



SC9: Variations and processes in the epithermal environment: Relation and transition to intrusions

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Post-conference short course 02-03 September 2023, ETH Zürich

This course will examine epithermal ore deposits, recognized by Lindgren to form within ~1 km of the surface. These deposits are related to intrusions, some of which are associated with porphyry ore deposits. Epithermal deposits have a broad range of characteristics that reflect variable environments of formation, ranging from different tectonic and magmatic settings to different lithologies of host rocks, despite general similarities in hydrothermal processes (including hydrolytic alteration, hydraulic brecciation, boiling at hydrostatic pressures, and mixing on margins with diluents such as steam-heated condensates).



Following an introduction to the fundamentals of intrusions and magmatic-hydrothermal components of Sillitoe's Porphyry Copper System, which includes the epithermal level, evidence for the links between porphyry and epithermal levels will be presented, including the transition from the tops of porphyry deposits to the lithocap roots of one style of epithermal deposit.

The mineralization of initially barren lithocaps, plus epithermal veins on their margins, will be illustrated with a variety of examples that record fluid and wallrock controls on the paragenetic evolution of ores. In addition, the well-known epithermal deposits in extensional settings and their active analogues will be reviewed, focusing on processes and products. The fundamental influences on variations in the epithermal environment provide guidelines for exploration.



Andreas Audétat is a senior scientist at the Bavarian Geoinstitute in Bayreuth, Germany. He received his Ph.D. degree in 1999 at ETH Zürich, followed by postdoctoral positions at Virginia Tech and University of Tübingen. His research revolves mostly around magmatic-hydrothermal ore deposits and involves both experimental studies and studies on natural samples, using geochemical and petrological evidence, fluid inclusions, melt inclusions, thermobarometry and LA-ICP-MS analysis.



Jeffrey Hedenquist is an independent advisor to the mineral industry and governmental groups on exploration and assessment of hydrothermal gold and copper projects. He has worked for ~120 companies in over 40 countries on more than 400 assignments, including field and classroom training. Prior to 1999 he spent 10 years each with government institutes of New Zealand and Japan, working on geothermal energy development and volcanic discharges; during this time he also studied the formation of epithermal and porphyry deposits. Dr. Hedenquist is adjunct professor at the University of Ottawa.