

## Lithology, stratigraphy and age of carbonate rocks in Permian chert of the Mino terrane

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The Mino terrane in central Japan is composed of Jurassic accretionary complexes, and includes Permian deep-sea radiolarian chert intercalating limestone and dolostone. We describe lithology, stratigraphy and age of the carbonate rocks in the Neo, Asagara and Aioi areas of the Mino terrane, and conclude that the carbonate rocks include, at least, (1) displaced limestone and dolostone derived from shallow marine environment and (2) dolostone consisting of authigenic dolomite after calcite and silicate minerals, both of which show distinct textures. The displacement events range in age from Early to Late Permian.

In modern ocean, carbonate rocks are deposited above CCD, whereas siliceous rocks are accumulated below CCD. Few occurrences of intimate relationship of chert and limestone have reported in accretionary complexes recorded ancient oceanic environments. Examinations of these examples are important in reconstructing the ancient environments and correlating shallow and deep marine formations. The Mino terrane in central Japan is composed of Jurassic accretionary complexes, and includes Permian deep-sea radiolarian chert intercalating limestone and dolostone. We describe lithology, stratigraphy and age of some of these examples in the Mino terrane, and provide basic information linking Permian shallow and deep marine stratigraphy.

Greenstone, chert and dolostone of the Hashikadani Formation of Sano (1988) occur in the Neo area. Lower part of the Upper Member of Hashikadani Formation is middle to late Early Permian in age and consists of reddish brown bedded chert, which include 10-100 cm thick layers or lenses of displaced limestone and dolostone. The carbonate rocks show clear boundary with the upper and lower chert and also show lamination structure. The displaced limestone has irregular limestone clasts together with fossil fragments such as crinoid, calcareous algae and fusulinaceans.

In the Asagara area of Gujo-hachiman, 25 m thick Middle to Late Permian bedded chert formations are exposed along the Nagara River, and are interbedded with dolostone formations of 1-10 cm thick. The dolostone has two types: types A and B. The type A dolostone is several cm in thickness and has clear boundaries with surrounding chert. It consists of 0.02-0.2 mm subhedral grains of dolomite, and shows lamination formed by grain-size difference. The type B dolostone layers or lenses are some cm in thickness, and have irregular and gradual boundaries with upper and lower chert. Type B is composed of 0.1-0.3 mm euhedral dolomite showing well-developed compositional zoning. These lines of evidence strongly suggest that the type A is a displaced dolostone derived from shallow marine environment and the type B is an authigenic dolostone.

Middle (?) Permian bedded chert formations, 20 m in thickness, occur in the Aioi area of Gujo-hachiman, which intercalate about ten beds of limestone, thickness of which range from several to several tens cm. One of the limestone bed is 1.3 m in thickness and has sharp boundaries with the chert above and below. The limestone consists of fragments of limestone, crinoid, basic volcanic rock enclosed in a very little matrix of basic volcanoclastic rocks; the limestone is interpreted to be clastic in origin.

As the results, carbonate rocks interbedded with the Permian chert in the Mino terrane include, at least, (1) displaced limestone and dolostone derived from shallow marine environment and (2) dolostone consisting of authigenic dolomite after calcite and silicate minerals, both of which show distinct textures. The displacement events range in age from Early to Late Permian.