

Stratigraphy and radiolarian ages of stratiform manganese deposits in Jurassic accretionary complex in the Chichibu Belt, Southwest Japan

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Stratiform manganese deposits have been known to occur in the Triassic to Jurassic bedded cherts sequence of the Chichibu Belt in Southwest Japan, which are considered to have accumulated in a mid-oceanic basin of the Panthalassa Ocean. To constrain the stratigraphic age and depositional setting of these manganese deposits, we describe the field occurrence, stratigraphy, and radiolarian age of the chert-hosted manganese deposits from the Triassic to Jurassic bedded chert succession of the Chichibu Belt, defined as a Jurassic subduction-generated accretionary complex in Southwest Japan. The Triassic to Jurassic bedded cherts in the Chichibu Belt are considered to be deep-sea sediments that accumulated in an open-ocean realm of the Panthalassa Ocean. Our biostratigraphic analysis of radiolarians reveals that the stratiform manganese deposits intercalated in the bedded cherts were deposited in the Late Triassic and Early Jurassic. Upper Triassic manganese deposit occurs associated with the massive cherts which appear to have been formed by hydrothermal activity. The red bedded chert above the manganese deposit yields radiolarian fossils, including *Trialatus longicornutus* and *Trialatus megacornutus*. These radiolarians indicate that age of manganese deposits can be correlated with the late Carnian age. Lower Jurassic manganese deposit occurs intercalated within the gray to dark gray bedded cherts. Detailed biostratigraphic analysis of radiolarians reveals that manganese deposit is embedded in the upper Pliensbachian to Toarcian (*Mesosaturnalis hexagonus* Zone - *Parahsuum(?) grande* Zone). Chemical compositions of Upper Triassic deposits are characterized by enrichments in Mn and depletion of Co, Ni and Zn. These geochemical features are similar to those of modern submarine hydrothermal manganese deposits from hydrothermal activity. In contrast, early Jurassic manganese deposits were triggered by an influx of warm, saline and oxic water into a stagnant deep ocean floor basin. It is likely that the deposits are considered to have formed by oceanic anoxic event.

Keywords: Stratiform manganese deposits, Chichibu belt, radiolarian, Late Triassic, Early Jurassic