Karstification and Environmental Aspects of the Lar Formation in Central Alborz, Northern, Iran.

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The Upper Jurassic in southcentral Alborz Mountains in Iran consist of deep marine limestone sequence of Lar Formation. Karstification and to a lesser extent cementation are the most important diagenetic processes in this formation.

Karstification in the vicinity of Damavand volcano, has a dual nature of varying magnitude. Near surface, karstification is due to the meteoric water diagenesis, whereas in deeper parts (>400m) occurrence of large and numerous caverns indicate the presence of more chemically aggressive waters. Faults and fractures in the area act as a conduit network facilitating water movement to the phreatic zone.

Stable isotope composition of matrix limestones ($\delta^{18}O$ = -4.5 to -6.1‰ and $\delta^{13}C$= -1.1 to 2.1‰) and fracture filling calcite ($\delta^{18}O$=-12.2 to -4.4‰ and $\delta^{13}C$ =-3.5 to 1.4‰), indicates that heated meteoric waters were responsible for karstification and cementation.

Thermal springs carrying CO_2 and H_2S reach the surface. The stable isotopic composition of thermal springs reflect major input from meteoric source ($\delta^{18}O_{water}$ =-10.6 ± 0.9‰ and δD_{water}= -65.0 ± 4.5‰). The acid waters responsible for karstification appear to be associated with fumaroles.

Pyritization during cementation and presence of sulfur springs are strong indication of the presence H_2S within the system at depth below 400m. Upon H_2S arrival to the oxygenated zone, sulfuric acid is formed with subsequent dissolution, karstification and pyrite formation.