

Platinum & Gold Placers of Late Cretaceous and Quaternary age in the Gobi Desert, Mongolia

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ABSTRACT

A desk study using satellite images, air photos and ER Mapper 6.0 software predicted that palaeoplacers should be present at Altan Uul ('gold mountain') in the south Gobi, as it has been a topographic high continuously since at least Jurassic times. An EMI expedition in July 1999 discovered substantial gold-platinum placers of Upper Cretaceous age of economic significance, as well as confirming Quaternary placers also of economic significance. The Upper Cretaceous palaeoplacers are dull red thick angular conglomeratic fans derived from Altan Uul which was (and still is) a topographic high. The presence of old Chinese placer mines was apparent in the gold-platinum paleoplacers, in the form of shafts and tunnels. A surprise was the discovery of active platinum and gold deposition occurring today in wadis, in heavy mineral streaks on the top of flash-flood sands, secondarily derived from the Upper Cretaceous palaeoplacers undergoing 'badlands' erosion. The Upper Cretaceous palaeoplacers are sands and gravels that elsewhere in the Gobi are rich in dinosaur remains. It seems probable that dinosaurs were walking around on gold and platinum dust during Upper Cretaceous times.

Introduction

In June 1999, EMI funded an expedition to Altan Uul (= 'Gold Mountain') in the South Gobi, inside Mongolian territory and close to the Chinese border. The north side of Altan Uul was the main object of the EMI expedition (see Fig.1).

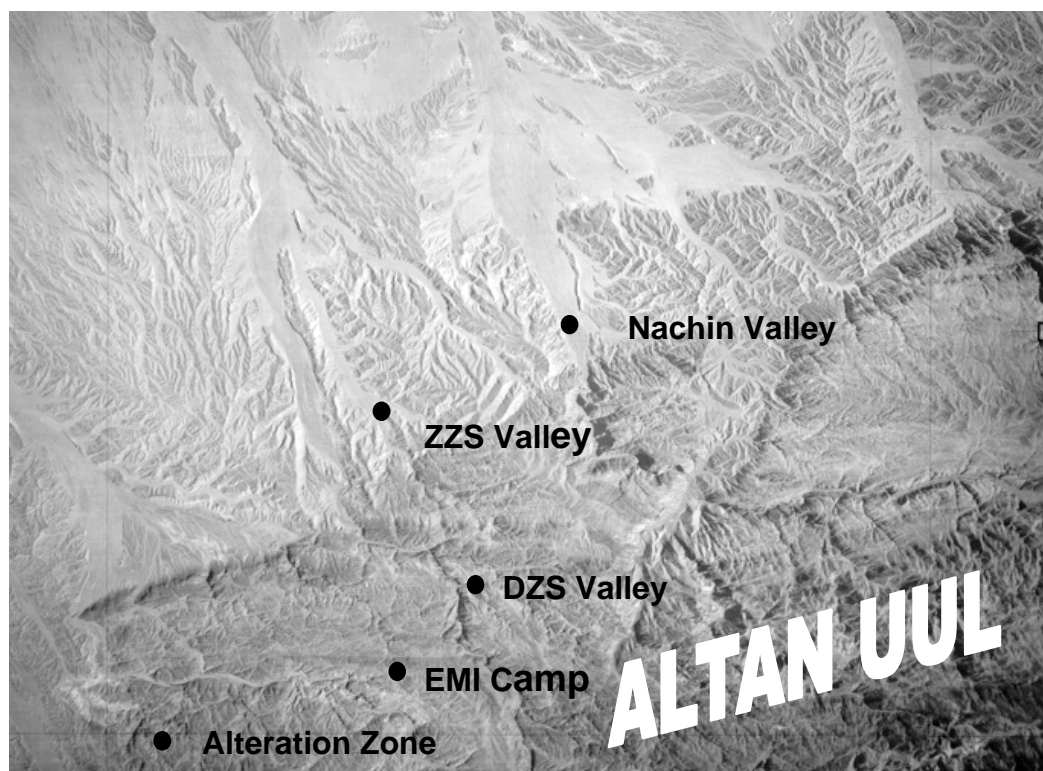


Fig. 1: Vertical aerial photograph showing some of the locations visited on the EMI expedition in 1999.

The EMI expedition was at the request of Buyan-Uguuj Co. Ltd. who had recently (29 April 1999) been awarded 2 exploration licenses (1521-X - 23,260 ha, and 1522-X - 7,247 ha) and earlier (19 December 1997) had been awarded a small mining license for placers (375A).

Placer gold at Altan Uul has been known for a long time, at least since early this century. During the EMI expedition we recorded widespread small-scale ancient placer diggings, typically by shafts and tunnels. These may be of Chinese origin from about 1910, but dating from archives or archeological artifacts is lacking. Before 1998, the prognosis was of 18 tons of placer gold in the Quaternary sediments around Altan Uul, and a survey in 1998 of a limited area gave a prognosis of 4.1 tons of placer gold.

Hard rock gold at Altan Uul became apparent only recently, in a sequence of metamorphosed cherts, basic lava's and altered gabbros of supposed Devonian age. In 1998 a prognosis was made of 259 tons of gold in a strike zone 4km long, 100m wide and 125m deep, with grades averaging 2.09%. The sequence may be an abducted oceanic or ocean-margin crust, and part of an E-W lineament. The prognosis was based on surface sampling, without drilling. EMI consider that in the vicinity are several similar prospects untested.

