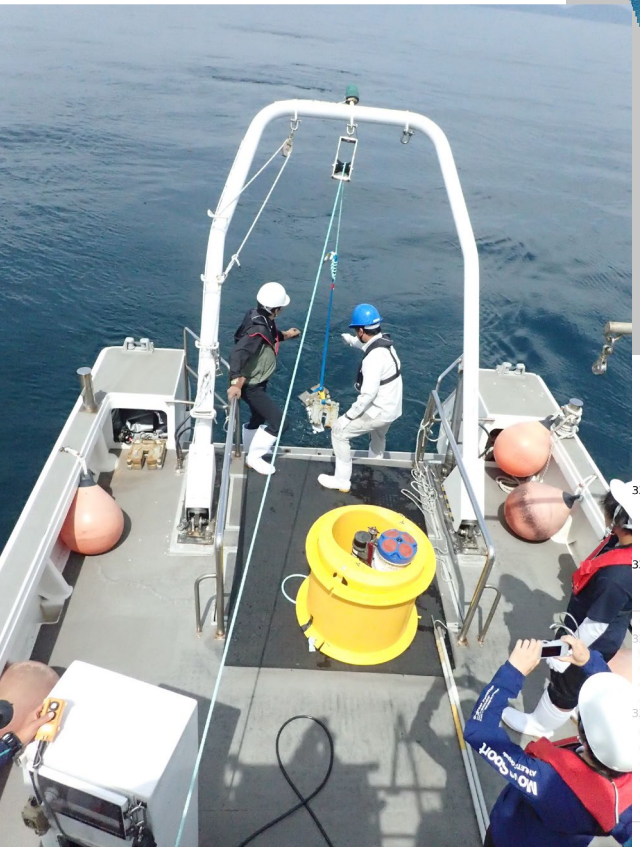
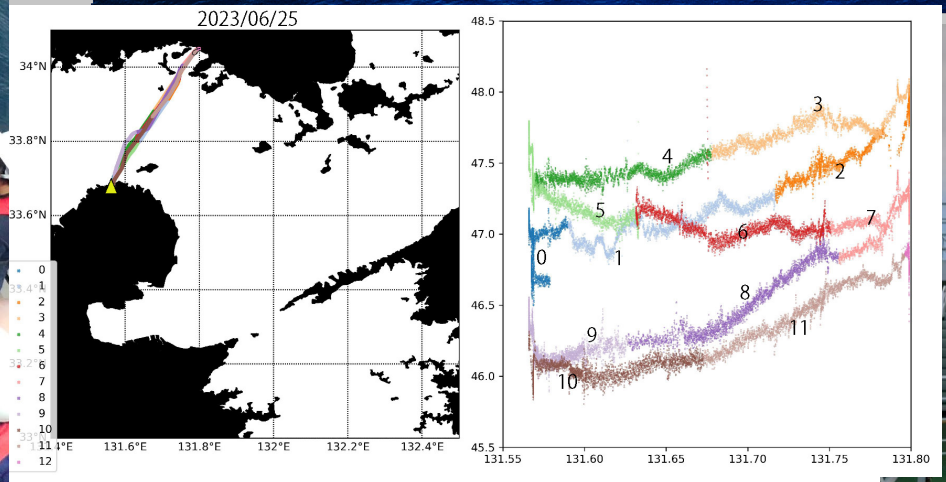
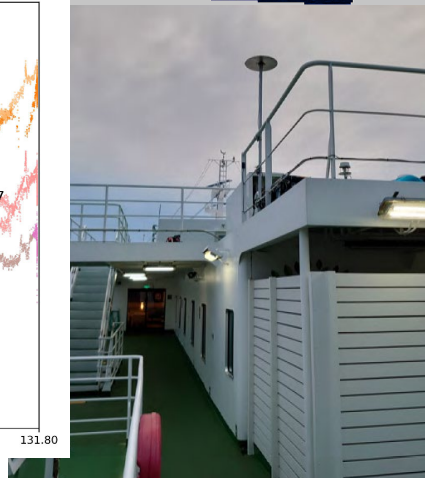
Bungo Channel Tidal Front Observations

K. Ichikawa and A. Morimoto







Bungo Channel Tidal Front Obs

Cal/Val of SWOT 1-Day pass

Frequent SSH observations by GNSS receivers on ferries

New Kunisaki (10 lines/day)

ReimeiMaru (6 lines/day)

