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Preliminary Data on the AMS Fabric in Salt Domes from the SW Part of Zagros Mts., Iran

Jakub ŠMÍD[1], Karel SCHULMANN[1] and František HROUDA[1,2]

[1] *Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic*
[2] *Agico Inc., Ječná 29a, 621 00 Brno, Czech Republic*

Salt diapirism has been studied intensively for many years, but the mechanisms and geometry of flow of salt diapirs are not yet satisfactorily resolved. Therefore, main objective of our study is detailed research of salt flow mechanics based on quantitative investigations of its internal structure (flow foliation, lineation, folds and microstructures). The area of Zagros was chosen for our study due to presence of about 150 salt extrusions. Hormuz salt of Upper Proterozoic to the Lower Cambrian age is composed of evaporites (multicoloured halite, lenses of anhydrite, dolomite, limestone and blocks of volcanic and sedimentary rocks of so-called Hormuz Formation) (Talbot and Alavi 1996). Original thickness of these evaporites was estimated as 1 km (Kent 1958), evaporites are presently covered by younger sedimentary formations up to 10 km in thickness. Salt diapirs extruded to various stratigraphic levels mostly in the hinge parts of mega folds, which affect Mesozoic and Tertiary formations. Strong planar fabric is developed in salt delineated by mesoscopic flow foliations mostly formed by alternations of coloured and pure salt strips. The colour of salt is due to variable presence of disseminated non-evaporite material (black – hematite, red – hematite ochre, green and purple – volcanic and sedimentary rocks). Thickness of individual layers of salt varies in conjunction with its grain size and dip of fabric across the dome. Coarse grained salt pegmatites (grain size from 3–10 cm) are developed, together with fine grained salt (ultra)mylonites (grain size in matrix about 1 mm, porphyroclasts up to several centimetres).

The anisotropy of magnetic susceptibility (AMS) of salt samples was measured by the KLY-3S Kappabridge in the laboratory of Agico Ltd. Brno. The mean susceptibility of salt ranges widely, from -11×10^{-6} to $+5 \times 10^{-2}$ [SI], due to character and quantity of dispersed magnetic particles among which hematite is obviously the main carrier of susceptibility. It is present in the form of flakes or less commonly as isometric grains.

We studied salt dome at Hormoz Island (Persian Gulf) with nearly circular shape and strongly concentric structure. Its structure can be divided into three main domains (see Fig. 1): central apical part of cupola (4 km in diameter, elevation 120–180 a.s.l), outer ring (thickness about 2 km, elevation max. 100 m a.s.l.) and peripheral zone. All domains exhibit different morphology, structure and also composition of evaporites in terms of amount of hematite. Dome is in its southern part surrounded by steeply inclined (80–60°) beds of limestones of Tertiary age.

The central dome shows flat foliation and radially spreading lineations in the apical part of cupola (about 20°), and towards the edge of the dome foliation and lineation become steeper, up to 80°. Here, central cupola passes to the outer ring, where folded zone is locally developed. Dip of foliation is subvertical and parallel to axial planes of numerous isoclinal flow folds. Going towards peripheral zone, which is probably developed only in the western part of the diapir, the foliation dips in opposite direction towards the core of the central cupola. The lineation becomes horizontal indicating lateral flow around main body of diapir. Mean susceptibility and the degree of anisotropy expressed by P parameter are low in the central part of the dome and both values increase towards periphery of the dome. The fabric symmetry characterised by T parameter show highly variable values in the central part and becomes oblate towards margin.

In conclusion, magnetic fabric in central part of the dome indicates symmetrical flow of material outwards, which passes to lateral compression in folded zone. For the southern part of the dome is distinctive lateral flow along the margin (see Figure 1). These results may reflect changing boundary conditions at the peripheral limits of diapiric structure.

The main but preliminary results of our research are as follows: (1) AMS is useful technique for fabric research of some salt domes where magnetic minerals are disseminated in salt; (3) measured magnetic foliation is in good agreement with mesoscopic flow foliation; in addition, magnetic lineation as well as magnetic fabric intensity and symmetry can be defined; (3) mean susceptibility is controlled by the amount and type of dispersed magnetic particles, e.g. in the Hormoz dome hematite is frequent.

