SWOT Variadations in Bungo Channnel & Assimilation in the western North Pacific

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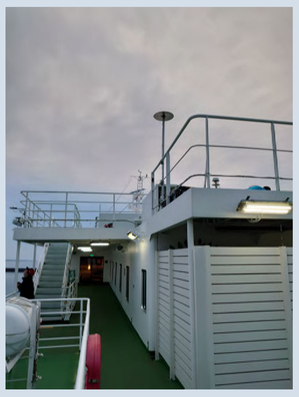
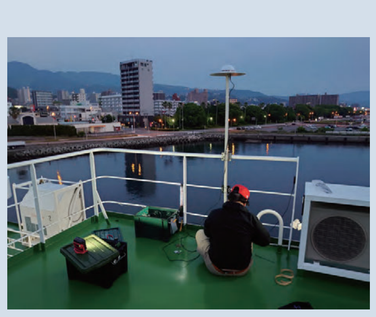
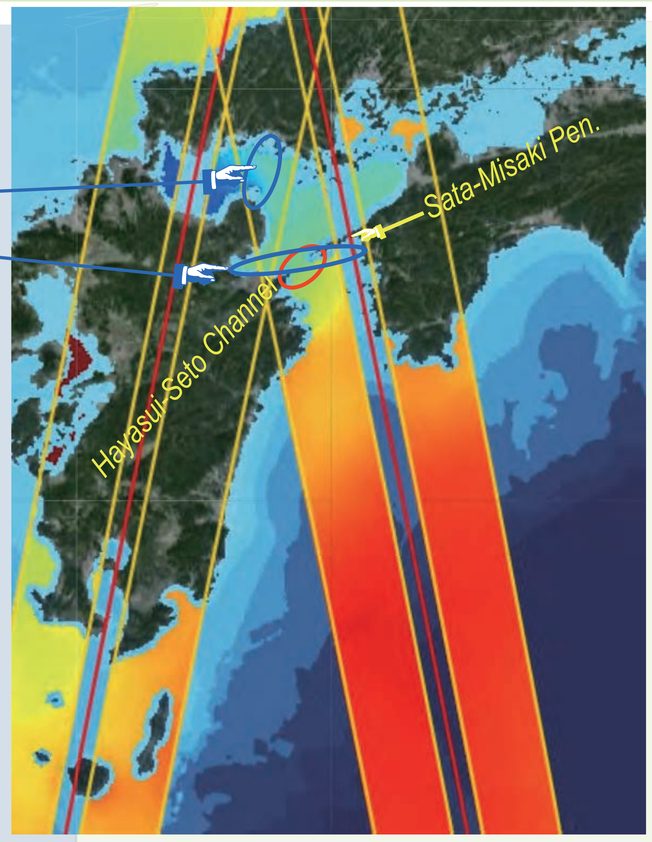
1. GNSS on ferryboats

u-blox F9P GNSS receivers are deployed on ferryboats:
New Kunisaki (725 t, Suonada Ferry Co. Ltd,) 2023/03/01-08/17
Reimei-maru (2718 t, Uwajima Unyu Co. Ltd,) 2023/06/01-08/11
SSH along the ship tracks can be used for cal/val of 1-day SWOT data

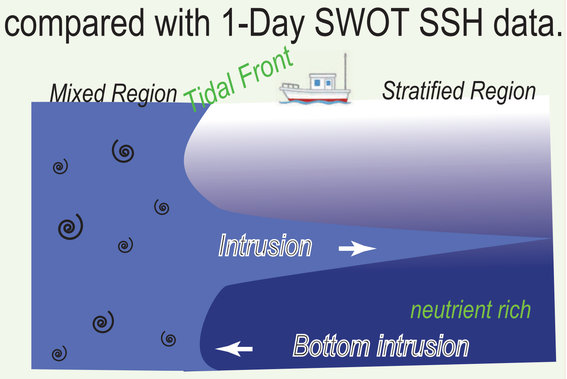


1-day Cal/Val SWOT tracks around Bungo Channel

2. Tidal fronts in Bungo Channel

Strong tidal currents in narrow *Hayasui-Seto* (*BunYo*) Channel would vertically mix water column, which eventually generate tidal fronts in Bungo Channel.
In the lower layer of the stratified region, bottom intrusion transports nuetrient-rich water into the mixed region. The mixed water would be trasnported to the stratified region in a middle layer.

