

The Status of current and future CNSA Earth Observing System

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Lugano Switzerland

Outline

- Introduction
- Status of Current CNSA EOS
- Status of Future CNSA EOS
- HJ-1
- HY-2
- Conclusion

Introduction

- Technology and application of satellite remote sensing has been extended rapidly in China.
- CNSA'S EOS will be built up, including **FY series satellites, ZY series satellites, HY series satellites, and environment and disaster small satellite constellation (HJ).**
- Meanwhile, China is also developing the ground receiving and processing system of EOS.

Current Earth Observing system

Seven satellites are operating in orbit, including FY-3A, FY-3B, HY-1B, HY-2, HJ-1A/B, and ZY-3.

Satellites	Space Agency	Equator Crossing Time + Altitude	Launch Date	Instrument	Status, applications and other information
HY-1B	CNSA	10:30 (D) 798 km	04/07	4-band CCD Camera Ocean Colour and Temperature Scanner	Ocean colour and temperature monitoring
HJ-1A	CNSA	10:30 (D) 650 km	06/09/2008	Two 4-band CCD camera, Hyperspectral camera	Land, resource and environment monitoring
HJ-1B	CNSA	10:30 (D) 650 km	06/09/2008	Two 4-band CCD camera, IR camera	Land, resource and environment monitoring
HY-2	CNSA,	06:00 (D) 964 km	16/08/2011	Altimeter, MW radiometer, Scatterometer	Ocean dynamics environment monitoring
ZY-3	CNSA	10:30(D)	09/01/2012	3-D mapping camera, multi-spectral imager	mapping. Land resource monitoring

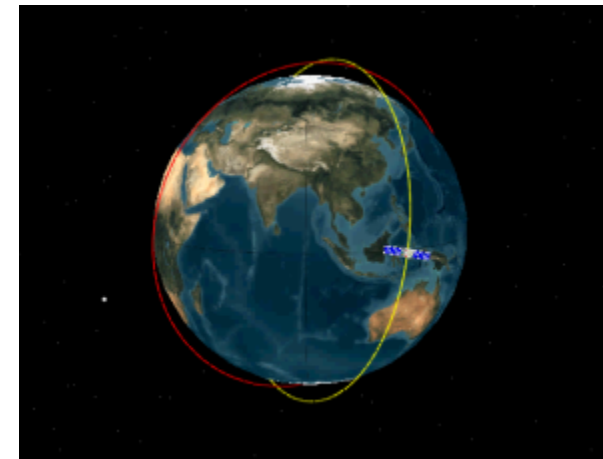
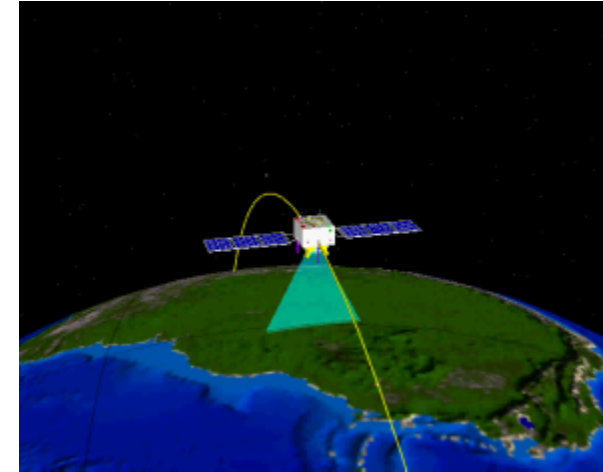
Future Earth Observing System

Five satellite will be launched in recent three years, including FY-4, **HJ-1C**, **CBERS-03/04**, and **CFOSAT**.

