P/T ratio in high pressure rocks as a function of dip and velocity of continental subduction

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High-pressure low-temperature (HP-LT) metamorphic rocks that belong to the same orogen commonly show alignment of their peak pressure and related temperature within a PT diagram, defining a P/T ratio. In the Aegean region for example, two metamorphic belts of different ages, the Eocene Cycladic blueschists and the Miocene Cretan blueschists, show contrasting P/T ratios that are characterized by the slope and the temperature at 10 kbar ($\Delta P/\Delta T$ and T@10 kb). Peak PT data for the Cyclades yields a $\Delta P/\Delta T$ of 0.056 and T@10 kb of 375°C while the Cretan blueschists gave a much larger $\Delta P/\Delta T$ with a lower T@10 kb. 1D modelling of the thermal evolution of a subducted continental margin show that subduction velocity controls T@10 kb of the P/T ratio and the subduction dip controls both the slope $\Delta P/\Delta T$ and T@10 kb. On these bases, the variations of P/T ratios in the Aegean region reflect variations through time of subduction dip and velocity. Eocene subduction for Cycladic blueschists burial occurred at a rate of 1.5 cm/y, while subduction velocity during Cretan blueschists formation is found to be 2.75 cm/y. Because the convergence rate between Africa and Eurasia is constant and around 1-1.5 cm/y at these times, the active southward roll back of the Aegean slab during the Oligo-Miocene likely explains the larger subduction velocity for the Cretan HP-LT rocks. These results exemplify the use of this new modeling approach as a proxy to quantify dip and velocity of continental subduction from the P/T ratio of high pressure rocks.