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Syn-Graben hidden folded structuring revealed by advanced Gravity analysis: Kalaa Khesba study case (Northwestern Tunisia)

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Abstract:

Central Tunisia is characterized by numerous folded graben systems. In this study, the gravity data were analyzed to reveal the Syn-Graben hidden folded structuring associated with the NW-SE Kalaa Khesba graben (northwestern Tunisia).

For the regional-residual separation, we adopted the Gaussian Regional/Residual Filter. This Filter was coupled with the Tilt filter to exhibit shallow sources associated with hidden folded structures toward the Kalaa Khesba graben. This method presents a new spatial filter designed to separate short-wavelength anomalies from long wavelength anomalies.

After the detailed mapping of positive and negative gravity anomalies associated with respectively, anticlines and synclines, we have produced the Total Horizontal Gravity Gradient map, the Source Edge Detect (SED) map and Euler solution map to delineated the faulting network. Finally, a structural map of the Kalaa Khesba graben was achieved and compared with seismic lines analysis.

In this study case, the gravity data analysis can be considered as a preferred method for structural mapping such as hidden faults and faults. The advanced processing of gravity data produces also a fine image of the subsurface geometry of a graben as well as to enable a better understand the structural complexity and the role of the various tectonic features.

Keywords: Kalaa Khesba, Syn-Graben, Gravity, Seismic reflection, Hidden, Folded structure