



Concept of the Japanese Future Altimetry Mission

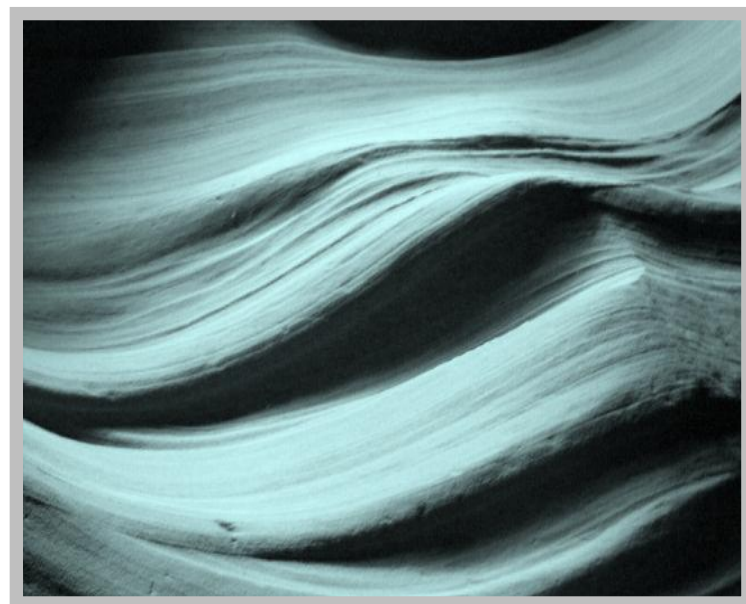
H.NAKAYAMA¹, K.MATSUI¹, K.NIGO¹, T.KOBAYASHI¹, S.NAKAMURA¹, A.MORI¹, A.UEMATSU¹, R.NAKAMURA¹, A.MUKAIDA², O.ISOGUCHI²
 Organization:¹Japan Aerospace Exploration Agency, ²Remote Sensing Technology Center of Japan
 Japan Aerospace Exploration Agency

Introduction

Japan's territorial seas and EEZ are the sixth largest in the world. Ocean observation systems have been developed in terms of comprehensive governance of the oceans. Ocean surface height is recognized as important as ocean color and ocean temperature in the systems. Japan Aerospace Exploration Agency (JAXA) has started the future altimetry mission. We have considered the specifications and the purpose of our mission with a committee of potential users established by JAXA.

Mission | COMPIRA
 Coastal and Ocean measurement Mission with Precise and Innovative Radar Altimeter Sensor | SHIOSAI
 SAR Height Imaging Oceanic Sensor with Advanced Interferometry

Objectives



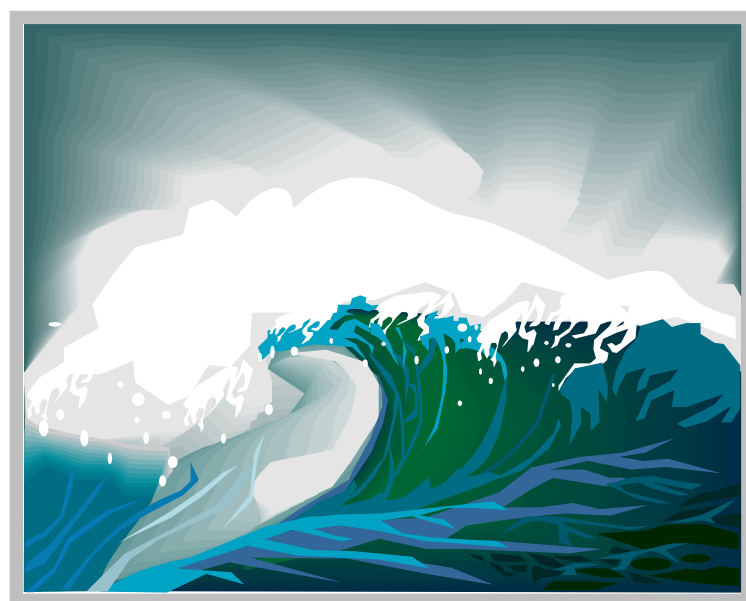
Ocean current

- Planer observation with wide swath of SSH by In-SAR technique to improve tidal models
- Improving ocean current forecast especially in coastal region and coastline sea
- Contribution to marine salvage (current drift), efficiency of marine navigation and oceanic prediction of diffusion of radioactive material with improved ocean current forecast