Satellites	Space Agency	Equator Crossing Time + Altitude	Launch Date	Instrument	Status, applications and other information
HJ-1C	CNSA	06:00 (D) 500 km	2012.11	S band SAR	Phase D Land monitoring
CBERS-3	CNSA + AEB	10:30 (A) 778 km	end 2012	PAN CCD camera, MUX CCD camera IRMSS, WFI	Phase D Land, resource and environment monitoring
CBERS-4	CNSA +AEB	10:30 (A) 778 km	2014	PAN CCD camera, MUX CCD camera IRMSS, WFI	Phase D Land, resource and environment monitoring
CFOSAT	CNSA+ CNES	07:00(D) ~600Km	2014	SCAT (Scatterometer) SWIM (Directional Wave spectrum form)	Phase C Ocean dynamics environment monitoring

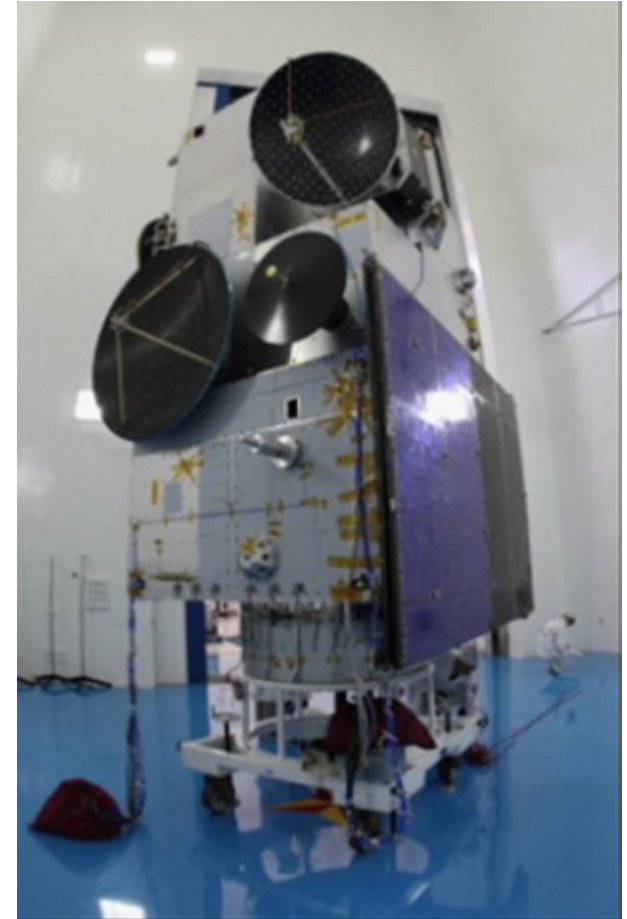
HJ-1 small satellite constellation

- Environment and disaster small satellite constellation (HJ) consists of four optical satellites and four SAR satellites for monitoring land environment and disaster .
- The first stage of HJ, including 2 optical satellites (HJ-1 A/B) and one SAR satellite(HJ-1C), will be formed at the end of this month.
- HJ-1 is aiming to provide high temporal resolution data products in every two days with 30m spatial resolution.
- HJ-1A/B have been used for not only lands, but also regional atmosphere, water bodies.
- CNSA will evaluate the results of HJ-1 constellation in 2013, and then arrange the demonstration for the second stage of HJ constellation.
- CNSA will share our demonstration progress of the second stage on the CGMS platform.



HY-2 satellite characteristics

- HY-2 Satellite was launched in August 2011
- HY-2 payloads:
 - Radar altimeter (Ku & C bands)
 - Microwave scatterometer (Ku band)
 - Microwave radiometer (6.6, 10.7, 18.7, 23.8 & 37.0GHz)
- Orbit altitude: ~965 km, sun - synchronous, with 99°inclination
- Repeat cycle: 14 days (for three years) & 168 days
- Its data has been used in many application fields



