Subduction of the split PHS slab and Neotectonics of the Kinki triangle, central Honshu.

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1. Introduction

The location of tectonic basins and faulting, and sense of faults have changed since Pliocene in the Kinki triangle zone. The presenter tries to interpret its mechanism based on the kinematics of the Philippine Sea (PHS) Slab.

2. Subduction of split PHS slab accompanying with drugging

Source depth distribution of the earthquakes discontinuously change along east of the Ise bay (Yamaoka and Nishihara, 1997) and east of the Kii channel (Ide et al., 2010), it shows the PHS slab tears to three fragments (Tokai, Tonankai and Nankai slabs) and these split slabs subduct with different vector. On land GNSS analysis (Miyazaki and Heki, 2001) and seafloor GNSS observation indicate direction of subduction on the Tonankai and Nankai slabs differ 10 degrees, deep seismic reflection survey (Ito et al., 2006) suggestively shows western edge of the Tonankai slab is pushed down under the Nankai slab. Yamaoka and Nishihara (1997) show eastern edge of the Tonankai slab lies beneath the Tokai slab. Split of PHS slab and drugging down of the Tonankai slab under both sides slab fragments would be caused by change of direction of PHS plate motion in the Pliocene, and kinematics of the split PHS slab would decide the tectonics in and around the Kinki triangle zone since then.

3. Migration of tectonic basins and change of stress field in the Kinki triangle

Tectonic basins in the Kinki triangle have northward migrated with rate of 70km/3.5million years (2cm/y) since the Pliocene (Yokoyama, 1969, Mizuno, 2010). Such migration rate is similar to NS component of the PHS plate motion relative to Amur plate. The maximum compressive stress axis in the Kinki district had changed with counterclockwise rotation during the middle Pleistocene (e.g. the Median Tectonic Line in the Kinokawa valley (Sangawa, 1999)). On the other hand, it have changed with clockwise rotation in the outer zone of the Kinki triangle (e.g. fold axis in the Chita Peninsula (Makinouchi,1979), and sense of faulting around the Tango Peninsula (Komatsubara and Hongo,2020)). These facts demonstrate counterclockwise rotation of stress axis have occurred accompaning with northward migration of tectonic basins on the Tonankai slab, and clockwise stress change have occurred in the outer zone of it.

4. Change of tectonism in the upper crust in the Amur plate and kinematics of the Tonankai slab

The Amur (AMR) plate thrusts up to the PHS slab. The shallower the depth of the PHS slab, the stronger stress from the NW ward sliding PHS plate would militate in the upper crust of the AMR plate. Thus, the deepening of the Tonankai slab by pushing down by both sides slab fragments (Tokai and Tonankai slabs) would generate subsiding, low gravity, counterclockwise rotation of stress axis just upon the Tonankai slab, on the other hand, the shallowing of the Tokai and Nankai slabs would make clockwise rotation of stress axis on the overlapping two split slabs. This kinematics may be a factor causing northward basin migration, change of sense and location of faulting in the Kinki triangle upon the Tonankai slab.

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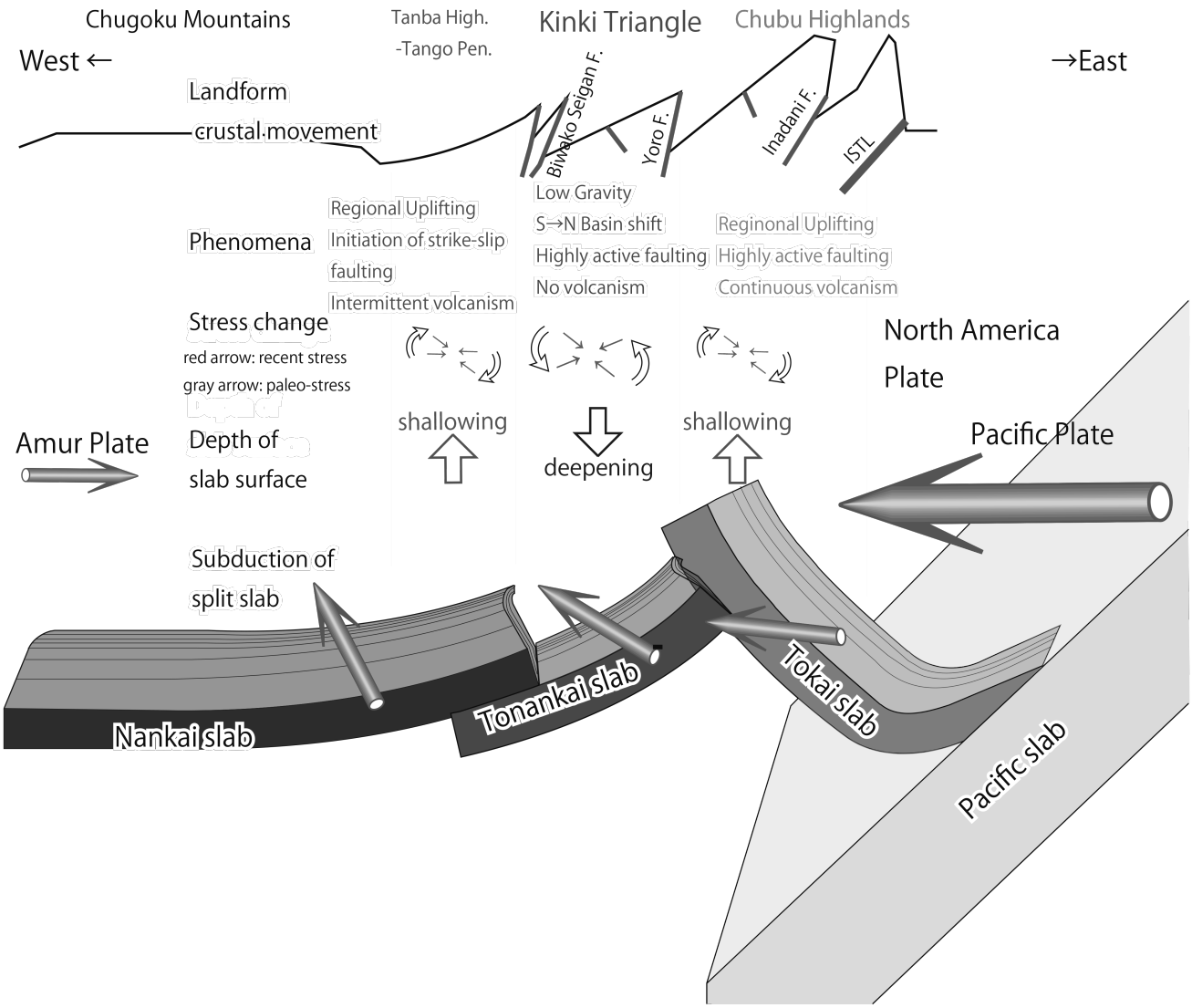

A conceptional deep structure and upper crustal tectonics around the Kinki district
Note that : Northward migration of basins in the Kinki triangle (on the Tonankai slab) have occurred accompanying with stress change in the upper crust of the Amur plate, and its rate is similar to the N-S component of PHS plate motion, the area where remarkable low gravity anomaly on the Tokai and Tonankai slabs coinsident with highly active faulting areas.

