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Geodynamics at subduction zones governed by the buckling of spherical shell-like oceanic lithospheres into the mantle

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We propose physical principles on the geometrical evolutional change of subduction zones, due to the global-scale buckling of oceanic lithospheres with the age-dependent thickness, by referring numerical experiments on the buckling mode of spherical shells under uniform marginal loads, as follows.
(1) Spherical buckling due to the sudden temporal increase of downgoing lithosphere thickness at the subduction zone would provide dynamic driving forces to transform the previous two adjacent arc-like trenches into a single longer one. Similarly, (2) due to the temporal decrease of downgoing lithosphere thickness at the subduction zone, the previous single large-scale trench might transform itself into some shorter adjacent ones. In both cases, (1) and (2), geodynamics on the overriding lithosphere, including the island arc volcanism and metamorphism, may temporally activate to compensate the transitional process.
In the case of (1), we could expect some episodic formation of back-arc basin(s) behind the self-transforming subduction zone, mainly because of the geometrical reason.
In general, the geometrical change due to the spherical shell deformation would provide the instantaneous and long-term responses on various fields of geodesy, geophysics, geology and mineral physics, etc.
We, thus, inferred some possible geodynamic processes due to the sudden change of downgoing oceanic lithosphere thickness at subduction zones during the evolution history of the Earth.

Keywords: oceanic lithosphere, buckling, subduction zone, geodynamics, spherical shell