

An investigation of the origin and groundwater discharge to Bazangan Lake, Eastern Kopet-Dagh Basin, Iran, using geochemistry and stable isotopes approaches

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The origin of Bazangan Lake, the largest lake is located 120 km northeast of Mashhad city-Iran, and the groundwater/surface water interaction in this lake is investigated using geochemistry and stable isotopes. Bazangan Lake is surrounded by red siliciclastic sediments of Pestehleigh formation (Paleogene) and the carbonate cliffs of Kalat formation (Maastrichtian). Lake water mainly supplied from the Mozdouran and the Kalat karstic formations. The groundwater of these formations discharges to the lake water through several springs and underground seepage face. The fairly enriched ¹³C value of dissolved inorganic carbon in lake water (average of -4.5 ‰) confirms the contribution of calcite dissolution from these karstic formations. The high electrical conductivity (15500 μmohs/cm) of the lake water is attributed to the dissolution of underlying gypsum layers and to the high evaporation rate at this area (average of 2700 mm/year). This can be confirmed by high concentration of SO₄ (4600 mg/l) and the enriched isotopic values of ¹⁸O and ²H (average of 1.7 ‰ and -6.2 ‰, respectively) for the lake water. DOC of lake water (8.5 mg/l, 27.7 ‰) is higher than that of recharge spring water (0.6 mg/l, 26.2 ‰), which is due to the presence of phytoplankton groups within the lake water.

Hydrogeochemical prospecting studies for identifying PGE mineralization in Sittampundi Anorthosite Complex, Southern India

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Hydrogeochemical exploration is an important tool for prospecting mineral deposits. The underlying principle is defined by the contact between groundwater and the mineralized zone, and leaching of trace/heavy metals under favourable pH-Eh conditions. PGE solubility in water is dependent on acidic conditions and oxygen fugacities [1]. Recent studies have shown that platinum group elements (PGE) anomalies occur when groundwater comes in contact with primary mineral deposits and the concentration depends upon the distance from the source.

Hydrogeochemical exploration studies were carried out near the Sittampundi Anorthosite Complex in southern India. The major rock types exposed in this area include chromitite, chromite-bearing pyroxenite, meta-pyroxenite, hornblende-anorthosite gneiss, and biotite gneiss ± garnet of Bhavani Group with intrusives of quartz and pegmatite veins. PGE bearing chromitite occurs as detached linear bodies manifesting pinching swelling characteristics, lenses, pods and boudins within the hornblende-anorthosite gneiss. Earlier studies on the chromitite, chromiferous pyroxenite and contact zone anorthosites indicated total PGE values ranging from 200 ng/g to 6.9 μg/g [2].

Water samples collected from representative bore wells and dug wells covering an area of about 200 Km² with a sample interval of about 1 Km. The pH, Eh, Ec and salinity were measured in the field. The samples collected were pre-concentrated by two different procedures involving cation-exchange and activated charcoal methods followed by ICP-MS, XRF analysis. Chromitite samples were also collected and examined for their petrological and PGE geochemical characteristics. In all the analyzed samples, Pt is higher than Pd. Pd/Ir ratio show large variation in these rocks. The data on PGE in groundwater as well as its relation with the occurrences of PGE bearing chromitite body are dealt in detail in this paper.

[1] Blaine *et al.* (2004) *Geochim. Cosmochim. Acta* **69**, 1265-1273. [2] Gopalakrishnan (2006) *Proc. DST sponsored Natl. Training Course on Appln. ICP-MS in Ear. Sys. Sci., Hyderabad*, 77-91.