Tidal front south of *Sata* Peninsula

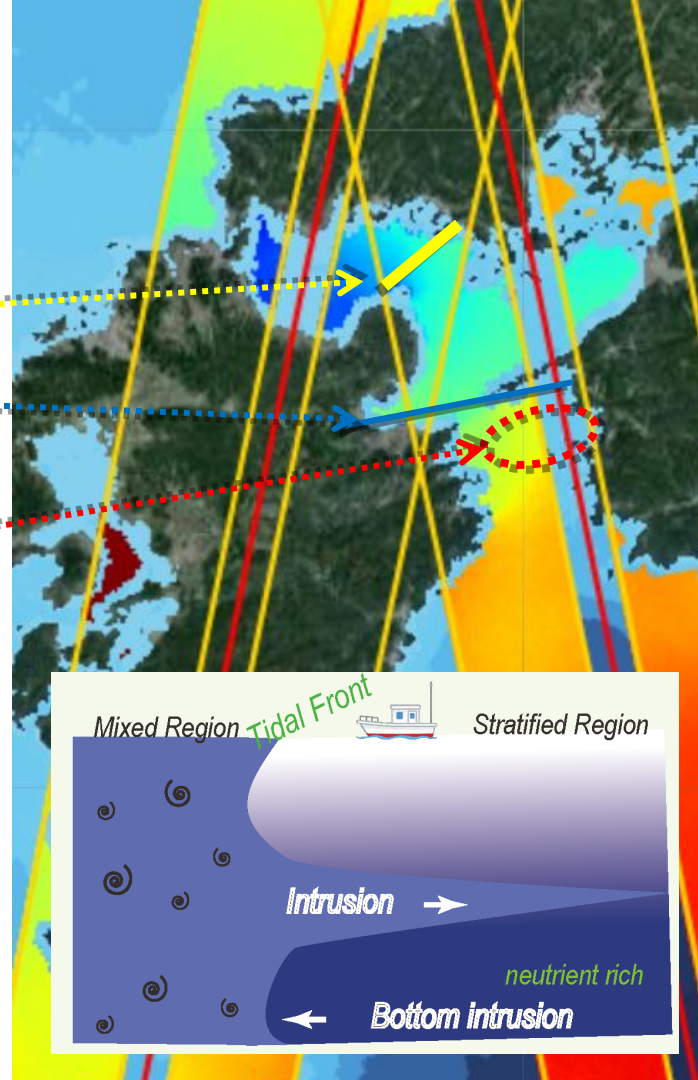
Strong tidal currents across the narrow *HayasuiSeto* Channel cause significant vertical mixing

Tidal front is formed south of Sata Peninsula

Its position shifts by ebb and flood tidal cycles

Comprehensive observations are conducted near the frontal zone

- 4 Bottom Moorings for ADCP + CTD + DO + pressure sea level gauges (can be used for SWOT cal/val)
- Occasional ship measurements



