# Possible convective fluid flow and asperity of the plate boundary

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The plate boundary zone comprises the high permeable layer rich in fluid filled cracks. The type of fault zone can be considered as the permeable two dimensional plate like box in which fluid occupying cracks should start the convective flow in the geological framework. Such nearly 2 dimensional convective flow in the geothermal field has formulated by Murphy (1979). Rayleigh number of the convective flow in the geological cases shows the minimum at the wave number ratio between length and depth scales of a convection cell about 1 to 4 with increasing outflow of the heat from the convective platy box.
The inclined plate boundary zone should be highly cracked and high permeably zone, and the temperature gradient along the plate boundary extension reaches about 0.1 to 0.01 C/km. The permeability may be over the 0.001 to 0.01 darcy, the convective fluid flow should start within several thousand years as shown by Murphy in the case of vertical platy box.
Such convective fluid flow should result in the downward low temperature fluid flow of like seawater and high temperature upward flow. The contrast of these fluid flow is that the high temperature fluid passes through the geochemical region that solubility change against pressure is very large, and that low temperature down flow passes such region also. Therefore, it is strongly suggested that in the down flow region fluid flow may enhance dissociation of quart in the rocks but in the upflow region it rapidly precipitates quartz, calcite and albite. These processes are potential to be responsible for the geophysical coupled features of seismic asperity and deep seismic reflection zones along the plate boundary. The model system requires the cell dimensions ratio of convection along the plate boundary zone about 1 to 4, so that the distance between DSR and asperity may be about 30-100 km in the case of convection cell reaching about 100 km extension along the boundary.