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Volcaniclastic-Dominated Lake Deposits, Afyon-Sandikli Region, Central-Western Anatolia Turkey

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Studied Afyon-Sandıklı Neogene basin, located in the eastern part of the western Anatolia, consists of thick potassic and ultrapotassic volcanic units and fluvio-lacustrine sedimentary rocks. The volcanism in Afyon was developed as stratovolcanos during Middle- Late Miocene period (14.8-8 Ma) in association with lacustrine sedimentation. Where volcanic grains are generally derived from riyolite and latite and then transported by fall and flow from the volcanic centres to low-topographic areas covered by local lakes. The volcanic flows took place as coarse-grained grain flow and mass flow with huge volcanic blocks up to approximately ten meters. Lake deposits were generally initiated by a caliche layers and followed upward by thin-medium bedded tuff or tufitte mixed with mollusc remains and alternated with very thin volcanogenic clays (several centimetres). Peat-bearing intervals (5-20 cm thick) are also presented within the tuffeceous unit. The tuff- dominated depositional packages are generally terminated by coarse–grained volcaniclastic deposits (1-10 meter thick) characterized by matrix supported diamictite having clasts in a range of meter size. The coarse-grained unit exhibits either wedge-shaped depositional character recorded by poorly sorted and reverse-grading volcanic clasts which mixed with a chaotic matrix rich in dispersed clasts and fine-grained volcanic grains indicating a lahar type deposition. The unit in the some places laterally grade into well-bedded and thick coarse-grained volcanic deposits. They are typified by cross-beds, ripple-cross laminations, ripple scours, scour-fill structures, channels, load structures, matrix-supported reverse-grading pumice pebbles, normally graded, clast supported and well-rounded pumice pebbles and cobbles. Some organic and coalified wood materials are also associated with the volcaniclastic layers. All deposition characteristics are consistent with the volcanic grain flow or pyroclastic flow.

Soft deformation structures, especially syn-depositional faulting are very common in the lake deposits, in which huge volcanic blocks generally show a hanging-wall setting and embedded in a volcanic matrix that laterally passed into gravel-sized volcanic layers. The observations suggest that the huge blocks were transported by high dense grain-mass flow or debris avalanches moved from slopes or fault-scarp into the local lake or they abruptly slumped and tilted beneath the lake during extraordinary ground movements induced by earthquakes. In fact that the tectonic-induced topographic structures served as construction of the inclined surface from which high density volcaniclastic flows or debris avalanches took place. These processes were probably triggerred by earthquakes or huge volcanic explosions. The field observations indicate that combination of volcanic and tectonic activities caused very rapid and high deposition rate that is enough to fill the shallow lakes, however, the outstanding rate of sedimentation was balanced by rapid subsidence of the lake. This provided new accommodation space following flows, similar to many lakes formed within the modern volcanic areas.