



Deformation patterns, reworking and low-angled extension on Kythnos, W. Cyclades

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Southwards rollback of the African plate from the Cretan subduction zone led to extension of the continental crust underlying the Aegean sea. Top-to-SW low-angled extension (D2/M2) recorded in the W. Cyclades (Makronisos-Kea-Kythnos-Serifos-Sifnos) was superimposed on an earlier (D1/M1) southerly-directed high-P exhumation event at ~ 30 Ma; in some islands, blueschists are recognisable at outcrops, whilst in others only relicts have been found in thin-sections. Due to rotation of the Cyclades region high-P exhumation, early stretching lineations (L1) are now ENE-WSW oriented, at an angle to subsequent NE-SW oriented low-angled detachment lineations (L2). This difference can be used to qualitatively estimate the intensity of D2 structural reworking of D1, although the small angle between L1 and L2 azimuths makes it difficult to determine which generation is present in the field for intermediate orientations. On Kea (NW end of W. Cyclades), only relict blueschist assemblages have been preserved in greenschist facies rocks and structural reworking was strong; stretching and crenulation lineations are overwhelmingly dominated by L2 directions ($\sim 040^\circ$), with abundant top-to-SW S-C' fabrics. On Kythnos, just 11.5 km SE of Kea, evidence of high-P metamorphism has also only been seen in thin-sections, in greenschists, but, despite this, structural overprinting was weak and predominantly L1 ($\sim 070^\circ$) stretching lineations are present. Only in the southernmost part of the island, where the detachment fault and hanging wall are exposed, are L2 directions ($\sim 040^\circ$) common. Currently available Ar/Ar phengitic white mica cooling age data shows a range of 24-19 Ma (N=5), from samples including both early and late lineation directions; these data are similar to those from Kea (13-21 Ma). A minor late brittle detachment on the east coast, with (ultra)cataclasites up to 0.5 m thick, has south-dipping Riedel shears and weak southerly-plunging lineations, indicating a late evolution. A ca. 40 m thick marble in the hanging-wall of this has been asymmetrically boudinaged and back-rotated within enclosing pelitic schists. The geographical proximity of the boudins and minor detachment suggests a causative link, but no late lineation directions have been recorded in the area. In summary, the degree of D2 structural reworking does not seem to be linked either to the degree of metamorphic reworking, suggesting that end M1 conditions were essentially identical to M2 conditions, or to extent of Ar/Ar isotopic resetting.