

Interferometric SAR and its Application to Measuring the Surface Deformation

Yonghong Zhang Jixian Zhang Zhongjian Lin

Chinese Academy of Surveying and Mapping ,

16 Beitaping Road, Beijing, 100039, P.R.China

E-mail: yohonzhang@263.net

Tel:(8610)68212277-290 Fax:(8610)68218654

Abstract Interferometric SAR (INSAR) has promised to have advantages recent years in generating DEM and measuring deformation associated with landslide, earthquake displacement, volcanic activity and so on .The interferometry baseline is formed by one antenna flown twice over the same scene in repeating ground tracks, in stead of traditionally by two physically separated antennas which illuminate a given area simultaneously. The fundamentals of INSAR are brively presented, for DEM generation , two images over the same scene with short time interval in repeating ground tracks are used to obtain interferogram which then deduces elevation information; for deformation detection ,multiple images in repeating ground tracks are used for differential interferometry. The algorithms for Interferometric SAR processing are discussed, especially on phase unwrapping and subpixel-precision registration of complex images. Then, three scenes of the ERS-1 and ERS-2 SAR images in the Three Gorge region, China are processed to measure the surface deformation arisen from landslide. Two SAR images before the landslide are used to synthesize topography-only interferogram , one of the two and one image after the earthquake are used to form another interferogram ,the two interferogram phases are again differenced ,dubbed “differential interferometry”, leaving a new phase image with nonzero phases only in areas where the surface had been disturbed by the landslide. The interferogram-deduced deformation measurement will be compared with the GPS survey values. A geophysical explanation to this will be presented.