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Synthesis of Late Cretaceous-Quaternary tectonic, sedimentary and magmatic processes and basin formation related to episodic subduction-collision in the easternmost Mediterranean region

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Mesozoic oceanic crust of the easternmost Mediterranean has experienced northwards subduction during Late Cretaceous-Cenozoic, either continuously or discontinuously based on kinematic evidence. Much of the existing information on sedimentation within the easternmost Mediterranean oceanic basin comes from the non-emplaced continental margins of the Levant and North Africa. In addition, sedimentary basins related to plate convergence are recorded along the northern margin of the Southern Neotethyan ocean, mainly in the Kyrenia Range of northern Cyprus and its extension into the Misis Mountains of southern Turkey, coupled with the adjacent submerged areas. In a setting of only incipient continental collision such as the easternmost Mediterranean the sedimentary basins would be expected to remain entirely submarine. In contrast, the Kyrenia Range has been strongly uplifted and subaerially exposed during Late Pliocene-Quaternary time. This allows the recognition of a number of discrete phases of sedimentary basin formation: 1. Late Cretaceous (Campanian-Maastrichtian): silicic volcanism to create a subaqueous volcaniclastic apron; 2. Maastrichtian-Paleocene: pelagic carbonate deposition interspersed with proximal gravity flows and within-plate type alkaline volcanics; 3. Early Eocene: large-scale sedimentary melange (olistostrome) emplacement; 4. Late Eocene-Late Miocene: terrigenous gravity-flow deposition in a deep-water fault dissected 'fore arc' setting. Initial, Late Eocene non-marine coarse clastic alluvial fan deposition was succeeded by Oligocene-Miocene deep-marine siliciclastic gravity flow deposits, fining and shallowing upwards during the Late Miocene; 5. Messinian: localised precipitation of evaporites in small fault-controlled basins; 6. Pliocene: shallow-marine siliciclastic-carbonate deposition in a shelf-depth, overall regressive setting; 7. Latest Pliocene to mid-Pleistocene: gravitational accumulation of coarse talus along a strongly uplifting subaerial lineament; 8. Mid-Late Quaternary: gradual tectonic uplift giving rise to a flight of shallow marine to non-marine terrace deposits, that were also influenced by eustatic sea-level fluctuations and climatic change. The stages of basin development were punctuated by four main episodes of compression/uplift. A. Late Miocene underthrusting/metamorphism/exhumation; B. Mid-Eocene southwards thrusting; C. Late Miocene southward thrusting/left-lateral transpression; D. Late Pliocene-Mid Quaternary tectonic uplift. In a setting of continuing plate convergence why did the nature of sedimentation change so dramatically through time? The deformation front between the Kyrenia Range and the Troodos Massif is delineated by the Ovgos Fault which shows an episodic development including Late Miocene compression (transpression) and Quaternary left-lateral strike slip. The Late Cretaceous volcanogenic rocks relate to a phase of regional arc magmatism also documented in SE Turkey. Subduction appears to have slowed or ceased during the Maastrichtian-Palaeocene while the active margin experienced extension or transtension. Following final closure of a Tethyan oceanic basin further north ('northern Neotethys') subduction appears to have relocated southwards and re-activated/accelerated during the Early Eocene triggering large-scale collapse of the over-riding plate and olistostrome formation. Diachronous continental collision was in progress during Early Miocene causing strong uplift of the over-riding plate, intense erosion and voluminous siliciclastic sediment supply to a fore-arc type basin in the N Cyprus-Misis area (becoming foreland basin further east, in SE Turkey). The Pliocene was characterised by eastward 'tectonic escape' of the Anatolian plate towards the Aegean and this allowed relatively fine-grained deposition to accumulate along the former convergent continental margin in northern Cyprus and adjacent areas (e.g. Mesaoria basin). The dramatic late Pliocene to mid-Quaternary uplift of the Kyrenia-Misis lineament, plus the Troodos massif to the south, can be explained by regional-scale collision of the Eratosthenes Seamount with the Cyprus trench to the south in a setting, more broadly, of slab rupture or break-off. The summary and synthesis given here is based on a combination of field mapping, structural, sedimentological and biostratigraphical studies, in the light of knowledge of the wider

Eastern Mediterranean and Anatolian regions.