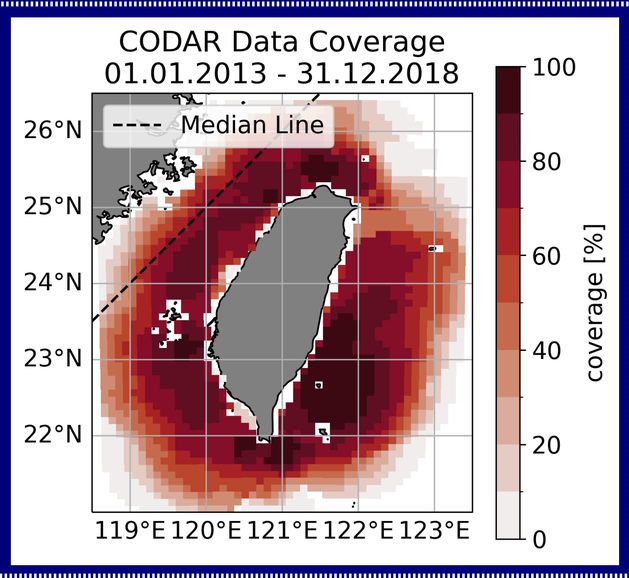
- Hourly CODAR surface currents from TORI
- Hourly wind data from ERA5 Reanalysis
- Daily geostrophic currents from CMEMS
- all from 01.01.2013 - 31.12.2017

- Non-uniform FFT
- Tide Removal
- EOF Analysis
- Vector cross-correlation

3 Results

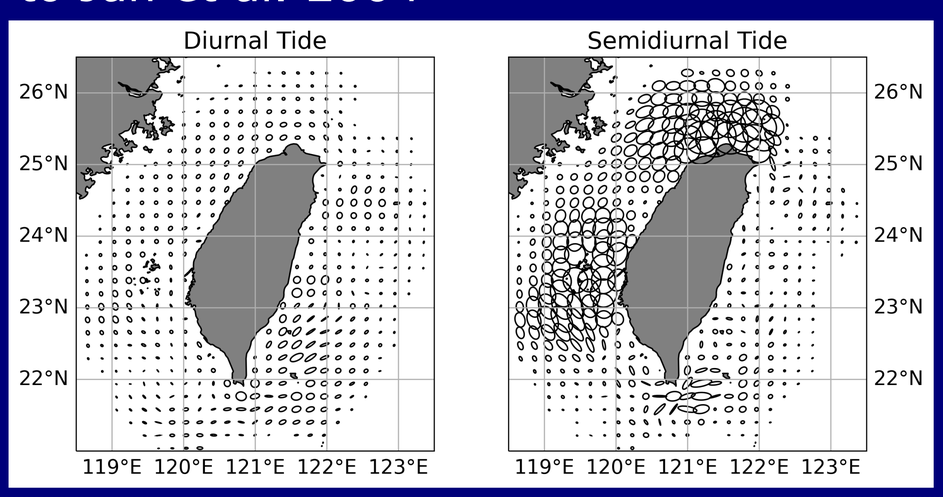
3.1 Coverage

- good around the whole island
- best in Southeast
- mostly sufficient to perform trustworthy analysis
- important to keep in mind



