

Tolga Gorum

Title: Towards an improved method for earthquake-induced landslide susceptibility

Level: PhD

Research Interest

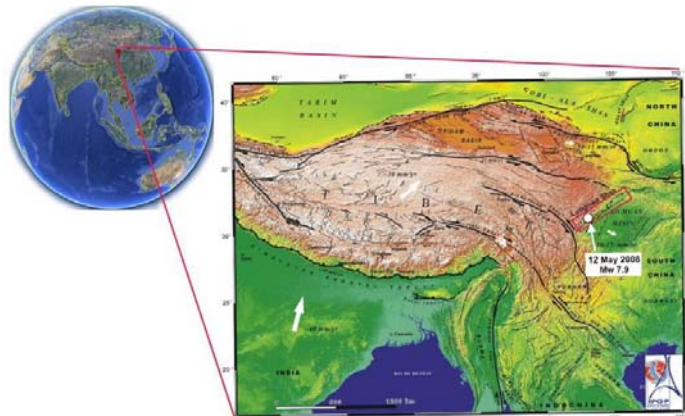
- Geomorphic coupling of hillslope processes
- Earthquake induced landslide susceptibility and hazard zonation
- Remote Sensing and GIS
- Geomorphometry
- Tectonic geomorphology and Quaternary landscape evolution

Description of work:

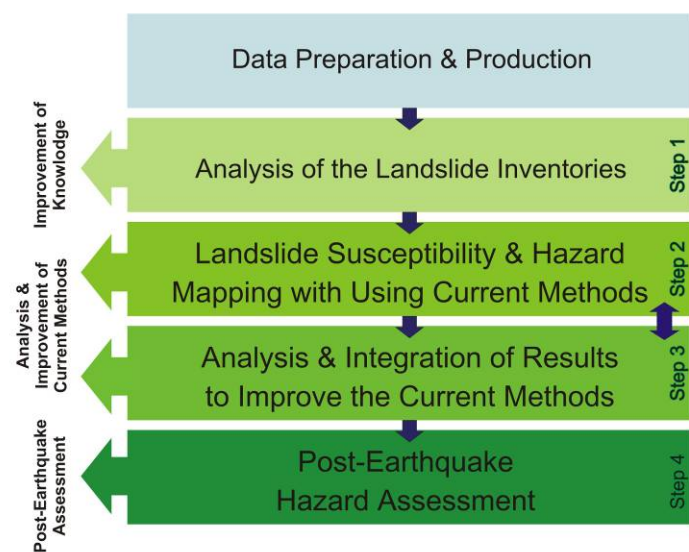
Sichuan Province (China) has been one of the areas most affected by strong earthquakes and earthquake-induced landslides in historical times. On May 12, 2008, a magnitude 7.9 earthquake ruptured the Longmen Shan margin of the eastern Tibetan plateau in Sichuan. This earthquake triggered more than

50,000 mass movements, such as landslides, rockfalls, rock avalanches, and debris slides in the area. One third of estimated 88,000 casualties of the earthquake were considered to be caused by landslides.

The methodology and research framework of this study has five main components to accomplish the research objectives. The first stage includes data preparation and production, with the second stage analyzing the distribution of landslides. In this step, landslide characteristics and their relationship between predetermined predisposing factors will be evaluated. In this respect, we will prepare an event-based landslide inventory for the whole earthquake affected area. The purpose of the inventory is not only to improve the earthquake-induced landsliding knowledge, but it will also contribute to a better understanding of the frequency-size distribution relations phenomenon in seismically active regions. However, there are certain limitations when it comes to the event base inventory mapping for large areas. In this regard, time is the primary limiting factor. In the last decade, the development of object-oriented analysis (OOA) and the recent advances in this method enabled a

