

2006 Fall Meeting
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HR: 0800h

AN: **V31A-0569**

TI: [Deep subduction of continental fragments in the Aegean region since the Early Cretaceous](#)

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AB: The Aegean region exposes a stack of nappes that accumulated since the late Mesozoic during African– European convergence. Late Cenozoic high–strain extension developed metamorphic core complexes. Based on the ages of their sedimentary protoliths, the metamorphic nappes exposed in the core complexes have been correlated to their non–metamorphosed parts that remained in a foreland position in the external Hellenides. We compared the geological history of the metamorphic and non–metamorphic portions to reconstruct the process of nappe stacking for two external Hellenic nappes and their metamorphosed, underthrust counterparts exposed in the core complex. Our results show that the (early Oligocene) onset of foreland basin (flysch) sedimentation on the external parts of the nappes occurred time–equivalently with the onset of formation of greenschist facies mylonites related to the underthrusting metamorphosed parts. The (latest Oligocene) end of flysch deposition and the earliest compressional deformation of the foreland basin occurred time–equivalently to the peak metamorphic conditions in the underthrust parts. Afterward, the underthrust portions were exhumed in central and southern Aegean core complexes. We therefore propose a model, in which nappe stacking results from the underthrusting of a nappe followed by decoupling of the nappe from its underlying lithosphere. If this model is valid, the amount of shortening that can be estimated from a nappe stack should be similar to estimates of convergence estimated from seismic tomographic images of the subducted lithosphere. Therefore, we balanced a cross–section across the Aegean nappe stack and compared it to the well–resolved seismic tomographic images from the mantle underneath the Aegean. Restoration of the Aegean nappes indicates 1400 km of minimum of lithosphere underthrust the

Aegean since the Cretaceous, at least 900 km of which was continental. Plate tectonic reconstructions for the eastern Mediterranean suggest that 1000 km of oceanic lithosphere subducted without leaving nappes since the Cretaceous, which leads to an estimate of 2400 km of continuous subduction since the Cretaceous. Estimates from seismic tomography indicate 2100– 2600 km of subduction, which validates our model. The consequence of this reconstruction is that continental fragments adding up to at least 900 km of continental lower crust and lithospheric mantle – measured parallel to the subduction direction – subducted underneath the Aegean region, and likely forms part of the present-day lower mantle portion of the slab.

DE: 3001 Back-arc basin processes

DE: 3040 Plate tectonics (8150, 8155, 8157, 8158)

DE: 3060 Subduction zone processes (1031, 3613, 8170, 8413)

DE: 8104 Continental margins: convergent

DE: 8139 Obduction tectonics

SC: Volcanology, Geochemistry, Petrology [V]

MN: 2006 Fall Meeting

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