Subduction of oceanic plate irregularities in Mexico and Japan and the influence on large megathrust earthquakes

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It is known that oceanic plates morphology is not a simple one, but rather complicated by a series of irregularitiles as seamounts, fracture zones and mid-ocean ridges. These features present on the oceanic floor form part of the fabric of oceanic crust, and once formed they move together with the oceanic plates until eventually enter a subduction zone. Some improvements have been done in the last decades in understanding the influence of seamont subduction on the forearc morphology and also on occurrence of large subduction earthquakes. Although the Cocos plate offshore Mexico present a series of multiple small height seamount chains that enter into subductionas well as large fracture zones (i.e. Tehuantepec fracture zone), the undertanding of the influence of these oceanic features that might play in geohazards (i.e the generation of large earthquakes) in Mexico is not yet well studied. Previoues studies along the Mexican trench reveal that only a lillte protion of the oceanic sedimentary blanket is accreted and this margin seems to be marked by errosional processes. In the particular case of seamounts, it is not well understood for example whether the Cocos plate seamount chains are accreted to the forearc or carried down into the subduction zone, and how the forearc mophology is affected. Whereas offshore Mexico the Cocos plate seafloor is littered with small but numerous seamounts and seamount chains, the Pacific plate offshore Japan is marked by relatively few but large iregularities (i.e. seamounts). However, both subduction zones are very active and prone to produce large and devastating earthquakes.
In this study we use for the ocean bottom topography SRTM30+ datasets which provide global topography and bathymetry at 30″ per-cell resolution (~ 1 km). In order to better indetify shallow feature as seamonts, we use a median-depth grid (using a median filtering tehnique) which is applied to the original bathymetric data. Here we present some preliminary results where we investigate in a comparative manner the shape and structure of medium-size to large seamounts and fracture zones in the vicinity of the trench in Mexico and Japan, and examine the possible links that might exist between these features and the rupture history of large subduction zone earthquakes.

Keywords: seamounts, fracture zones, Japan subduction zone, Mexican subduction zone

