

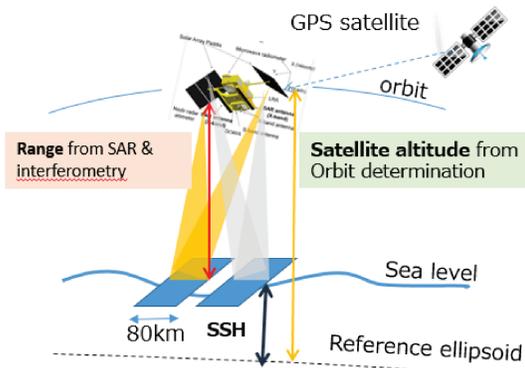
Introduction

Japan Aerospace Exploration Agency (JAXA) is working on a conceptual study of altimeter mission named Coastal and Ocean measurement Mission with Precise and Innovative Radar Altimeter (COMPIRA), which will carry a wide-swath altimeter named Synthetic aperture radar (SAR) Height Imaging Oceanic Sensor with Advanced Interferometry (SHIOSAI).

Mission | COMPIRA

Coastal and Ocean measurement Mission with Precise and Innovative Radar Altimeter Sensor | SHIOSAI

SAR Height Imaging Oceanic Sensor with Advanced Interferometry



COMPIRA
金毘羅

has been worshiped as a guardian of maritime traffic. In particular, they have been worshiped from the saddle.

Fig. 1 Schematic view of COMPIRA and SHIOSAI.

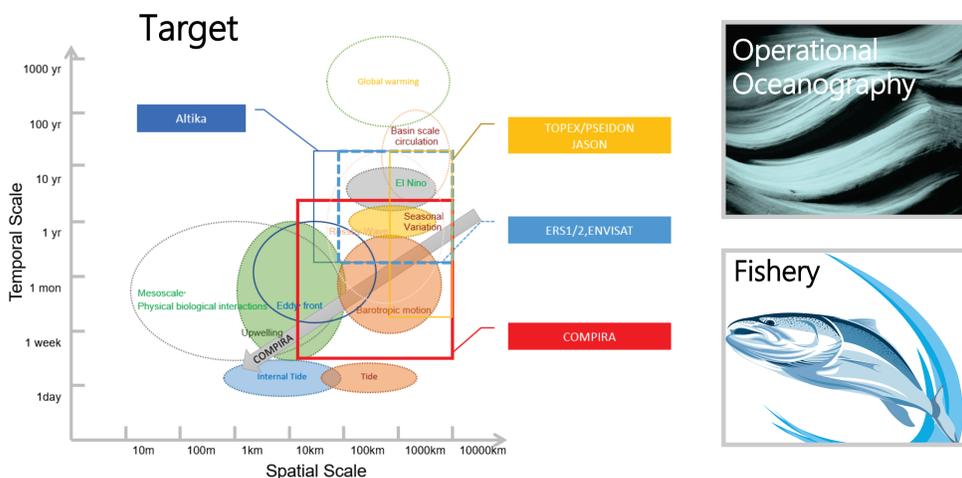


Fig. 2. Oceanic observations carry signals of a wide range of related processes, which can be investigated with nadir-altimeters and COMPIRA.

- Improving ocean current forecast especially in marginal/coastal seas.
- Contribution to marine salvage (current drift), efficiency of marine navigation with improved ocean current forecast.
- Contribution to search fertile fishing grounds
- Improvement the efficiency with saving fuel and hours of operation.

COMPIRA orbit configuration

COMPIRA orbit is designed to be suitable for operational oceanography in mid-latitudes. Table 1 and Fig.3 show orbit configuration and observation times per cycle, which represents about 1.8 times observation around Japan. Thus COMPIRA will provide good spatial coverage with reasonable sampling frequency.

Table 1. COMPIRA orbit configuration.

Revisit time	Inclination	Altitude	Orbit Param.	Swath
9.8671 days	51.2 deg.	937 km	14-3/10	80km×2

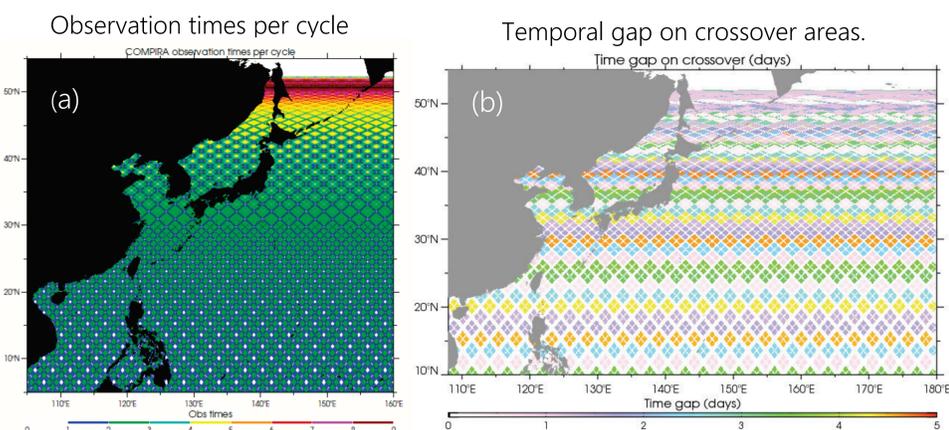


Fig. 3. (a) Observation times per cycle by COMPIRA, and (b) temporal gap between ascending and descending observations on crossover areas.

SHIOSAI configuration

Table 2 and Fig.4 show SHIOSAI sensor configuration and measurement performance.

Table 2. SHIOSAI configuration.

