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ESA–MOST Dragon Cooperation
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PROJECT SUMMARY

DRAGON 4 PROJECT ID. 31451
“OCEANIC AND ATMOSPHERIC PROCESSES IN CHINESE COASTAL ZONES”

LIs:

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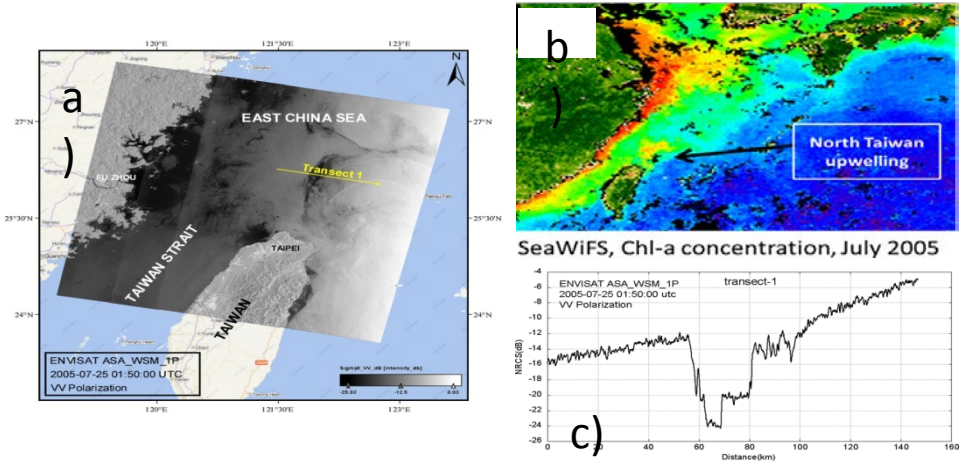
Sub-projects and themes:

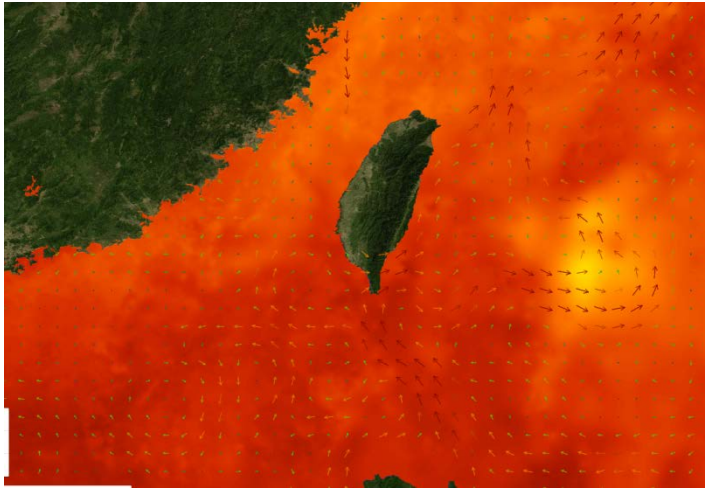
Id. 31451_1: Upwelling
Id. 31451_2: Coastal winds
Id. 31451_3: River-diluted waters
Id. 31451_4: SST retrieval
Id. 31451_5: Atmospheric corrections
Id. 31451_6: Water exchanges

Results summary ID: 31451_01 (Upwelling)

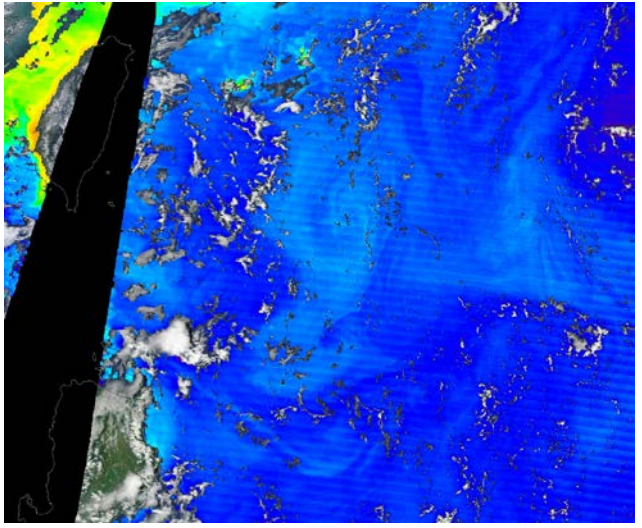
Radar, optical, and infrared signatures of upwelling regions and of sea areas hit by typhoons have been studied.

