

Identification of Igneous Intrusions in South Zallah Trough-Sirt Basin

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Abstract : Using mostly seismic data, this study intends to show some examples of igneous intrusions found in some areas of the Sirt Basin and explore the period of their emplacement as well as the interrelationships between these sills. The study area is located in the south of the Zallah Trough, south-west Sirt basin, Libya. It is precisely between the longitudes 18.35° E and 19.35° E, and the latitudes 27.8° N and 28.0° N. Based on a variety of criteria that are usually used as marks on the igneous intrusions, twelve igneous intrusions (Sills), have been detected and analysed using 3D seismic data. One or more of the following were used as identification criteria: the high amplitude reflectors paired with abrupt reflector terminations, vertical offsets, or what is described as a dike-like connection, the violation, the saucer form, and the roughness. Because of their laying between the hosting layers, the majority of these intrusions are classified as sills. Another distinguishing feature is the intersection geometry link between some of these sills. Every single sill has given a name just to distinguish the sills from each other such as S-1, S-2, and ...S-12. To avoid the repetition of description, the common characteristics and some statistics of these sills are shown in summary tables, while the specific characters that are not common and have been noticed for each sill are shown individually. The sills, S-1, S-2, and S-3, are approximately parallel to one other, with the shape of these sills being governed by the syncline structure of their host layers. The faults that dominated the strata (pre-upper Cretaceous strata) have a significant impact on the sills; they caused their discontinuity, while the upper layers have a shape of anticlines. S-1 and S-10 are the group's deepest and highest sills, respectively, with S-1 seated near the basement's top and S-10 extending into the sequence of the upper cretaceous. The dramatic escalation of sill S-4 can be seen in N-S profiles. The majority of the interpreted sills are influenced and impacted by a large number of normal faults that strike in various directions and propagate vertically from the surface to the basement's top. This indicates that the sediment sequences were existed before the sill's intrusion, were deposited, and that the younger faults occurred more recently. The pre-upper cretaceous unit is the current geological depth for the Sills S-1, S-2 ... S-9, while Sills S-10, S-11, and S-12 are hosted by the Cretaceous unit. Over the sills S-1, S-2, and S-3, which are the deepest sills, the pre-upper cretaceous surface has a slightly forced folding, these forced folding is also noticed above the right and left tips of sill S-8 and S-6, respectively, while the absence of these marks on the above sequences of layers supports the idea that the aforementioned sills were emplaced during the early upper cretaceous period.

Keywords : Sirt Basin, Zallah Trough, igneous intrusions, seismic data

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