Geophysical Research Abstracts
Vol. 20, EGU2018-3923-1, 2018
EGU General Assembly 2018

Integrated microfacies analysis of lower Paleogene carbonate rocks of Kasanwala area, Western Salt Range, North Western Himalayas, Pakistan.

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Abstract
The lower Paleogene carbonate rocks of the western Salt Range are comprised of Lockhart Limestone, Nammal Formation and Sakesar Limestone in the order of succession, whereas the upper Paleocene Patala Formation is absent in the area. The microfacies content of these rocks were analyzed from the Kasanwala section in the Western Salt Range. The Lockhart Limestone of Paleocene age is composed of nodular limestone with some intercalated shale and is dominated by larger benthonic foraminifera including; Miscellania miscella, Lockhartia haimei, L. conica, L. conditi, L. tipperi, Ranikothalia sindensis, R. sahni, Discocyclina ranikotensis, and Operculina salsa. The measured thickness of Lockhart Limestone in the study area was 37m. Four microfacies of Lockhart Limestone have been observed after detailed thin section analysis namely; Bioclastic Mudstone, Lockhartia Wackestone, Miscellanea Packstone and Lockhartia Packstone microfacies. The Nammal Formation of lower Eocene age consists of alternating beds of medium to dark grey limestone with clay & shale and is highly fossiliferous in some parts. In this section, Nammal Formation was 56m thick. It is comprised of the larger benthic foraminifera including; Discocyclina dispansa, D. ranikotensis, Assilina laminosa, Operculina sp. and Nummilites sp. Five microfacies of Nammal Formation have been identified after light microscopic analysis namely; Bioclastic Mudstone, Nummulitic Wackestone, Bioclastic Wackestone, Peloidal Wackestone and Nummulitic Packstone microfacies. The Sakesar Limestone is composed of cream to light grey nodular massive limestone with chert nodules in the upper part and is widely distributed in the project area. The observed thickness was 36m. In Sakesar Limestone, the larger benthonic foraminifers were Operculina sp., Assilina sp., Nummulites sp., Ranikothalia sp., and Discocyclina sp. Three microfacies of Sakesar Limestone have been proposed after comprehensive microscopic analysis namely; Algal Mudstone, Bioclastic Mudstone and Assilina Wackestone microfacies.
On the basis of observed fauna, its bathymetry and the microfacies framework, it can safely be concluded that these lower Paleogene rocks were deposited in shallow marine, open shelf environment with free circulation of water.