Evidence for Late Mesozoic intraoceanic subduction offshore NE Asia from mantle convection and geoid models

*Lorenzo Colli[1], Jonny Wu[1], Yi-An Lin[1]

1. University of Houston

The existence of the Izanagi plate is well established both from magnetic lineations and fracture zones in the western Pacific and from tomographic imaging of the deep mantle underneath East Asia. But its spatial extent, position and motion through time remain poorly known.

A common scenario envisages the Izanagi as a large and long-lived plate extending from central Panthalassa to the eastern margin of Eurasia. In this scenario the Izanagi plate is conjugate to the Farallon and Phoenix plates before the inception of the Pacific plate and it subducts continuously beneath East Asia during the Mesozoic (e.g. Müller et al., 2016). But more complex scenarios, entailing the existence of additional plates and subduction zones, have been proposed based on both geologic evidence from the East Asian margin and tomographic images of mantle seismic structure.

Here we explore four kinematic plate motion models of increasing complexity, starting with a maximum-size Izanagi plate and introducing in steps a number of additional plates and intraoceanic subduction zones in accordance with geologic evidence along the East Asian margin. We assimilate these kinematic plate motion models in geodynamic models of global mantle convection in the form of a time-dependent velocity boundary condition at the Earth’ s surface. Their implications for the evolution of mantle structure in East Asia during Mesozoic time up to present-day are presented and discussed, focusing in particular on how well the modeled present-day state can match tomographic images of the mantle and the geoid.

Keywords: Panthalassa, Arc accretion, Oku-Nikapu complex, Mainitskiy terrane

