Investigation of TanDEM-X InSAR DEMs as input for new sensor modelling, epidemiological and natural hazard applications

Giraud, Henri - SERTIT - UDS
Huber, Claire - SERTIT - UDS
Blumstein, Denis - LEGOS/CNES/CNRS
Lion, Christine - LEGOS/CNES/CNRS
Studer, Mathias - SERTIT - UDS
Uribe, Carlos - SERTIT - UDS
Yesou, Hervé - SERTIT - UDS

Water resources monitoring and preservation are some of the biggest stakes at the global scale, and spatial technologies will play a key role in various applications related to water topics. With regard to this issue, an accurate mapping of continental water resources is linked to the availability of high quality Digital Elevation Models (DEM). One of the purposes of this study is to develop a workflow to generate DEMs with a finer spatial resolution from Interferometric Synthetic Aperture Radar (InSAR) data such as TanDEM-X (TDX), and to compare the results with DEMs coming from multiple sources (DEMs generated from Very High Resolution (VHR) optical data, SRTM mission, external DEMs…). These various DEMs are meant to be one of the basic inputs of a processing chain designed to simulate the future SWOT wide-swath altimeter signal. In such a modelling approach, one of the key parameter is the quality of the DEM. The study area chosen to conduct these tests is the Poyang Lake area located in the Jiangxi Chinese Province. Another great interest of TDX InSAR capacities for DEM generation lies on its potential as regards epidemiological purposes, more particularly in the struggle against schistosomiasis, an endemic disease in the Poyang Lake region. In practice, the knowledge of accurate elevation information is very important to refine water body mapping and to derive parameters (flow speed and direction, submersion time) crucial for risk area determination. The combination between such parameters and land cover can provide an indication on the potential presence of schistosomiasis intermediate host, thus allowing progressing towards maps of potential transmission risks. Actually due to seasonal temporary floods the wetlands and lowlands of the Poyang Lake system, which can represent animal grazing sites during some periods of the year, are favourable mediums for the proliferation of the disease vector. The contamination of the animals is then a threat for the people living in those areas. Preliminary results based on the exploitation of two TDX strips acquired in mid-January 2013 are very promising. Additional process and evaluation are on-going, and the future steps for improving the DEM will be based on the integration of multi-temporal TDX datasets that will be acquired later this year during the low water season (starting from November).