Exceptionally Glauconite-Rich Strata from the Miocene Bejaoua Facies of Northern Tunisia: Origin, Composition, and Depositional Conditions

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Abstract : The exceptionally glauconite-rich Miocene strata are superbly exposed throughout the front of the nappes zone of northern Tunisia. Each of the glauconitic fine-grained intervals coincide with the peak rise of third order sea-level cycles during the Burdigalian-Langhiantime. These deposits show coarsening- and thickening-upward glauconitic shale and sandstone, recording a shallowing upward progression across offshore-shoreface settings. Petrographic investigation reveals that the glauconite was originated from the alteration of fecal pellets, and lithoclast including feldspar, volcanic particle, and quartz and infillings with intraparticle pores. Mineralogical analysis of both randomly oriented and air-dried, ethylene-glycolate, and heated glauconite pellets show the low intensity of (002) reflection peaks, indicating high iron substitution for aluminum in octahedral sites. Geochemical characterization of the Miocene glauconite reveals a high K_2O and variable Fe_2O_3 (total) content. A combination of layer lattice and divertissement theories explains the origin of glauconite. The formation of glauconite was facilitated by the abundant supply of Fe through contemporaneous volcanism in Algeria and surrounding areas, which accompanied the African-European plate convergence. Therefore, the occurrence of glauconite in the Miocene succession of Tunisia is influenced by the combination of eustacy and volcanism.