

# The Contribution of Global Ocean Observation of Continuity of HY-2 Satellite

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# 1. HY-2(Ocean Dynamic Environment Satellite) Mission

## 1.1 Object

- (1) Global Ocean Wind Field monitor and Service for Ocean Environment Forecast.
- (2) Global Ocean Topography Data, Sea Level and Gravity Field monitor and its Application.
- (3) Wave Field monitor and Reduce Disaster.
- (4) All weather Sea Surface monitor and forecast the El Niño.
- (5) Sea Ice monitor

## HY-2 satellite Monitor Parameter

Satellite	Payload	Monitor Parameter	Object
HY-2	Scatterometer	<b>Main Parameter:</b> Sea Surface Wind	Ocean State Forecast Storm Warn
	Altimeter	Sea Surface height, Significant wave height, Gravity field and Ocean Circumfluence	Topography Study Ocean Dynamic Process
	Radiometer	Sea Surface Temperature <b>Secondary Parameter:</b> Sea Level, Sea wind speed, Sea Ice and Vapor content	Median Scale Weather Process and Global Change

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## 2. HY-2 Satellite Main Character

### 2.1 Satellite and orbit characteristics

<i>Orbit type</i>	<i>Near sun-synchronous and frozen</i>
<i>Equator crossing local time</i>	<i>6:00</i>
<i>Altitude</i>	<i>963.6km , 965km</i>
<i>Inclination</i>	<i>99.3 deg</i>
<i>Period</i>	<i>104.45 minute</i>
<i>Payload</i>	<i>Sca, Alt and Rad</i>
<i>Attitude control</i>	<i>3 axis stabilized</i>
<i>Downlink frequency</i>	<i>X-band</i>
<i>TT&amp;C link</i>	<i>S-band</i>
<i>Designed lifetime</i>	<i>3 years</i>
<i>Launch</i>	<i>2010 by using Long March 4</i>
<i>Manufacturer</i>	<i>CAST</i>

- **point precision: pitching ,roll and yawing $<0.1^\circ$**
- **measure precision:  
pitching ,roll and yawing $< 0.05^\circ$**
- **three axis pose stability  $<0.001^\circ/s$**
- **Repeat Cycle: two phase (14days and 168days)**
- **life: more 3 years。**

## 2.2 Payload user requirements

### (1) SCAT

wind speed range: 2-24m/s

wind direction precision:  $\pm 20^\circ$

wind speed: 2m/s or 10%

### (2) ALT

Sea Surface precision: <8cm

SWH range: 0.5-20m

SWH precision: <10% or 0.5m(greater)

## 2.2 Payload user requirements (con.)

### (3) RAD

wind speed:

range: 7-50m/s

precision: 2m/s or 10%(greater)

SST:

range: 100-300K

precision: 1.0K

Ice:

edge: 15%

thickness: 2m

Vapor:

precision: 10%

## 2.3 Payload Character

- **Scatterometer**
  - frequency: 13.256GHz
  - polarize: HH, VV
  - scan coverage: >1300KM
  - ground resolution: 25km
  - backscatter coefficient precision: <0.5dB
  - backscatter range: -40~20dB
  - dynamics range: AGC range 60dB

- Altimeter

- frequency: 13.58 and 5.25 GHz
- compress ratio: 33000
- pulse repeat frequency: 1~4KHz
- ground resolution: 16km
- Range precision: <4.0cm
- backscatter precision: 0.5dB

- Radiometer

fre.(GHz)	6.6	10.7	18.7	23.8	37
Bandwidth (MHz)	350	250	250	400	1000
Polarize	VH	VH	VH	V	VH
Scan cov.	1600km				
Resolution	100	62	36	30	18
Sensitive	0.5	0.5	0.5	0.5	0.8
range	3-350K				
Cal.precise	1K (180-320K)				
Linear	>0.999				

## 2.4 Precision Orbit Determine requirement

**Satellite radius vector direction precision: 5cm**

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# 3. HY-2 Satellite Contribution

- **Observation of sea surface wind fields**

Satellite scatterometer data has play important role on study of large-scale ocean phenomenon.

