A Study of Post-Processed Filtering in DInSAR Technique for Ground Deformation Analysis

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Most of the filtering efforts in InSAR application are performed before unwrapping the interferogram to reduce noise and increase coherence. The phase noise is mainly caused by the thermal noise decorrelation, temporal decorrelation and geometrical decorrelation.

Filtering methods that have been developed such as adaptive filtering algorithm, maximum likelihood estimation, and nonlinear filtering are proven to reduce noise and improve the coherence.

However, the deformation signals as a final objective in ground deformation monitoring still contain noise related to the spatial resolution or pixel size factor. This study assesses the possibility of post-processed filtering for differential InSAR of PALSAR data to obtain a reliable displacement quantity. The method is assessing different low-pass filtering techniques to displacement results after converting the unwrapped differential interferogram. The unwrapped differential interferogram is obtained from an interferogram filtered by adaptive method based on local fringe spectrum (Goldstein and Werner, 1998).

It is found that for interferogram derived from PALSAR data, the moving average of 20 x 20 pixels size is effective to reduce noise. A filtered displacement map tends to appear flat unless strong frequency repeat patterns are brought out. By applying this method, it is possible to derive displacement contour map that useful to study ground deformation.