

Inversion of source parameters for slidequakes on the Xishancun Landslide, Sichuan, China

Risheng Chu¹

¹State Key Laboratory of Geodesy and Earth's Dynamics, Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan, China, chur@whigg.ac.cn

Landslides are a major geologic hazards in China, especially for the southwestern mountainous area. The slip of a landslide along its basal surface, crown and toe, and bounding transverse ridges will generate slidequakes that radiate seismic energy. Source parameters of these slidequakes, e.g. location and focal mechanism, are key to understanding the internal deformation of the landslide and provides important information for landslide early warning and treatment. In this study, we deployed 60 seismometers on the Xishancun landslide in Li County, Sichuan Province, with a station spacing of 200~500 meters between December 2016 and March 2017. The Xishancun landslide has a volume of more than 80 million cubic meters and is located about 60 km northwest of the hypocenter of the 2008 Wenchuan earthquake. GPS and InSAR observations suggest that the landslide deforms at about 5~8 cm per year, which poses great hazards to surrounding areas. We first obtained a group velocity map of 2~5 Hz Love waves extracted from seismic ambient noises, which show large lateral variations. We then identified several clusters of seismic events associated with the landslide deformation. These slidequakes radiate strong seismic energy that can be recorded by all 60 stations. About 80 % of the events are located near the toe of the landslide whereas the others are located on the crown. We also modified the Cut-and-Paste method to invert focal mechanisms of these earthquakes for double couples or single forces. These slidequakes show different characteristics, indicating various depths and mechanisms. The source parameters of these slidequakes may be good indicators of the surficial and internal slip of the landslide.