

## Formation process of Tonoshiki breccia and evidence of acute tectonic activity during the closure of the Maizuru back-arc basin at P-T boundary

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Tonoshiki breccia is a sedimentary breccia that was deposited in the paleo Maizuru back-arc basin which closed at Permo-Triassic boundary. The breccia is exposed in the Central zone of the present-day Maizuru Terrane in Mimasaka area (Okayama). Based on its petrological features, Tonoshiki breccia has been subdivided into two types, a mafic to intermediate rock clast-rich type (Type I) and a felsic rock clast-rich type (Type II). According to the existing knowledge, Tonoshiki breccia formed during Late Permian, as a result of a submarine slope failure and is the topmost unit deposited in the basin before its final closure. Geochronological studies revealed two different sources and possibly two pulses of tectonic activity-induced debris flow, at ca. 259 Ma and ca. 251 Ma for Type I and Type II respectively. Here we shall report the formation processes of this breccia, its microstructures, and their implication in terms of basin tectonics and evolutionary history. Extensive network of fractures that is possibly a result of hydraulic fracturing is found in the breccia and occurs mostly as calcite veins network in Type II. Some prehnite-pumpellyite and quartz-filled veins are also found in Type I. We shall also report the results of paleostress analysis conducted on the fractures. Altogether, it suggests an acute tectonic activity occurring in and around the Maizuru back-arc basin during P-T boundary. This breccia-dominated formation is related to the broader scale tectonics of the East Asian continent.

Keywords: Tonoshiki breccia, Formation process, Hydraulic fracturing, Maizuru back-arc basin closure, P-T boundary, Paleostress analysis