



Ground Deformation Measurement with SAR Interferometry - Exupéry Project WP2 Space Based Observations

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As one of major natural hazards volcanic unrest and volcanic eruption are gaining more attention nowadays. The Exupéry project aimed at setting-up an Early Response System (VFRS) for volcanic activity was funded by the German Federal Ministry of Education and Research. Within Work Package 2 'Space Based Observations' SAR interferometry is used for monitoring the ground deformation. In comparison with conventional monitoring techniques like GPS the surface changes can be directly detected by using 2 SAR images from different acquisition times and an external DEM. Persistent scatterer SAR interferometry (PSI) method is applied by using a stack of interferograms with common master image. Instead of whole SAR scene only the coherent scatterers during whole acquisition duration are selected and its phase measurements are used to estimate modelled parameters such as deformation velocity, DEM error and atmospheric distortions. In mountainous area backscatterers are decorrelated during the time because of vegetation. To ensure the coherence corner reflector (CR) is used to get stable backscattering.

To test the whole system a campaign was carried out during April to August 2009. Two CRs were installed for TerraSAR-X satellite on the test site Lagoa do Fogo volcano. During the campaign 11 strip-map scenes were gathered consequently. Post-processed interferograms as well as the coherence maps were delivered to database center in Hannover and would be published in project website. Time series analysis with coherent scatterers from the stacking was applied in order to detect complex deformation from mountainous area. The CRs were successfully detected in SAR image and will be used as reference points in PSI processing. At the end the interferograms computed from different wavelengths will be compared in this area.