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Backstripping differentiation to detect primary geochemical trends along the Aegean arc

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The present active volcanic arc in the Aegean runs from the centre of Methana in the west through Santorini to Nisyros in the east. The arc is built on (stretched) continental crust of African derivation.
None of the analysed whole-rock samples, either from literature or our own data set, is primary, based on a combination of Mg-number, Ni- or Cr-contents. Although samples with (moderately) high values for one or the other exist, they appear to be influenced by magma mixing processes. Therefore, any along-arc trends observed potentially suffer from the effects of crystal fractionation with or without mixing and crustal contamination, obscuring along-arc differences related to varying inputs into the sub-arc mantle.
Simple graphical extrapolation to more primitive compositions on variation diagrams is one way to strip the effects of the combination of differentiation processes. The main problem with this approach is the assumption that the observed variation is a faithful representation of all differentiation processes that acted on the primary magma. It is therefore unlikely to work if magma mixing is the process dominating the observed variation, as is the case for Methana. Moreover, it is possible that the first stage of differentiation, modifying the primary magma, is different in nature to the later processes, because it might take place at greater depth. These problems are compounded by the 'lumping' approach of looking at the variation within the whole volcanic centre, which obscures the potential presence of different magma series.
While keeping these caveats in mind, there appears to be a difference in the composition of the subducted slab component in Nisyros compared to the more westerly centres, with high Ba, Sr and Nb contents, and low Pb-isotope ratios. This could be related to sedimentary input from the Nile drainage system. Santorini shows the lowest 'slab contribution' in terms of fluid-mobile elements, and generally lower ratios of the more to less incompatible elements. This might be related to a more important role for adiabatic melting in this central part of the arc, where the overriding plate is thinnest. The very 'crustal' Sr and Nd isotopic ratios of Methana are likely to be a result of crustal contamination, rather than the subduction of continental material.
Along-arc changes in the Aegean therefore reflect an interplay of the identity of the subducted material, degree of partial melting as well as the influence of the overriding plate.