Quality Assessment of an Extended Interferometric Radar Data Processing Approach

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Radar data acquisition is a reliable technology to provide base data for topographical mapping. Its flexibility and weather independency make radar data more attractive in comparison with traditional airborne data acquisition. This advantages emplace radar data acquisition as an alternative method for many applications including Large Scale Topographical Mapping (LSTM). LSTM i.e. larger or equal than 1:10.000 map scale is one of the prominent priority tasks to be finished in an accelerated way especially in the developing countries such as Indonesia.

The available TerraSAR-X Add on Digital Elevation Model X (TanDEM-X) Intermediate Digital Elevation Model (IDEM) from German Aerospace Center (DLR) as one useful global scientific data set however still complies with High Resolution Terrain Information (HRTI) Level 3 only. The accuracy of the end product of pairwise bi-static TanDEM-X data can be improved by some potential measures such as incorporation of Ground Control Points (GCPs) within the interferometric data processing. It is expected that the corresponding end product can fulfill HRTI Level 4 specification.

From this point, we focus on the step of phase to elevation model with three main parameters i.e. height reference, absolute phase offset and baseline. Those three parameters are considered to be essential within the Digital Surface Model (DSM) generation process. Therefore it is necessary to find the optimal solution within aforementioned model. In this paper we use a linearized model, as discussed in section 2.4, to process the bi-static TanDEM-X datasets and investigate how this improves the accuracy of the generated DSM.

As interferometric radar data processing relies on accurate GCP data we use Indonesian Geospatial Reference System (SRGI) for our investigations. Also, we use baseline and phase offset information from TanDEM-X metadata. Subsequently, the DSM generated using Sentinel Application Platform (SNAP) desktop, is the main product used for LSTM. This product has to be assessed using check points derived from conventional airborne data acquisition using RCD-30 metric camera and the accuracy is compared with the accuracy of the IDEM. Summarized, this paper aims on an improvement of the DSM generation by adjusting main parameters through our linearized model.