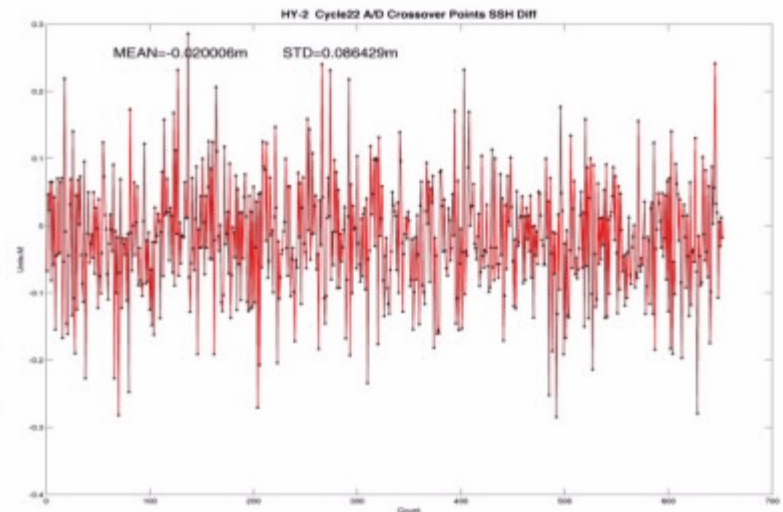
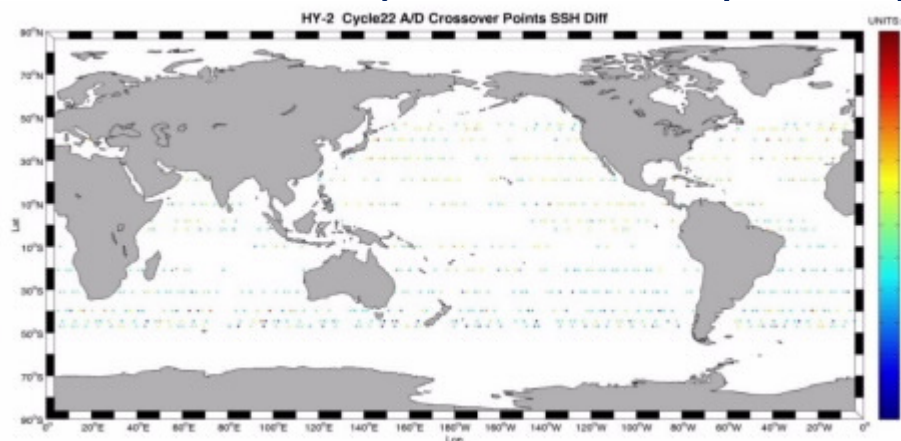
Accuracy of HY-2 data products

In current stage, we assessed accuracy of each payload by many cases.

