The Poldasht magnesite (W Azerbaijan, NW Iran) – a new type of magnesite deposit

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The Holocene magnesite deposit NW of Poldasht (W Azerbaijan, Iran) includes up to 12 m thick fine-grained, less consolidated magnesite covering basalt flows from Mt. Little Ararat. The surface of the basalt flows thereby forms two shallow basins (about 1 km^2), which are characterized by magnesite and small playa lakes. Sedimentation of magnesite started 5342±21 years BP, constrained by C^{14} age determination. Field observations indicate ongoing or modern magnesite precipitation. Magnesite, basalt and water samples were collected in order to unravel the mineralogical and (isotope) geochemical composition, and thus the type of magnesite deposit.

Mineralogical investigations revealed that the deposit mainly contains magnesite together with montmorillonite, dolomite and albite. Organic matter of plants and angular lithoclasts – reworked basaltic and pre-Quaternary metamorphic and volcanoclastic material from the hinterland – are disseminated within the fine-grained magnesite. Major element analyses of the magnesite sediment yield MgO and CaO contents between 35.1 to 44.4 wt.% and 0.9 to 9.4 wt.%, respectively. Distinct contributions from silicates are indicated by SiO_2 (3.2–19.3 wt.%), Al_2O_3 (0.3–3.4 wt.%) and Fe_2O_3 (0.1–1.5 wt.%) contents. Stable isotopes of the Mg carbonates span wide $\delta^{18}O_{V\text{-}PDB}$ and $\delta^{13}C_{V\text{-}PDB}$ range from –6.79 to +1.01‰ and from 0.99 to +5.06 ‰, respectively. The obtained Mg isotope values ($\delta^{26}Mg_{DSM3}$) range from –1.04 to +1.01‰ for the magnesite, and between +0.55 and +2.59‰ for ambient waters.

The comparison of the mineralogical and (isotope) geochemical data with well-known global types of magnesite (*e.g.*, Veitsch, Kraubath, Bela Stena type) highlights Poldasht to be an until now unknown type of a magnesite deposit characterized by (i) its Holocene age, (ii) basalt related Mg source of the mineralizing fluids, and (iii) its formation in a evaporation-controlled playa environment. This setting of magnesite formation is likely triggered by seasonal and/or climatic changes, which influence water conflux, evaporation and thus precipitation.

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