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DERIVING WATER SURFACES WITH WAMAPRO – OBSERVATION OF WATER SURFACE DYNAMICS OF THE YELLOW RIVER DELTA

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ABSTRACT:

River deltas are surrounded by water, shaped by water, influenced and affected by precipitation and inundation, and will be increasingly threatened by sea level rise. In view of this, the observation and mapping of water surfaces is central to most monitoring activities in river deltas, e.g. monitoring of environmental dynamics, wetland changes, and land use developments. Satellites provide a cost effective way for deriving periodical and area wide information on water surfaces. Especially satellite data from active SAR systems that can be used to monitor the land surface independently of prevailing cloud coverage provide highly valuable sources for water surface mapping.

The easy-to-use satellite data analysis tool WaMaPro – which stands for Water Mask Processor – is capable of utilizing any kind of radar data, such as Envisat ASAR, TerraSAR-X, and Sentinel-1. A knowledge-driven threshold-based approach combined with morphological operations separates surfaces with very low backscatter, i.e. water surfaces from those with high backscatter, i.e. land surfaces. The algorithm was implemented within the open-source GIS software Quantum GIS, thus, providing a user friendly interface for data handling and application. Both a server version and a desktop version of the processing tool are available. Both versions offer multi-dataset capabilities for processing large amounts of data at a time.

WaMaPro was tested for various regions and especially Asian river deltas so far. The dynamically changing surface of the Yellow River Delta at the Bohai Sea, China serves as a test case for this study. High sedimentation load in the Yellow River as well as extensive man-made shaping of the landscape are the main influencing factors in this region. With respect to the analyses of coastal dynamics, the surface water of the Yellow River Delta was monitored since 2005. 10 years of available SAR data were processed utilizing WaMaPro information to support scientists and decision makers in their respective activities.

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