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Assessing Mining-Induced Progressive Damage on Buildings with InSAR and Deformation Model

Cui Zhou (1) and Zefa Yang (2)

(1) Central South University of Forestry and Technology, College of Science, Geographic Information Science, China (cuizhou@163.com), (2) Central South University, School of Geosciences and Info-Physics, Geomatics Science and Technology , China(yangzf@csu.edu.cn)

Underground extraction tends to cause surface deformation, imposing progressive damage on buildings located in deformation regions during the whole period of mining. This paper presents a method for assessing mining-induced progressive damage on buildings based on InSAR and a mining-related deformation model named temporal probability integral method (TPIM). This method firstly inverses the model parameters of TPIM with InSAR-derived deformation measurements along the radar line-of-sight direction. Then three-dimensional dynamic displacements caused by future underground mining are predicted with the TPIM and its inverted model parameters. Finally, progressive damage on buildings associated with future underground extraction are assessed based on the predicted three-dimensional dynamic displacements. The feasibility and reliability of the proposed method were tested in Huaibei coal mining area, China.