

Detection of the Unayzah-Sarah Unconformity Using Integrated Image Log Interpretation

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Abstract

The Pre-Hercynian Paleozoic section, especially the Qusaiba member of the Qalibah Formation, was completely eroded in parts of Central Arabia during the Hercynian Orogeny. This Hercynian time truncation resulted in post-Hercynian Unayzah sandstones overlying the pre-Hercynian Sarah sandstones. Both sandstones have the same glacial depositional setting. This makes the Sarah well top picks and well correlations for the Paleozoic section challenging even with the aid of cores.

In this study we have performed image log interpretation to identify the Hercynian Unconformity within the Unayzah-Sarah section. The main interpreted geological features from the image logs, which have been used to help identify the Hercynian Unconformity, are fracture density and orientation, bedding dip variations, and angular discordances. The image log fracture interpretation indicates that the pre-Hercynian Sarah Formation has higher fracture density than the post-Hercynian Unayzah Formation. This is likely because the Sarah Formation experienced deeper burial and more tectonic events than that of the post-Hercynian Unayzah Formation. Our image log interpretation shows that the Hercynian Unconformity is normally indicated by angular discordances characterized by dip changes in both azimuth and magnitude. This technique has proven to be a reliable and efficient way to conduct well correlations for the Paleozoic section in this region.