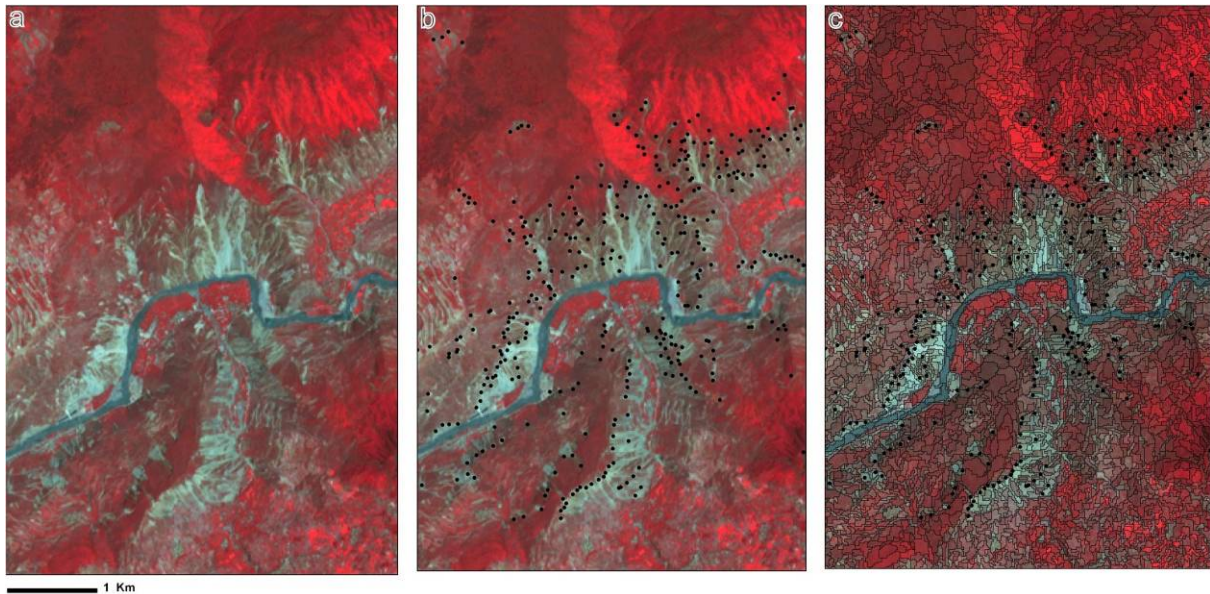


The great Wenchuan earthquake with moment magnitude 7.9 (Mw) occurred at 14:28 on May 12, 2008, nearby Yingxiu Town, Wenchuan County, Sichuan Province, China.



General flowchart of the approach and methods.

more accurate classification of the large areas. Besides, OOA classification technique, which is based on the shape, color and texture characteristics, made the mapping and classifying the landslides easier over the large areas. In this regard, particularly in the second stage of this study, the event-based landslide inventory will be established for the landslides triggered by Wenchuan earthquake by applying OOA methods. As mentioned before, this inventory will be used to improve the understanding of earthquake induced landsliding and the casual relationships between landslides and geo-environmental and triggering factors.



Segmentation of objects. (a) Post-Earthquake ASTER imagery of the Wenchuan County. (b) Interpreted event base landslide point distribution map. (c) Simple segmentation and correlation of results with event base landslide points.

Background: Tolga Gorum was born on 1st January 1980 in Mus, Turkey. He worked on his MSc degree in Geomorphology from 2003 to 2005 at the Physical Geography Department of Istanbul University, Istanbul, Turkey (www.istanbul.edu.tr). In 2005 he joined the Natural Sciences Research Center of Yildiz Technical University as a research assistant. Since then his work has mainly focused on geomorphic coupling of hillslope processes and geomorphic hazards, and tectonic controls of landslides in specifically. Before coming to ITC, he worked on several research projects which were supported by the Scientific and Technological Research Council of Turkey and he has published results from those projects in a range of articles in international journals, and presented at various conferences. In 2008 he was awarded HUYGENS scholarship by Netherlands Organization for International Cooperation in Higher Education (NUFFIC) to support research in International Institute for Geo-Information Science and Earth Observation (ITC). His PhD research topic is developing an improved method for earthquake induced landslide susceptibility assessment based on casual relationships between landslides geo-environmental and triggering factors during Wenchuan earthquake.



Publications:

Gokceoglu, C., Tunusluoglu, M.C., **Gorum, T.**, Tur, H., Gokasan, E., Tekkeli, A. B., Batuk, F., Alp, H., (2009) Description of dynamics of the Tuzla Landslide and its implications for further landslides in the northern slope and shelf of the Cinarcik Basin (Marmara Sea, Turkey). *Engineering Geology*, 106 (2009) 3-4, pp. 133-153.

Gorum, T., Gonencgil, B., Gokceoglu, C., Nefeslioglu, H. A., (2008) Implementation of reconstructed geomorphologic units in landslide susceptibility mapping: the Melen Gorge (NW Turkey). *Natural Hazards*, 46 (2008) 3, pp. 323-351.

Ustaomer, T., Gokasan, E., Tur, H., **Gorum, T.**, Batuk, F. G., Kalafat, D., Alp, H., Ecevitoglu, B., Birkan, H., (2008) Faulting, mass-wasting and deposition in an active dextral shear zone, the Gulf of Saros and the NE Aegean Sea, NW Turkey. *Geo-Marine Letters*, 28 (2008) 3, pp. 171-193.

Gokasan, E., Ergin, M., Ozyalvac, M., Sur, H. I., Tur, H., **Gorum, T.**, Ustaomer, T., Batuk, F. G., Alp, H., Birkan, H., Turker, A., Gezgin, E., Ozturan, M., (2008) Factors controlling the morphological evolution of the Canakkale Strait (Dardanelles, Turkey). *Geo-Marine Letters*, 28 (2008) 2, pp. 107-129.

Dolu, E., Gokasan, E., Meric, E., Ergin, M., **Gorum, T.**, Tur, H., Ecevitoglu, B., Avsar, N., Gormus, M., Batuk, F., Tok, B., Cetin, O., (2007) Quaternary evolution of the Gulf of Izmit (NW Turkey): a sedimentary basin under control of the North Anatolian Fault Zone. *Geo-Marine Letters*, 27 (2007) 6, pp. 355-381.

Gokasan, E., Tur, H., Ecevitoglu, B., **Gorum, T.**, Turker, A., Tok, B., Caglak, F., Birkan, H., Simsek, M., (2005) Evidence and implications of massive erosion along the Strait of Istanbul (Bosphorus). *Geo-Marine Letters*, 25 (2005) 5, pp. 324-342.