

An inquiry into the formation and deformation of the Cretaceous Gyeongsang (Kyongsang) Basin, Korea

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Detailed stratigraphic, sedimentologic, paleontologic, and paleomagnetic data as well as magmatic and mineralization ages are integrated with the broader scaled correlation to understand tectonic evolution of the Cretaceous Gyeongsang Basin, Korea. On the basis of an integrated approach, five distinct units (I-V) are recognized in the basin. Each unit is typically bounded at its top and base by unconformities that might be causally linked to the tectonic episodes (e.g., disturbance or orogeny). The oldest unit I (late Late Jurassic-early Early Cretaceous) includes the Myogog and Oknyobong formations that were deposited between the Daebo and Nagdong disturbances. This unit is attributed to the pre-rifting sequence that was locally developed prior to the major extension of the basin. The overlying unit II (Early Cretaceous) encompasses the Sindong and Hayang groups that represent a syn-rift sequence during the major E-W extension of the basin. The unit II is capped by a regional unconformity that resulted from the Yuchon Disturbance. The unconformity is overlain by calc-alkalic volcanic rocks of the Late Cretaceous Yuchon Group that may be subdivided into the three units by unconformities. These volcanic units are collectively considered as an inversion sequence that was deposited during the N-S and NW-SE compressions of the basin. Unconformities between the units may be attributed to the unknown tectonic episodes in Korea.

In the late Late Jurassic, northward movement of the Izanagi Plate beneath the Eurasia Plate probably produced a number of pre-rifting extensional basins in the southeastern margin of the Korean Peninsula. Continued northward movement of the Izanagi Plate through the Early Cretaceous resulted in an E-W crustal extension that resulted in the

Gyeongsang Basin. Accompanied with the intermittent alkaline volcanism, siliciclastic sediments were deposited, forming a syn-rifting sequence of the basin. Beginning the early Late Cretaceous, the E-W extension was gradually replaced by the N-S and NW-SE compression due to the progressive change in movement direction of the Izanagi Plate from north to northwest. The N-S and NW-SE compression continued until the Santonian, when the Izanagi Plate completely changed the movement direction to the northwest. This compression well documents in the Andong Fault System that is the part of the northern boundary of the basin. Here we proposed the N-S and NW-SW compression during the early Late Cretaceous as the *Andong disturbance*. Since the Campanian, when the Izanagi Plate underwent northwestward orthogonal subduction beneath the Eurasia Plate, the Gyeongsang Basin experienced the crustal deformation due to extensive NW-SE compression. Continued NW-SE compression until the early Maastrichtian eventually resulted in the northward protrusion of the Yongyang Block along a NW-trending proto-Ulsan fault. The northward protrusion of the Yongyang Block probably commenced at a time corresponding approximately to the initial volcanism (ca. 69 Ma) of the Tongri Basin near the Samcheog-Dogye coalfield, Gangwon Province, which might be related to the basin-forming tectonics of the Tongri Basin. Thus, this tectonic episode is informally named here as the Tongri disturbance. Due to the abrupt release of accumulated strain, the Izanagi Plate began to change the movement direction toward the east so that the E-W compression has been dominated in the basin. The E-W compression, since the middle Maastrichtian, resulted in the WNW-trending sinistral strike-slip faults (e.g., the Gaum Fault) as well as the open folds with an N-S axis in the basin.