



ESA-MOST Dragon Cooperation

中国科技部-欧洲空间局合作“龙计划”

DRAGON 2 FINAL RESULTS AND DRAGON 3 KO SYMPOSIUM

“龙计划”二期总结研讨会暨三期启动会

Crop Assessment with the Combined Utilization of the ENVISAT-MERIS and FY-3 MERSI Data - 10640

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Objectives

This proposal is to get better crop parameters retrieval by taking advantages of both ENVISAT-MERIS and FY3-MERSI and then to enhance the application of satellite data in the crop assessment by the means of assimilating the crop parameters retrieved from satellite data into the crop model.

- (1) Improve the FY MERSI data processing and product generation in comparison with ENVISAT-MERIS data and product processing methodologies.
- (2) Develop the advanced methods to map the crop types with both ENVISAT-MERIS and FY MERSI satellite data.
- (3) Improve the methods of retrieving crop LAI from FY MERSI satellite data.
- (4) Assimilate satellite data into the crop model based on the crop type map and the crop LAI.

ENVISAT-MERIS and FY3-MERSI

ENVISAT-MERIS

- MEdium Resolution Imaging Spectrometer (MERIS)

FY3 : Fengyun satellites

- MEdium Resolution Spectral Imager (MERSI)

Table 1.1 - MERIS spectral bands and applications.

No.	Band centre (nm)	Band width (nm)	Applications
1	412.5	10	Yellow substance and detrital pigments
2	442.5	10	Chlorophyll absorption maximum
3	490	10	Chlorophyll and other pigments
4	510	10	Suspended sediment, red tides
5	560	10	Chlorophyll absorption minimum
6	620	10	Suspended sediment
7	665	10	Chlorophyll absorption & fluorescence reference
8	681.25	7.5	Chlorophyll fluorescence peak
9	708.75	10	Fluorescence reference, atmosphere corrections
10	753.75	7.5	Vegetation, cloud, O ₂ absorption band reference
11	760.625	3.75	O ₂ R- branch absorption band
12	778.75	15	Atmosphere corrections
13	865	20	Atmosphere corrections
14	885	10	Vegetation, water vapour reference
15	900	10	Water vapour

MERSI - Spectral Information

Channel set	Central wavelength	Spectral range or Bandwidth	Radiometric accuracy (NEAT or NE $\Delta\rho$)
Broad-band channels with 250 m resolution, mostly for clouds, vegetation and surface temperature	0.470 μm	0.445 - 0.495 μm	0.45 %
	0.550 μm	0.525 - 0.575 μm	0.4 %
	0.650 μm	0.625 - 0.675 μm	0.3 %
	0.865 μm	0.840 - 0.890 μm	0.3 %
	11.250 μm	10.0 - 12.5 μm	0.3 K @ 300 K
Narrow-band channels with 1000 m resolution, for ocean colour, vegetation, aerosol	412 nm	20 nm	0.1 %
	443 nm	20 nm	0.1 %
	490 nm	20 nm	0.05 %
	520 nm	20 nm	0.05 %
	565 nm	20 nm	0.05 %
	650 nm	20 nm	0.05 %
	685 nm	20 nm	0.05 %
	765 nm	20 nm	0.05 %
	865 nm	20 nm	0.05 %
	905 nm	20 nm	0.10 %
	940 nm	20 nm	0.10 %
	980 nm	20 nm	0.10 %
	1030 nm	20 nm	0.10 %
	1640 nm	50 nm	0.05 %
2130 nm	50 nm	0.05 %	

Partners and Roles

Project team from NSMC:

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Partners and Roles

Roles from NSMC:

- Improving the processing of the FY3-MERSI data and products
- Conducting field survey in China
- Mapping the crop types with both ENVISAT-MERIS and FY3 MERSI satellite data
- Retrieving crop LAI from FY3 MERSI satellite data.
- Assimilating satellite data into the crop model based on the crop type map and the crop LAI

Partners and Roles

Roles from UCL:

- Facilitating the obtain and processing of the ENVISAT-MERIS data and products
- Methodology of crop type mapping
- Methodology of crop LAI retrieval
- Methodology of the assimilation of satellite data into crop model
- Field Survey in Europe

Data Needs

- ENVISAT-MERIS
 - L2 Red Res Geophysical Product - MER_RR_2P (Full mission archive)
 - L2 Red Res Extracted Vegetation Indices - NRT and recent - MER_RRV_2P (Last 7 days)
- FY3-MERSI
 - L1b data
 - NDVI products

Data Needs

- Dates of data
 - March to October from 2002 to 2015
 - Overlap dates: 2008 – 2012
- Locations of data
 - North China Plain: $39^{\circ} 08' N$ and $115^{\circ} 40' E$
 - North Belgium: $49.75^{\circ} N$ and $3.75^{\circ} E$

Project schedule and planning

Schedule: July 2012 to June 2016

2012: Arrangements for the study areas in China and Europe and the consolidation of data acquisition plan

2013: Mapping of crop type and Retrieval of Crop LAI (2013-2014)

2014: Assimilation of satellite data and products into the crop growth model

2015: Method Validation

2016: Improvement of the project and preparation for Summary review

Field data collection campaigns

- Collect the historic data
- Expected to be conducted in 2013 and 2014 in The North China Plain
- Observation items:
 - LAI
 - Biomass/Yield
 - Crop stage
 - Soil Moisture
 - ...

Training of young scientists

1. Young Scientists will be invited to a field survey. This activity will help young scientists be familiar with and understand the complexities of crop area in China and Europe.
2. Young scientists will be guided in processing the ENVISAT-MERIS and FY-MERSI data. Thereafter, young scientists will be able to handle those data for the information retrieval.
3. Young scientists will be guided for the tuning and utilization of the crop model. Thereafter young scientists will be able to run the crop model and assimilate the satellite data into the crop model.

Expected results

- (1) A new methodology will be developed to assimilate the satellite data and products into a crop growth model for the reliable crop assessment.
- (2) The enhanced methods of mapping crop type and retrieving crop LAI will be developed.
- (3) Two scientific articles with joint authorship will be published.

- Thank you very much for your attention!
- Look forward to your constructive comments on the project