

Stratigraphic Framework and Nomenclature of the Precambrian and Paleozoic Successions in the Sirt Basin, Libya

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Abstract

The prevailing assumption in the Sirt Basin was that the basement is normally overlain by Cambro-Ordovician siliciclastic, which assigned to the Qarqaf Group and has been widely used for the succession lying between the Precambrian basement and the Silurian shales or the continental siliciclastic of Nubian or undifferentiated age (pre-Upper Cretaceous) in different parts of the basin.

This work is a part of a wider national project that is currently underway to review, update, and unify the stratigraphic nomenclature of the Precambrian and Phanerozoic successions in the Sirt Basin, Libya, which has not been done systematically since 1972.

In the lower stratigraphic column of the Sirt Basin, fourteen stratigraphic units have been identified, described, and characterized based on revisions to earlier works, analyses, and interpretation of the current study, which includes lithological characteristics, log behavior, stratigraphic position, palynology, and chemostratigraphy.

Thirteen stratigraphic units are belonging to the Paleozoic Era, and a new stratigraphic unit has been proposed for the Proterozoic Eon. This finding document, for the first time, the presence of Proterozoic sediments in the western and eastern parts of the Sirt Basin.

Although various Paleozoic units are present mainly on the periphery of the basin, a nearly complete succession of the Lower Paleozoic is penetrated at an oil well on western side of the basin (Waddan Platform), with the exception of the Lower Ordovician Hawaz Formation, which is almost probably absent. The upper Paleozoic succession has also been documented primarily on the western edge of the Sirt Basin as well, despite sporadic observations in the far eastern part of the basin and on the offshore area.

There are no discernible patterns in the Paleozoic strata's extent, distribution, or thickness variations over the basin. The Caledonian Orogeny, a major tectonic event that occurred at the end of the Silurian, is partially responsible for this, however the Hercynian Orogeny and other, more recent tectonic activity also had a substantial influence on the stratigraphy and depositional style of the Paleozoic succession in the Sirt Basin. Deltaic, shallow marine and open marine environments were dominant during the deposition of the Cambrian, Ordovician and Silurian stratigraphic units, within which a three major stratigraphic sequences have been defined with mainly TST and HST constituents. Whereas the Devonian, Carboniferous and Permian sediments had been broadly deposited in a deltaic to terrestrial fluvial environments, where LST and HST are the main components of the stratigraphic sequences documented.