POC-P

Factors affecting the local variability of the Kuroshio: The Changjiang diluted water effect

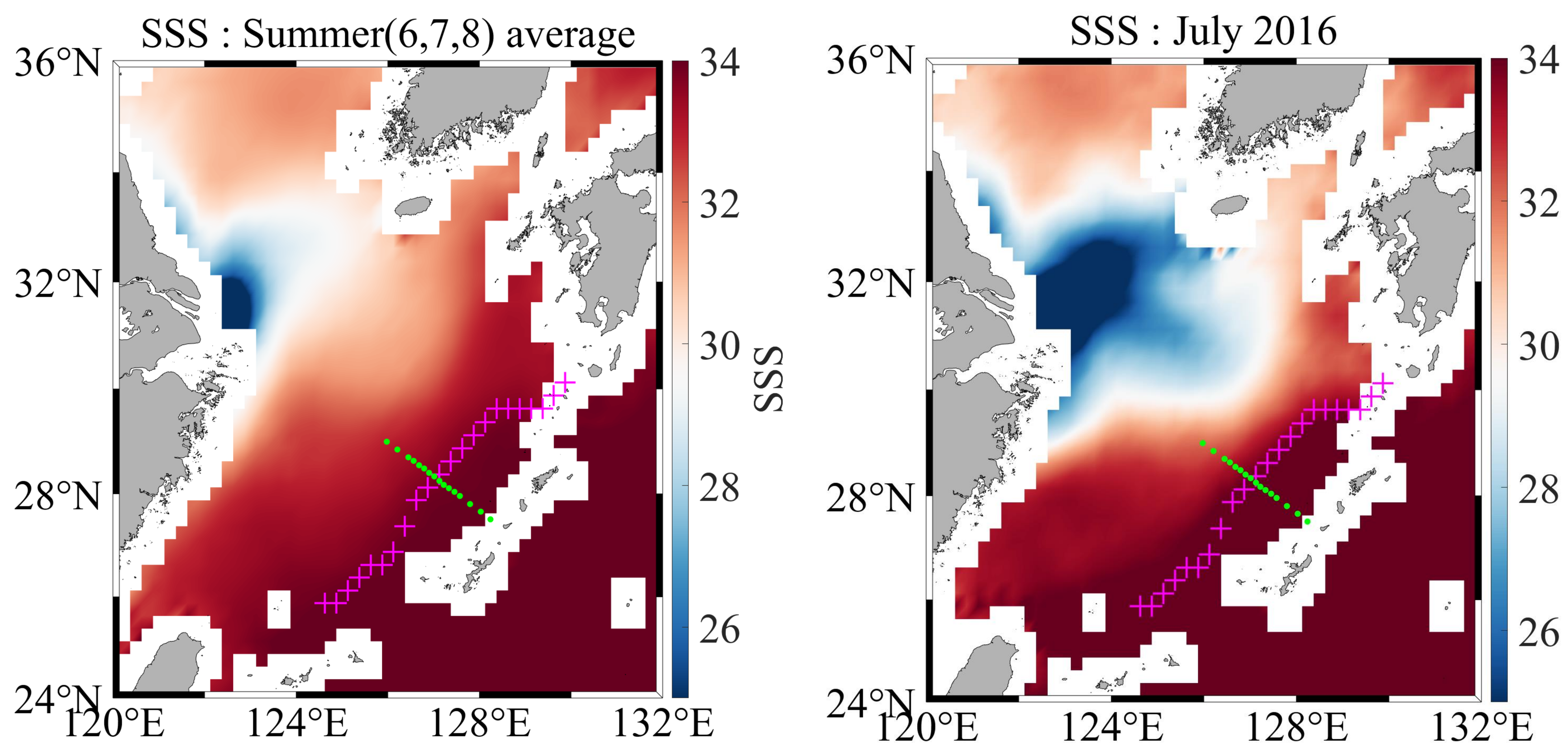
Eun-Seo Jeong and Jae-Hyoung Park

(eunseojeong6@gmail.com)

Department of Oceanography, Pukyong National University, 45, Yongso-ro, Nam-gu, Busan 48513, Republic of Korea

PUKYONG NATIONAL UNIVERSITY

1 Introduction



- ✓ The Changjiang diluted water (CDW) affects the marine ecosystem and circulations in the East China Sea (ECS) during summer (Uncles, 2002; Yu and Shen, 2011; Day et al., 2012).
- ✓ Western boundary currents flow in geostrophic balance (Gill, A. E., 1982), so the Kuroshio current (KC) is affected by density gradients.
- ✓ In this study, we hypothesized that the CDW in low-salinity waters alters density structure, impacting the intensity of the KC.

