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Numerical modeling of fracture zone subduction and related volcanism in Southern Mexico

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Oceanic fracture zones are recognized as areas where parts of the oceanic lithosphere can be partially serpentinized. Therefore, when subducting, these fracture zones have the potential to carry significant amounts of fluids which are released at certain depths, depending on the slab dynamics. In the case of Southern Mexico, the Cocos plate hosts a large oceanic fracture zone named Tehuantepec FZ, currently subducting. Onshore a large stratovolcano, called El Chichon, intersects the prolongation of Tehuantepec FZ where the slab depth beneath is more than 200 km, an unusual depth for a subduction related volcanic arc.
In this study we investigate numerically the influence of a serpentinized fracture zone rheology on the depth where hydrous instabilities (cold-plumes) are formed. Our preliminary results show that the subduction of serpentinized oceanic lithosphere plays an important depth control for the hydrous cold-plume formation, which is probable responsible for the unusual volcanism location in Southern Mexico.