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Application of SAR interferometry for underground mine subsidence monitoring

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The ground subsidence resulted from a coal mining activity at the mining area often develops continuously with large scale. In measuring the ground displacements, traditional ground surveying technique and GPS (Ground Positioning System) measurement provides a precise but point data. However, InSAR (Interferometric SAR) could be used effectively for detecting and monitoring the 2-dimensional ground subsidence since InSAR has the ability to observe continuous displacements over several km with high accuracy and spatial resolution. In addition, the advantages of SAR technique are large area coverage and the availability of historical archives of SAR data. Especially, DInSAR (Differential Interferometric SAR) generates interferograms using a precise DEM and the phase difference of two SAR images selected by a baseline and acquisition time interval. Therefore, in the study, a DInSAR technique was applied for detecting ground subsidence over the study area (Gohan and Sabuk in Korea) using JERS-1 L-band (24cm) SAR images and SRTM-3' DEM. From interferograms, a series of successive phase variation with a linear distance of 12km was detected over the two area rather than wrrors such as atmospheric effect and the DEM

As a result of SBAS application, it was confirmed that deformation between Sep. 21, 1992 and Sep. 30, 1998 reached 22cm at the significant subsiding area. Overall, most of the subsidence was taken place from 1993 to 1997 and since 1998, the subsidence has been stabilized. RMSE between the optimum measurements from SBAS and 25 used interferogrms including the phase of removed DEM error, atmospheric effect,

unwrapping error and noise is calculated and as a result, the mean and the standard deviation of RMSE is 2.0 cm and 0.78 cm, respectively.