Application of Quasi-Psi Method for Landslide Determination in Northern Mountainous Region of Vietnam by Multi Sensor Radar Satellite Images.

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Key words: Remote sensing; Landslide; Quasi-PSI; Sentinel-1A; ALOS PalSAR-1

SUMMARY

Radar technology recently has been applying for many researches relating to terrain changes such as landslides, land subsidence with several methods of interferometry SAR radar (InSAR) such as DInSAR, PSInSAR, SqueerSAR. Each method has different characteristics and advantages, but for mountainous Vietnam with high coverage of vegetation, humidity and cloudy, DInSAR method is limited due to atmospheric influences. The PSInSAR method eliminates this disadvantage of DInSAR by using a series of images and only determines the permanent scattering points, which are the points in all pairs of images with high coherence. However, one drawback of traditional PSInSAR is that it only determines linear land deformations while nonlinear deformations are less accurate. In this paper, we used an improved PSInSAR method called Quasi-PSI. This method does not use one master image and the other one are the slave images like traditional PSInSAR but uses multiple master images to connect both images of the dataset to multiple pairs of images that make up the minimum spanning tree chart. The study area was part of Bat Xat district and part of Sa Pa district in Lao Cai province with an area of 20kmx20 km. The images were used as a series of 13 ALOS PalSAR-1 scenes from 2007 to 2010 and 18 Sentinel 1A scenes from March 2017 to July 2018. The landslide location was determined from the satellite images that were concentrated mostly near rivers, streams and roads in communes such as Den Sang, Bat Xat district and Ta Phin communes, Sa Pa town, Sa Pa district. The landslide determination results have been compared with the surveying landslides provided by the Vietnam Institute of Geosciences and Mineral Resources and have proven its ability to detect landslides by the ALOS PalSAR images and Sentinel-1A images for the mountainous areas which have large landslide phenomenon.

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FIG Working Week 2019
Geospatial information for a smarter life and environmental resilience
Hanoi, Vietnam, April 22–26, 2019