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Deciphering P-T conditions of metamorphic core complex rocks in the Southern Menderes Massif, SW Turkey

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The Aegean region contains numerous metamorphic core complexes that reflect post-collision extensional tectonics, and can be used to evaluate multiple models developed to infer the nature and timing of the tectonic evolution of the region. The largest exposed of the metamorphic core complexes is the Menderes Massif of southwest Turkey, which crops out over 40,000km^2 and is sub-divided into three regions (Northern, Central, and Southern) split by grabens of two separate time frames. The Menderes Massif comprises a series of horizontally stacked nappes with shear sense showing N-NE movement. In stratigraphic order from top to bottom the nappes are Selimiye, Cine, Bozdag, and Bayindir. The Selimiye Shear Zone (SSZ) separates the Selimiye and Cine Nappes that make up the Southern Menderes Massif (SMM) and is a key location for understanding the Menderes system, because it provides a contact for widely varying pressure and temperature (P-T) conditions recorded in adjacent rocks. To model thermal evolution of the region accurately requires an understanding of the peak P-T conditions the rocks in the region experienced and the time at which they were at those conditions. Only limited and scattered P-T data exists in the SMM, and to supplement the thermal evolution, a better understanding of the SMM's metamorphic record is needed. Evidence supporting polymetamorphism is found by studying garnet-bearing rocks. Improved spatial resolution of polymetamorphism occurring in the SMM is needed and obtained by sampling multiple transects across the contact of the SMM and SSZ that separates the SMM to Selimiye Nappes in the south. There is an apparent inverted thermal gradient from previous P-T conditions collected in the Menderes system suggesting an inverted metamorphic thermal structure existing during a single metamorphic event. Alternatively, this region may have experienced a polymetamorphic history thus providing another explanation for overlying-adjacent rock units recording different P-T conditions. To resolve which hypothesis is correct, systematic P-T data is required between rocks of the SMM and Selimiye Nappes adjacent to the SSZ.

Keywords: metamorphic core complex, extensional tectonics, garnet, Electron Microbeam analysis, geochemistry, petrology, geochronology, and monazite