

## Empirical links between the dehydrations and earthquakes in intermediate-depth to deep seismic zones

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In the present study, we show close links between the depth distribution of subduction-zone earthquakes and that of dehydration reactions in the hydrated slab-peridotite. We constructed a phase diagram for presumably-hydrated slab-peridotite up to 30 GPa, by a combination of thermodynamic calculation and the Schreinemakers analysis of previous experiments. We showed depth-distributions of dehydrations in various thermal condition of model subduction-zones. In parallel to the mineralogical approach, we compiled a depth-temperature diagram for hypocenters in selected 11 subduction zones. Comparison of the diagrams showed close links between the dehydrations and earthquakes in the subduction zones. In conclusion, we propose an extended dehydration-induced earthquake (EDIE) model for the earthquakes in the subducting slab, which considers any dehydration in the slab acts as a trigger of seismicities. This is a possible unique model to explain the intermediate and deep earthquakes together. We also discuss the implications of this model to the thermal, physical and chemical processes in the mantle.