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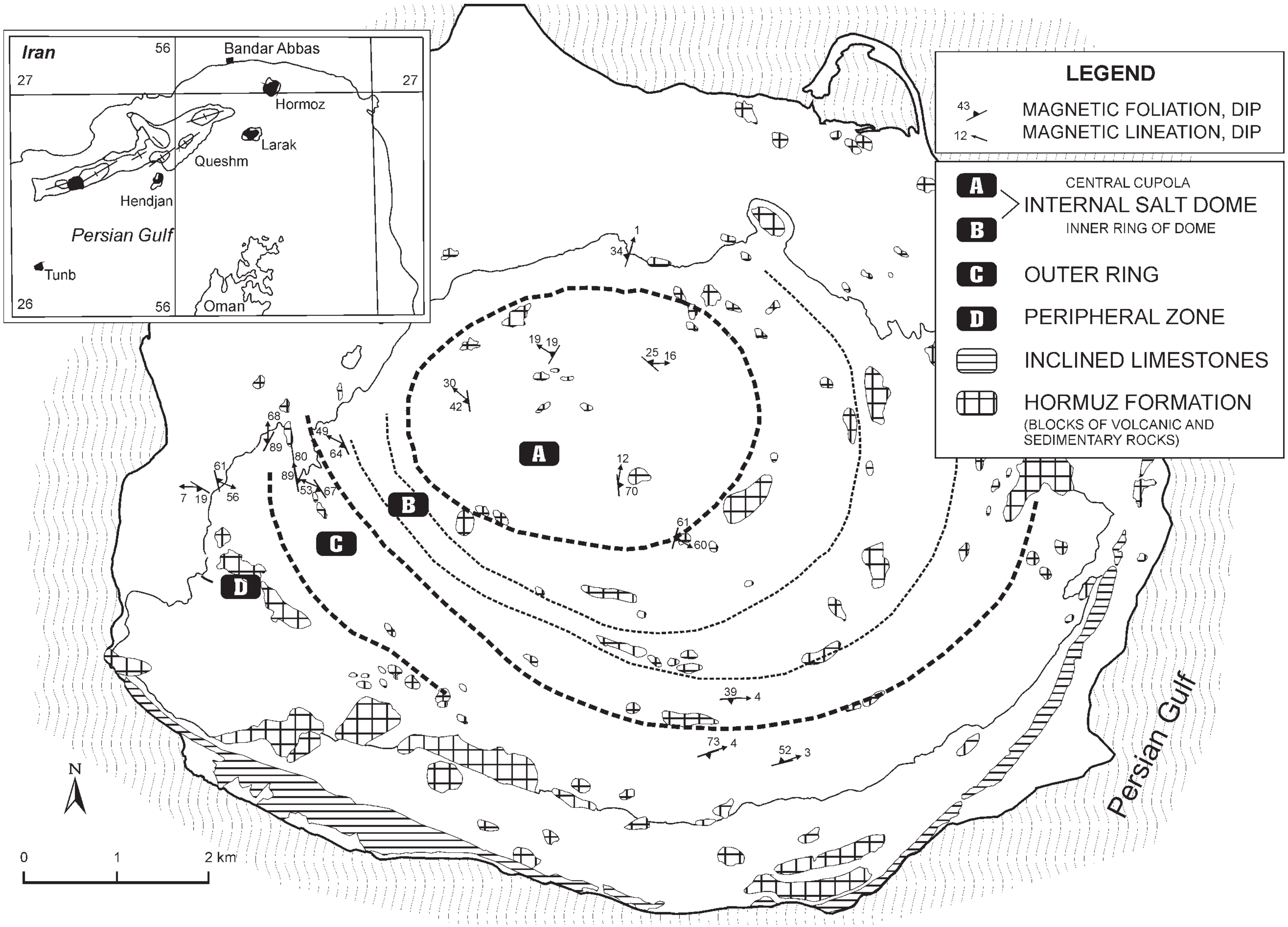

Fig. 1. Map of Hormoz Island, orifice of Persian Gulf.