➤ For radar altimeter

-- Accuracy

the standard deviation of SSH at crossovers for Cycle22 is about 8.6 cm



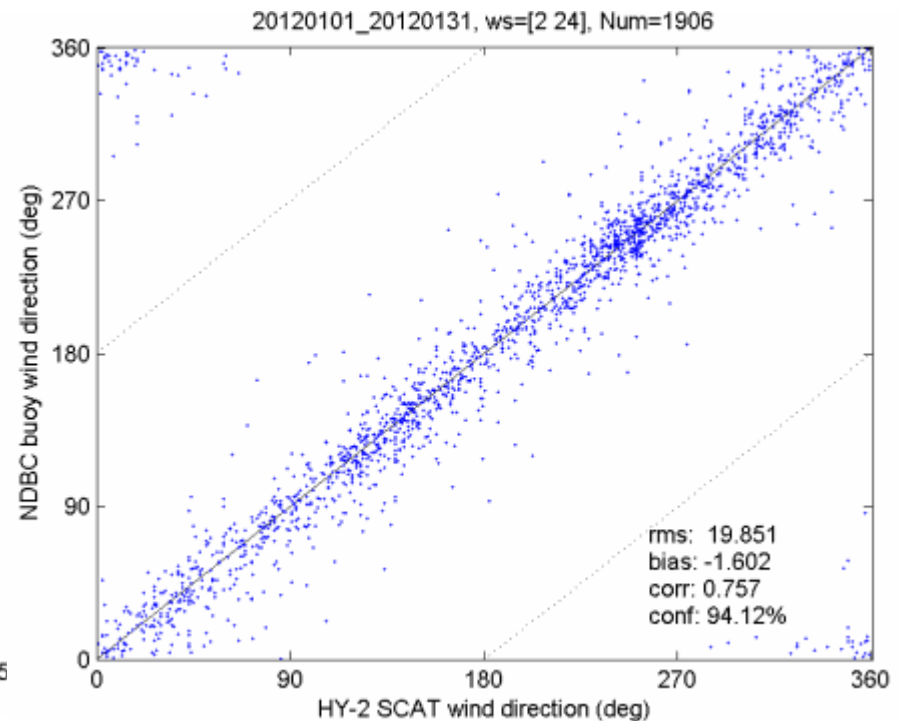
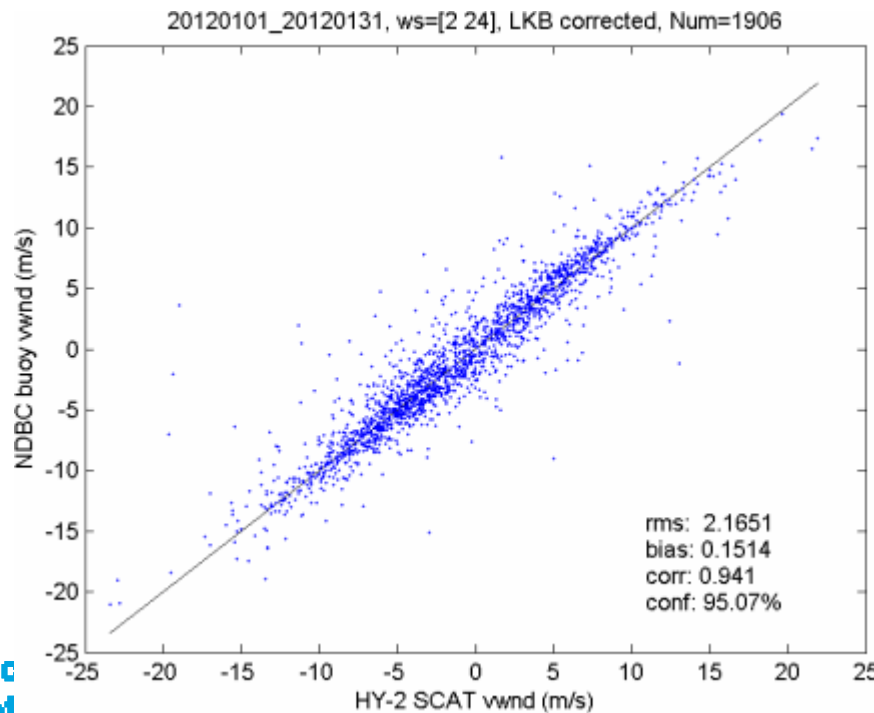
Accuracy of HY-2 data products

