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Interplay between active and past tectonics in the Hellenic Arc (Greece): Geological and geomorphic evidences from Kythira Island

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The Hellenic Arc undergoes the largest convergence velocity and highest seismic activity among Mediterranean subduction systems. The outer-arc high islands of the Hellenic Arc are thus key to understand the mode of deformation of the crust during subduction and the mechanisms behind vertical motions at the front of overriding plates, here and elsewhere. Kythira Island, located between SW Peloponnese and NE Crete, provides an exceptional opportunity to understand the interaction between past and active tectonics in the Hellenic Arc. The recent uplift of the Kythira Island is marked in its landscape as paleosurfaces, marine terraces, abandon valleys and gorges. Together with the sedimentary record of the island and its geologic structures, we attempt to reconstruct its tectonic evolution since the latest Miocene. Here, we present exceptionally detailed geological and geomorphological maps of the Kythira Island based on fieldwork, Pleiades satellite imagery and 2-m resolution DEM, as well as the analyses of marine terraces and river network morphometrics. Pliocene or younger infill sequences rest atop of Palaeocene or older rocks in several marine basins in the island. In the largest marine basin, we found a stratigraphic sequence with a (tilted) continental conglomerate at the base, passing upwards to a disconformal subhorizontal conglomerate, calcarenites and fine sands, and terminating with a marine conglomerate. This marine conglomerate acts as a "cap rock" that marks the topography and shapes the highermost, and most extensive, low-relief surface. Overall, the infill sequence onlaps basement with the exception of the western margin where normal faults partly controlled the deposition of its lower sector. These faults reactivated older Hellenic fold-and-thrust structures, parallel to the subduction trench, and were not active during the maximum marine transgression that led to the deposition of the subhorizontal part of the infill sequence, including the topmost marine conglomerate. Younger, roughly N-S normal faults transecting Hellenic-trending structures and the infill sequence are responsible for subsequent surface uplift, and to a large extent, for the present day shape of the island and its seismicity. Ongoing datation (with foraminifera) near the highest paleosurface, as well as the analysis of marine terraces and river morphometrics, will allow us to derive modes and rates of surface uplift, and re-evaluate and further discuss the evolution of this sector of the Hellenic Arc.