QuikSCAT scatterometer has operational application in 1999, but it has not the following plan.

ERS-2 scatterometer mission has transferred to METOP ASCAT in 2006.

GCOM-B1 will launch in 2008, one of its payloads is an ocean vector wind measurement (OVWM) instruments, and it also called AlphaScat.

HY-2 satellite scatterometer will launch in 2010, it can fill up the gap of scatterometer observation after 2012. At the same time. It is Ku band that will measure wind field higher sensitivity and signal-noise- ratio than ASCAT.



# 3. HY-2 Satellite Contribution

- The compatibility of HY-2 scatterometer data**

The table 1 shows that the technical data are in basic agreement between HY-2 scatterometer and other same kind of scatterometers. HY-2 scatterometer can run by self, it also can applicants by using data merging with other scatterometers.

	ERS1/2 (AMI)	SeaWinds	ASCAT	HY-2/SCAT
Swath	500km	1800km	600×2km	H polarization : 1350km V polarization : 1700km
Frequency	5.255 GHz	13.4 GHz	5.255 GHz	13.256GHz
Wind speed	2m/s or 10%	2m/s or 10%	2m/s or 10%	2m/s or 10%
Wind direction	20°	20°	20°	20°
resolution	50km	12.5/25km	25km	50km

# 3. HY-2 Satellite Contribution

- **Observation of sea surface height**

**HY-2 satellite altimeter can measure the global sea surface height, sea surface wind speed and significant wave height.**

**JASON-2 has launched on June 20, 2008. It and JASON-1 will service continuously for forecast system.**

**ENVISAT RA-2 will be end-of-life around 2014; Sentinel 3 is its follow-on, which will launch in 2012. Therefore it is little measurement altimeter data from 2011 to 2013. HY-2 altimeter can fill up the gap. At the same time, HY-2 also can measure polar area and glacier area; therefore it can offset the measurements of JASON-1&2. HY-2 and JASON-2 will be on the on-orbit, As far as ocean measurement concerned, the not less than two satellite altimeter is necessary. So, HY-2 altimeter and JASON-2 can keep the continuity of global altimeter observation plan.**

<b>Satellite</b>	<b>Inclin</b> .	<b>Sensor</b>	<b>2</b> <b>0</b> <b>0</b> <b>6</b>	<b>2</b> <b>0</b> <b>0</b> <b>7</b>	<b>2</b> <b>0</b> <b>0</b> <b>8</b>	<b>2</b> <b>0</b> <b>0</b> <b>9</b>	<b>2</b> <b>0</b> <b>1</b> <b>0</b>	<b>2</b> <b>0</b> <b>1</b> <b>1</b>	<b>2</b> <b>0</b> <b>1</b> <b>2</b>	<b>2</b> <b>0</b> <b>1</b> <b>3</b>	<b>2</b> <b>0</b> <b>1</b> <b>4</b>	<b>2</b> <b>0</b> <b>1</b> <b>5</b>	<b>2</b> <b>0</b> <b>1</b> <b>6</b>	<b>2</b> <b>0</b> <b>1</b> <b>7</b>	<b>2</b> <b>0</b> <b>1</b> <b>8</b>	<b>2</b> <b>0</b> <b>1</b> <b>9</b>	<b>2</b> <b>0</b> <b>2</b> <b>0</b>
Envisat	98.5	RA-2															
Jason-1	66°	Poseidon2															
Jason-2	66°	Poseidon3															
HY-2	99°	RA-1															
Sentinel 3	98.5	Altimeter															

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## 4. HY-2 Satellite Data Policy

**The distribution of HY-2 satellite data needs the authorization of China National Space Administration (CNSA). Then HY-2 satellite data is distributed by National Satellite Ocean Application Service (NSOAS). These data after a delay of one month in global Open Ocean can provide for all users.**

Welcome to NSOAS !