Frequency	Antenna size	Band width	Baseline length	Grid size	SSH error (Sensor-induced)
9.65GHz (x-band)	Range:0.37m Azimuth:5m	120MHz	3m	5 km	4.2cm (swath-average)

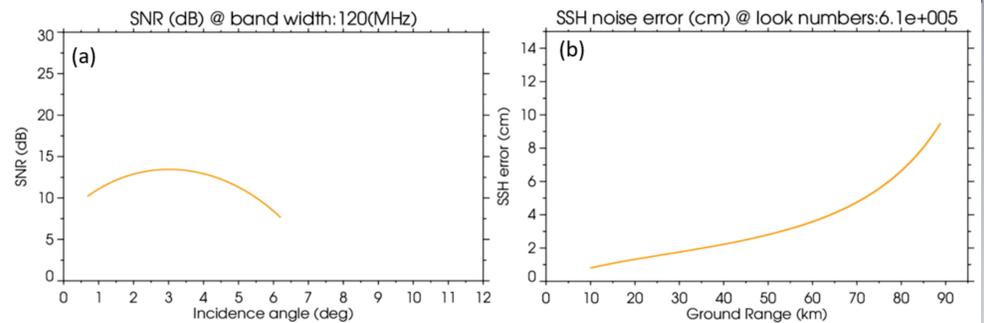


Fig. 4. (a) SNR as a function of incidence angle and (b) SSH measurement error due to noise as a function of ground range.

Generation of COMPIRA simulated data

Fig.5 shows an example of the simulated data produced from the JAMSTEC model (Rokka). The grid and temporal interval of the model are 1.5km and 3 hours, respectively. The SAR white noise of 4.2cm is added to the sampled SSHs. The 0.05 deg. gridded SSHs are created from the simulated SSHs by simple averaging with different ranges of window size.

Geostrophic currents are then calculated. Fig.6 represents comparison with the model surface currents. In order to reduce noise effects, filtering is needed to reproduce coastal currents. Object analysis will also be applied to make grid data.

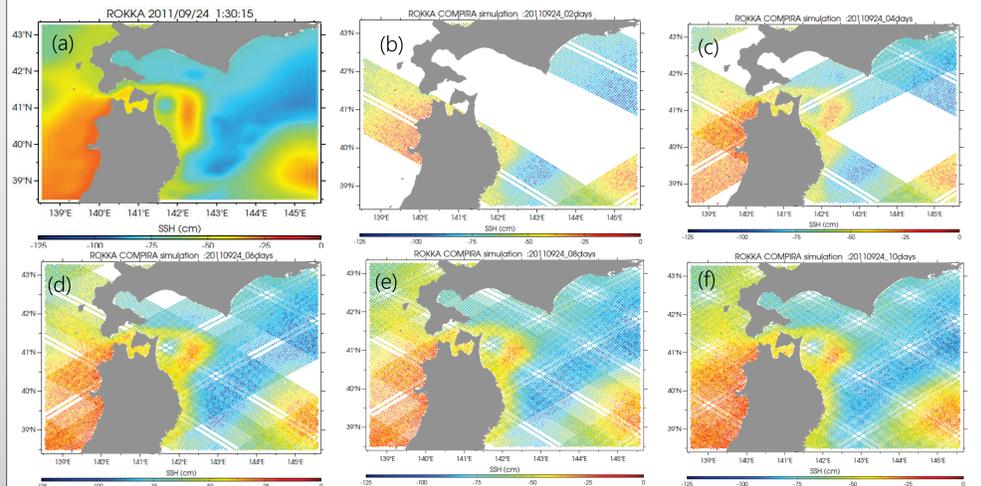


Fig. 5. (a) Model SSH on 2011/9/24 and COMPIRA simulated SSHs accumulated for (b) 2 days, (c) 4 days, (d) 6 days, (e) 8 days, (f) 10 days after 2011/9/24.

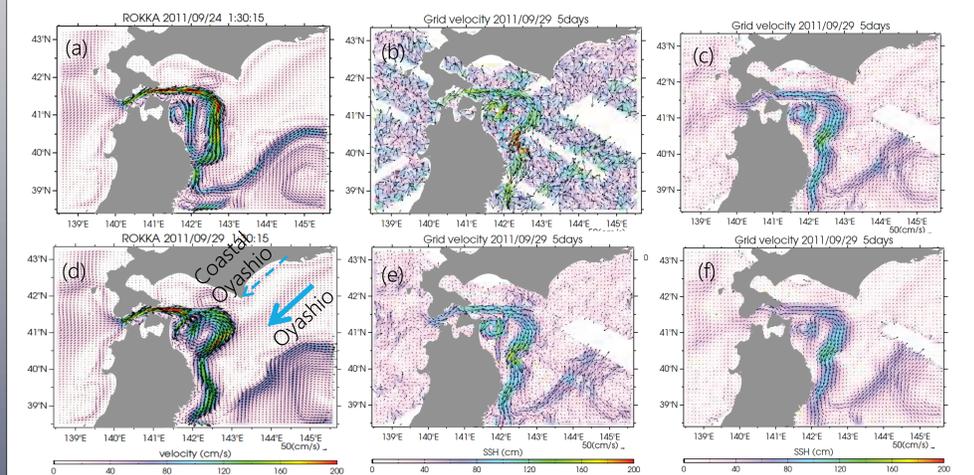


Fig. 6. Model surface current on (a)2011/9/24, and (b) 2011/9/29. Geostrophic currents from 5days simulated SSHs with (c) 7.5km box, (d) 17.5km box, (e) 25km box, and (f) 37.5km box averaging.

Next step

- Observing System Simulation Experiment (OSSE) using COMPIRA simulated data is underway under cooperation with several operational oceanography institutes (MRI, JAMSTEC, Kyushu Univ. etc.).