

TanDEM-X for national forest mapping

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Many developed countries including Sweden have national coverages with airborne laser scanning (ALS), performed at least once, from which an accurate digital terrain model (DTM) can be constructed. Moreover, the forest sector can benefit from wall-to-wall remote sensing data that has proven to give accurate estimations of common forest attributes, such as tree height, basal area and stem volume. However, this information gets outdated quickly, because of constant changes in the forest, caused by for example storm hazards, thinning and cuttings, growth and so on. One alternative to update the Swedish forest map product Skogliga Grunddata(SGD), which is based on ALS data, is to use satellite based techniques which can provide frequent acquisitions at sufficient resolution.

In this study, we have used a nation-wide collection of about 500 TanDEM-X images, the ALS based DTM, and thousands of 7 to 10 m sample plots from the Swedish National Forest Inventory (NFI) in order to create a nation-wide pixel product. The possible update or replacement of existing ALS based products is partly evaluated and the preliminary results are pointing to this method having great potential, however having several important challenges to be overcome, before an automatically generated product can be delivered. This includes suitable acquisitions, correct phase unwrapping, relevant height calibration, and moreover a meaningful merging of the TanDEM-X tiles.

In summary, the potential of using X-band radar data for frequent boreal forest mapping appears high, accounted that some crucial challenges are overcome.