Depositional process for the stratiform manganese deposits in the Chichibu Belt in Saiki area, eastern Oita Prefecture, Japan.

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Stratiform manganese deposits have been known to occur in the Permian to Jurassic cherts or chert-greenstone complex in the Chichibu Belt, Southwest Japan, which are considered to have accumulated in a mid–oceanic basin of the Panthalassa Ocean. To constrain the depositional environment of these manganese deposits, we describe the field occurrence, stratigraphy, and age of chert-hosted manganese deposits of the Nishiyama, Takahira, and Takahama deposits from the Chichibu Belt in the Saiki area, Oita Prefecture.
The stratiform manganese deposits range in thickness from 80 to 150 cm, and occur intercalated with bedded chert. The age of the deposits is constrained by the presence of radiolarian fossils in the associated bedded chert. The Nishiyama manganese deposit exists between bedded chert and greenstone. The bedded chert above the manganese ores contains Middle Permian radiolarian fossils (e.g., *Pseudoalbaillella globosa*). The red-bedded chert above the Takahira manganese ores contains Late Triassic (Carnian) radiolarian fossils, including *Trialatus longicornutus* and *Trialatus megacornutus*. Radiolarian fossils from the Takahama deposit has stratiform manganese ores to be of Early Jurassic age (possibly Toarcian), based on the occurrence of *Parvicingula nanoconica* with *Trillus* species. These results suggest that three manganese ore forming events occurred in the pelagic Panthalassa Ocean during the Middle Permian, Late Triassic and Early Jurassic.
Chemical compositions of the Upper Triassic manganese deposits are characterized by the enrichment in Mn content and the depletions of Co, Ni and Zn and are similar to those of modern submarine hydrothermal manganese deposits. In contrast, the enrichments in Cr, Ni and Zn are recognized below the Lower Jurassic manganese deposits, suggesting an anoxic depositional environment. It is likely that the Lower Jurassic deposits are considered to have formed by an oceanic anoxic event, at the end of the middle Early Jurassic.

Keywords: stratiform manganese deposit, Jurassic accretionary complex, Chichibu belt, Late Triassic, Early Jurassic