➤ For microwave scatterometer

–Accuracy

Wind speed <2 m/s or <10%

Wind direction <20 rms

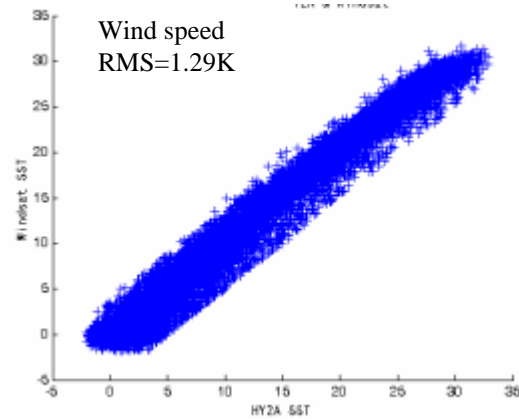


Accuracy of HY-2 data products

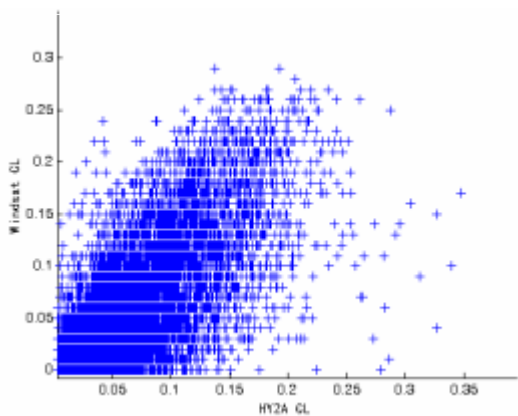
➤ For microwave radiometer

–Accuracy

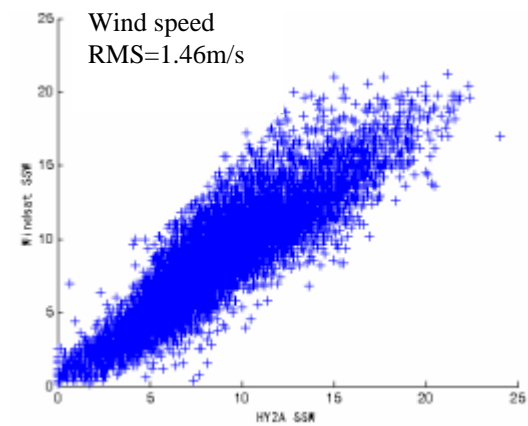
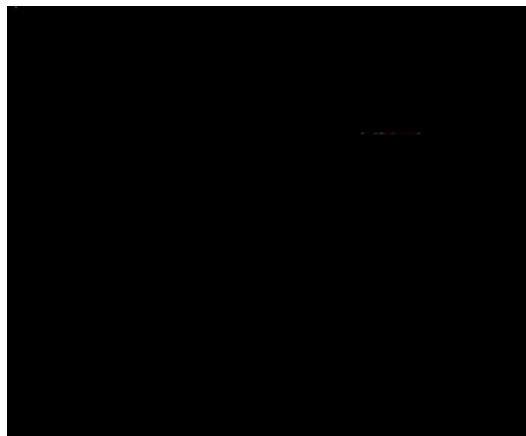
SST	1.29K
wind speed	1.46m/s
water vapour content	1.18mm
liquid water content	0.033mm



