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Depositional cyclicity, diagenetic environments and porosity evolution of wadi El-Giddi Middle Jurassic coal bearing paralic sandstones, Central Sinai, Egypt.

R. I. Rifai (1), H. Holail (2), H. E. Belkin (3) and M. AboEl-Safa (4)

(1) Environmental Studies and Research Institute, Minufiya University, Egypt (rifai50@hotmail.com), (2) Faculty of science, Alexandria University, Egypt (hanafyholail@hotmail.com), (3) 956 national Center, U.S. Geological Survey, Reston, VA 20192, USA (hbelkin@usgs.gov), (4) Environmental Studies and Research Institute, Minufiya University, Egypt (magdaaboelsafa289@hotmail.com)

The Middle Jurassic clastic rocks of wadi El-Giddi are characterized by a thick sequence of shales, sandstones and coals interbeds, deposited in paralic environments (deltaic, estuarine and shallow marine). The presence of iron-rich chlorite (chamosite; 14Å) and the high percentages of carbonate cement indicates that the sandstones were deposited in nearshore environments during a relative highstand. The sandstones were deposited as a result of several small progradional highstands and transgressions. Changes in quartz sand and percentages of carbonate composition accompanied by sharp breaks and repetition in facies delineate this cyclicity. The studied sequence consists of shales, carbonate-rich sandstone, porous-rich sandstone, sulfide-rich sandstone, mud-rich sandstone and carbonate-rich siltstone. The sandstones are generally quartz arenite, moderately well to poorly-sorted, fine to very coarse grained. Feldspars in these sandstones (K-feldspar) are sparse ($< 0.5\%$).

Petrology, geochemistry and stable isotopes indicate that the studied sandstones have undergone severe processes of diagenesis, initiated at the sediment-water interface and continue in subsurface where the sequence was exposed to burial. Eight stages of diagenetic alteration are detected: (1) growth of chamosite ooids, (2) early compaction and quartz cementation, (3) authigenic kaolinite cementation, (4) calcite dissolution and cementation, (5) ferroan dolomite cementation, (6) ankerite cementation, (7) sulfide cementation (pyrite, sphalerite and chalcopyrite) and (8) sulfide alteration. Three diagenetic events (compaction, cementation and dissolution) significantly influenced

the sandstone porosity.