Fishery

- Observation of ocean surface topography related to KUROSHIO-front and ocean phenomena from mesoscale to sub mesoscale
- Estimating fishing places related to SSH and ocean salinity/temperature under the sea



Disaster(optional)

- Observation of TSUNAMI waves by magnitude 8-9 class earthquakes in oceanic region
- Improving TSUNAMI forecast model using inversion method with satellite SLA observation

User Requirement

Table 1. Relationship between objectives and specification.

Mission objective	Ocean current	Fishery	Disaster
Main specification item	<ul style="list-style-type: none"> Planer observation in coastline sea and coastal region to improve tidal model Improving ocean current forecasting in coastline sea and coastal region Contribution to marine activity with improved ocean current forecast 		
Spatial resolution	to observe in coastline sea and coastal region 5km	for Four-dimensional assimilation 3km	for marine salvage 10km
Sea Surface Height error	to observe in coastline sea and coastal region a few centimeters		to observe TSUNAMI absolute:10cm relative:5cm
Rainfall-induced date underage ratio	to improve tidal model 0%		
Marine area	to observe in coastline sea and coastal region Japan Sea, East and South China Sea	for efficiency of marine navigation transpacific line area	to estimate fishing places northern limit: Aleutian islands southern limit: equator
Observation area ratio	to improve tidal model 100%	for Four-dimensional assimilation 100%	
Observation frequency	to observe in coastline sea and coastal region once / 1 day to a several days		to estimate fishing places once / 6 hours to 1 day
Closeness to coastal line	to observe in coastline sea and coastal region as close as possible		to observe TSUNAMI as high freq. as possible
Tidal analysis	tidal component removal		

Specification

Spatial Resolution 5km	Sea Surface Height error GOAL 6.8cm THRESHOLD 10.0cm	Orbital Inclination 51deg
Swath 140km(70x2)	Observation frequency 2 times per 10days	Closeness to coastal line 5km - 10km