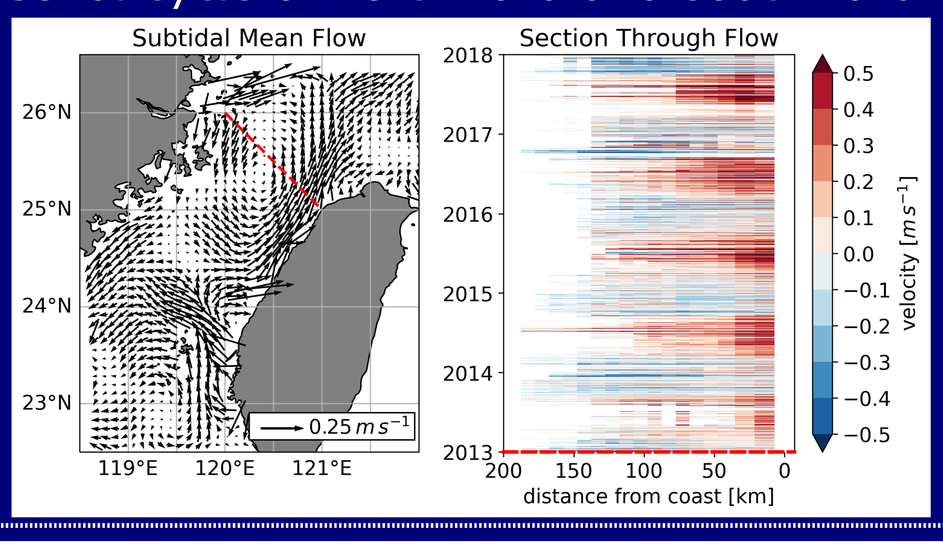
3.2 Tides

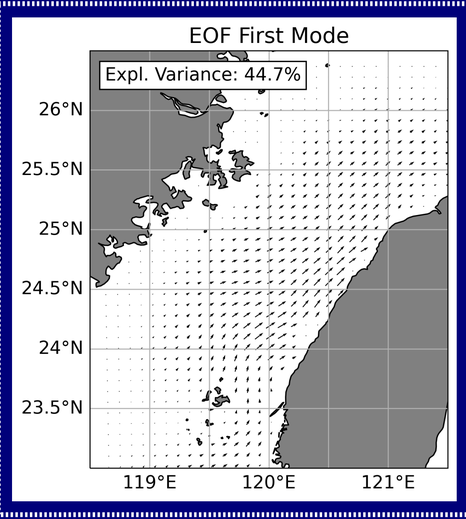
- semidiurnal dominates; especially in the Strait
- diurnal important in the east
- fits to Jan et al. 2004



3.3 Subtidal Flow

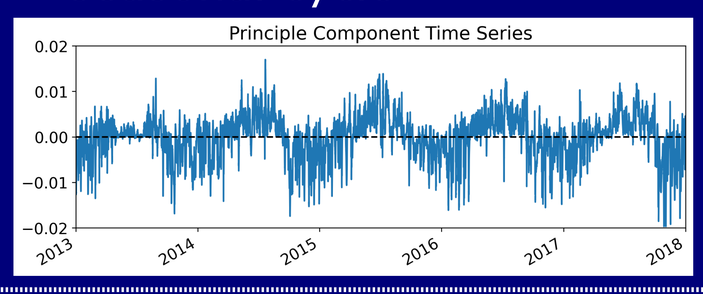
- northward mean flow along the west coast
- mean flow is guided by bathymetry
- seasonal cycle of northward and southward flow





