

NEOGENE HOFUF FORMATION HOSTED JABAL AL QARAH CAVES: STRUCTURAL AND DEPOSITIONAL CONSTRAINTS, EASTERN SAUDI ARABIA

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The Jabal Al-Qarah Caves, located close to the town of Hofuf, Eastern Province of Saudi Arabia, display an intricate network of above-ground cave system hosted by the Neogene calcareous sandstone of the Hofuf Formation. Unlike other limestone caves in the As Shumman Plateau where the cave floor and ceiling are characterized by the presence of different dripstone features including stalactites, stalagmite, cave pearls, guano (bird droppings), and wind-blown fine dusts, the floor of the Jabal Al Qarah caves is fairly clean except for fine, wind-blown dust. The orientations of the major cave chambers along with the joints/fractures alignment observed in the Hofuf Formation suggest that these caves have developed due to erosional enlargement of a series of dominant N-S and E-W trending near-vertical joints associated with the Hofuf Formation.

The Hofuf Formation at Jabal Al-Qarah cave is a white to light gray, massive, calcareous (marly) sandstone inter-bedded with soft, reddish to yellowish brown marl and clay. The dominant presence of palygorskite and Mg-smectite type clay minerals coupled with low (40 to 373 ppm) concentrations of Sr as observed in the Hofuf Formation suggest an ephemeral saline lake or saline flood plain depositional environment pertaining to the overall formative process of the cave system.



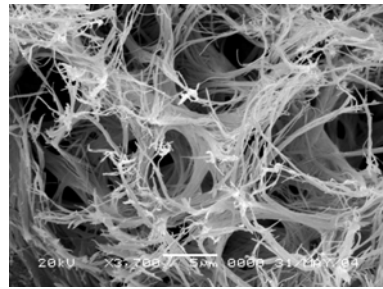
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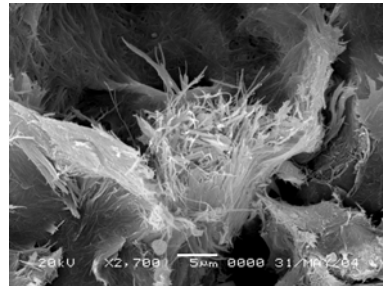
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Fig. 4a

The main entrance of the Jabal Al Qarah Cave.



a

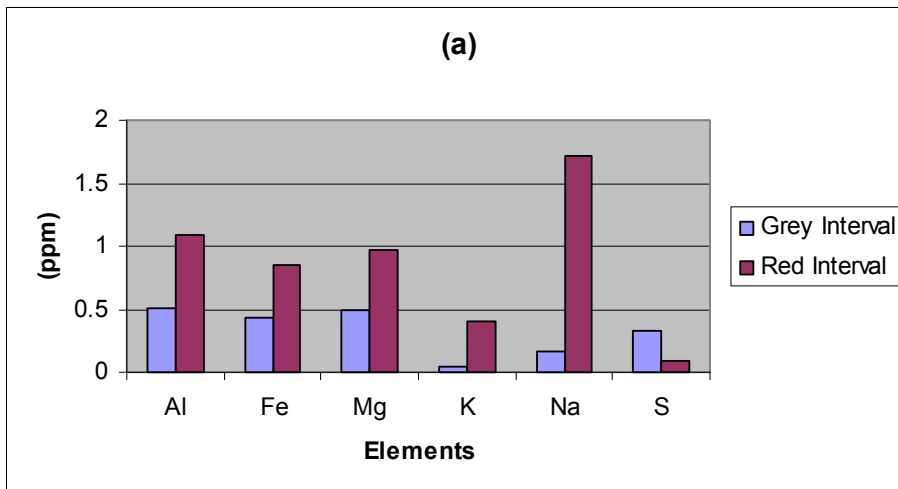


b

Fig. 16

Clay minerals in the hofuf Formation in Jabal Al Qarah Caves.

Distribution of different elements in the Hofuf Formation in Jabal Al Qarah Caves



(b)