Radar signatures of surface films (mineral oil films and biogenic slicks)





SST signature of typhoon Megi on 26 September 2016



Chl-a signature of typhoon Soudelar on 12 August 2012, 6 days after the passage of the typhoon.

Results summary ID: 31451_02 (Coastal winds)

- Since the Sentinel -1 can acquire images at VV and VH polarizations. it is possible to retrieve from them also high winds as encountered in typhoons/ hurricanes. To this end, a new wind retrieval algorithm was developed which also takes into account the cross-polarization data.

- The wind speeds retrieved from Sentinel-1 data have been compared with wind speeds retrieved from data of the L-band e radiometer onboard the American SMAP (Soil Moisture/Active/ Passive) satellite. The comparison of both wind maps shows good agreement when the Sentinel-1 winds are processed to 40 km resolution.

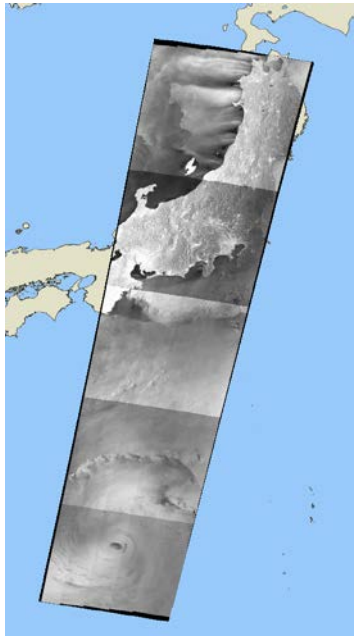
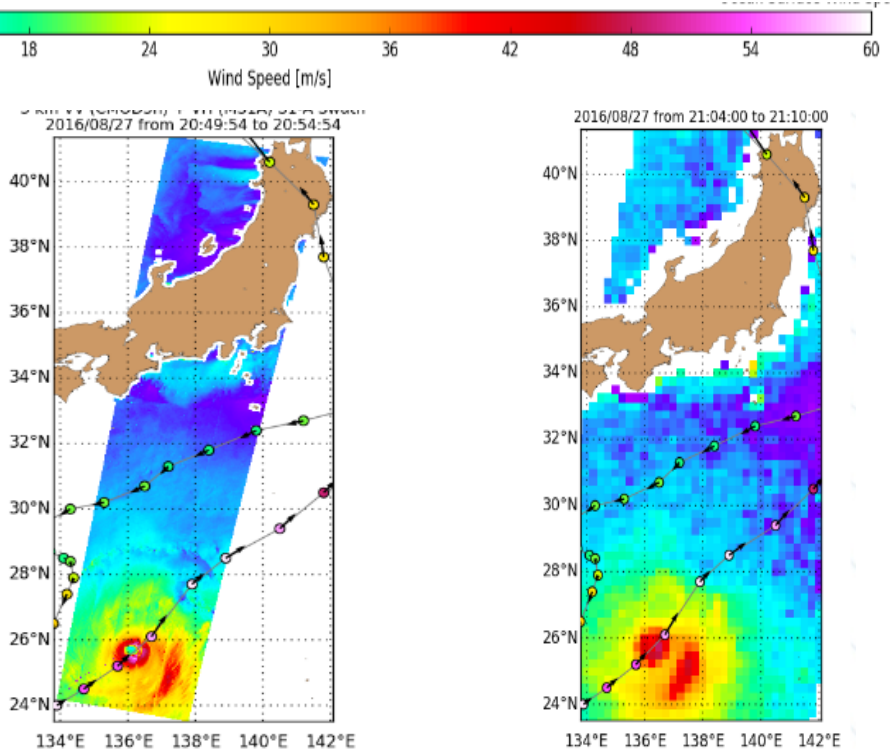


