Evolution and geological set up of the Barmer Basin, Rajasthan, India

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The Barmer Basin is interpreted as a narrow, N-S trending graben, a northern extension of Cambay rift. The sediments of the Barmer Basin are classified into pre-rift, syn-rift and post-rift sediments. The pre-rift sediments are represented by: 1. Siliceous facies comprising shales, sandstone and orthoquartzite (Randha Formation). 2. Calcareous facies comprising limestone, phosphorites and dolomudstone (Birmaria Formation). 3. The Sarnu Formation comprises thinning and fining upward sand bodies with intervening red siltstone. 4. The Lathi Formation, comprising medium to coarse, fining upward fluvial sands with fossils logs.

The syn-rift sediments comprise Barmer-Hill and Fatehgarh Formations. The Barmer Hill Formation is comprised of sandstone and clast supported conglomerate representing rapid deposition in an alluvial-fan environment with source from Malani Rhyolite. The Fatehgarh Formation shows a mixed sand and mud tidal flat environment. It is comprised of conglomerate at base, overlain by sandstone which, in turn, is overlain by ferruginous phosphatic sandstone. The Fatehgarh Formation is overlain by Siliceous Earth of Bariyara Member (base of Mataji-ka-dunger Formation).

Most of the Barmer Basin has been filled up with post-rift sediments constituting Mataji-ka-dunger and Akli Formations. The Mataji-ka-dunger Formation consists of cyclically arranged claystone, siltstone and sandstone. The Mataji-ka-Dunger Formation is interpreted as a shallowing upward fluvio-deltaic complex. The base of the sequence exposed at south of Fatehgarh is comprised of sand poor claystone which is interpreted as pro-deltaic, delta slope/delta mouth deposition.

The Akli Formation overlies Mataji-ka-dunger Formation. It comprises sand poor bentonitic claystone, grey bituminous claystone, lignites and light yellow claystone. The beds are arranged in 2-3m thick cycles with bituminous claystone bases and lignite tops. The benotnitic claystone and Fuller's earth type claystone facies of Akli formation are considered to represent low energy shallow basinal sedimentation. Lignites developed in protected lagoons within this setting.

Palynological analysis of Kapurdi Fuller's earth and Akli shale and lignite indicates Palaeocene-Eocene age. They are correlated with the palynomorphs of the lower Indus Coal Basin of Pakistan.

The Siliceous Earth of Barmer Basin represents a sequential time deposit accumulated close to the Cretaceous-Tertiary boundary event.