Water vapor content
RMS=1.18mm

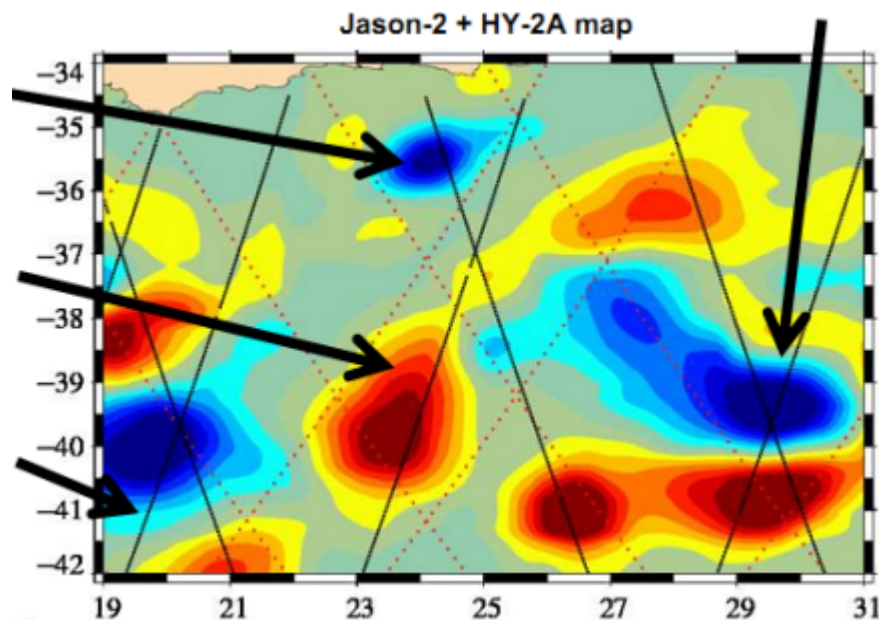
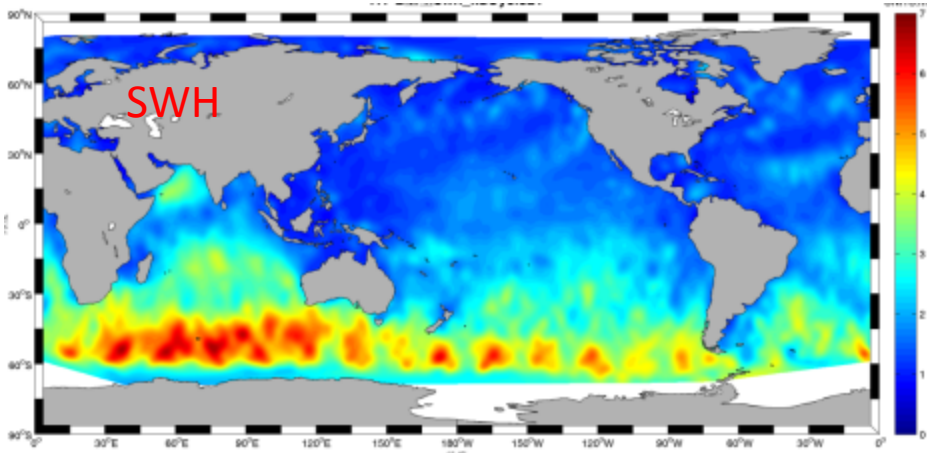
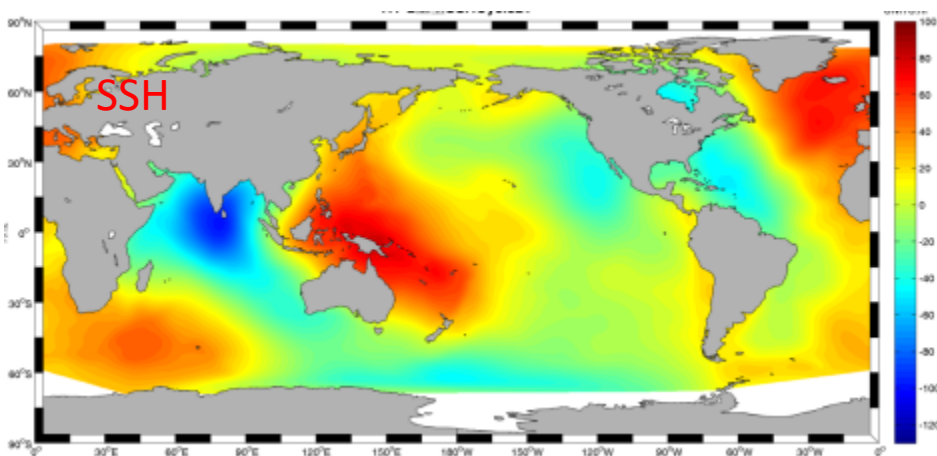


