

Distribution of natural hydraulic fractures (Gypsum beef veins) within the Bouhedma Formation, Northern Chotts range – Southern Tunisia.

Nabil ABAAB^{a, b, c*}, Alain ZANELLA^a, Dhaou AKROUT^d, Régis MOURGUES^a, Mabrouk MONTACER^b.

^a Le Mans Université, L.P.G-UMR 6112, avenue Olivier Messiaen, 72085 Le Mans, Cedex 9, France

^b U.R : 3G - Géosystèmes, Géoressources et Géoenvironnements (UR13ES80), Faculté des Sciences de Gabès, Tunisie.

^c L'Institut Supérieur des Sciences et Techniques des Eaux de Gabès, 6072 Zrig Gabès, Tunisie.

^d L'École Supérieure Polytechnique de Nouakchott, BP 4303 Cité Cadres – Sebkhia Nouakchott, Mauritanie.

Abstract

Bedding-parallel veins (BPV), also called “beef veins”, are common in sedimentary basins worldwide, especially within anisotropic sediments. These geological structures are mainly composed by fibrous minerals such as gypsum, calcite or quartz, and are interpreted to be a marker of fluids-rocks interactions. The veins are organized in a complex as well as very widespread fracture network. BPV result from several geological processes as: hydraulic fracturing of impermeable and anisotropic sediments due to fluid overpressures, ii) the force of crystallization, iii) the addition of external stresses. The understanding of the geometrical distribution of BPV is of great interest to understand the fluid pathways through sediments during their geological history. In the Northern Chotts Range (Southern Tunisia) these structures crop out very well. Nevertheless, their distribution through the sedimentary fill and their lateral continuity remain poorly studied. Thus, we decided the BPV distribution in the Zemlet el Beidha Anticline structure “ZBAS”, Tunisia, to investigate the parameters controlling the distribution of BPV in the Bouhedma Formation (Lower Cretaceous).

In the ZBAS, performed 4 sedimentary and structural logs. We described 46 levels of BPV composed by gypsum minerals mainly distributed in: i) mudstones and ii) evaporitic series of the Bouhedma Formation outcrops. Two different types of BPV are recognized: (i) continuous and (ii) discontinuous. We observed that the continuous BPV are preferentially located in mudstones whereas the discontinuous BPV are predominant in evaporitic beds. These observations tend to demonstrate the role of the lithological composition as well as the role of the anisotropy in the generation and propagation of such veins. The internal structure of BPV showed that the crystals are mainly perpendicular to the edges of the veins. Several growth phases have been observed. Some of the fibers are curved, indicating a growth during shear process.

We infer that the BPV formation is the consequence of several process such as: i) fluid overpressure, ii) the force of crystallization and iii) compressive tectonic stresses.

Keywords: Bedding parallel veins (BPV), “beef” veins, gypsum, fluid overpressure, lower Cretaceous, Tunisia.