

Determination of original mineralogy in Surmeh Formation from SW Iran: Using by O and C isotope and trace element analysis

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Abstract

The Surmeh Formation with the age of Jurassic composed of shallow-water limestones and dolomites. The study area is located in the southwest of Iran in the Lorestan Province. This paper presents results of a geochemical analysis of a section of Jurassic shallow-marine carbonates. Microfacies analysis led to the recognition of 11 microfacies that are related to four belts such as tidal flat, lagoon, shoal and open marine. An absence of turbidite deposits, reefal facies, gradual facies changes and widespread tidal flat deposits indicate that the Surmeh Formation was deposited in a carbonate ramp environment. Trace element geochemistry of carbonates from different environments can be used as a powerful tool for determination of paleoenvironmental and original mineralogy of carbonates rocks. Recognition of original carbonate mineralogy based on petrographic studies is difficult in ancient carbonate rocks, because aragonite (A) and high -Mg calcite (HMC) transformed to low-Mg calcite (LMC) during diagenesis. Major and minor elements and carbon and oxygen isotopes values were used to determine the original carbonate mineralogy of Surmeh Formation. In this research, petrographic evidence and elemental and oxygen and carbon isotope values indicate that aragonite was the original carbonate mineralogy in this formation. Geochemistry shows distinct differences in Sr, Na, Mn and Fe contents between lithologies reflecting different depositional environments. Bivariate plot of Sr/Ca and $\delta^{18}\text{O}$ values versus Mn, also illustrate that Surmeh carbonates were affected by non-marine diagenesis in a closed to semi-closed system. Temperature calculation based on the heaviest oxygen isotope value of the least-altered sample and δ_w of upper Jurassic about -1.2 ‰ SMOW, indicates an ambient temperature was 29.8 °C.

Keywords:

Surmeh Formation, original mineralogy, geochemistry, carbon and oxygen isotopes