2 Data and methods

- ✓ **ADT data** (0.25° × 0.25°) from the Copernicus Climate Change Service (C3S), based on two satellites. - 1993/01 ~ 2021/12
- ✓ **L3 8-day running SSS data** (ver. 0.53) from the Soil Moisture Active Passive (SMAP) mission - 2015/04 ~ 2023/06
- ✓ **Hydrographic data** (temperature, salinity, pressure) at PN section from the Japan Meteorological Agency (JMA) - 2000/01~2019/06

➢ Equations

⁎ Steric height

$$\zeta_{st} = -\int_{-H}^{0} \frac{\rho'}{\rho_0} dz$$ (Archer et al., 2022)

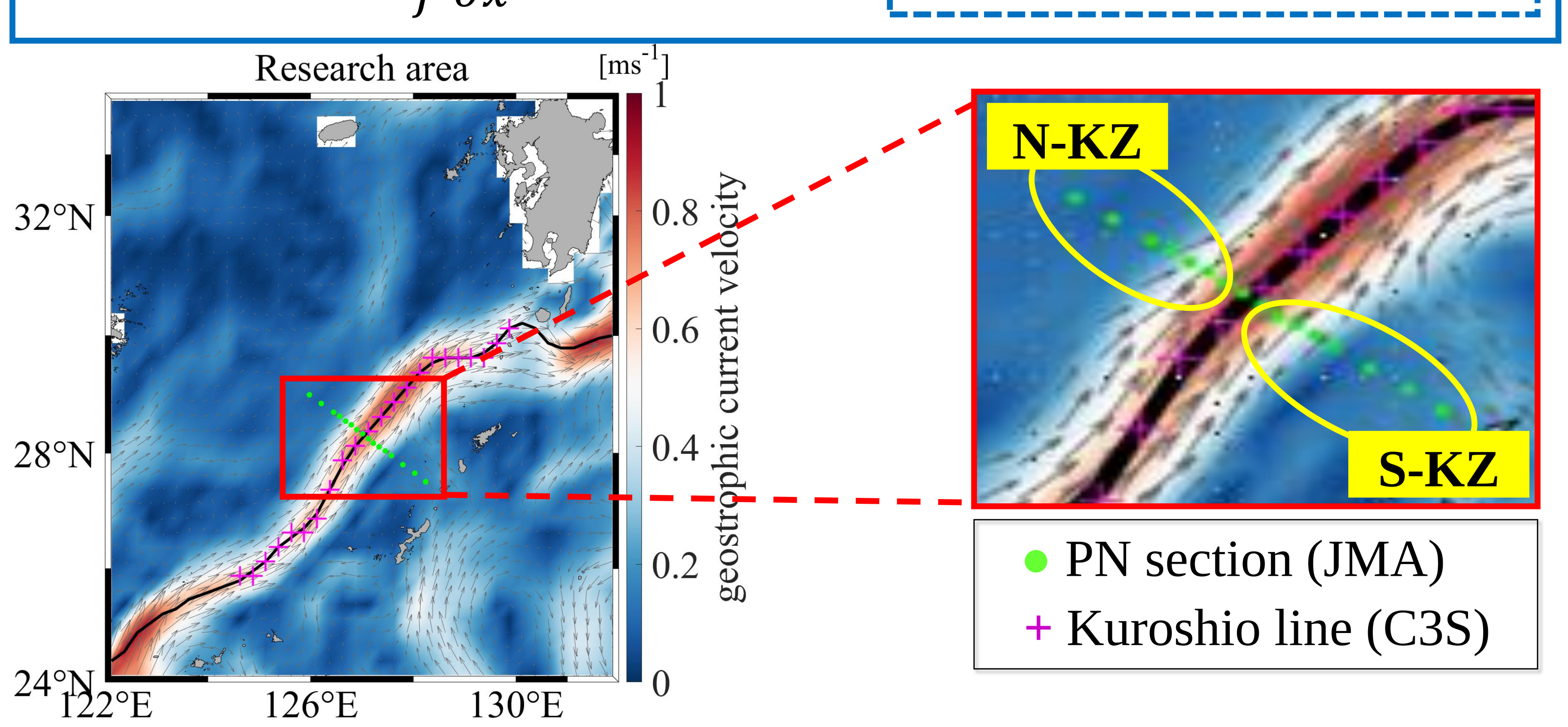
⁎ Barotrophic geostrophic current

$$v_g = \frac{g}{f}\frac{\partial \eta}{\partial x}$$

✓ Steric height is integrated up to 91m.

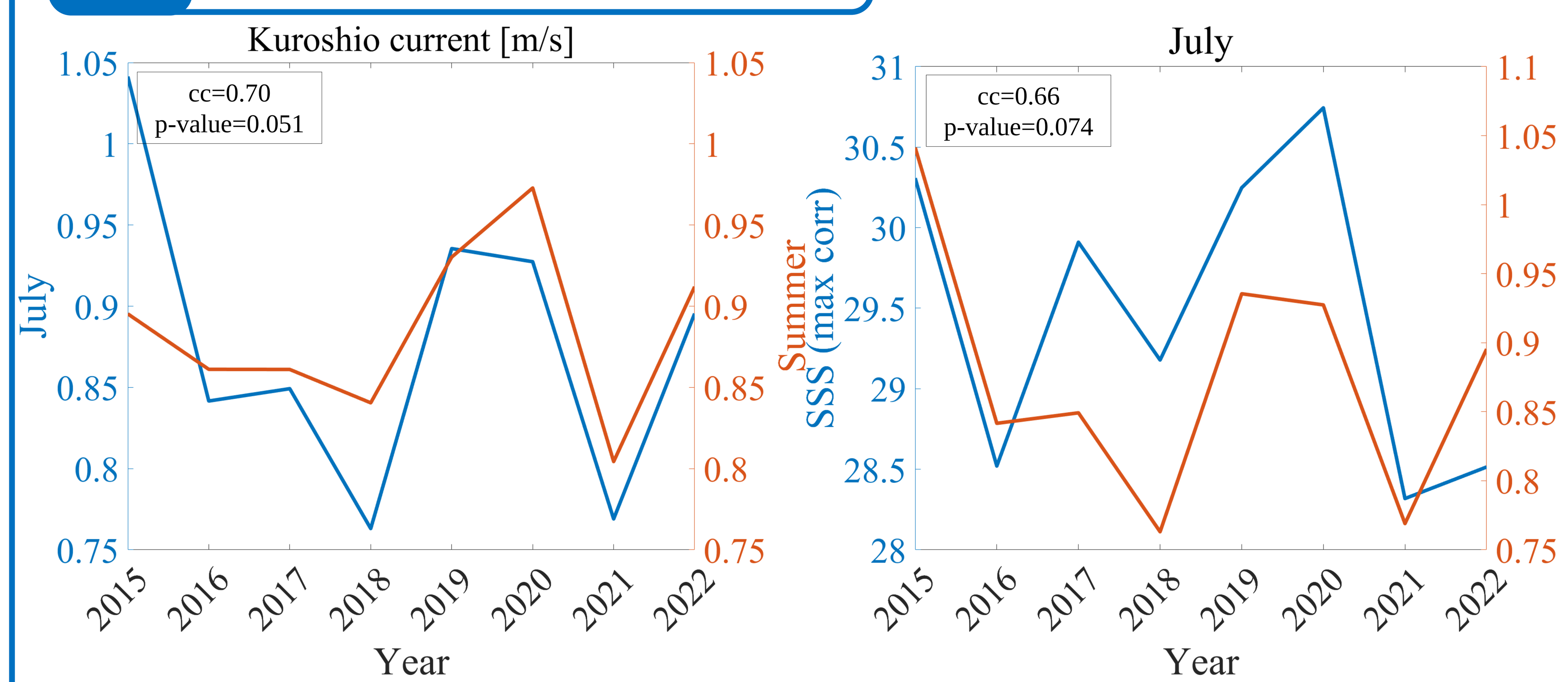
⬇

This is because data for about 20 years exists up to 91m.



