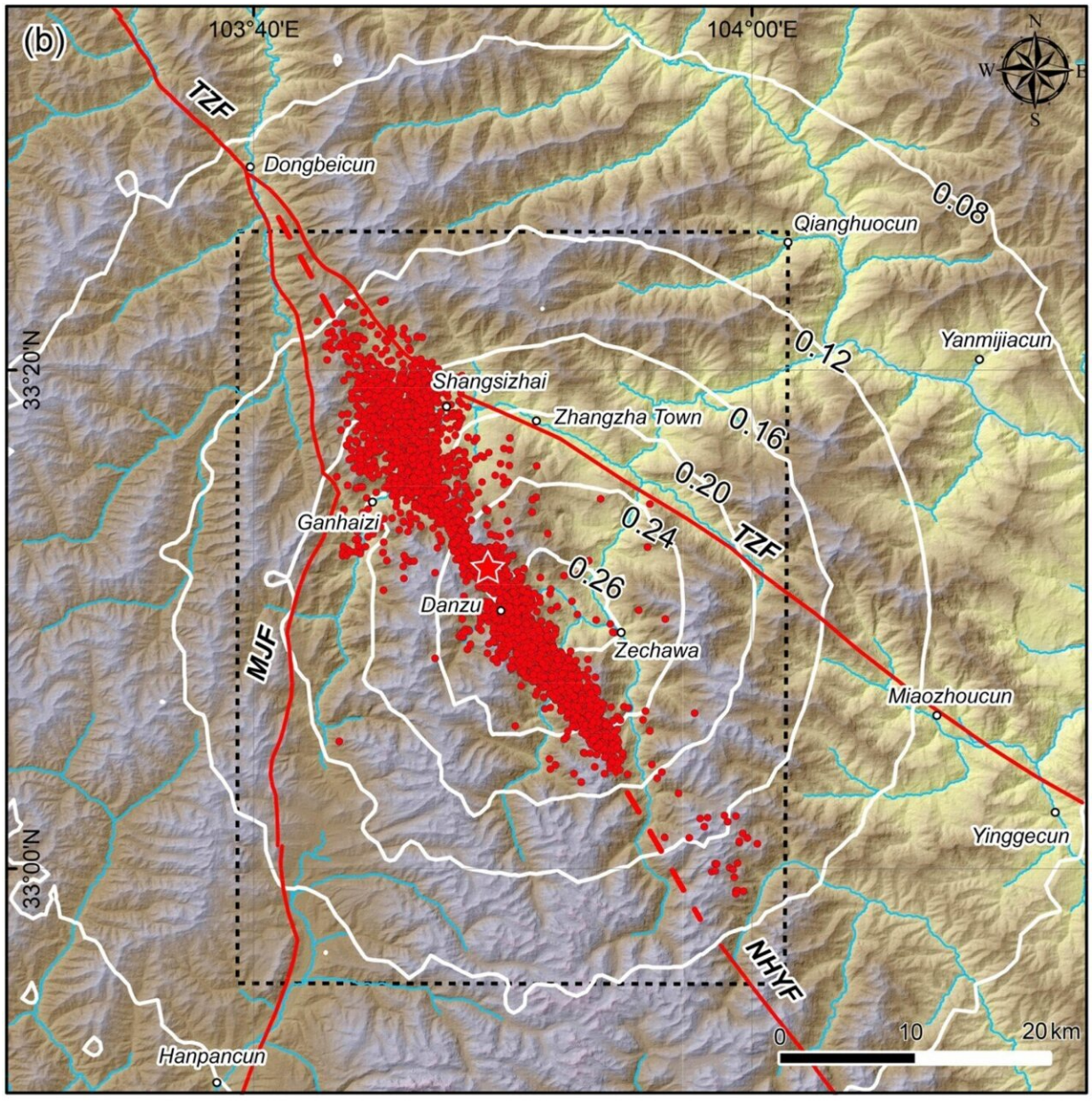
Exploring long-lasting effects of pre-phase landslides on future landslide occurrences

October 26 2023, by Li Yuan



2017.08.08 JZG Ms7.0 epicenter

Aftershock

Study area

Village

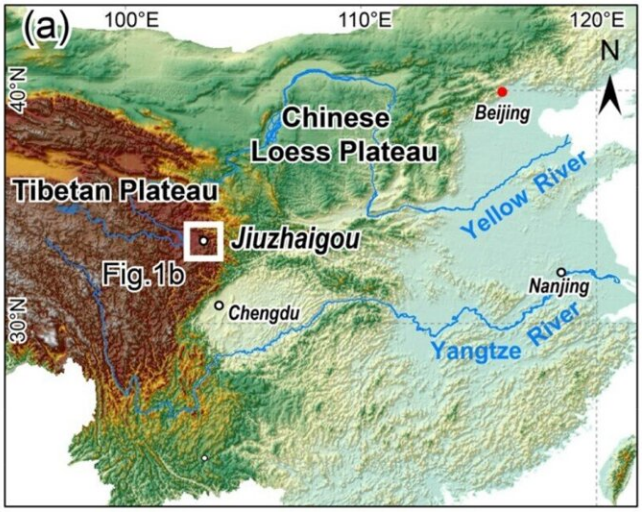
River

Faults

Infered seismogenic fault

PGA

Elevation 5568 m 0



Jiuzhaigou MS7.0 Earthquake. (a) The map shows the location of Jiuzhaigou, (b) Tectonic setting of the 2017 Jiuzhaigou MS7.0 Earthquake (modified by Guo et al. Citation2021b). MJF: Minjiang Fault, NHYF: North Huya Fault, TZF: Tazang Fault. Credit: *International Journal of Digital Earth* (2023). DOI: 10.1080/17538947.2023.2265907

A research team from the Aerospace Information Research Institute (AIR) of the Chinese Academy of Sciences has explored the long-lasting effects of pre-phase landslides on future landslide occurrences and evaluated the susceptibility of regions prone to seismic events.

The study was published in the *International Journal of Digital Earth* on Oct. 18, aiming to establish a robust post-seismic landslide susceptibility model and unravel the spatio-temporal dynamics of landslide vulnerability.

With a focus on the magnitude-7.0 earthquake-stricken Jiuzhaigou World Heritage Site in southwest China's Sichuan Province, the study adopted an integrated space-to-ground monitoring technology to build a multi-temporal post-seismic landslide dataset. This dataset serves as a fundamental component for assessing the post-seismic landslide susceptibility.

The researchers took the buffer analysis method to document the spatio-temporal characteristics of post-seismic landslides, and to understand how the location and timing of landslides are influenced by previous seismic events.

Moreover, they found that distance was a pivotal factor in quantifying

the legacy effect of pre-phase landslides on future landslide occurrences. Based on this, they established an improved time-variant model to evaluate post-seismic landslide susceptibility accurately.

Results showed that post-seismic landslides tended to gradually occur in closer proximity to pre-phase landslide locations over time. The distance from the initial landslides emerged as a critical indicator, significantly enhancing the precision of post-seismic landslide susceptibility models. Notably, the correlation between landslide susceptibility and seismic activity weakened after a significant seismic event.

This study underscores the importance of understanding the enduring impact of pre-phase landslides on future landslide susceptibility, therefore contributing to more effective disaster management and mitigation strategies in seismically active regions.

More information: Xinyi Guo et al, Enhancing post-seismic landslide susceptibility modeling in China through a time-variant approach: a spatio-temporal analysis, *International Journal of Digital Earth* (2023). DOI: 10.1080/17538947.2023.2265907

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