



Foundering and demise of a Tortonian supradetachment basin (central Crete, Greece)

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The late stage of exhumation of a high-pressure, low-temperature metamorphic belt on Crete, above the active Aegean subduction zone, was accompanied by sedimentation in an E-W trending fluvial supradetachment basin, which in central Crete shows a surprisingly uniform basin fill, without angular unconformities and without debris from the HP-LT metamorphic footwall. This suggests that the anchi-metamorphic hangingwall stretched effectively homogeneous above the Cretan detachment. The fluvial supradetachment basin in central Crete lasted from 10.8 to 10.4 Ma and transformed into an E-W trending marine half-graben between 10.4 and 10.3 Ma. The half-graben geometry suggests a major listric bounding fault in the south with subsidiary faults to the north under continued N-S extension. Footwall debris in the incipient half-graben fill of the Ierapetra region east of central Crete dates the dismembering of the hangingwall during the final stages of the supradetachment basin at around 10.4 Ma. Uplift of the marine half-graben in central Crete between 9.7-9.6 Ma and dissection by N-S and E-W trending normal faults shortly afterwards marks the transition from dominant N-S to combined N-S (arc-normal) and E-W extension characteristic for arc-parallel extension in a forearc region. Radial extension continued between 9.6 and 7.36 Ma as is shown by the tilting and foundering of fault blocks with foundering events centered at 9.6, 8.8, 8.2 and 7.36 Ma.

The implication of our early basin reconstruction in central Crete is that the final stage of the exhumation history of the HP-LT metamorphics is driven by 400 kyr of homogeneous stretching of the hangingwall above the Cretan detachment. The majority of exhumation dates from before the beginning of N-S extension on Crete at 10.8 Ma.