STEREO RADARGRAMMETRY IN SOUTH-EAST ASIA USING TERRASAR-X STRIPMAP DATA

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ABSTRACT:

SAR interferometry (InSAR) is common technique for the generation of precise digital surface models (DSM). With the new high-resolution SAR satellite systems, like COSMO SkyMed, TerraSAR-X, and Radarsat-2, DSMs can be obtained in a high spatial resolution. The disturbing influence of the temporal decorrelation of vegetation for repeat pass interferometry hinders the operational application of space borne InSAR in strongly vegetated areas. The fast repeat cycle of the COSMO SkyMed satellite constellation can reduce this problem, even more so the TanDEM-X system. Stereo radargrammetry is less affected by the temporal decorrelation. In the mountainous and densely vegetated areas of South-East Asia, radargrammetry has therefore been successfully applied to generate precise surface models in areas where InSAR is not applicable. In radargrammetry, a SAR stereo pair is acquired with different incidence angles. The data is processed to reconstruct the 3D geometry in object space. The classical radargrammetric method is the parallax-based method which uses the difference of homologous point coordinates on reference and match image to calculate the corresponding object's height. Homologous points are found using series of cross-correlations in pyramid layer levels. In geo-location, the RPC (Rational Polynomial Coefficient) model, which relates image 2D coordinates and the corresponding object 3D coordinates by rational polynomial, can be applied. In order to determine the unknown coefficients in RPC model, the rigorous sensor model is often used. The rigorous physical sensor model can also be applied in geo-location directly and has a high accuracy for geo-location. However, the RPC model's capability of sensor independence, high fitting accuracy and efficient calculation made it a better choice. Based on exampled from Malaysia, the capability of high-resolution SAR radargrammetry with TerraSAR-X data will be shown.

TOPIC: Microwave remote sensing
ALTERNATIVE TOPIC: Remote sensing applications