

# MEETING

## Addressing Questions on Life in Terrestrial Geothermal Systems

**Symposium on China-US Collaborative Research on Life in Terrestrial Geothermal Springs; Kunming, China, 26–28 June 2013**

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A binational research team met on the campus of Yunnan University in Kunming, China, to discuss recent progress and future plans to leverage binational support to address major questions on life in terrestrial geothermal systems. The symposium included about 90 faculty, postdocs, and students from China and about 30 faculty, postdocs, students, and high school teachers from the United States. The introductory session reviewed the progress of the Tengchong PIRE project funded by the U.S. National Science Foundation (NSF) Partnerships for International Research and Education (PIRE) program (OISE-0836450). It also introduced a new collaborative project funded as a Key Project of International Cooperation by the Chinese Ministry of Science and Technology (MOST, 2013DFA31980), which is the first project funded through a memorandum of understanding between NSF and MOST to promote China-U.S. collaboration.

Oral and poster sessions focused on the Tengchong geothermal region of Yunnan Province, southwest China, supplemented by comparative work in other regions in Asia (e.g., Tibet, Philippines, and Armenia) and the western United States. The scientific program was organized around several themes that are integral to the PIRE-MOST collaboration, including geological setting and geochemistry, censuses of microbial biomarkers, carbon and nitrogen biogeochemical cycles, novel microorganisms, and integration of PIRE activities into the new U.S. science education standards.

Several paradigms emerged from the scientific program and ensuing discussions. First was broad agreement that microbial activity measurements should be the centerpiece of research efforts due to their importance and current underrepresentation in the literature. Second was the need to parallelize data collection and experimentation in diverse geothermal systems. This would help researchers generate a comparative framework to illumi-

nate local-, regional-, and global-scale patterns in the geobiology of terrestrial geothermal systems. Third was the need to step up efforts to understand the biology of novel organisms, particularly high-level taxa such as phyla, classes, and orders. There was broad agreement that parallel advancement of microbial cultivation methods and genomics methods (metagenomics and single-cell genomics) is needed. Finally, the importance of integrating secondary educators into scientific research was emphasized by participants from both countries to bridge gaps between educators and researchers and to broaden the impact of geobiology research. Following the meeting, participants visited the Stone Forest World Natural Heritage Site and continued to the Rehai and Diantan (Ruidian) geothermal fields for field research.

The meeting webpage (<http://faculty.unlv.edu/pire/Yunnan-symposium3.html>) includes an electronic copy of the abstract book, including most conference posters, and the presentation made by Brian Hedlund entitled "Overview of NSF-funded China-US collaborations." A special issue in the journal *Geobiology* is planned to nucleate research presented at the conference.

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