



## **Sentinel-3 Hydrologic Altimetry Processor prototype (SHAPE) : Project achievements**

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The SHAPE project is part of SEOM, Scientific Exploitation of Operational Missions, an ESA program element which aims at expanding the international research community, strengthening the leadership of the European EO research community and addressing new scientific researches.

This Research and Development intends to make the best use of SAR (delay-Doppler) altimetry data for applications in hydrology. The study focuses on three main variables of interest: river water level (RWL), river discharge (RWD) and lake water level (LWL), RWD and LWL being part of the Terrestrial Essential Climate Variables (TECV) defined by GCOS.

The project embraces data processing from L1A altimetry products up to L2 (geophysical products), L3 (water level time series) and L4 (River discharge). It started with CryoSat-2 data (before the launch of Sentinel-3A) and is integrating Sentinel-3A as another input for the SHAPE processor.

The project has developed its own modular and configurable altimetric processor comprising a delay-Doppler processor (from L1A to L1b), a L2 processor including state-of-the-art geophysical corrections and new SARM retracers. On top of this, the SHAPE project also implements its own L3 processor (from L2 to RWL and LWL) and L4 processors (from RWL to RWD) and a validation and verification framework. With the confidence brought by the validation and verification steps, the project implements hydrological dynamic and semi-distributed models of river catchments able to assimilate RWL measurements in order to estimate RWD.

The high level of configuration of the processor allows to work in parallel on two different baselines. The first one is dedicated to mimic as much as possible the real Sentinel-3 baseline and the second a baseline optimised for hydrology, at all processing levels.

The project focuses on 3 rivers (Amazon, Danube and Brahmaputra) and 2 lakes (Vänern and Titicaca). Sentinel-3A L1A data is considered to be used on the Brahmaputra river while CryoSat-2 L1A data is used on the other water bodies.

In this communication, we report both on the achievements made by the project as well as providing results, we also report about its status and planning.