

## The origin of placer gold in the Tibetan Plateau?

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Placer golds are widespread in the Tibetan Plateau, especially the northern area of it, however, there has long been debated about whether gold grains are supergene or hypogene, the origin of gold grains of this region is unclear.

Recently, more and more studies demonstrate that combining both morphological and microchemical analysis of placer gold can constrain the origin of gold grains [1]. Here, we adopted the technique to insight the origin of gold grains in the Tibetan Plateau. We have examined over 1000 gold particles from several typical placer gold deposits in the northern Tibetan Plateau. These include the Bengnazangbu, Shangxu and Qiaqiugou placer gold deposits. We found that there are different morphological and internal composition structure characteristics of the gold grains from these regions. Angular gold grains are mainly found in the Shangxu area, with commonly associated quartz crystal and scarce Au-Ag compositional zonation. In contrast, the gold grains in the Bengnazangbu area is mainly rounded and oval, associated minerals consist mainly of Fe oxides or clay, Au-Ag compositional zonation is very common. Gold grains recovered in the Qiaqiugou placer deposit are in between them. These features indicated that gold grains of these localities are subjected to different transport distances. Furthermore, most of the gold grains of these areas show high Ag value in their cores (most grains >8%), which is different from authigenic gold [2], but a typical characteristic of hypogene gold. This is further supported by the discovery of unstable mineral inclusions in the surface environment such as galena, pyrite, arsenopyrite and chalcopyrite. In addition, a small Te and frequent Bi signature suggest that the gold grain from the three localities may be related to the magmatic-hydrothermal gold deposit system [3].

Considering the characteristics presented here, we believe that the gold grains in the Tibetan Plateau are mainly ascribed to weathering and erosion of gold deposits, the supergene origin gold grain is either absent or insignificant.

[1] Chapman et al (2021), *Mineralium Deposita* 56, 1563–1588. [2] Chapman et al (2000), *Economic Geology* 95, 1753–1773. [3] Deady et al (2022), *Ore Geology Reviews* 143, 104722.