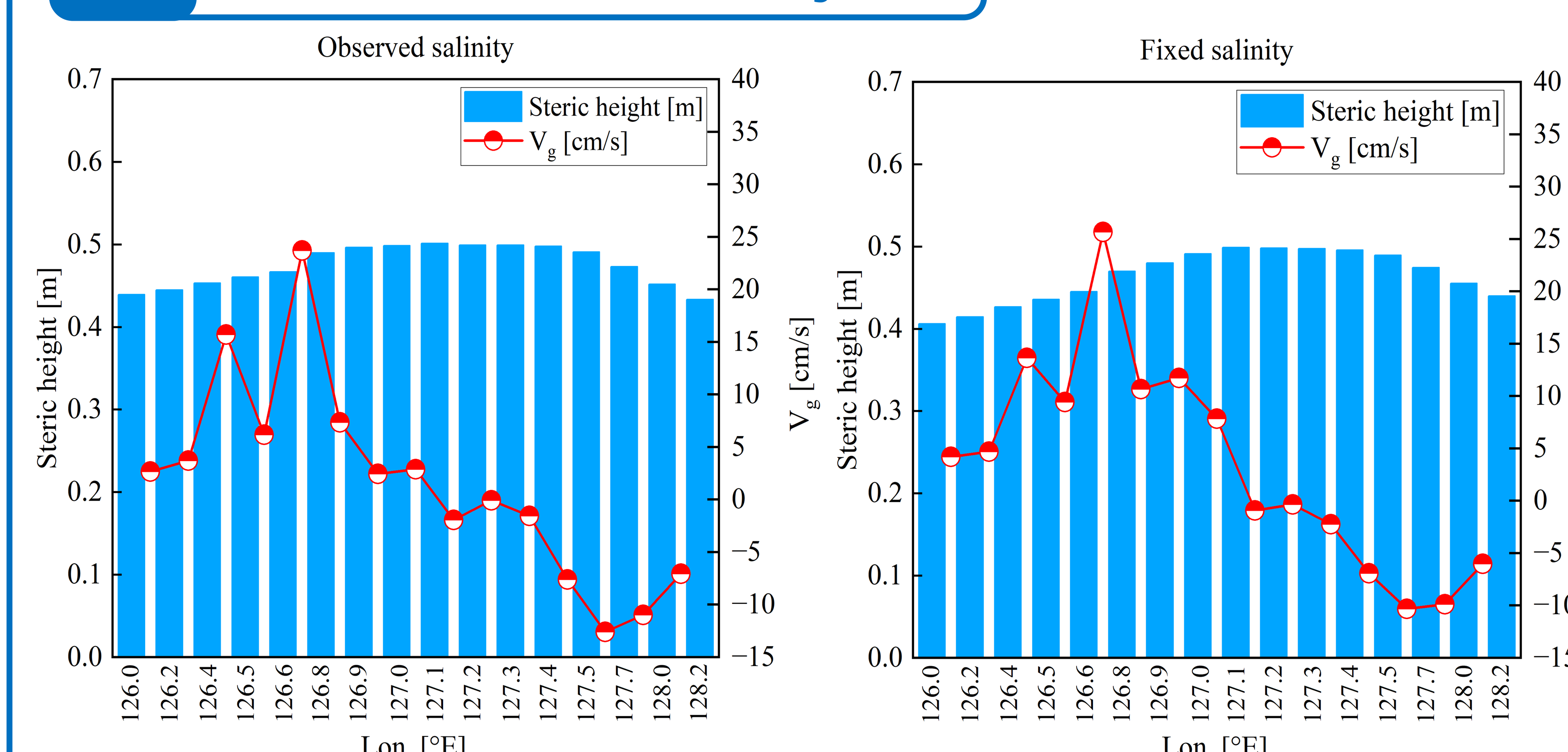
- ✓ To avoid the effect of meandering of current, we focused on a region where the KC path remains stable over time (bounded by 124.5°E-130°E; based on Wang and Oey, 2014).
- ✓ We divided into an experimental group (fixed salinity at 34.5) and a control group (observed salinity) to evaluate the effect of salinity.

3 Statistical analysis



✓ We expected the KC to be weaker in 2016 due to the broader spread of low-salinity water, but it was stronger than in 2018.

