

The evolution of the Cretaceous Jinan Basin in South Korea based on the age and origin of volcanic activity for the volcanic rocks

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The Jinan Basin is one of the Cretaceous pull-apart basin in South Korea. It is located along the Yongdong-Gwangju fault system and consists of non-marine sediments with volcanic and pyroclastic rocks. The sinistral strike slip movement which formed the Cretaceous pull-apart basins was occurred by the collision between Siberian and Manchria blocks at ca. 130~100 Ma. LA-MC-ICPMS age dating for the sedimentary and igneous rocks indicates followings. The sedimentation in the Jinan Basin had started at least from 97.7 Ma and continued until 89.5 Ma. Basaltic andesite extruded at 92~90 Ma and later rhyolitic and andesitic magma intruded at 90~89 Ma and 85~84 Ma respectively. After that, the Jinan Basin uplifted to form the Noryeong mountain range due to the compression which was related with dextral strike slip fault movement. This fault movement is expected to be caused by the collision between Indian plate and Eurasian plate at ca. 55~25 Ma. Rhyolitic volcanic rocks in the Jinan Basin are plotted on the VAG (volcanic arc granite) field and basaltic to intermediate volcanic rocks are plotted on the CAB (calc-alkaline basalt) and WPB (within plate basalt) field in the tectonic discrimination diagrams. There was a roll back of subduction zone toward Pacific ocean at ca. 100 Ma. These data suggest that the igneous rocks in the Jinan Basin formed by the mantle upwelling due to extension caused by the roll back of subduction zone. The upwelling asthenospheric mantle supplied heat which caused the felsic magma by the melting of the lithospheric mantle and crust which had been contaminated by crustal material supplied from subducting sediment or ocean before roll back of the subduction zone. The upwelling of asthenospheric mantle was also melted to form basaltic magma. The deep faults formed by sinistral strike slip movement around the Jinan Basin at the Cretaceous gave the path toward surface for the magma at deep depth.