Cloud liquid water content
RMS=0.033mm



Typical Applications of HY-2's products

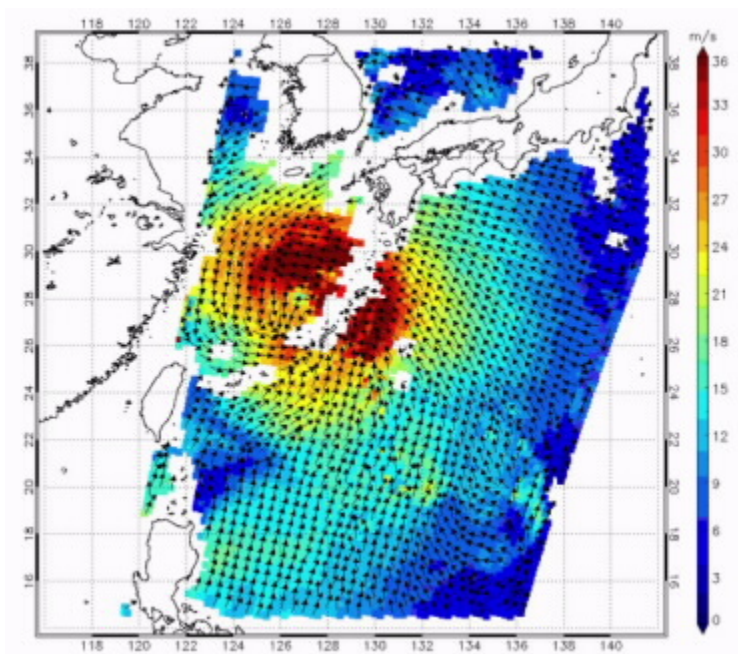
➤ Radar altimeter



HY-2 altimeter data and the Jason-2 data are used to research the mesoscale eddies in the Agulhas retroflexion current area

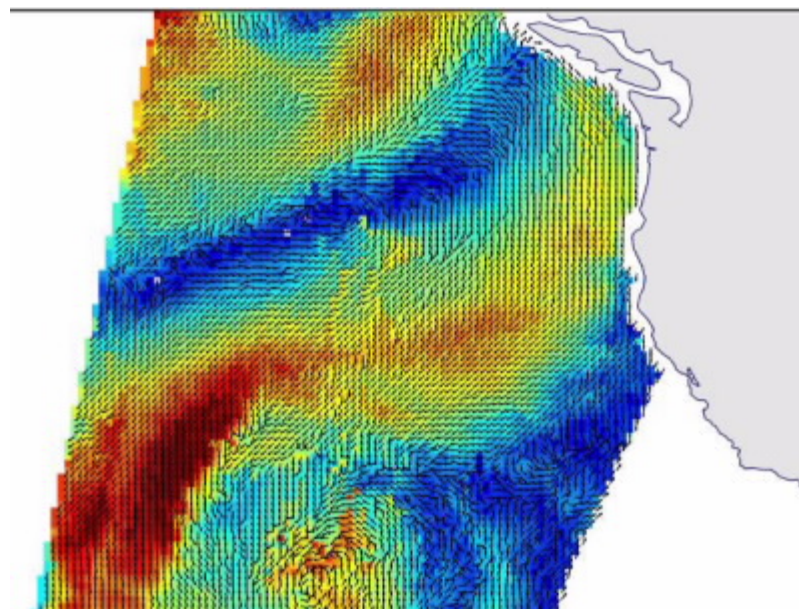
Applications of HY-2's products

➤ Microwave scatterometer



Detection Typhoon
Bolaven using the HY-2
scatterometer at 2012-08-
26 21:42:52(UTC)

**Coordination Group for
Meteorological Satellites**



Detection of atmosphere
front using HY-2
scatterometer



Current and future of HY-2

- Data discovery, ordering, distribution channels, and channels specific to instruments and additional information can be found online through the National Satellite Oceanic Application Service(<http://www.nsoas.gov.cn>).
- HY-2 designed lifetime is 3 years. It will be benefit to remove the gap of sea surface dynamic environment monitoring.
- CFOSAT is under developing with CNES, which is equipped with a directional wave spectrum form SWIM and a wind scatterometer SCAT. It will continue partly function of HY-2.
- Meantime, HY-2 operational satellites are demonstrated by state oceanic administration(SOA).

Conclusion

---Recently, many R&D satellites ,such as HY-2, will be launched and tested in-orbit, and become gradually into the operation mode.

---CNSA is devoted into the transformation from R&D satellite to operating satellite. And is jointly organizing some discussion about operational satellite system with other administrations

---CNSA will continue to share experience with CGMS members, and make more contribution for the optimization of Globe Earth Observing System.

Thanks for your attentions !