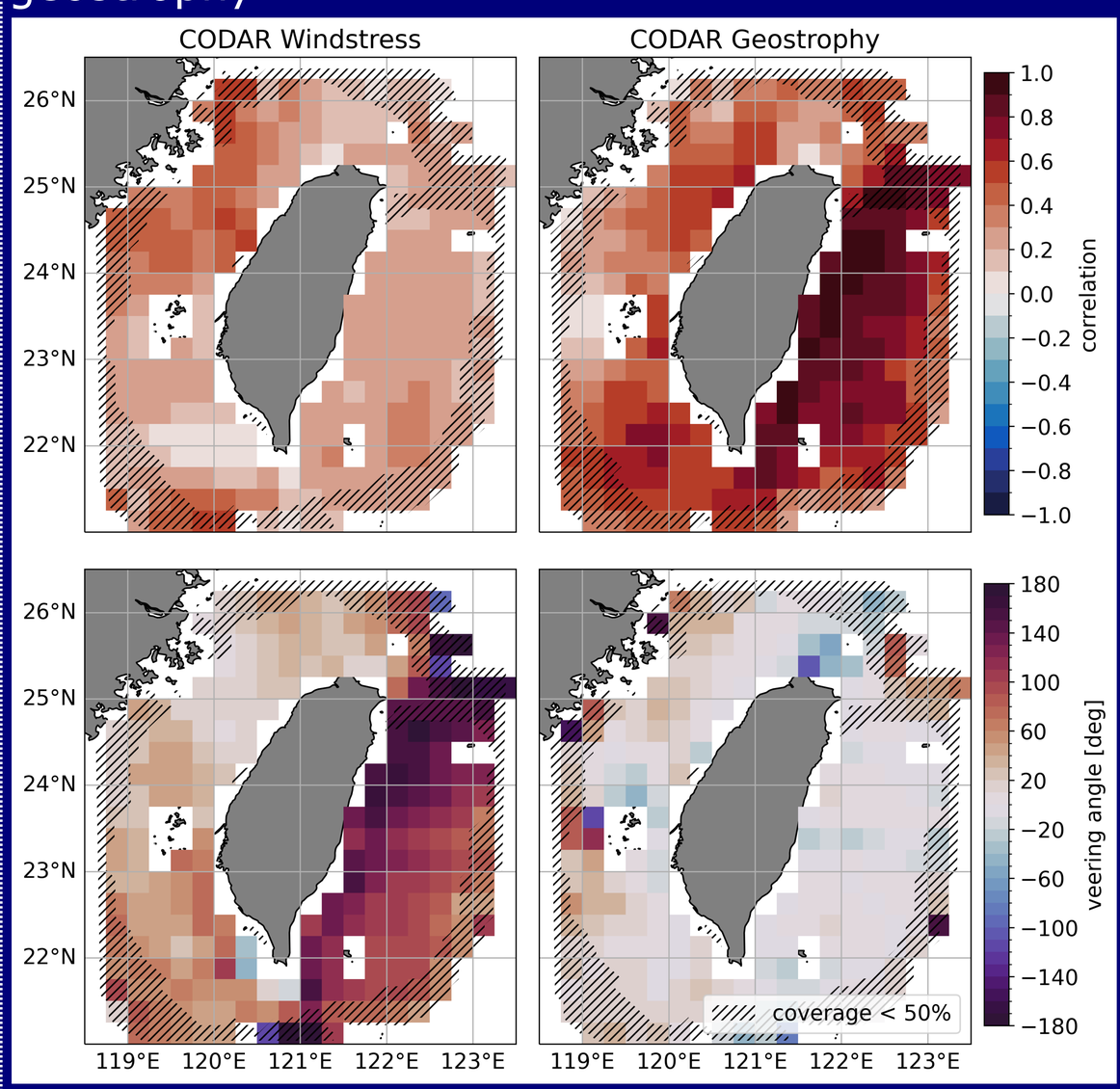
3.4 EOF Analysis

- pattern of northward/ southward flow
- seasonal cycle



3.5 Vector Cross-Correlation

- Wind influence larger in Taiwan Strait
- Geostrophy dominates the east
- Wind Veering angle in Taiwan Strait could relate to Ekman dynamics
- Flow is on average in similar direction as geostrophy



4 Conclusion

- TORI HF-Radar observations provide a great dataset to study ocean dynamics around Taiwan
- Tides are very prominent in the raw data
- Subtidal flow shows seasonal fluctuation in Taiwan Strait
- Radar-derived subtidal flow is largely related to satellite-derived geostrophic flow
- Wind acts on seasonal timescales to influence the surface signal
- Are results statistically significant?
- Apply an eddy tracking algorithm to possibly investigate their interaction with the Kuroshio

Acknowledgements

I want to thank Prof. Ying-Chih Fang from the National Sun-Yat-Sen University Kaohsiung for his highy valuable input for the analysis. Additionally, I want to thank the National Applied Research Laboratories NARLabs as well as the German Accademic Exchange Service DAAD for scholarships to fund my internship at the Taiwan Ocean Research Institute TORI and of course TORI itself for giving me this opportunity.