

## WRI-15 MEETING REPORT

The 15<sup>th</sup> International Symposium on Water–Rock Interaction (WRI-15) was held 16–21 October 2016 in Évora (Portugal), a UNESCO World Heritage City. The Organizing Committee was led by its Secretary General, Prof. José Manuel Marques (Centre for Natural Resources and Environment, Instituto Superior Técnico, University of Lisbon, Portugal), who was greatly assisted by many colleagues and graduate students.



WRI-15 "Family" photo.

About 300 delegates from over 33 countries registered for the symposium. Participants received a memory key with the WRI-15 proceedings (edited by Jose Manuel Marques and Antonio Chambel) and published as volume 17 of the *Procedia Earth and Planetary Science* (2017). This volume, totaling 980 pages, consists of 247 papers, peer reviewed by 76 expert reviewers, and all open access.

Scientifically, WRI-15 continued the excellent tradition of previous WRI symposia. The oral and poster presentations covered the latest research results on water–rock interaction, including trending ones judging from the large number of worldwide students it attracted. Some of the major topics covered were as follows:

- New insights into thermodynamics and kinetics of water–rock interactions.
- Developments on water–gas–rock interactions.
- Water–rock interaction in volcanic systems and natural hazards.
- Water quality at active and abandoned mines.
- Improvements in water–rock interaction and ecohydrology of arid and semi-arid environments.
- Controls and impacts on groundwater quality and quantity.
- High- and low-enthalpy geothermal systems, among others.

The scientific content was at a very high level, the talks and posters were excellently presented, and the conference offered delegates a great opportunity to network. The WRI-15 Scientific Committee received a large number of extended abstracts, which resulted in 144 oral presentations, 132 posters and 23 e-posters.

The plenary lectures covered the major themes of WRI-15 and were among the highlights of the symposium. The scientific program started with the first plenary speaker, Fernando Noronha (Porto University, Portugal) on "Fluids and Variscan Metallogenesis in Granite-Related Systems in Portugal." A plenary lecture was given by Alexis Navarre-Sitchler (Colorado School of Mines, USA) on "Complex Coupling of Fluid Transport and Geochemical Reaction Rates: Insights from Reactive Transport Models." A plenary lecture by Giuseppe Etiope (INGV, Italy) talked about "Abiotic Methane in Continental Serpentinization Sites", and Yanxin Wang (China University of Geosciences, China) presented his plenary lecture on "Remediation of High Arsenic Aquifers by Learning from Nature." The lecture by Mark Chappell (US Army Engineer Research and Development Center, USA) provided insight into "Predicting Soil Geochemistry Processes using the Emerging Pedo-Informatic Approach." A very interesting lecture was given by Avner Vengosh (Duke University, USA) on "The Environmental Effects of Unconventional Energy Development and Hydraulic Fracturing:

Lessons from the United States". In the closing plenary lecture, António Costa e Silva (Partex Oil & Gas, Portugal) discussed "Water, Energy and Environmental Challenges in the XXI Century: Solutions for the Future." A special session dedicated in honour of our friend and colleague Mike Edmunds was initiated by the plenary talk "Mike Edmunds: Fifty Years of Water, Rock and Interaction" by his colleague at the British Geological Survey, George Darling. This plenary lecture and the special session were also one of the highlights of WRI-15.

The posters were evaluated by an international committee consisting of four colleagues who did a great job talking to all of the professionals and students present during the poster sessions. They awarded Markus Baum (CEA, France) with the Best Overall Poster. Christiane Meier (UFZ, Germany) was awarded the Best Student Poster, and Amit Reiss (Ben Gurion University, Israel) was selected runner up. The committee also awarded an honourable mention for Excellent Poster Presentation to Noriyoshi Tsuchiya (Tohoku University, Japan).

As has been the custom at previous WRI meetings, active scientists associated with the symposia were honoured by the WRI Group. Six people were designated as "Friends of WRI": Professor Enrique Merino, Professor Stepan Shvartsev, Professor Tianfu Xu, Dr. Katherine Romanak, Dr. Roland Hellmann, and Professor Mark Reed. Furthermore, three WRI leadership awards were presented to Dr. Richard Wanty, Dr. D. Kirk Nordstrom, and Professor Jose Manuel Marques.

The very popular mid-week symposium field trips were led by senior Portuguese researchers and scientists and covered topics such as:

- "Hyperalkaline Mineral Waters Ascribed to Serpentinization (Cabeço de Vide)", led by José Manuel Marques.
- "The Lousal Pyrite Mine", led by Manuel Francisco Costa Pereira, Jorge Relvas and Álvaro Pinto.
- "The Hard Rock Aquifers of Évora", guided by António Chambel.



The Lousal Pyrite Mine: the open pit acid-water spring.



Azores Islands (São Miguel): the Furnas area, containing numerous mineral waters, thermal springs and fumaroles.

The conference concluded with a post-symposium field trip to the Azores Islands (São Miguel), organized by José Manuel Marques. This trip was attended by 20 senior researchers and focused on the main topics of thermal and mineral waters and high-temperature geothermal resources.

Secretary General for WRI-16, which will be held in Tomsk (Russia) in 2019, will be Natalia Guseva (Tomsk Polytechnic University, Russia). We are expecting another excellent symposium and a large attendance in 2019.

**Thomas Kretzschmar**, Chairman, WRI working group  
**José Marques**, Secretary General, WRI-15