4 Quantitative analysis



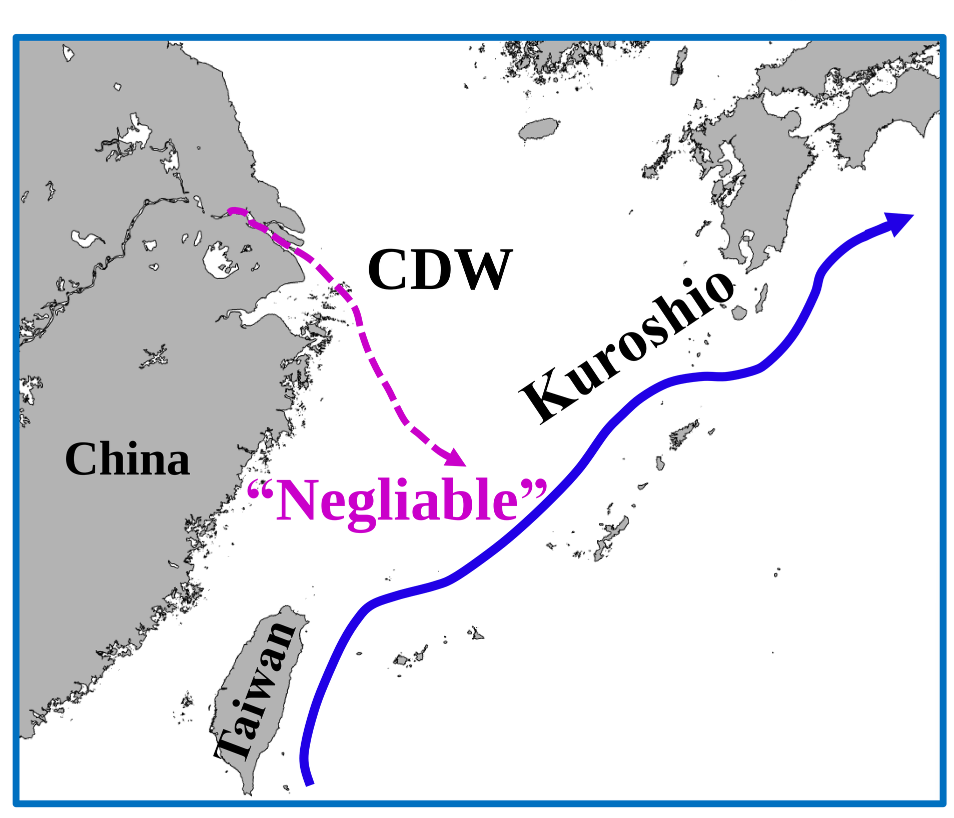
✓ The results showed that the V_g with observed salinity decreased by 2.6cm/s compared to the V_g with fixed salinity.

[Vg (unit: cm/s) in summer]

V_g	N-KZ	S-KZ
Observed	8.81	4.87
Fixed	11.44	3.60

5 Summary

✓ 1% of the total Kuroshio velocity was influenced by the CDW has a minor effect on the variability of the Kuroshio.



➢ Future research direction

Regional drivers

- Mesoscale eddies
- Local atmospheric forcing

⬇

Interaction of Kuroshio current

6 References

Uncles, R.J., 2002. Estuarine physical processes research: some recent studies and prog ress. Estuar. Coast. Shelf Sci. 55 (6), 829–856.

Yu, Z.M., Shen, Z.L., 2011. Eutrophication in the Changjiang River Estuary and Adjacent Waters. Science Press, Beijing (in Chinese).

Day, J.W., Crump, B.C., Kemp, W.M., Yáñez-Arancibia, A., 2012. Estuarine Ecology. Wiley Blackwell, Hoboken.

Gill, A. E. (2016). *Atmosphere—ocean dynamics*. Elsevier.

Archer, M. R., Li, Z., Wang, J. & Fu, L. L. (2022). Reconstructing fine-scale ocean variability via data assimilation of the SWOT pre-launch in situ observing system. Journal of Geophysical Research: Oceans, 127(2), e2021jc017362.

Wang, J., & Oey, L. Y. (2014). Inter-annual and decadal fluctuations of the Kuroshio in East China Sea and connection with surface fluxes of momentum and heat. *Geophysical Research Letters*, *41*, 8538-8546.