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Melt- and Fluid-Mediated Processes in the Crust: A Microanalytical Approach

Fluids and melts are crucial agents for metamorphic reactions, chemical differentiation of the planet and countless other processes in the solid Earth. The interaction of fluids and melts with minerals creates chemical signatures and zoning at the microscale. With advanced micro-analytical techniques we can now sample these chemical variability and use them to distinguish and reconstruct the timing and conditions of rock evolutions. Using example from high temperature and high pressure terrenes I will show how chemical (trace elements in particular) and isotopic (U-Pb and oxygen) zoning in metamorphic minerals are use to investigate (i) the residence of melt at the cores of collisional orogenies and (ii) fluid metasomatism within subduction zones.