

Land-Ocean Linkage: Pelagic Cherts in Mesozoic Neritic-Terrestrial Sequences in East Asia

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How to cite this paper: Matsuoka, A., Ito, T. and Sakai, Y. (2019) Land-Ocean Linkage: Pelagic Cherts in Mesozoic Neritic-Terrestrial Sequences in East Asia. *Open Journal of Geology*, 9, 551-553.
<https://doi.org/10.4236/ojg.2019.910039>

Received: August 15, 2019

Accepted: September 17, 2019

Published: September 20, 2019

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Abstract

Chert clast-bearing epi-continental neritic-terrestrial Jurassic and Cretaceous sequences are sporadically distributed in southwestern Japan. Typical and geological entities are the Torinosu Group and Tetori Group. Radiolarian dating of chert clasts enables us to discuss denudation stages of mid Mesozoic accretionary complexes. Chert clast-dominated conglomerate can be used for identifying marine beds within terrestrial sequences.

Keywords

Pelagic Radiolarian Chert, Conglomerate, Accretionary Complex, Neritic-Terrigenous Sediments

1. Introduction

Mesozoic sedimentary sequences in East Asia are categorized into two types; marine accretionary complexes and epi-continental neritic-terrestrial sequences. The accretionary complexes are distributed in the eastern margin of Asia including Russian Far East, the Japanese Islands, and the Philippines [1] [2]. The epi-continental neritic-terrestrial sequences are distributed mainly in Russian Far East, China, the Korean Peninsula, and the Japanese Islands. Oceanic rocks such as pelagic chert are typical components of accretionary complexes. They are also included in neritic-terrestrial sequences as recycled clasts. They are important not only in recognizing the provenance of sedimentary basins but also in tracing the denudation history of accretionary complexes. The pelagic materials are tools for linking lands and oceans. We introduce two examples of

chert-bearing conglomerate in neritic-terrestrial sequences in Japan: the Torinosu Group in the Southern Chichibu Terrane, Outer Zone of southwest Japan and the Tetori Group in the Hida and Hida-Gaien terranes, Inner Zone of southwest Japan. Significance of the pelagic cherts within neritic-terrestrial sequences is discussed.

2. Epi-Continental Neritic-Terrestrial Jurassic and Cretaceous Sequences in Southwest Japan

2.1. Torinosu Group

The Torinosu Group and its equivalents are late Jurassic to early Cretaceous neritic sequences distributed disconnectedly in the Chichibu Belt in southwest Japan. Three terranes are recognized in the Chichibu Belt based on characteristic features of their components and geologic structures: the Northern Chichibu, Kurosegawa (Middle Chichibu), and Southern Chichibu terranes from north to south. The Torinosu Group occupies the Southern Chichibu and Kurosegawa terranes. In the type locality of the Torinosu Group (Sakawa area in central Shikoku), this group unconformably covers the Togano Group [3] [4] of Jurassic accretionary complex or the Naradani Formation of trench slope sediments. The basal part of the Torinosu Group is the Tsukadani Formation composed mainly of chert clasts. They are regarded to have been derived from the Togano Group because the group is the basement of the Torinosu Group and contains a large amount of chert sequences. No microfossils, however, have been obtained from the chert clasts due to recrystallization.

2.2. Tetori Group

The Tetori Group ranging in age from the Middle Jurassic to Cretaceous is distributed over the Hokuriku District in central Japan. Most parts of the Tetori Group overly unconformably constituent geologic units of the Hida and Hida-Gaien terranes. These units do not include mid-Mesozoic accretionary complexes. This group is divided into the Kuzuryu, Itoshiro, and Akaiwa subgroups in ascending order and interbeds conglomerate layers. Permian, Triassic, and Jurassic microfossils were obtained from siliceous and muddy rock clasts in the conglomerates. Based on fossil dating and lithological characteristics, most of these clasts were presumably derived from the mid-Mesozoic accretionary complexes in East Asia [5] [6].

3. Discussion and Conclusion

As mentioned above, the Torinosu Group and Tetori Group are good examples for chert clast-bearing epi-continental neritic-terrestrial Jurassic and Cretaceous sequences in southwest Japan. These chert clasts must be derived from mid Mesozoic accretionary complexes formed in the eastern margin of Asia. Ito *et al.* [7] discussed denudation stages of mid Mesozoic accretionary complexes based on the dating of chert clasts by means of radiolarian fossils not only from the

Japanese Islands but also the Korean Peninsula.

Highly resistant nature of chert clast suggests certain sedimentary environments. Chert clast-dominated conglomerate could be a good marker indicative of high energy sedimentary environment such as marine beach. The Tsukadani Formation in the Torinosu Group is considered to be beach sediment resting on mid Mesozoic accretionary complex or slope sediments directly covering the accretionary complex. Chert clast-dominated conglomerate within the upper part of the Itoshiro Subgroup in the Tetori Group is possibly marine beach origin. Chert clast-dominated conglomerate can be used for identifying marine beds within terrestrial sequences.

Acknowledgements

This is a contribution to UNESCO/IUGS/IGCP 679.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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