

Estimating volatile content in oceanic upper mantle from magnetotelluric observations

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Marine magnetotelluric (MT) observations give estimates on electrical conductivity structure of the oceanic upper mantle. The obtained electrical conductivity distribution can be interpreted in terms of the parameters controlling that of mineral and melt phases. The parameters are temperature, small amount of H₂O and CO₂ dissolved in nominally anhydrous minerals and melt and the fraction of melt if the mantle is partially molten. The relations between the conductivity of each phase and these parameters have widely explored by laboratories. The electrical conductivity obtained from the MT observation can be converted into one of the parameters using the relations. It is impossible to constrain all the parameters at once from the electrical conductivity alone and use of other independent information and/or reasonable assumptions are indispensable to distinguish the impacts of each parameter. The consideration of the reduction of peridotite solidus due to the H₂O and CO₂ and partition of them in peridotite and melt can couple the parameters mutually and they can be constrained more by self-consistent manner. In this presentation, I introduce my recent effort on quantitative interpretation of electrical conductivity of the oceanic upper mantle from the point of this view.