

TOPOGRAPHIC ESTIMATION BY TERRASAR-X

U. Sefercik^{*a} U. Sörgel^b

^b Leibniz University Hannover, Institute of Photogrammetry and
GeoInformation, Nienburger Str. 1, 30167, Hannover, Germany

^a Zonguldak Karaelmas University, Geodesy and Photogrammetry Engineering, Zonguldak Karaelmas
Uni. Department of Geodesy and Photogrammetry Engineering, 67100, Zonguldak, Turkey

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ABSTRACT:

SAR Interferometry (InSAR) is a technique to derive Digital Elevation Model (DEM) from at least two complex SAR images. The data are either taken simultaneously (single-pass mode) or sequentially (repeat-pass mode) by airborne or space-born sensors (carriers: plane, satellite, shuttle etc.). To date, one of the most important single-pass interferometry measurement campaigns is the Shuttle Radar Topography Mission (SRTM) completing its mission successfully after 11 days of operation between 11th and 22nd of February 2000. On the other hand, repeat-pass InSAR has been used by several satellite systems: ENVISAT, ERS 1-2, RADARSAT 1-2, ALOS, JERS-1 etc. One of the most advanced systems is the German TerraSAR-X (TSX) satellite launched on June 15th, 2007. TSX offers high resolution (~1m by Spotlight mode) imagery which could not been achieved from radar technologies up to this time similar to high resolution optical imagery. In contrast to optical sensors, TSX can be operated under all weather conditions without being influenced by clouds. The data sets provided by TSX newly obtained by scientific community and evaluations are currently being performed. As mentioned above, utilizing the advantages of SAR technology, indeed the planimetric locations of target ground objects, elevations of them can be determined using interferometry. Through the interferometric data, interferograms (fringe maps) can be generated and applying interferometric processing steps height models can be created for large coverage interest areas. The main targets of this investigation can be summarized as; generation of height models derived from TSX InSAR image-pairs and evaluation by comparison with more accurate reference height models as well as height models based on high resolution optical satellite images. Absolute and relative accuracy, stability, homogeneity and dependency upon various parameters are determined. The approach will be demonstrated using TSX data covering Istanbul area, Turkey.

TOPIC: Microwave remote sensing

ALTERNATIVE TOPIC: Remote sensing applications