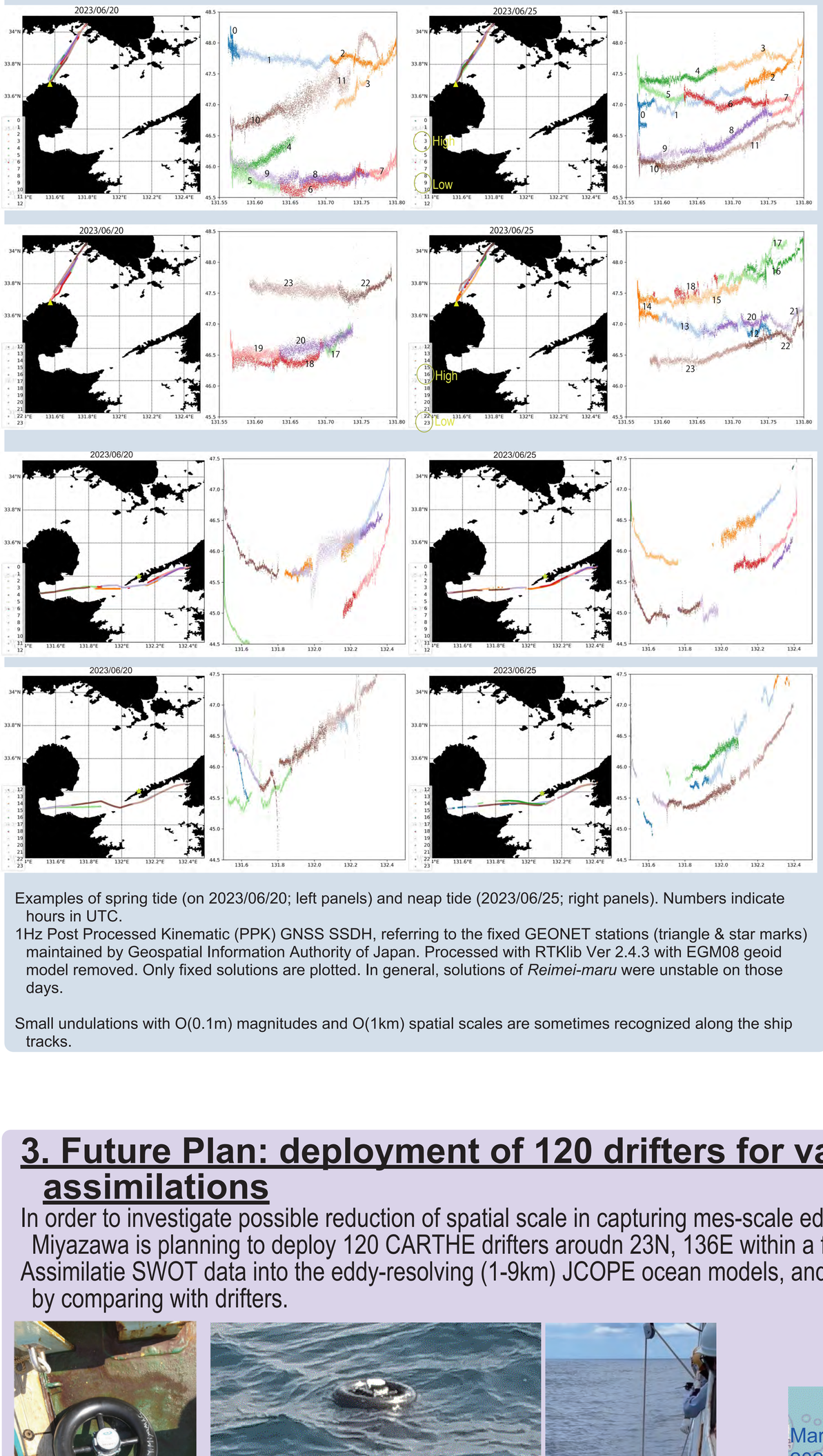
Position of tidal fronts would shift in time. They will be measured by bottom-mounted ADCPs and sea level gauges, and compared with 1-Day SWOT SSH data.



Schematic vertical density profiles near a tidal front.


Different sea surface roughness across fronts, as seen by a drone at 100-m height on 2023/05/11.

