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Hydrothermal activity in the Gahkum salt diapir, South Iran

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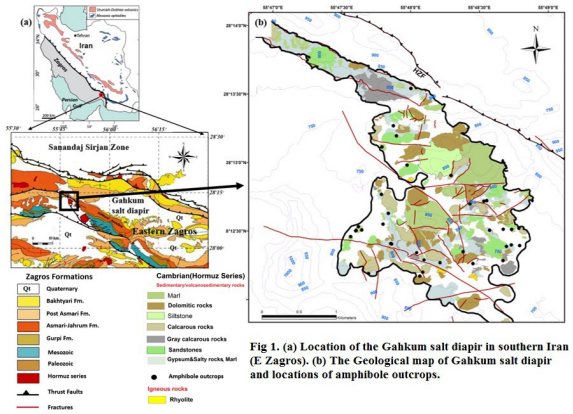

Fig 1. (a) Location of the Gahkum salt diapir in southern Iran (E Zagros). (b) The Geological map of Gahkum salt diapir and locations of amphibole outcrops.

The area in the north of the Persian Gulf is unique in the world, as about 200 salt-gypsum diapirs are exposed, which are believed to have yielded material from the Ediacaran to Early Cambrian Hormuz series. They show different stages of intrusion of less dense rock salt into the denser sediment above. Together with the salt, exotic blocks, consisting of carbonates, igneous rocks and metamorphic rocks are brought to the surface. One of them, the Gahkum salt diapir in the eastern Zagros, within the Zagros thrust belt, is particular because of the unusual mineralogy in the carbonates. As shown in Fig. 1b, different carbonate types with occasionally strongly altered volcanic interlayers occur together with siltstone and sandstone. In addition to dolomite and calcite, alkali feldspar, albite, iron oxides (haematite), and bassanite are typically found in the carbonate rocks. They may also contain amphiboles such as magnesiohornblende, winchite and tremolite, and celestine. The assemblage points to temperature conditions above 300°C. XRF and ICP-MS analysis indicate depletion of REEs within the altered igneous rocks while the amphibole bearing rock may contain Ti, Cr and V. Extraordinary are veins composed of Na-bearing minerals such as blue magnesioriebeckite and aegirine augite as shown in Fig. 1c. The growth of these partly fibrous amphiboles in veins within sometimes highly altered host rocks (mostly carbonate and sometimes gypsum) indicates the transport of Si, Na and Fe with the fluids along pathways. Correspondingly, some of the carbonates show silicification in addition to dolomitisation. The formation of a network of veins with blue amphibole in the carbonates indicates high fluid pressure. The fact that such outcrops also occur in neighbouring salt diapirs of the Zagros thrust belt suggests that the proximity of these salt diapirs to the fault zone is a factor for the unusual P-T condition.