Platinum in Quaternary placers was suspected by Buyan-Uguuj Co. Ltd. and confirmed by analysis in 1998. In 1998 the Government and this company conducted a wider search of the Quaternary sediments and proved widespread placer platinum with placer gold. Grades are 300-400 mg/m³ gold and 15 mg/m³ platinum. The platinum source is not known, but expected to be the altered gabbros of Altan Uul, making it an attractive gold-platinum prospect.

Upper Cretaceous Gold & Platinum Paleoplacers

Using remote sensing information and ER Mapper 6.0 software, old B&W vertical air photographs and modern tectono-palaeogeographic models, EMI hypothesized that Altan Uul has been a positive element in the geomorphology since at least the Jurassic, and so should have been shedding gold and platinum into placers for the last 100+ million years, when climatic and sedimentological conditions were favourable.

EMI therefore targetted Upper Cretaceous sandstone's and conglomerates as prospective for palaeoplacers and tested them in the June 1999 expedition.



Fig. 2: Trenching by EMI through Upper Cretaceous gold/platinum conglomeratic placers near Altan Uul.

Upper Cretaceous Disconformity

The EMI team sampled by pitting Upper Cretaceous sediments and, with few exceptions confirmed the presence of both gold and platinum.

In spite of age, lithification is minor, and the uncemented palaeoplacer seems amenable to processing without crushing. Outcrops are excellent facilitating pitting, and the irregular 'badlands' erosion allows trench sampling without recourse to drilling during prospecting. The thickness of the gold-platinum placer is unclear, but maybe in the order of 3m or more. The potential for a stacked placer sequence has not yet been considered. The perfect exposure, low dip and 'badlands' landscape would enable strip mining with minimal overburden removal.



Fig. 3: Upper Cretaceous gold/platinum conglomeratic placer resting disconformably on Lower Cretaceous silts and clays.

The lateral extent of the Upper Cretaceous placers was not established, but on the evidence collected is expected to be in the order of at least several tens of kilometres along strike.

On a regional scale, it seems probable that, if the Altan Uul ridges were positive elements in the landscape shedding gold and platinum into placers during Upper Cretaceous times, then this 'play' is now valid throughout the 1000's sq. km. where Upper Cretaceous sands occur close to such basement highs.

Active Gold & Platinum Placers

Of special interest, the EMI expedition proved some Quaternary placers to be highly 'active', with gold and platinum particles being transported actively in the modern environment. These active placers consist of silts and sands in low-angle alluvial fans discharging from passes and gaps in the ridges of the Altan Uul source-rocks. In general, overburden is minimal (40cm) to non-existent, allowing the EMI team to identify gold and platinum particles on the surface of dry fans by crawling over the ground surface using hand lenses (see Figure 1). This was confirmed by panning. The Quaternary placers have been prospected by pitted in 1997-99 and are typically 1 to 1.5m thick. An analysis of gold indicated a purity of 986 - remarkably high and requiring further investigation.



Fig. 4: Discovery by hand lens of active platinum and gold placer deposition near Altan Uul

Not investigated is the considerable potential of stacked Quaternary placers, a concept which seem likely if the ridges of Altan Uul have been positive since at least late Cretaceous times.

Conclusions

1. Altan Uul, and similar little-researched basement slices nearby, is a substantial hard rock gold prospect, and a major source rock for alluvial gold in the region.
2. Quaternary gold placers surrounding Altan Uul are now known to contain alluvial platinum as well as alluvial gold, suggesting that Altan Uul is also a significant hard-rock platinum target.
3. A search should be made for a 'stacked' placer sequence in the Quaternary low-angle fans, by drilling to determine presence/absence of placers throughout the Quaternary. Assuming a

moderate number are discovered and economic, then the prognosis needs to be revised upwards to perhaps as high as 20+ tons of gold and 1+ tons of platinum for the Quaternary.

4. Discovery of Upper Cretaceous palaeoplacers with both gold and platinum suggests some or all of the Altan Uul ridges have been uplands for a geologically long time. This is of interest for palaeogeography, palaeoclimatology and neotectonics.
5. The discovery of palaeoplacers requires a further upward revision of the total placer resource of the Altan Uul area to 40+ tons of gold and 2+ tons of platinum. These estimates are speculative and subject to drastic revision (+ or -) upon detailed pitting and drilling.
6. Similar Upper Cretaceous paleoplacers are to be expected throughout the Gobi wherever Upper Cretaceous arenaceous sequences are near basement highs. This includes many of the world-famous dinosaur-bearing horizons of the Gobi. In particular Nemegt which is only 70 km along strike from Altan Uul, has Cretaceous dinosaurs such as *Tyrannosaurus Baatar*, sauropods, *Tarbosaurus*, *Symosaurus viminicadus*, *Therizinosaurus* etc. and the gold/platinum-bearing conglomerate is close in age to these dinosaur horizons. It is plausible to suggest that some dinosaurs may have made their nests on gold and platinum placers. Panning at dinosaur sites is now required. Also, detritus platinum in the Upper Cretaceous renders problematic any interpretation which seeks to invoke an iridium-rich event horizon' as linked to dinosaur extinction in Late Cretaceous times. Painstaking research of sediment-derived iridium and platinum minerals needs first to be undertaken.