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Abstract

Slab dehydration and fluid migration in subduction zone is important because it allows us to understand characteristics of the arc volcanism such as migration of the volcano front as well as the global circulation of water and carbon. To minimize the technical difficulties in the implementation of the slab dehydration and fluid migration, the COMSOL Multiphysics® is used. By modifying the implemented module of the Transport of Diluted Species (TDS), slab dehydration and fluid migration are successfully implemented in the 2-dimensional subduction model. As a preliminary study, the water solubility of the basalt for the subducted oceanic crust, reported from the laboratory experiment, is used to understand the dehydration style of the subducted oceanic crust in the mantle wedge. The model calculations show most of the water in the oceanic crust is dehydrated by a depth of 100 km and the effects of the convergence rate and age of the subducting slab on the dehydration of the subducting slab and behavior of the expelled water are not significant. The larger grain size allows faster porous flow of the expelled water through the oceanic crust, mantle wedge and overlying continental crust and reduces the volume fraction of the expelled water there. The developed technique will be used for future studies on arc volcanism.