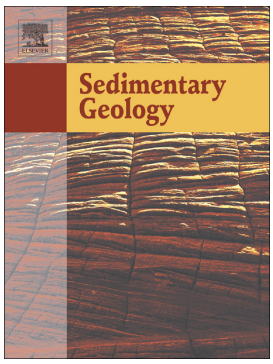

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Alijan Aftabi, Habibeh Atapour

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A new record of silica-rich coating on carbonate substrates in southeast-central Iran: Constraints on geochemical signatures

Alijan Aftabi[1]*, Habibeh Atapour[2]

[1]**Department of Geology, Shahid Bahonar University of Kerman, P. O. Box 76135-133, Kerman, Iran. *e-mail: aftabi@mail.uk.ac.ir*

[2]*Department of Mining Engineering, Shahid Bahonar University of Kerman, P. O Box 76135-133, Kerman, iran.*

ABSTRACT

There exist few data on the geochemical signatures and occurrence of silica-rich coatings developed on siliceous carbonate substrates. The rock coatings in the Maran-e-Galu area in southeast-central Iran are composed of four layers; a lower thick layer (1 mm) of silica, a lower thin film of Fe-Mn oxide, an upper thick (1 mm) silica-rich layer, and an upper thin film of Fe-Mn oxide. Energy dispersive X-ray spectrometer (EDS), X-ray diffraction and bulk coating geochemistry data obtained by XRF and ICP-MS highlight that the 1-3 mm thick silica-rich coatings occur as a silica glaze of opal composition on the siliceous carbonate substrate. The coatings were probably formed by the interaction of rainfall, water vapor or dew with silicate and carbonate-rich detrital atmospheric dust, releasing $H_4SiO_4$with a pH of 5-10 in this semiarid-arid desert environment. This led to the formation of silica gels as well as minor Fe-Mn oxide gels by evaporation and supersaturation, and finally changed to the black brown silica glaze probably at ambient temperatures of more than 40°C Major and minor element signatures are consistent with the known silica glazes, displaying enrichment in Ba, Sr, P, and LREEs with little to no Eu and Ce anomalies and a weak Tm anomaly. However, the very low content of aluminum