Geophysical Research Abstracts
Vol. 13, EGU2011-2828, 2011
EGU General Assembly 2011

Future supercontinent assembled in the northern hemisphere: Insight from a numerical model of mantle convection

Masaki Yoshida
IFREE, JAMSTEC, Japan (myoshida@jamstec.go.jp)

The convergence of multiple continental fragments carrying ancient cratons together with accreted terranes have created large landmasses on the Earth termed as supercontinents. Several configurations of supercontinents and pseudo-supercontinents which shaped the globe during various periods in Earth history have been proposed including Valbaara (3.2 Ga), Ur (3.0 Ga), Kenorland (2.7–2.5 Ga), Columbia (1.8–1.9 Ga), Rodinia (1.1 Ga), Pannotia (0.7 Ga), Gondwana (0.54 Ga) and Pangea (0.25 Ga). The history of growth, evolution and dispersion of supercontinents through time has received considerable attention in the recent years, specifically in relation to the process of evolution and destruction of the continental crust, the history of life, and major surface environmental changes.

Whereas hypothetical models supported by geological correlations have attempted the configurations of past supercontinents, the question of when and where the future supercontinent will form is controversial. A popular concept is that as Pacific Ocean is closing, Asia is moving towards America with the western Pacific region defining the frontier of the future supercontinent, dubbed “Amasia”. However, this model faces a problem in that the South Pacific superplume is lying at the center, along the path of migration of the Asian continental mass to join America and form the future supercontinent.

Most of the numerical models so far have assumed the continent/supercontinent to be rigid or nondeformable bodies mainly because of the limitations in the numerical simulations, as well as the simplification of models. In this study, we use a more robust numerical model within three-dimensional spherical-shell which enables us to treat the evolution of deformable, mobile continental lithosphere both in space and time, and attempt to answer the question of when and where the future supercontinent will form.

The mantle convection in our model is driven by internal temperature anomaly mainly compiled from a global seismic tomography model. The temporal evolution of a compositionally-different continent with an initial present-day configuration is simulated for around 200 Myr. The result reveals that Australia, Eurasia, North America and Africa would gather in the northern hemisphere to form the future supercontinent. On the other hand, Antarctica and South America stay in the present-day position even after 200 Myr from present, and do not join the future supercontinent amalgam. The configuration of the future supercontinent numerically simulated here is broadly consistent with the hypothetical model of the future supercontinent Amasia speculated from geological correlations.