

Numerical Subduction Modeling with Back-arc Temperature Heterogeneity Using CFD Module

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Abstract

Numerical modeling study using the COMSOL Multiphysics has contributed to the evaluations of the thermal and flows structures of the subduction zones, which are directly correlated to the arc volcanism. To understand arc volcanisms, consideration of the back-arc temperature heterogeneity becomes important along with the temperature heterogeneity of the subducting plate. This poster demonstrates that the back-arc temperature heterogeneity can explain the unexplained arc volcanisms in Northeast Japan (Quaternary), Kermadec (Quaternary) and Southwest Japan (Cretaceous). The CFD module of the COMSOL Multiphysics allows to consider the back-arc temperature heterogeneity with kinematic or dynamic implementations. In addition, three-dimensional modeling with clustering allows a large amount of calculations possible which cannot be conducted using a single computer or workstation. The model calculations show the back-arc temperature heterogeneity plays a crucial role in the evolution of the thermal and flow structures of the mantle wedge, which is well correlated to the arc volcanisms in the studied subduction zones.

Figures used in the abstract

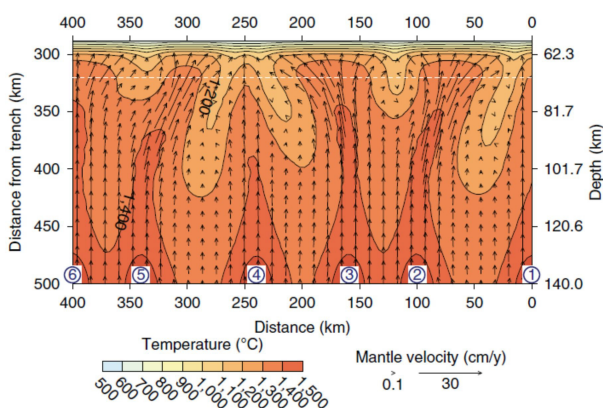


Figure 1: thermal and flow structure of the mantle wedge in Northeast Japan. From Lee and Wada (2017)