CAUSE OF GREAT EARTHQUAKES BY HIGHLY COMPRESSED METHANE GAS MASS TRAPPED IN SUBDUCTION FAULTS

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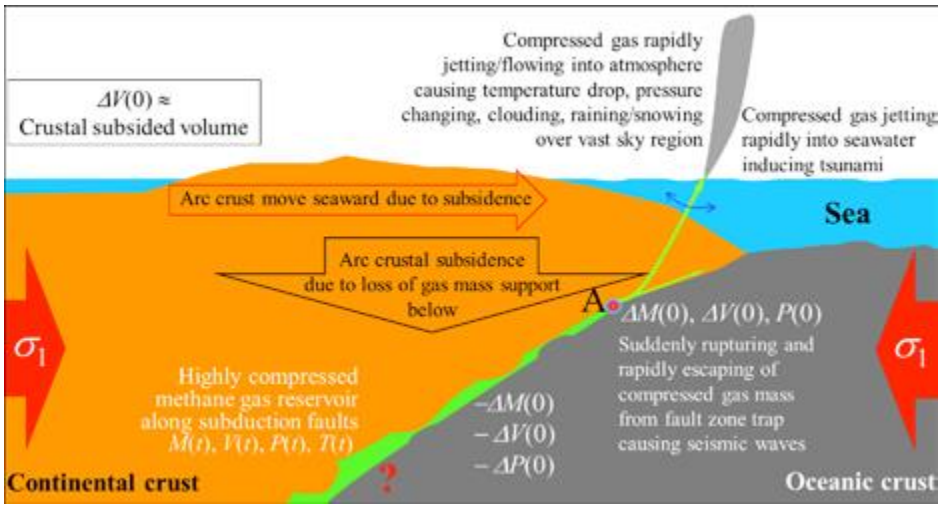
This paper uses the highly compressed methane gas mass model to interpret and explain the occurrence of great earthquakes at subduction fault with long recurrence intervals[1]. The gas model can be described as follows with the reference to Figure below. The subduction faults are weak zones and can become gas reservoirs generated in deeper rocks. With time t, the mass $M(t)$, volume $V(t)$, pressure $P(t)$ and temperature $T(t)$ of the reservoir gas can change and increase. At the fault rupturing of great earthquakes ($t = 0$), a huge amount of highly compressed gas mass $\Delta M(0)$ with the pressure $P(0)$ escapes the reservoir trap at the focus A. It rapidly flows and expands into upper and adjacent rock masses along the weakest fault zones, generating seismic waves. It jets into the seawater inducing tsunami. It jets and flows into atmosphere, causing temperature drop, pressure fluctuations, clouds, rains and/or snows. The arc crust subsides and moves seaward due to the loss of the gas mass in the fault zones. The highly compressed gas masses in various reservoirs induce numerous aftershocks. With time, the aftershocks become less and less, showing the gas-rock gains compatible and equilibrium. The fault reservoirs re-collect new gas masses from deep and surrounding rocks, taking time, which is consistent with great earthquakes of long recurrence intervals. The arc crust would gradually reverses direction to move landward as the gas mass in the subduction fault has collected and accumulated enough, which indictes the occcurrence of next great earthquakes.



[1] Yue Z.Q., 2014. On cause hypotheses of earthquakes with external tectonic plate and/or internal dense gas loadings, Acta Mechnica 225(4), 1447–1469