# US-China Collaboration on Landslide Research and Student Training





## Abstract

This International Research Experience for Students (IRES) program is hosted by the University of Houston (UH) in U.S. and the China University of Geosciences (Wuhan) in China. This program is funded by a National Science Foundation (NSF) Award (OIA:1460034) for a three year period (September 1, 2015 — August 31, 2018). The IRES program will support 18 to 24 U.S. students (minimum two graduates and four undergraduates per year) to conduct advanced landslide research in the Three Gorges area in China during the summers (eight weeks) of 2016, 2017, and 2018. The IRES students will attend a two-week intensive Chinese language and cultural course at the main campus of the China University of Geosciences (Wuhan) and then conduct a five-week field investigation in the Three Gorges Reservoir area. The field investigations will be supervised by Dr. Guoquan (Bob) Wang at the University of Houston (UH) and three professors at the China University of Geosciences (CUG), Drs. Huiming Tang, Hanwen Zhou, and Changqian Ma. The eight-week-long collaborative project is designed to expose U.S. students to the international landslide research community at an early stage of their careers. The IRES project will increase the visibility of U.S. students in China through their activities in the CUG campus and in the Three Gorges Reservoir area. This project will provide U.S. students with hands-on field research experience in landslide surveying, mapping, monitoring, and early-warning. The main research objectives are to (1) develop a GPS based real-time landslide monitoring and early-warning system at the Huangtupo landslide site, (2) develop a rapid landslide mapping method using high-accuracy GPS and LiDAR integrated technologies, and (3) study the correlation of landslide movements with fluctuation of the water level within the Three Gorges Reservoir. The methods developed through this project will be modified to serve other regions prone to landslides. The knowledge and skills that students learned from this project will better prepare them for their professional careers.



The Huangtupo Landslide in the Three Gorges Region of China

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## **2016 Summer Program Attendees**



Eight students – six undergraduates and two graduate students



Students Rob Able, Jennifer Welch, Janice Navarro, Wanda Crupa, Valeria Smith, Benjamin Miller, Katherine Sorrows and Jacob Kratavil pose in front of the Three Gorge Dam.

## First Week: Pre-Departure Preparation at UH

The international office at UH offered a 1-day orientation program to prepare students for conducting research in China. The PI's group conducted intensive training on the field instrumentation of GPS (Global Positioning System) and TLS (Terrestrial Laser Scanning), as well as basic training on Chinese culture and language.







GPS and LiDAR training at the Freeport Beach, Texas

Second and Third Weeks: Chinese Language and Culture Study at the China University of Geosciences (CUG)











## Fourth Week: Regional Geology Study in the **Three Georges Dam Area**

















## **Fieldwork: Adjusting to the Unexpected**

During the trip, students learned one of the cardinal rules of fieldwork - how to deal with unexpected complications. Out in the field, many things are out of our control. Four of eight students got serious DYSENTERY problem. "We were able to see how to finish a project within a specific time frame, even while adjusting to unexpected problems," Miller said.



**HOUSTON** International Research Experiences for Students http://ires.nsm.uh.edu

While in China, students worked with a team of UH and CUG faculty members, students, and engineers, taking measurements of the Huangtupo landslide site, which is a slow-moving landslide that is creeping towards the Three Gorges reservoir.

"I was shocked to see the devastating effects of the Huangtupo landslide to the daily lives of local people," said Benjamin Miller, one of the UH undergraduate students on the trip.



As part of the ongoing efforts to understand the impact of this landslide, CUG constructed a monitoring and observational tunnel that is nearly 1 kilometer in length and includes 5 branching tunnels with 36 observation windows. Students were given the opportunity to walk inside this tunnel and observe the landslide happening in actual time. "We were able to see the effects of the damage from the landslide. The corridors within the tunnel, which had been built flat and straight, were wavy and cracked from the weight of the landslide," Welch said.

## Seventh Week: Visit the Great Wall, Travel back to US **Eighth Week: Program Wrap-Up at UH**

Apply for the 2017 Summer Program http://ires.nsm.uh.edu Due Day: Feb. 1, 2017

## Faculty & Mentors

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Miller in the Badong County Hospital bang examined by a doctor