

Coastal zone remote sensing monitoring in Yellow River, Yangtze River and Pearl River Delta — Final Report

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Yellow River, Yangtze River and Pearl River Delta are the economically developed area in China, where the changes of the ecological environment are remarkable. In this project, the coastal zone of three Deltas is taken as the study area. The main objective of the research is to monitor and evaluate the status and the changes of the land use/cover, wetland, coastline and water quality in the 3 largest river deltas of China by satellite images of MERIS, SPOT 5 of Europe and HY-1B CZI, HJ-1 of China. Significant progress has been made in corresponding aspects during the dragon 2 process. This abstract briefly summarizes the research results of this project as a final report.

(1) land use/cover remote sensing monitoring

Based on HY-1B CZI and ENVISAT MERIS remotely sensed images, coastal land use/cover remote sensing monitoring in the Yellow River delta was carried out. Firstly, interpretive symbols and Ground-Control-Points (GCPs) data oriented to the above two kinds of remote sensing data were established based on field work; remote sensing images were registered according to the field survey results and the coastal land use/cover classification system of the Yellow River delta was set up based on the above two kinds of data; interpretation was carried out respectively on remote sensing images of HY-1 B CZI on 8th 5, 2006 and MERIS on 16th 6, 2006 with the combination of robust and artificial methods; corresponding thematic maps were also produced.

(2) coastline remote sensing monitoring

Coastline classification system for three major estuaries of China was established based on remote sensing data from China and Europe; Based on the extraction of instant land-water boundary from multi-date remote sensing images, coastline and the low tide coastline analyzing methods were developed and corresponding modules were compiled; using multi-date HY-1B CZI remote sensing images, coastline and the low tide coastline of coastal zone of Yellow River delta were extracted and coastline

changes of Yangtze river estuary and laizhou Bay were monitored and analyzed. We also extract the coastal lines and analyze the changes from 2005 to 2012 with the SPOT 5 and ZY-1 02C(a Chinese new resource satellite) remote sensing images.

(3) littoral wetland remote sensing monitoring

Littoral wetland remote sensing monitoring and change analysis were carried out in Dongying, Yellow River Delta, based on remotely sensed images of domestic HJ-1 and European SPOT 5. About 20 days field work was undertaken in 2008, 2009, 2011 and 2012. With the help of the in situ data, wetlands classification systems and wetlands interpretation symbols were established. Then the wetlands information were extracted in human-computer interaction way. Based on the wetlands extraction results, evaluation research on the service function of littoral wetland of Yellow River delta was launched.

(4) nearshore water quality remote sensing monitoring

The statistical retrieval models for the concentration of suspended particulate matter (SPM) in Bohai Sea of China by ENVISAT MERIS, FY-3 MERIS, HY-1B CZI and CEBRS-02 CCD data were developed. Spatio-temporal distribution of SPM in the Bohai Sea were analyzed in terms of its spatial pattern, disturbance by sustaining strong wind and seasonal variability. QAA (Quasi-Analytical-Algorithm) was modified and validated by field data in the Bohai Sea, Yellow Sea and East China Sea to retrieve inherent optical properties (IOPs). Two new models for retrieving surface slinity and particle size of SPM in the Yellow River estuary were developed and validated.

(5) validation of Water color products of MERIS

Extensive in situ data in the Bohai Sea of China were collected to assess MERIS radiometric properties and concentrations of ocean color constituents, including spectral normalized water leaving radiance, concentrations of SPM and chlorophyll a. During the analysis, a relatively strict spatio-temporal match-up method was adopted regarding the complexity of marine environment and its variation in the turbid coastal area.

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黄河口、长江口和珠江口三角洲海岸带遥感监测

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黄河口、长江口和珠江口三角洲是中国最大的三个河口三角洲, 其海岸带区域是中国经济最为发达的区域, 同时也是人类开发活动最为剧烈的区域。基于遥感手段, 开展对这些区域的高效监测具有十分重要的意义。本项目利用多时相的中方和欧方遥感影像数据, 包括 HY-1B CZI、HJ-1、MERIS 和 SPOT 5 等影像, 开展了针对上述三个河口三角洲海岸带和近海的土地利用/覆盖、滨海湿地、岸线、近岸水质和 MERIS 水色产品检验等五个方面的遥感监测工作。

(1) 土地利用/覆盖遥感监测方面

基于中国 HY-1B CZI 遥感影像和欧空局 ENVISAT MERIS 遥感影像, 开展了黄河三角洲海岸带土地利用/覆盖的遥感监测。项目组于 2008 年开展了为期 10 天的黄河三角洲现场踏勘, 获取了面向上述两种数据的遥感现场解译标志和地面控制点数据; 根据踏勘结果对两景遥感影像进行了配准, 并建立了基于上述两种数据的黄河三角洲海岸带土地利用/覆盖分类体系; 通过计算机自动分类和人工解译相结合的方式分别完成了对 2006 年 5 月 8 日和 2006 年 6 月 16 日的 HY-1B CZI 和 MERIS 遥感影像的解译; 制作了相应的专题图件。

(2) 海岸线遥感监测方面

制定了针对中欧卫星遥感数据的我国三大河口海岸带岸线类型分类体系; 发展了基于多时相遥感影像水边线提取结果的岸线和低潮线分析方法, 并开发了相应的岸线、低潮线分析软件模块; 应用 2007-2008 年多时相的 HY-1B CZI 遥感影像, 完成了黄河三角洲海岸带的海岸线、低潮线提取; 开展了长江口和莱州湾的岸线变迁监测与分析; 应用 2005 年 SPOT 5 影像和 2012 年的 ZY-1 02C 影像开展了黄河三角洲岸线变迁监测与分析。

(3) 滨海湿地遥感监测方面

分别于 2008、2009、2011 和 2012 年开展了共约 20 天的黄河三角洲滨海湿地遥感监测现场踏勘, 基于踏勘成果, 应用中国 HJ-1 卫星遥感影像和欧洲 SPOT 5 遥感影像, 开展了黄河三角洲区域东营市的滨海湿地遥感监测及变迁分析, 基于湿地提取结果, 开展了黄河三角洲滨海湿地服务功能价值评估研究。

(4) 近岸水质遥感监测方面

应用中欧 ENVISAT MERIS、FY-3 MERSI、HY-1B CZI 和 CEBRS-02 CCD 遥感影像,开展了渤海水体悬浮物 (SPM) 浓度的统计反演模型研究。分析了渤海水体 SPM 浓度在大风过程的时空分布和季节性变化;应用实测数据,对渤海、黄海和东海固有光学性质的半分析反演模型进行了修正和检验;开展了两种渤海海域海表盐度模型建立和反演工作。

(5) MERIS 水色产品检验方面

应用大量的渤海实测数据评估了 MERIS 的水色要素产品,包括光谱归一化离水辐亮度、叶绿素 a 浓度和 SPM 浓度。在分析中,考虑到海洋环境的复杂性和近岸水体的浑浊性,引入了一种相对精确的时空匹配方法。

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