



sulfides with base metals. In some cases, both epithermal settings as well as the deeper porphyry deposit may constitute ore bodies (e.g., Lepanto-Victoria-Far Southeast, Luzon). Gold-rich and sulfide-poor quartz-adularia veins tend to form in the shallow epithermal environment, <300-400 m depth, in back-arc extensional settings. These deposits contain low sulfidation-state sulfides and are distinct from their arc-hosted cousins in vein mineralogy, alteration halos, and geochemical association as well as tectonic setting and volcanic affiliation; although they are also magmatic driven, the magmas are deeper and evidence is less obvious than where magmas intrude to 2-3 km depth to form porphyry deposits in volcanic arc. This course reviews the nature of active hydrothermal fluids from intrusion-centered volcanic-hydrothermal and geothermal systems, as well as the processes that occur in these systems and the exploration insight that comes from their understanding. The features of deposits formed in different epithermal environments as well as the transition to the tops of porphyry deposits will be examined, with numerous case studies from around the world. Variations among epithermal deposits, and differences from the end-member (model) characteristics will be discussed, and exploration guidelines highlighted. It is essential to treat every exploration prospect on its own merits, rather than generalizing and missing the mineralized portion of a deposit that does not neatly fit a current, in-vogue model.

Jeffrey Hedenquist was educated in the USA followed by the University of Auckland, New Zealand, where he received a Ph.D. in 1983. He conducted research with national institutes in the USA, New Zealand and Japan for 24 years on lunar studies, geothermal energy development, the composition of volcanic discharges, and epithermal and porphyry deposits of the circum-Pacific region, topics on which he has published widely.

Since 1999 he has been based in Ottawa, working as an independent consultant to the World Bank Group Mining Department, several government agencies, and the mineral resources industry worldwide, preparing over 300 assignments reports for 85 clients in 28 countries, and providing over 100 training courses for organizations in 24 countries, plus presentation of numerous invited lectures. He is also adjunct professor at the University of Ottawa and James Cook University, and in 2010 was President of the Society of Economic Geologists, a scientific society with over 7000 members in 105 countries.

