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Recent and active deformation in the North Evia domain, a diffuse plate boundary between Eurasia and Aegean plates in the Western termination of the North Anatolian Fault.

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The Anatolia-Aegean microplate is currently extruding toward the South and the South-West. This extrusion is classically attributed to the southward retreat of the Aegean subduction zone together with the northward displacement of the Arabian plate. The displacement of Aegean-Anatolian block relative to Eurasia is accommodated by dextral motion along the North Anatolian Fault (NAF), with current slip rates of about 20 mm/yr. The NAF is propagating westward within the North Aegean domain where it gets separated into two main branches, one of them bordering the North Aegean Trough (NAT). This particular context is responsible for dextral and normal stress regimes between the Aegean plate and the Eurasian plate. South-West of the NAT, there is no identified major faults in the continuity of the NAF major branch and the plate boundary deformation is apparently distributed within a wide domain. This area is characterised by slip rates of 20 to 25 mm/yr relative to Eurasian plate but also by clockwise rotation of about 10° since ca 4 Myr. It constitutes a major extensional area involving three large rift basins: the Corinth Gulf, the Almiros Basin and the Sperchios-North Evia Gulf. The latter develops in the axis of the western termination of the NAT, and is therefore a key area to understand the present-day dynamics and the evolution of deformation within this diffuse plate boundary area.

Our study is mainly based on new structural data from field analysis and from very high resolution seismic reflexion profiles (Sparker 50-300 Joules) acquired during the WATER survey in July-August 2017 onboard the R/V "Téthys II", but also on existing data on recent to active tectonics (i.e. earthquakes distribution, focal mechanisms, GPS data, etc.). The results from our new marine data emphasize the structural organisation and the evolution of the deformation within the North Evia region, SW of the NAT.

The combination of our structural analysis (offshore and onshore data) with available data on active/recent deformation led us to define several structural domains within the North Evia region, at the western termination of the North Anatolian Fault. The North Evia Gulf shows four main fault zones, among them the Central Basin Fault Zone (CBFZ) which is obliquely cross-cutting the rift basin and represents the continuity of the onshore Kamena Vourla - Arkitsa Fault System (KVAFS). Other major fault zones, such as the Aedipos Politika Fault System (APFS) and the Melouna Fault Zone (MFZ) played an important role in the rift initiation but evolved recently with a left-lateral strike-slip motion. Moreover, our seismic dataset allowed to identify several faults in the Skopelos Basin including a large NW-dipping fault which affects the bathymetry and shows an important total vertical offset (>300m). Finally, we propose an update of the deformation pattern in the North Evia region including two lineaments with dextral motion that extend southwestward the North Anatolian Fault system into the Oreoi Channel and the Skopelos Basin. Moreover, the North Evia Gulf domain is dominated by active N-S extension and sinistral reactivation of former large normal faults.