Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SCG66-P06 Room:Convention Hall Time:May 24 16:15-17:30

Subduction zone categories based on the slab age gradient

Takao Eguchi[1*]

[1]National Defense Academy, Japan

In general, it seems that possible factors which would correlate with the category of subduction zones, are slab thickness (thickness of the elastic core), the negative buoyancy force of sinking slab, surrounding upper mantle flow regime, physical properties of the surrounding upper mantle (esp., the viscosity), the presence or absence of stagnated slab at 670km depth, stagnated slab volume at 670km, slab stagnating or penetrating at 670km, global-scale dynamic constraint of the subduction zone distribution, absolute plate motion of overriding lithosphere, spherical slab buckling, convergence of the buoyant linear topography, gradient of slab age, and others.

We, here, present new treatment on the classification of subduction zones, mainly focused on the age gradient of downgoing oceanic slab. One of the other factors to be incorporated during the classification is the absolute motion of overriding lithosphere. For simplicity, hereafter we assume zero absolute plate motion for the overriding lithosphere.

Numerical studies on the buckling mode of spherical shell on the earth (e.g., Mahadevan et al., 2010) suggest that the mechanical buckling wavelength of subduction zone segments is not a continuous but a discrete function of slab age. For example, the trench-parallel length of the subduction zone segment with the slab age of ˜135Ma is approximately twice as large as that of the segment of ˜20Ma. Mechanical state of subduction zone segment with the slab age between ˜20Ma and ˜135Ma is rather ambiguous. For the case of the convergent segment with the increasing (or decreasing) slab age, transitional response constrained by spherical buckling would provide additional horizontal stress component being trench-normal compressive (or less-compressive).

The slab age gradient might be important for understanding the evolutionary process of lithosphere convergence on the Earth.

Keywords: subduction zone category, slab age gradient