Evaluation of influence of interpolation methods on coregistration of radar images

Abstract

SAR interferogram processing requires subpixel coregistration of SAR image pair for accurate phase differencing. Errors in alignment introduce phase noise in SAR interferogram. Last step in coregistration is resampling one of SAR images. Also this step introduces errors in SAR interferogram. The resampling algorithms *Nearest Neighbor*, *Bilinear interpolation*, *Cubic Convolution* and advanced methods such as *Raised Cosine kernel*, *Knab interpolation kernel* and *Truncated Sinc* were tested on ERS tandem data and compared. The results were compared with the theory and simulations of earlier investigations (Hanssen, Bamler, 1999), (Migliaccio, Bruno, 2003) and (Cho ... [et al.], 2005).

The main experiment in this work was to examine and compare resampling methods on real data to evaluate their effect on the interferometric phase quality and DEM generation. The coregistration performance was evaluated by the coherence (Touzi ... [et al.], 1999) and the sum of phase differences (Li ... [et al.], 2004). No evidence showed that computationally intensive algorithms produced better quality of interferogram than *Cubic Convolution*. The possibilities of evaluating by means of the accuracy of the final InSAR DEM (Li, Bethel, 2008) were examined. External digital elevation model from the digital geographical model of the Czech Republic, ZABAGED, and digital geographical model from airborne laser scanning were used for validation. Effect of Land Cover was examined. The resolution of the final InSAR DEM is 40 m × 40 m. The final InSAR DEM accuracy not depends on the interpolation method selection.

Keywords: InSAR DEM Generation, ERS, Resampling, Interpolation