

Relationship between high-grade gold mineralization and fluid pressure in the Yamada sub-deposit, Hishikari Epithermal Gold Deposit, Japan

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The Hishikari deposit is a world-class low sulfidation epithermal deposit hosting the most productive gold mine in Japanese mining history. It is composed of the Honko, Sanjin and Yamada sub-deposits. Mixed Bingham distributions have been fitted to the orientation of the ore veins for the clustering of Yamada sub-deposit in order to unravel the paleostress conditions. Furthermore, the relationship between fluid pressure and high-grade gold mineralization has been investigated. Two paleostress states A (of strike-slip faulting regime) and B (intermediate between reverse-faulting and strike-slip faulting regime) were identified. The subsequent analysis of high-grade ore bands (gold grade > 100 g/t) shows that although most of Yamada veins were formed by ore fluids with low driving pressures, the high grade veins among them were formed by those with higher driving pressures. This reveals a close association between high-grade gold mineralization and higher driving pressures. If the principal stress magnitudes are assumed to be constant over the sub-deposit, provided that the data were collected at the same elevation, the result also means that high-grade gold mineralization in the Yamada sub-deposit is related to higher fluid pressures. This is further supported by the fact that the high-grade ore bands deposition is controlled by the stress state A which is more likely to be associated with the main hydrothermal activity (thus higher fluid pressure).

Keywords: mixed Bingham distribution, Hishikari, Yamada, orientation, driving pressure, fluid pressure