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Landscape evolution and relict landforms in Southwestern Peloponnese, Greece

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Geomorphological evolution in southwestern Greece during the Quaternary was affected by large-amplitude climatic swings and also uplift/subsidence of individual blocks, related to large-scale tectonism. This resulted in forcing of the geomorphological evolution that was both area-specific and highly variable over time. We here identify and analyse landforms of Southwestern Peloponnese and the climatic and tectonic events that has been driving the geomorphic evolution during the Quaternary. For changes in geomorphic regime imposed by climate changes, we focus primarily on the difference between present regimes and those prevailing during cold periods of the Quaternary. Our framework predicts (hindcasts) specific changes in geomorphic regime and landform production to have occurred as a consequence of cyclic climate change and tectonic events and trends. We test these predictions against observations and show that some important landforms and landscape elements can only be understood in the context of a Plio-Pleistocene time perspective and reflect particular tectonic trends and events. The observational database consists of study of river profiles, spatial landform distribution and genetic classification of landforms, some of them not previously described from the area. We conclude that the impact of climate changes is most obvious at the highest and lowest elevations (< 500m and > 2000m). At the lowest elevations, eustatic sea-level changes influenced the spatial location of erosion and sedimentation, and ravine systems developed in tectonically uplifted marine sediments. At the highest elevations, glaciation has during the last glacial cycles left a diagnostic imprint. At intermediate elevations, the landscape can be described as a continuously evolving fluvial landscape in which climatic changes have left few or no diagnostic landforms. A coherent relict surface comprising the highest summit of the Taygetos mountains and a disjunct high-elevation low-gradient valley is identified. We infer that this morphology formed at considerably lower elevation and has since been uplifted to its present position. It is indicative of very low non-glacial summit erosion rates throughout Plio-Pleistocene uplift of the Taygetos horst. We further identify a semi-continuous and southward-tilted pediment surface along the west side of the Mani peninsula. The seaward truncation of this surface is interpreted to reflect initial Pliocene rifting and uplifting of the Taygetos horst. Analysis of the spatial relations between landforms suggests that before the onset of rifting and the late-Pliocene-Pleistocene phase of uplift, there already existed a mature mountain morphology in the Taygetos – Mani block. The along-crest elevation differences were less pronounced than they are today, and the central part of the massif was fluvially dissected to a lesser depth than today.