Fig. 1. Sentinel-1A intensity image acquired on 27 August 2016 at 20:49 UTC over the Pacific south of Japan (ESA)



Fig, 2. Wind speed map derived drom the Sentinel-1A image (copyright: Ifremer)

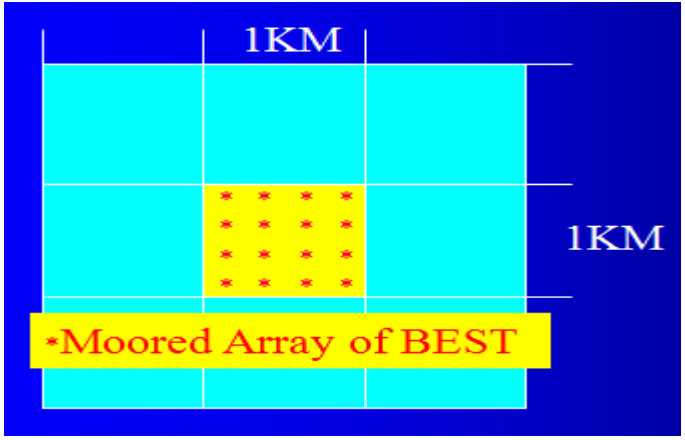
Wind speed map derived from radiometer onboard the American SNAP satellite (copyright: REMSS)

Results summary id. 31451_04 (SST retrieval)

1. New version of the instrument BEST (Buoyant Equipment for Skin Temperature) is under development, with which the accuracy for detection of the vertical location of the sensors will be improved to match the vertical resolution of the temperature measurement.
2. **Chinese FY-3 B VIRR data were used for retrieval of SST in South China Sea(SCS).** The results show that the SST retrieved from FY-3B has similar temporal and Spatial distribution to those retrieved from MODIS data.
3. The new method for validation of SST with moored array with BEST instruments is in progress, several candidate water sites are under consideration.
4. More satellite data from China and ESA will be employed for SST retrieval and validation.

Future:

Using a moored array of instrument BEST (Buoyant Equipment for Skin Temperature) for validation of the satellite-retrieved SST, for improving the validation methodology.



Results summary id. 32430_5 (Atmospheric corrections)

We adopt a new infrared extrapolation method to extend the existing turbid water atmospheric correction of the Operational Land Imager (OLI) data on Landsat-8 platform. The atmospheric correction uses the extrapolated Rayleigh-corrected reflectance at NIR and SWIR bands to derive the ratios of NIR to SWIR and visible aerosol single scattering contributions (aerosol epsilon). Taking the Pearl River Estuary as an example, the magnitude and spatial distribution of reflectance from OLI compare well with those of concurrent moderate resolution imaging spectroradiometer /Aqua based on SWIRE atmospheric correction method.

