

## Structure of the basement beneath the Illizi Basin: insights from the reinterpretation of an aeromagnetic survey

Sonia Brahimî (1,2), Amar Bourmatte (3), Jean-François Ghienne (2), and Marc Munsch (2)

(1) Laboratoire de Géodynamique des Bassins Sédimentaires et des Orogènes, FSTGAT\_USTHB, BP. 32, El Alia, 16111 Babezouar, Algiers, Algeria, (2) Institut de Physique du Globe de Strasbourg, UMR 7516, Université de Strasbourg / EOST, CNRS, 1 rue Blessig, 67084 Strasbourg Cedex, France (sonia.brahimi@unistra.fr), (3) Laboratoire de Géophysique, FSTGAT\_USTHB, BP. 32, El Alia, 16111 Babezouar, Algiers, Algeria

The Illizi Basin is an intracontinental basin occupying the southeastern part of the Algerian Sahara platform at the northeastern junction of the Hoggar terranes with the East Saharan Metacraton. Aeromagnetic data covering an area of about 2000 km<sup>2</sup>, including the Illizi Basin, Tassilis and northeastern part of the Hoggar, are compiled to obtain a magnetic map with a special resolution of 600 m and interpreted in the light of that of the adjacent Hoggar Shield, the structural geology of which is well documented.

Interpretation of the magnetic map uses potential field transformations like reduction to the pole, fractional vertical derivatives, analytic signal and tilt-depth. These transforms allow to identify beneath the cover of the Illizi Basin two main structural boundaries: 1) The N-S 'Raghane Mega-shear zone' (RSZ) at 8°30' E, manifested by a weak magnetic signal. It corresponds to the most important Panafrican suture, which separates the East Saharan Metacraton from the LATEA terrane assemblage (Metacraton of Central Hoggar). 2) A N-S mega-shear zone at 4°50' E (MSZ4) marked by a strong amplitude anomaly. It separates the Central (LATEA) from the Western Hoggar. Both mega-shear zones change their direction northward: to the NNE for the RSZ and to the NW for the MSZ4.

To the west of the RSZ, inside the LATEA, another linear structure is identified by a weak amplitude magnetic lineation, which corresponds to the 7°30' E shear zone (SZ7) marking the western boundary of the Tazat-Assodé-Issalane terranes (TAI). Along SZ7 is identified the strongest amplitude magnetic anomaly, which is in excess of 2000 nT and correlated spatially to the northern part of the Ounane pluton. Two other magnetic anomalies further north probably relate to similar bodies. Also a distinct area with strong amplitude magnetic anomalies is identified and extends 300 km toward the north below the sedimentary cover. It is associated to the northern extension of the TAI.

In addition, N-S oriented structures are identified within the TAI terrane, which also intersect the RSZ. Ten kilometers dextral or sinistral offsets are evidenced by the shifts of N-S oriented anomalies. NE-SW structures are thus interpreted as shear zones as well.

To the east of RSZ, N-S elongated strong amplitude magnetic anomalies are suspected being magmatic intrusions, especially beneath the Zarzaitine and Edjeleh oil fields. Several magnetic lineations with NW-SE orientation are also identified, which are parallel to the regional structural grain.

The basement of the Illizi Basin thus has a composite structure including two major mega-shear zones, several other subordinate shear zones and numerous plutons. In particular, the later phase of the Panafrican orogeny dissected the Tazat-Assodé-Issalane terranes. Related faults affected on the long term the development of the Illizi Basin. Indeed, the Fadnoun fault, which is coincident with one of the related shear zone, had a synsedimentary imprint through most of its Paleozoic evolution and currently corresponds to a geomorphic lineament.