

Detection of the ground surface deformation by InSAR analysis at Kuchisakamoto landslide

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SAR Interferometry (InSAR) is one of the methods measuring small-scale ground surface deformation such as landslides and land subsidence. However, InSAR is a relatively new technique and factors affecting the accuracy of analysis are not well understood. We conducted accuracy validation of InSAR analysis using ALOS and ALOS2 images by comparing with in-situ GPS observation data in the Kuchisakamoto landslide in Shizuoka prefecture, central Japan. Additionally, we calculate annual average deformation rate by stacking method using interference images with high accuracy. Comparison of InSAR analysis results with GPS observation data showed that 17 in 97 ALOS and 4 in 6 ALOS2 interference images had high accuracy with error ≤ 20 mm. By comparing errors in the InSAR analysis and SAR observation conditions, four factors likely increased errors in InSAR analysis: (i) baseline decorrelation affected by long perpendicular baseline, (ii) temporal decorrelation affected by long observation period, (iii) noise associated with observation mode conversion, and (iv) phase unwrapping error that sometimes occur when ground deformation is large. Deformation rate map calculated using stacking method showed that some sub-blocks of landslide with large ground surface deformation existed in the main landslide block.

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