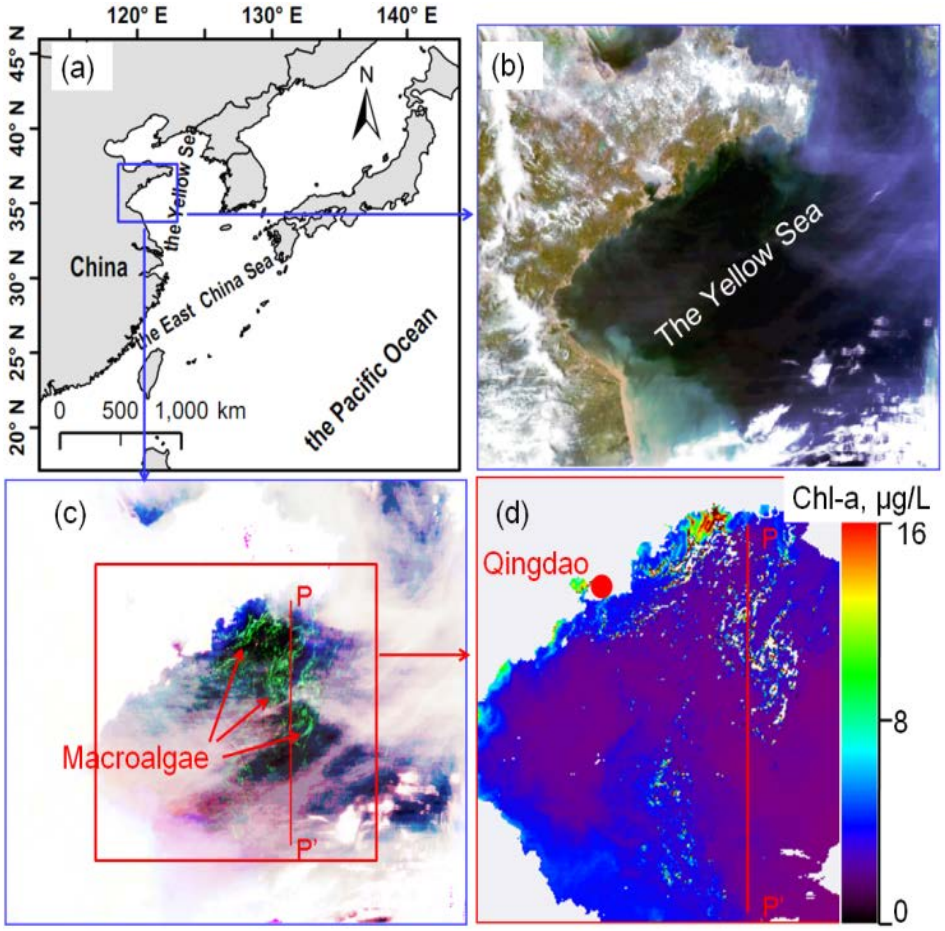
Results summary id. 31451_6 (water exchanges)

1. The early green macroalgae blooms in the Yellow Sea were observed and validated in 2016 and 2017.
2. Golden tide caused by Sargassum was retrieved by high resolution images.
3. The effects of MABs on the retrieval of SSD were evaluated.
4. The long-term changes in the SDD in the Yellow Sea were studies, and a decline in water clarity is observed in the western Yellow Sea.

Macroalgae in the Yellow Sea

17-July-2009,
MODIS/ Aqua level-1b
MODIS level-2: Rrs, Chl-a

To check the effects of floating macroalgae on the SDD and the Chl-a products…



Summary EO data exploitation – cumulative stats all subprojects

ESA & ESA TPM DATA	Nos. scenes or inform if by FTP
ERS SAR	5
ASAR	
MERIS	
AATSR	
SMOS	20
etc.	
TOTAL	

SENTINELS 1, 2 & 3 DATA	Nos. scenes
Sentinel 1-A/B SAR	2000
Sentinel 2-A/B MSI	
Sentinel 3-A OLCI	
Sentinel 3-A SLSTR	
Sentinel 3-A SLAR	
Etc.	
TOTAL	

CHINESE EO DATA	Nos. scenes
HJ-A/B	
GF-1	
GF-2	
HY-A	
FY-3B	1500
Etc.	
TOTAL	**1500**

Young scientists contributions

No European young scientists have sent to China in the first year of Dragon 4.

No Chinese young scientists have been sent to Europe in the first year of Dragon 4.

Academic exchanges & joint publications

Academic exchanges & cooperation

No academic exchanges organized so far.

Joint publications

“Oil spill detection by imaging radars: challenges and pitfalls”.

by Werner Alpers, Benjamin Holt and Kan Zeng, Remote Sensing of Environment, under review.