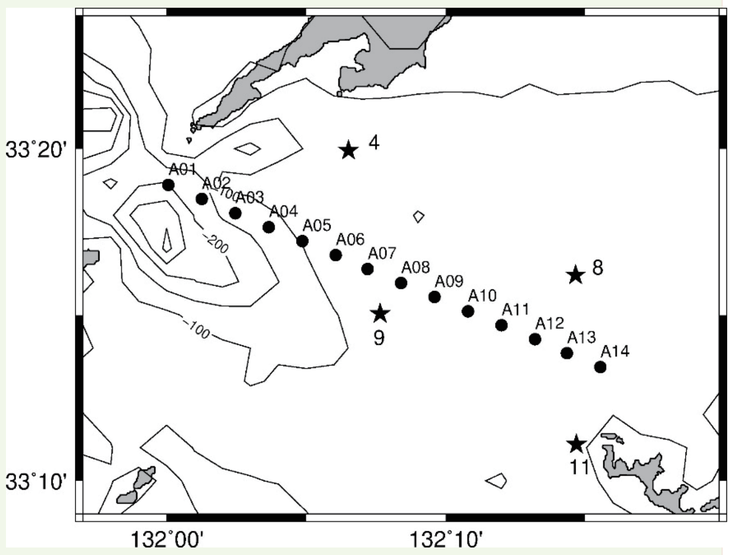
Spring Tide | Neap Tide



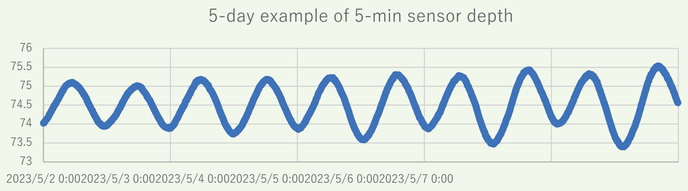
Examples of spring tide (on 2023/06/20; left panels) and neap tide (2023/06/25; right panels). Numbers indicate hours in UTC.
1Hz Post Processed Kinematic (PPK) GNSS SSDH, referring to the fixed GEONET stations (triangle & star marks) maintained by Geospatial Information Authority of Japan. Processed with RTKlib Ver 2.4.3 with EGM08 geoid model removed. Only fixed solutions are plotted. In general, solutions of *Reimei-maru* were unstable on those days.

Small undulations with O(0.1m) magnitudes and O(1km) spatial scales are sometimes recognized along the ship tracks.


Deployment of Compact Recoverable Ocean Mooring (C-ROM)



Ship CTD survey points (A01-A14).
At A06, A08, A10 and A12, C-ROMs (with ADCP, TS sensor and sea level gauge) were depolyed from 2023/4/26 to 2023/05/23-25.



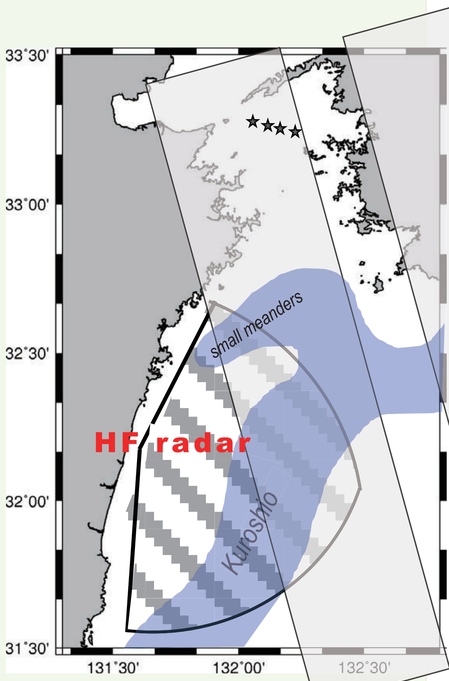
5-day example of 5-min sea level gauge records, which can be compared with SWOT height data.

3. Future Plan: deployment of 120 drifters for validating SWOT data assimilations

In order to investigate possible reduction of spatial scale in capturing mes-scale eddies in data assimialtion models, Dr. Miyazawa is planning to deploy 120 CARTHE drifters aroudn 23N, 136E within a few days in Feburary 2025.
Assimilatie SWOT data into the eddy-resolving (1-9km) JCOPE ocean models, and evaluate captured horizontal scales by comparing with drifters.

CARTHE drifter
Weight: 4kg
Drogue depth: 40cm
Telemetry: Microstar


Intrusion of the Kuroshio small meanders into Bungo Channel will be studied using HF rada data and SWOT data.



Coverage of HF radar (Miyazaki Pref.) and schematic Kuroshio axis.