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Complex hanging-wall deformation above the Santorini Detachment (Cyclades, Greece).

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Located in the southern Aegean Sea in Greece, the island of Santorini (Thera), lies at the center of the active Hellenic Volcanic arc, between the Cycladic massif in the north and the accretionary wedge of the External Hellenides in the south. The greater part of the island is covered by Quaternary volcanic products, while the pre-volcanic basement is only exposed in two separate localities: (i) around the port of Athinios in the western part of the island schists and metaconglomerates with marble lenses are found, indicating blueschist facies metamorphism, equivalent to the Lower Cycladic Blueschist Unit exposed on other Cycladic islands, and (ii) in the southeastern part of Santorini the mountains Profitis Ilias and Mesa Vouno are composed oflow-grade white Upper Triassic marbles with preserved megalodon shells conformably overlain by yellow dolomites ,followed by blueish marbles with chert layers and covered by a wildflysch-typemetasediment. The whole sequence is correlated with the Sub-Pelagonian Unit and is deformed into a complex large refolded synform with the wildflysch-type metasediment in the core. The different tectonic units are separated by the top-to-the SE Santorini Detachment.
Unlike on other Cycladic islands, where only cataclastic remnants of the hanging wall are exposed above the detachments, the hanging wall on Santorini is preserved over a thickness of almost 600m and records a complex succession of shallow SE dipping ductile shear zones and localized brittle faults recording a clear top-to-the SE kinematics. Between several meter thick ultra-mylonitic calcite marble shear zones, several tens of meters thick blocks of almost undeformed marbles are preserved. These record large megalodon shells, palaeo-karst, palaeosol and palaeo speleothems. The sub-horizontal to gently SE dipping brittle faults zones are associated with several meter thick cataclastic to ultra-cataclastic fault rocks. The principal slip surfaces are associated with truncated grains, injection dykes and polished surfaces that probably suggest seismic activity during top-to-the SE displacement.
Our new structural and microstructural observations give insight into the complex and continuous localization of deformation from ductile to brittle during Miocene displacement along the Santorini Detachment.