

Assessing Flood- Wetland- and Land Use Dynamics of Dongting Lake, China

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OBJECTIVES

Within the DRAGON-3 project "Assessing Wetland Dynamics and Land Resources of Dongting Lake, China" we want to depict the potential of remote sensing for the support of spatial planning for a wetland of international magnitude: Dongting Lake. Rich in water resources, biodiversity, crops, and urban settlement (7 Mio people in the region) it is one of the most diverse ecosystems in China. The area, extending from 28°30'-30°20' North and 111°40'-113°14' East, is China's second largest inland water body, located in the centre of the Yangtze River Watershed. The flood path lake plays a crucial role in the accommodation of flood waters. Before the 1990s intensive land reclamation to gain new agricultural production ground, and strong sedimentation, following deforestation along the upper reaches of the Yangtze, resulted in a rapid decrease of the size of the lake. From 1820 to 1990 half of the lake area had disappeared. After a disastrous flood in 1998 killing more than 3600 people, much of the land reclaimed had been inundated again. Since that date there is a reversing trend. Lake size and retention capacity increases; largely triggered by the government-induced Return Land to Lake initiative, envisaging the final extent of the lake to be 4350 km². However, many scientists doubt the realization of this goal, as too many people would have to be resettled, and too much farmland would be lost. The region is one of China's leading rice producing regions, and is furthermore well known for cotton growth, oil production, aquaculture, and citrus and vegetable crops. Additionally, reed, together with poplar, has become the main source of raw material for paper mills. Especially the poplars spread rapidly and lead to the destruction of the natural wetlands (3 UN Ramsar sites exist). Objective of this proposal is the assessment of Dongting Lake dynamics the assessment of flood pulse dynamics, wetland development, and the quantification of wetland degradation, as well as the derivation of land use changes in the direct lakes surrounding.

METHODS

Remote sensing data analyses based on Envisat ASAR data at different resolution (mapping of inundation extent and frequency) utilizing automated algorithms based on relative thresholding and morphologic filters under development at the German Remote Sensing Data Centre, DFDDL jointly with remote sensing groups at Beijing Normal University, BNU, Hangzhou University, and Hunan Normal University, HUNNU. Derivation of inundation time series for the three consecutive years of the DRAGON 3 project, as well as for past years based on different modes of different spatial and temporal resolution. Investigation of Wetland composition and biodiversity, wetland degradation based MERIS data and optical data of multispectral data of the Environmental Monitoring Constellation and Beijing-1 and 2 data. Assessment of land use dynamics in the direct lakes surrounding, mapping and change detection of agricultural crops based on the same optical sensors. Focus on the implementation of automated, transferable algorithms (spatially and temporally) for inundation analyses (generation of an inundation monitoring toolbox based on the merge and extension of existing IDL codes), automated wetland and land use mapping based on methods with little analyst bias (TwoPac: twinned pixel and object based classification chain, employing C5 decision tree, maximum likelihood, support vector machine and random forest classification developed at DFD of DLR) and new developments for biodiversity assessment in wetlands and agriculture.

DELIVERABLES

- 1) EO based information product,
- 2) Two SCI joint Sino-German journal publications envisaged per year,
- 3) Young scientist exchange between the German and Chinese Partners,
- 4) Training classes and summer schools organized by the involved parties.

FUNDING

Funding for personnel is available via the base funding of the involved institutions.

洞庭湖洪水-湿地-土地利用动态的评估分析

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目标

在"龙计划"三期项目"洞庭湖洪水-湿地-土地利用动态的评估分析"中，我们将研究遥感技术用于洞庭湖湿地空间规划的潜力。洞庭湖位于长江流域中心，是中国第二大内陆湖泊。那里水资源充足，物产丰富，是生物多样性最好的地区之一，同时起着重要的洪水调节作用。在二十世纪九十年代以前，随着上游森林的砍伐导致的水土流失和不断的围湖造田，水面面积迅速减少。1820-1990年间水面面积减少了一半。1998年的洪水使围湖造田面积几乎全部被淹没，死亡人数超过3600.此后开展的退田还湖使水面面积和蓄洪能力都有所增加。洞庭湖地区是水稻的主产区，同时出产棉花，油料作物，水产品，蔬菜和芦苇（重要的造纸原料），近年来又大量种植杨树，导致天然湿地迅速减少。本项目的目的是评价洞庭湖的动态，包括洪水的变化，湿地的退化，以及洞庭湖周边地区土地利用动态变化。

方法

来自德国遥感数据中心和北京师范大学，湖南师范大学以及杭州师范大学的研究者将与基于不同分辨率的Envisat ASAR数据分析洪水淹没范围和频率，建立基于不同时间和空间分辨率淹没时间系列；使用多光谱遥感影像（包括MERIS数据，HJ-1数据和北京-1，北京-2卫星数据）调查湿地的组成，生物多样性，和湿地退化，评估洞庭湖周边地区土地利用动态变化，及农作物制图。