



## **Origin and Age of the Yemi Limestone Breccia, Korea**

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The Yemi Limestone Breccia (YLB), which has been argued for its age and depositional origin, occurs sporadically in the upper part of the Cambro-Ordovician Chosun Supergroup (CS) in Korean Peninsula. The YLB is characterized by a carbonate breccia with calcareous and carbonaceous shale matrix. Based on occurrence and composition of breccia and matrix, the YLB can be classified into Type-I and Type-II carbonate breccia. Type-I carbonate breccia comprises dark gray to light gray limestone and lime-mudstone breccia with calcareous matrix and is commonly constrained within the upper part of the CS as a lens-shaped zonal occurrence. The Type-I carbonate breccia results in syn-depositional solution-collapsed brecciation through karstification during intermittent subareal exposure of platform carbonate in Middle Ordovician. Type-II carbonate breccia mainly occurs in the uppermost part of the CS showing an irregular-shaped distribution rather than sheet-like layering parallel to bedding. Type-II carbonate breccia consists of gray to dark gray limestone and lime-mudstone breccia and shale matrix. Matrix is typically purple to reddish and gray to dark gray shale with minor amount of sandstone, and partly carbonaceous indicating organic origin. Most of Type-II carbonate breccia is morphologically classified into chaotic breccia. Matrix and breccia display considerable difference of composition and deformational structures. Breccia preserves various penetrative ductile to brittle deformation structures such as cleavage superimposing bedding, minor fold structure, minor faults crosscutting both dolomite and calcite veins, and fracture zones filled in calcite. However, these deformational structures of breccia do not continuously extended into matrix. Especially Type-II carbonate breccia is well observed in limestone of the lower part of unconformity between CS and clastic rocks of the Jurassic Bansong Group (BS). Fractured and solution zones of brecciated limestone of the CS were filled and injected by sandy and muddy material of the BG. These kinds of evidence of indicate that Type-II carbonate breccia is a product of post-orogenic solution-collapsed brecciation in karst platform framed during exposure in surface through uplift after ductile deformation. The age can be constrained from Karstification of limestone after ductile deformation (the Middle Triassic Indosinian orogeny) to beginning stage of the sedimentation of the BG. Conclusively the YLB has to be re-defined as Type-II carbonate breccia with difference of composition and deformation characteristics between breccia and matrix, except Type-I carbonate breccia belonging to the CS stratigraphically.