

The origin of dolomite associated with salt diapirs in central Tunisia: Preliminary investigations of field relationships and geochemistry

Ihsan S. Al-Aasm^{a,*}, Hassen Abdallah^b

^a Department of Earth Sciences, University of Windsor, Windsor, Ontario, Canada N9B 3P4

^b National Institute of Scientific and Technical Research, BP 95, TN-2050 Hammam-Lif, Tunisia

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Abstract

Black and white dolomite crystals (mm to cm width) of different isotopic composition are associated with Triassic diapirism in central Tunisia, as well as with evaporite minerals and clays. The white dolomites occur mostly in the Jabal Hadifa diapir near the contact with Cretaceous limestones, whereas the smaller black dolomites occur in the Jabal Hamra diapir. The former dolomite has a narrow range of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values (-3.83‰ to -6.60‰ VPDB for $\delta^{18}\text{O}$; -2.11‰ to -2.83‰ VPDB for $\delta^{13}\text{C}$), whereas the latter dolomite has a wider range and more depleted values (-4.92‰ to -9.97‰ for $\delta^{18}\text{O}$; -0.55‰ to -6.08‰ for $\delta^{13}\text{C}$). However, the $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of most of the samples are near Triassic seawater values. Dolomite formation is due to at least two different fluids. The main fluid originated from deeper hydrothermal or basinal sources related to the Triassic saliferous rocks and ascended through faults during the diapiric intrusion. The second, less important fluid source is related to meteoric water originating from Cretaceous rocks.

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1. Introduction

The presence of various minerals (e.g., lead, zinc, barite) associated with saliferous diapirs have been known and exploited in North Africa and elsewhere (cf. Charef and Sheppard, 1987; Orgeval, 1994). The genesis of the formation of these economic minerals has been attributed to the migration of hot saline brines from a deeper part of the basin followed by influx of low-temperature meteoric fluids (e.g., Charef and

Sheppard, 1987). However, the presence of fairly large (few mm to few cm), isolated black and white dolomites has not been described previously. In northern Tunisia, Bolze (1954) recognized at Fej Lahdoun diapir a formation separating the saliferous from the Cretaceous deposits and labelled it “X-limestones” and attributed them to the Aptian. Charef and Sheppard (1987) also described these fractured carbonates and speculated that their age was of Cretaceous (Aptian) with some Triassic material. However, the “X-limestones” does not exist in Jabal Hadifa or in Jabal Hamra. Hence the Triassic appears directly in contact with the Upper Cretaceous series and the dolomite crystals are located within the gypsum immediately near the contact between the two formations. The purpose of this preliminary study is to investigate the formation of these dolomites and their

* Corresponding author.

E-mail addresses: alaasm@uiwindsor.ca (I.S. Al-Aasm), Hassen.Abdallah@inrst.mrt.tn (H. Abdallah).

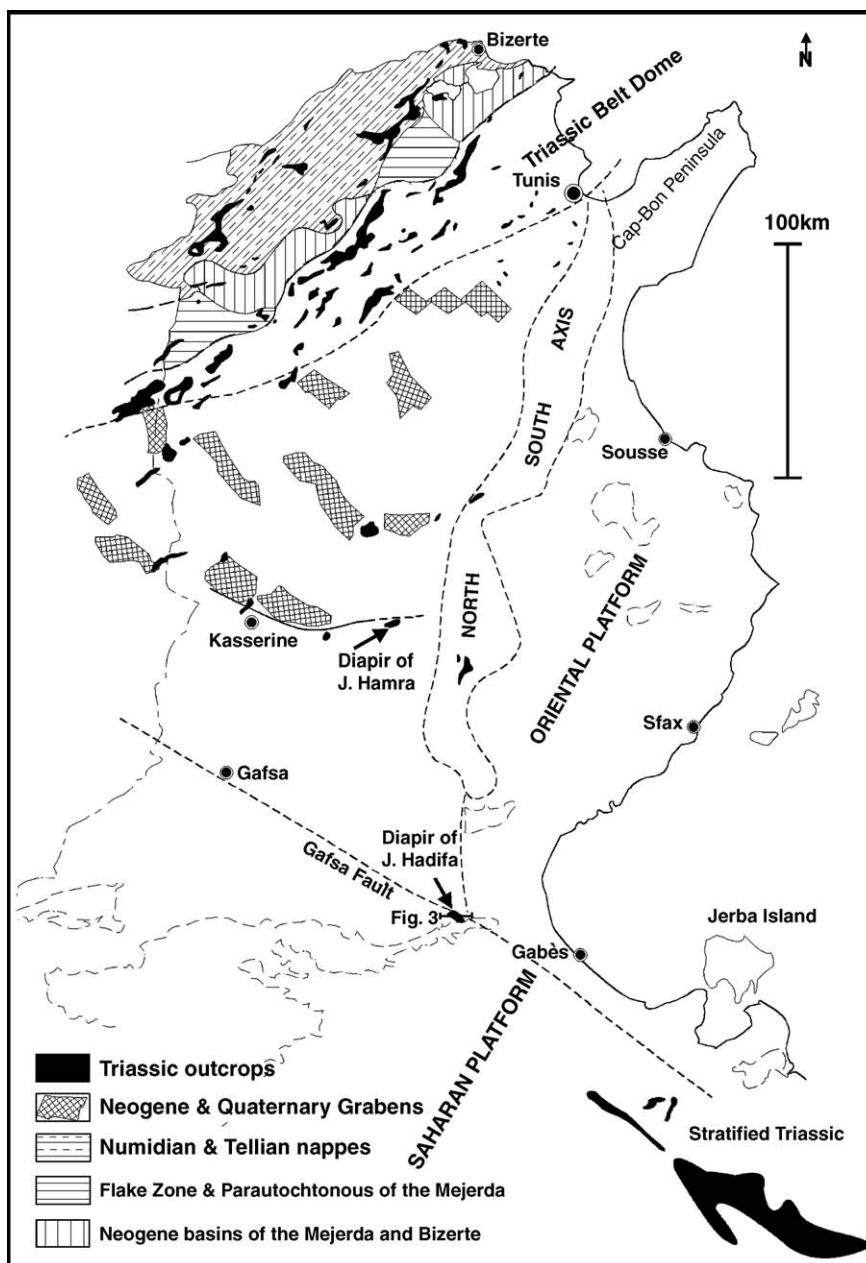


Fig. 1. Map of Tunisia showing the main structural elements and the location of the studied diapirs (modified after [Perthuisot, 1978](#)).

relationship to diapirism by combining field relationships and dolomite geochemistry.

2. Geological setting

The two studied Triassic diapirs are located in central Tunisia. The first diapir crops out at Jabal Hamra, 100 km northeast of Gafsa ([Fig. 1](#)). The second outcrop, Jabal Lella Hadifa, is located to the east of Gafsa within the eastern part of the northern range of the Chotts.

The study areas are located between two domains in which the Triassic strata show contrasting geology. The northern part of Tunisia, especially the Tunisian Trough, was very active during the Jurassic and Cretaceous, and was dominated by the formation of diapirs such as in the Dome belt. In contrast, in southern Tunisia, the Triassic remains undisturbed and stratified. Between the Saharan platform and the dome belt, in the Gafsa district and bordering areas, the Triassic underwent diapirism but diapirs almost remain buried. In this district, at depth,

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