

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

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Low resolution satellite data have been applied to the agricultural monitoring in past more than 20 years. The 1km AVHRR on board NOAA series satellite was used worldwide. The MODIS has dramatically improved the satellite product development since its inception but the spatial resolution is still at 1 km scale for the agricultural monitoring. It started to indeed come to 250m scale for the agricultural monitoring since the successful launch of ENVISAT-MERIS and FYMERSI. The ENVISAT-MERIS and FY3-MERSI are both quite similar sensors on board European and Chinese satellites, respectively, but both have their own advantages. This proposal is to get better crop parameter retrieval by taking advantages of both ENVISAT-MERIS and FY-MERSI and then to enhance the application of satellite data in the crop assessment by the means of the assimilation of crop parameters retrieved from satellite data into the crop model.

The main objectives are as follows:

- (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 method of retrieving crop LAI from FY MERSI satellite data.
- (4) Assimilate satellite data into the crop model based on the crop type map and crop LAI.

In this proposal, two research sites will be selected, one in North China plain and another in Europe covering the northern France and Belgium. Each sites is covering about 300 km by 300 km area. or both sites, we need the data covering the growing season from the middle March to the end of October. FY-MERSI data processing will be anticipated to be improved in comparison with the methodology of the ENVISAT-MERIS data and product processing. The algorithm of the automatic land cover classification with some tuning developed by UCL will be applied to map crop type in both sites. Crop LAI will be retrieved by the advanced methodology developed by UCL. The assimilation algorithm will be used to facilitate the assimilation of satellite data into the crop model. Finally, the validation will be conducted.

The expected outcomes from this project are three folders.(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 retrieval of crop LAI will be developed.(3)Two scientific articles with joint authorship will be published. The Funding for this proposal will come from the on-going projects and new projects from both sides.

## 利用ENVISAT-MERIS和FY3-MERSI数据开展作物评价

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过去20年来低分辨率的卫星数据已经成功应用于农业监测, NOAA系列卫星的1公里分辨率AVHRR数据在全球得到了广泛使用。MODIS的出现大幅改善了卫星数据和产品的开发, 但是农业监测仍然是1公里的尺度。ENVISAT-MERIS和FY3-MERSI的成功发射才真正将农业监测带到250米的尺度。ENVISAT-MERIS和FY3-MERSI是分别搭载于欧洲和中国卫星上的两个相近的传感器, 但是各自有其独特的优势。

本建议书旨在综合利用ENVISAT-MERIS和FY3-MERSI数据的优势提取更好的卫星作物参数, 通过同化卫星获取的作物参数到作物模型增强卫星数据的农业监测应用能力。本建议书的主要目标是:

- (1) 通过与ENVISAT-MERIS数据和产品处理方法的比较, 改进FY3-MERSI 250米数据和产品的生产;
- (2) 利用ENVISAT-MERIS和FY3-MERSI进行作物制图;
- (3) 改进FY3-MERSI 作物LAI反演的算法;
- (4) 在利用作物类型和作物LAI的基础上, 同化卫星数据进入作物模型。

本建议书将选择两个研究区, 一是在中国的华北平原, 另一个是在欧洲的法国北部和比利时。每个研究区的大小大长宽各约为300公里。数据的获取时间是作物生长季, 从3月中旬至10月底。由比利时鲁汶大学开发的自动土地分类算法将用于作物制图, 其开发的作物LAI算法将用于提取作物LAI。数据同化算法将用于同化卫星数据进入作物模型。最后将进行验证。预期的研究成果是:

- (1) 同化卫星数据和产品进入作物模型开展作物评价的新方法;
- (2) 改进的作物制图和作物LAI算法;
- (3) 发表两篇文章。项目经费来源于在研项目和新申请的项目。