Geophysical Research Abstracts
Vol. 19, EGU2017-4141, 2017
EGU General Assembly 2017

Structural controls on fluid escape from the subduction interface

Bruno Reynard, Benoit Tauzin, Thomas Bodin, Jean-Philippe Perrillat, and Eric Debayle
CNRS, ENS Lyon, UCBL, Laboratoire de Géologie de Lyon, Lyon, France (bruno.reynard@ens-lyon.fr)

Seismic activity and non-volcanic tremors are often associated with fluid circulation resulting from the dehydration of subducting plates. Tremors in the overriding continental crust of several subduction zones suggest fluid circulation at shallower depths, but potential fluid pathways are still poorly documented. Fluids are also released at different depths in hot and cold subduction zones, which may result in different schemes of fluid escape. We document potential fluid pathways in Cascadia, one of the hottest subduction zone, using receiver function analysis.

We provide evidence for a seismic discontinuity near 15 km depth in the crust of the overriding North American plate. This interface is segmented, and its interruptions are spatially correlated with conductive regions of the forearc and shallow swarms of seismicity and non-volcanic tremors. The comparison of seismological and electrical conductivity profiles suggests that fluid escape is controlled by fault zones between blocks of accreted terranes in the overriding plate. These zones constitute fluid escape routes that may influence the seismic cycle by releasing fluid pressure from the megathrust.

Results on Cascadia are compared to fluid escape routes suggested by former geophysical observations in NE Japan, one of the coldest subduction zones. Links between fluid escape, permeability and fluid-rock reactions at or above the plate interface are discussed.