# Geochemistry of hydrothermal mineral assemblage in the Hatu gold district (Xinjiang, China)

LEI WANG, LIBING GU*, YONGFENG ZHU

**School of Earth and Space Science, Peking University, Beijing 100871, China**

We report detailed texture and mineral geochemical data of various stages of pyrite and other common hydrothermal minerals within disseminated sulfide mineral orebodies of the Hatu gold district in west Junggar (Xinjiang, China). Hatu, the largest gold deposit in west Junggar, is located in the Hatu-Baobei volcanic-sedimentary basin, and has yielded more than 50 t of gold at an average grade of 5 g/t. Several other gold mines in the Hatu district are situated along the northeast striking Anqi fault zone, or are adjacent to intermediate to felsic intrusions. Orebodies of the Hatu gold district consist of Au-bearing quartz veins and altered host-rocks with disseminated sulfide minerals and gold mineralization. Six types of pyrite in these mines are studied here to illustrate ore-formation processes. Sedimentary pyrite, including framboidal and fine-grained pyrite, occurs in mudstone-bearing sedimentary rocks or altered volcanic-sedimentary rocks. Framboidal pyrite formed during redox changes in sedimentary layers. Hydrothermal pyrite contains five subgroups, from Py1 to Py5. Porous Py1 formed prior to gold mineralization, and is overgrown by Py2 that contains inclusions of sulfide minerals and native gold. Coarser Py3 coexists with arsenopyrite and native gold, and contains the greatest As concentrations. Gold and antimony are also preferentially concentrated in arsenian Py2 and Py3. The Au-As-deficient Py4 and Py5 formed during the post-ore stage. There is a negative correlation between the As and S contents in Py1, Py2, and Py3, implying the substitution of sulfur by arsenic. Gold precipitated under relatively reducing condition in framboid- and graphite-bearing tuffaceous rocks. Ce, Rb, Sr, La, Ce, Au, As, Sb, Cu, and Pb are concentrated in altered host rocks. The Au-bearing quartz veins and disseminated sulfide mineral orebodies were formed via a co-genetic hydrothermal fluid and formed during different stages. The variation of $fO_2$ during fluid/rock interactions, and crystallization of arsenian pyrite were major factors that controlled gold precipitation.