Observable Ocean Area

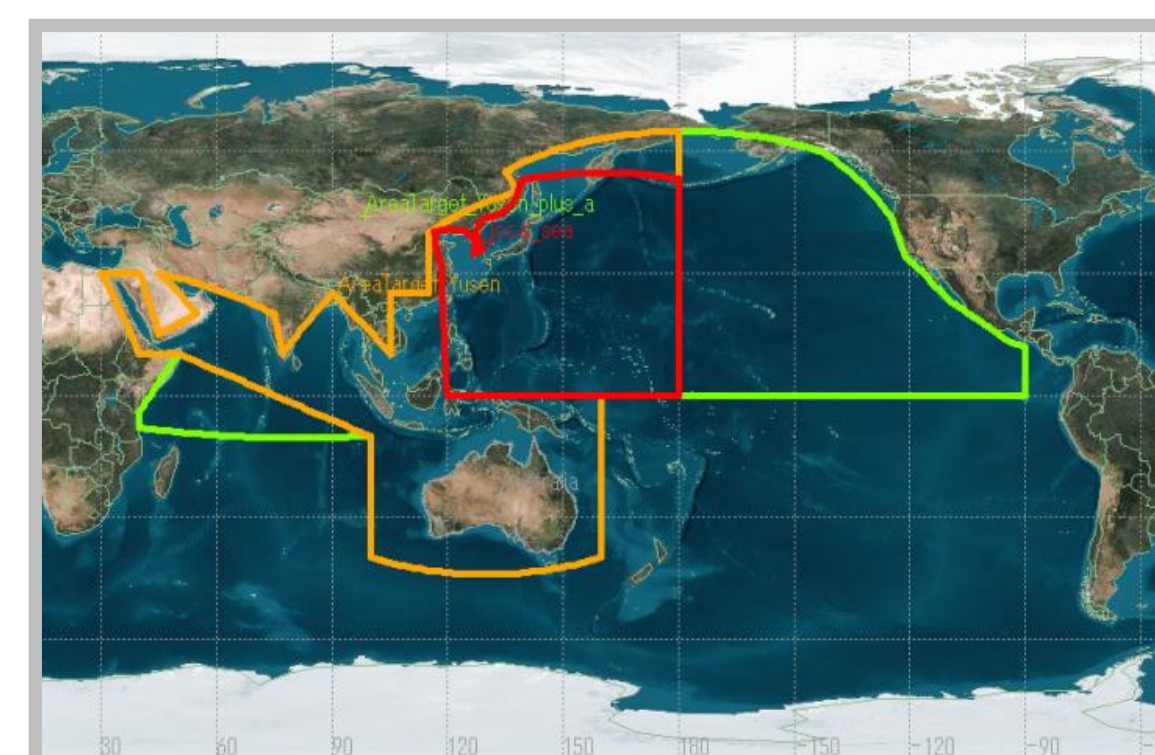


Figure 1. Observable Ocean Area.

Red : Assumed observable sea area, "near Japan"
 • 120deg E ~ 180deg E
 • 0deg N ~ orbital inclination

Orange : Assumed observable sea area, "near Japan + sea lanes + near Australia"

Green : Assumed observable sea area, "near Japan + sea lanes + near Australia + Aleutian Islands + coast of Somalia + the North Pacific"

Products

Table 2. Product with term.

Features	Near-real-time	Short-term	Delayed time
Primary targets	Fishery users	Assimilation users	Science researchers
Delivery delay	TBD(8 hours)	TBD(2-3days)	TBD(60days)
Total RSS sea surface height	TBD	TBD	6.8cm (goal)
Standard product (Level2)	Direct observations and corrections needed to calculate sea surface heights with 5km cell spacing		
High-level product	Corrected SLA/ADT		
	Time, location, and corrected SLA/ADT at fixed 5km cell		
	SLA map	TBD-day gridded SLA/ADT	5-day gridded SLA/ADT
	Speed/currents	Geostrophic current	Assimilated current fields (with/without tidal currents)
	*Cooperative institute operates Numerical model		
Composite product	SLA/ADT map + (SST,Chl-a,SSWetc.)	Composite images	
Remarks	Delivery delay of high-level product is TBD(8 hours)+ Δdays	Delivery delay of Speed/currents is TBD(2-3days) +Δdays	※SLA: Sea Level Anomaly ※ADT: Absolute Dynamic Topography

System Configuration

● Mission Payload

- SHIOSAI
- Microwave radiometer for water vapor correction
- Dual-frequency nadir radar altimeter for roll angle correction, ionospheric correction and reference of ranging for CALVAL (TBD)
- GPS, SLR, DRC

● Launcher

- H2A or H2B, dual launch



Schedule

Table 3. Long-term schedule.

	2011 (FY23)	2012 (FY24)	2013 (FY25)	2014 (FY26)	2015 (FY27)	2016 (FY28)	2017 (FY29)	2018 (FY30)	2019 (FY31)
Review	MDR Mission Definition Review		SRR	SDR	PDR	CDR	PQR	LRR	
Phase	prephase A Conceptual study	phase A Conceptual design		phase B Preliminary design	phase C Critical design	phase D Production Test		phase E Operation	

What's COMPIRA?



reference: <http://busson.jp/>

Compira is the god of water. It has been dedicated as the ancient guardian deity of maritime transportation. There are many shrines for Compira on hilltop overlooking the port in Japan.

People

