Observing 2018 M_w 6.4 Hualien earthquake Surface Displacement with SBAS InSAR and GNSS

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Abstract: The 2018 M_w 6.4 Hualien earthquake occurred at 23.50, Feb. 6, caused significant surface displacement and resulting fatal building collapse. Besides the displacement occurred at that moment, before and after shock surface motions were observed as well. This study utilizes InSAR technique to explore these displacements. SBAS scheme is used for the InSAR analysis with images collected from Sentinel-1A and 1B. Both ascending and descending, VV and VH, were analyzed in separate time series. The direction of LOS displacement from ascending is opposite to those derived from descending. This indicates that the horizontal displacement may be larger than the vertical components. In this study, the LOS displacement observed from InSAR is compared with GNSS derived coordinates of three continuous observation stations, namely, PEPU, HUAL, and NDHU. The result shows that there is significant correlation between those observed with GNSS and SBAS. And, the R square value from VV is about 0.6 to 0.8, which is higher than VH. On the HUAL station, the result from SBAS is worse than other two stations. This is likely caused by phase unwrapping error and remaining systematic errors. The horizontal displacements observed from GNSS is significantly larger than the vertical component. This agrees with the opposite sign LOS displacement observed from SBAS. Regarding the magnitude, the SBAS three dimensional components projected from LOS displacements could reaches 50 cm as compared with those observed with GNSS.

Keywords: Sentinel-1, LOS