

# **Estuarine, Inland and Coastal Water Quality Monitoring using Earth Observation Data**

Our objective of this project is to adapt or develop available algorithms to the high turbid water (Extremely high suspended matter and plankton blooms), and to apply the HY-1B/COCTS and MERIS Data for monitoring of suspended matter and associated turbidity/light attenuation and plankton blooms in particular of cyanobacteria and red tides. In this final report, we will first give the executive status of our project, including the research objective, satellite data acquisitions, major results, published papers and also the training program. Then, we will give the details of the representative achievements as follows:

- (1) We developed a vector radiative transfer model of coupled ocean-atmosphere system using matrix-operator method for rough sea-surface [He et al., 2010]. We also developed a method to evaluate the aerosol models by simulating the aerosol retrieval using the Aerosol Robotic Network (AERONET) data (He et al., 2011).
- (2) We established a regional TSM algorithm for MERIS in the Changjiang River Estuary with extremely high turbidity (Bai, et al., 2010). Also, we developed a semi-empirical algorithm for TSM retrieval for turbid waters based on the radiative transfer model (Shen et al., 2010), and proposed a multi-spectral data projection method to reduce the effect of haze on the TSM retrieval (Shen et al., 2010).
- (3) We developed a new three-band model to estimate chlorophyll-a concentrations in turbid inland waters (Duan et al., 2010). Using the MERIS data, we got the distribution of the chlorophyll and cyanobacteria concentrations, and mapped the cyanobacterial blooms in the Taihu Lake, China (Duan et al., in press; Jin et al., 2010). Also, we developed an algorithm for the retrieval of the chlorophyll concentration in the turbid waters using the synthetical chlorophyll index (Shen et al., 2010).
- (4) We carried out validations of the EO data both for the MERIS and HY-1B/COCTS. We validated the MERIS ocean color algorithms in the Lake Taihu, including the chlorophyll and TSM concentrations (Duan et al., in press). We also validated the ocean color data of HY-1B/COCTS, including the normalized water-leaving radiances, Sea surface temperature (SST), chlorophyll-a concentration and TSM concentration (Bai, et al., 2010).

## “龙计划”二期项目 ID5351 结题报告摘要

本项目的研究目标是开发高浑浊水体的遥感反演算法，并应用于 HY-1B/COCTS 及 MERIS 卫星遥感数据，实现对高浑浊水体悬浮物浓度、水体光谱漫射衰减系数及藻华（以蓝藻和赤潮为主）的遥感监测。

结题报告中，我们首先对项目的总体执行情况进行说明，包括研究目标实现、卫星资料获取、主要成果、发表论文及培训等情况说明。在此基础上，报告将给出以下代表性成果的详细说明：

- (1) 开发了粗糙海面的海洋-大气耦合矢量辐射传输模型 (He et al., 2010)；建立了利用 AERONET 观测网数据对海洋水色卫星遥感气溶胶模式适用性的评估方法 (He et al., 2011)；
- (2) 建立了针对 MERIS 的适用于长江口极端浑浊水体的悬浮物浓度遥感反演模型 (Bai et al., 2010)；研制了基于辐射传输模型的悬沙浓度半经验反演模型 (Shen et al., 2010)，建立了基于辐射传输模型的大气-水体耦合的多光谱数据投影方法(MDP)，以消除卫星景浑浊水域阴霾可致悬浮泥沙反演的高估或误判(Shen et al., 2010)；
- (3) 构建了适用于内陆水体的叶绿素浓度三波段反演算法(Duan et al., 2010)；构建了富营养化湖泊浮游植物色素遥感反演模型构建，并基于 MERIS 数据，绘制了叶绿素和藻蓝素空间分布图(Duan et al., in press; Jin et al., 2010)；提出了叶绿素综合指数 (SCI) 概念模型，研制了浑浊含沙水体叶绿素浓度的 MERIS 卫星数据反演模式(Shen et al., 2010)；
- (4) 开展了针对 MERIS 和 HY-1B/COCTS 的产品真实性检验。通过在太湖同步采样，对 MERIS 的叶绿素浓度和悬浮物浓度反演结果进行验证(Duan et al., in press)；对 HY-1B/COCTS 的归一化离水辐亮度、海表温度、叶绿素浓度和悬浮物浓度产品进行了检验 (Bai, et al., 2010)。