

Synvolcanic and syntectonic sedimentation of the mixed volcanoclastic–epiclastic succession in the Miocene Abu Terifia Basin, Cairo-Suez Road, North Egypt

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Understanding the variability and complex interplay of volcanism, tectonism, and sedimentation is crucial for unraveling the evolution of sedimentary basins and volcanotectonic depressions in many settings. The Miocene Abu Terifia Basin in North Egypt, formed in association with extensional tectonics, is filled by abundant volcanic deposits intercalated with fluvio-lacustrine sedimentary deposits. Four lithostratigraphic units (Units I to IV in ascending order) are identified in the Abu Terifia basin, including extensive and voluminous lapilli tuffs (Units II and IV) and mixed basaltic volcanoclastic and epiclastic sedimentary deposits (Units I and III). These units suggest repetitive basaltic emplacement onto a braided-stream to lacustrine environment. Paleoflow measurements show that the epiclastic conglomerates were deposited by a north-flowing fluvial system that debouched from a drainage area to the south of the basin, whereas the basaltic rocks were introduced from the east. Because of the separate source areas, the epiclastic and volcanoclastic depositional processes did not interfere with each other, resulting in discrete alternations of epiclastic and mostly primary volcanoclastic deposits. The studied succession also lacks an aggradation–degradation cycle, which results from the alternation of periods of rapid volcanoclastic sedimentation and relatively longer periods of fluvial incision. The volcanoclastic and epiclastic deposits are therefore interpreted to have accumulated in rapid succession, in association with rapid basin subsidence and contemporaneous basalt-forming eruptions. The studied succession can thus be regarded as a syntectonic sequence, in which the stratal geometry was significantly modulated by tectonostratigraphic controls, with overprints of syntectonic contemporaneous volcanism.