Outline of basin formation tectonics in the NE and SW Japan Arcs since the opening of the Sea of Japan

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Basin formation tectonics along convergent margins may vary according to the variation in characteristics of plates and their styles of subduction. In this presentation, basin formation tectonics in the NE and SW Japan Arcs since the opening of the Sea of Japan will be compared. Tectonic Stages in both the NE and SW Japan Arcs are roughly divided into the rifting stage and the post-rifting stage. Early rifting sub-stage in the rifting stage commenced at Eocene and was characterized by formation of small rift basins associated with volcanism along the present Sea of Japan coasts in both the NE and SW Japan Arcs. Regional unconformity was formed in both the NE and SW Japan Arcs in Late Oligocene, which suggests a common tectonic setting between the NE and SW Japan Arcs. During the syn-rifting sub-stage in Early Miocene, regional transgression commenced simultaneously in back arc regions of the NE and SW Japan Arcs at 18 Ma. While large rift basins were restricted along the Sea of Japan coast of the SW Japan Arc, deep rift basins were formed in the present backbone range of the NE Japan Arc.
Rifting terminated at 15 Ma in the SW Japan Arc with regional uplift and emergence, which were followed by extraordinary volcanism such as fore-arc volcanism and high-Mg andesite activities in Setouchi region. In contrast, back arc region of the NE Japan Arc subsided to have been deep basins. Rifting associated with subsidence and volcanism had continued in the backbone basins in the NE Japan Arc until 13.5 Ma. This notable difference in tectonics between the NE Japan and SW Japan Arcs was succeeded during the post-rifting stage. While most of the SW Japan Arc remained emerged without intense basin formation by Pliocene, the NE Japan Arc had experienced intermittent uplift and unconformity events and had gradually been emerged since Late Miocene.
Conventional plate reconstruction models commonly assumed that the Pacific Plate had subducted to both the NE and SW Japan Arcs in the early rifting sub-stage and that the young Shikoku Basin in the Philippine Sea Plate replaced the Pacific Plate and subducted to the SW Japan Arc by sometime either during the syn-rifting sub-stage or during the post-rifting stage. Differences in basin formation tectonics between the NE and SW Japan Arcs after the late syn-rifting sub-stage can be attributed to differences in characteristics of subducting plates, in the styles of back arc rifting reflecting complex basin formation processes in the Sea of Japan, and in the styles of drifting of the NE and SW Japan Arcs.

Keywords: basin formation tectonics, NE Japan Arc, SW Japan Arc, rifting stage, post-rifting stage, opening of the Sea of Japan

