Geophysical Research Abstracts
Vol. 14, EGU2012-2625, 2012
EGU General Assembly 2012

GIS-based Reconstruction of Pangaea with Recent Progresses in Plate Tectonics

O.-H. Kwon (1), H.-B. Cheong (2), and Y.-W. Lee (3)

(1) Institute for Regional Studies, Pukyong National University, Busan, Republic Of Korea (okwon@pknu.ac.kr), (2) Department of Environmental Atmospheric Sciences, Pukyong National University, Busan, Republic Of Korea , (3) Department of Spatial Information Engineering, Pukyong National University, Busan, Republic Of Korea

It is now widely accepted that the continents or land masses are constantly, slowly moving, or drifting over the asthenosphere as the sea floors spread in response to the mantle convection. These continents were joined together at one time, some 250 million years ago, in a single giant landmass called Pangaea. Alfred Wegener, who proposed originally the hypothesis of continental drift, succeeded in reconstructing the Pangaea in early 20th century, by gathering evidences such as land features, fossils, and climate change. The shape of Pangaea shown by Wegener is a huge landmass which is in rounded shape close to an oval. The Pangaea of Wegener was found to be in good agreement with the supercontinent which was reconstructed by modern scientists in late 1960s based on concrete and sophisticated sciences such as the plate tectonics. There are a couple of shapes describing the Pangaea by now, other than the Wegener's, that are recognized by the geological community. In spite of profound geological data and development of related-area sciences, uncertainties still remains on the precise shape of Pangaea before the stage of breaking up and drifting apart.

In this study, the Pangaea is reconstructed taking the recent progresses of plate tectonics into full consideration with the use of an elaborate Geographical Information System (GIS) mapping technique. For a better visualization of the shape of the supercontinent the equidistant map projection is incorporated to display the Pangaea, where the central point of Pangaea is placed on the center of the map. The Pangaea reconstructed in this way appears in an almost circular shape, which has never been seen in previous studies (Fig. 1). The radius of the circle which circumscribes the Pangaea is about 9 000 km, giving the total area slightly above that of continents and lands of present day, because some of the continental margins were considered as a part of continents. This result suggests us that the Pangaea might have existed in an exact circular shape until it started to break into parts. Comparing the Pangaea to the present geography reveals that the Pangaea's geometric center falls on somewhere in Sinai Peninsula. One of notable features of the Pangaea reconstructed in this study is that there are two inland seas in circular shape: One is small and corresponds to Tethis sea, and the other corresponding to present Arctic ocean is several times larger than Tethis. From the geological viewpoint, these inland seas seem to be the oceanic crusts located inside the continental crusts, and it is likely that they were connected to the Panthalassa by sea.

The main result of the present study that the Pangaea appears to be a circle may give us much more important implication than just being in a beautiful geometric configuration.

Figure 1 Pangaea on a equidistant projection map, reconstructed with the use of GIS technique incorporating recent progresses in plate tectonics.