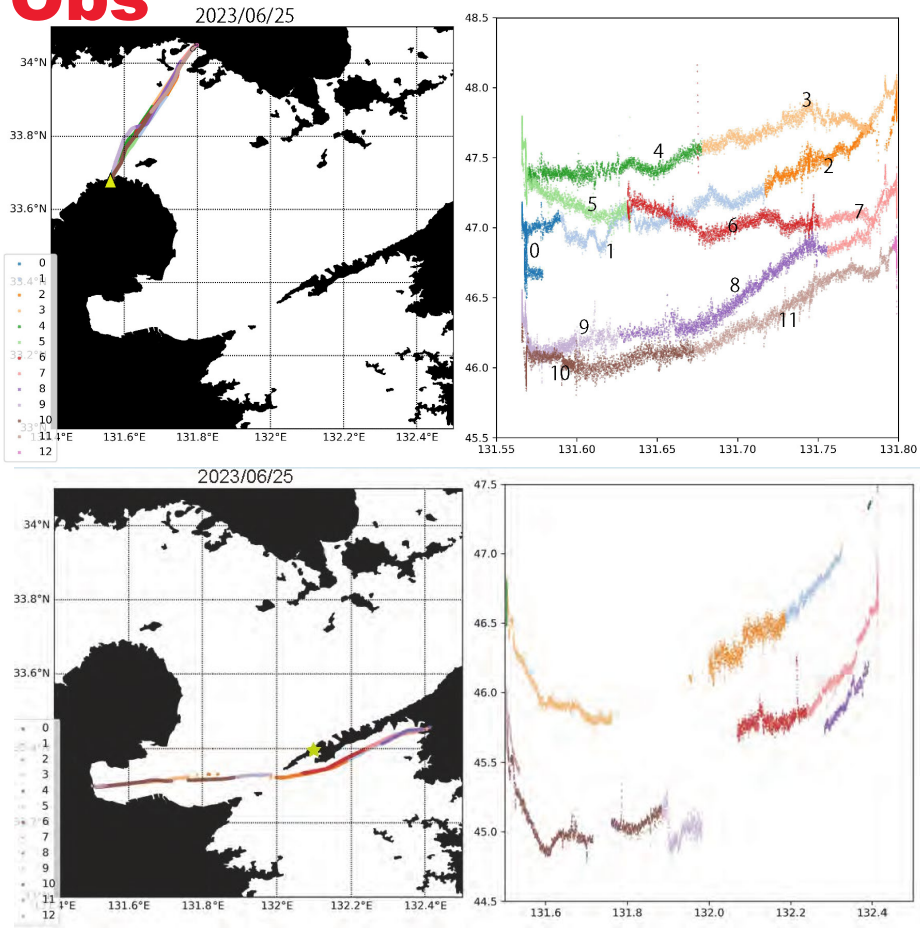
Bungo Channel Tidal Front Obs

GNSS Measurements

- GNSS Records on ferries
  New Kunisaki (2023/3/1-2023/8/18)
  ReimeiMaru (2023/6/21-2023/8/24)

- Using fixed reference GNSS stations, 1 Hz SSHs are determined by the PPK GNSS method
- Converted to SSDH using EGM08 geoid model to account for variable ship routes

- To be compared with 1-day SWOT SSDH data (twice a day for *New Kunisaki* and western part of *Reimei Maru*)

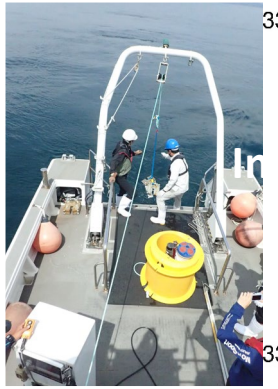


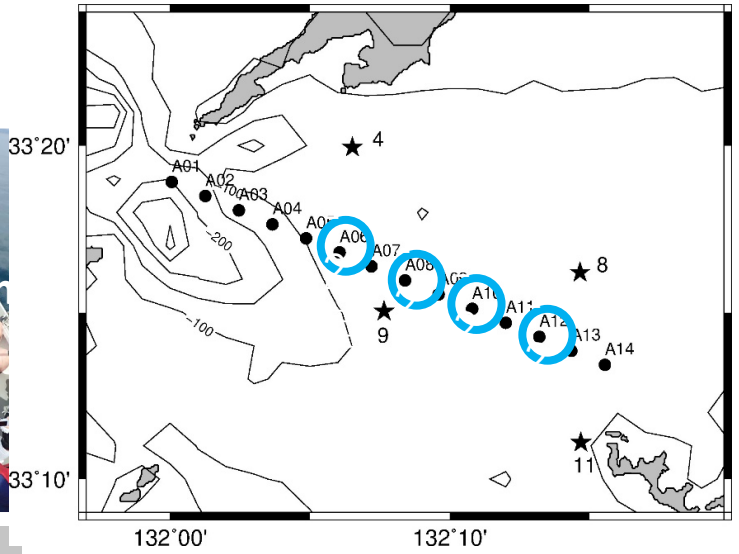
Half-day samples on 6/25 (neap)

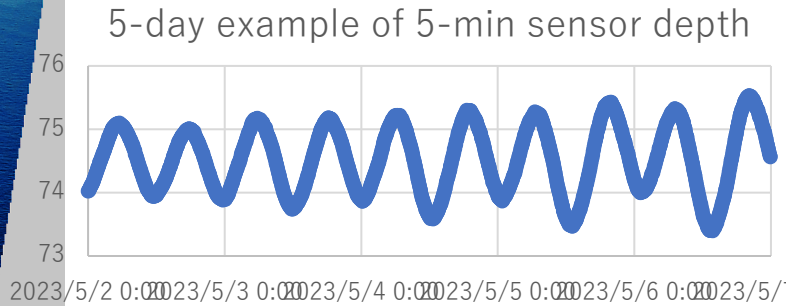
Bungo Channel Tidal Front Obs

Tidal Front observations

- Ship cruise surveys (4 times in 2023 May)
- 4 Bottom moorings (2023/5/1-5/29) A6, A8, A10, A12
  - ✓ To be compared with SWOT SSHA
- Contrast of surface roughness across the front
  - ✓ Could be compared with SWOT sigma0







Bungo Channel Tidal Front Obs

Future perspectives

- Surface velocity observations by HF ocean radar systems at the mouth of Bungo Channel
  - To be compared with the Kuroshio small meanders seen in SWOT SSHA
  - These Kuroshio interactions (surface and bottom intrusion) could affect tidal front formations.

Further Future activities

- Bungo Channel
  - New ADCP moorings in 2025 near the topographic slope to observe intrusion of the bottom Kuroshio water in the Channel
- **Other Areas**
  - ✓ Daily GNSS observations of the Kuroshio over the Izu Ridge by a ferry GNSS
  - ✓ Deploying 120 surface drifters (23N, 136E) in Feb 2025 to compare with SWOT-assimilated models