Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

MIS28-01 Room:304 Time:May 19 16:15-16:30

Lithostratigraphy and radiolarian age of Late Cretaceous pelagic sedimentary rocks within the Oman Ophiolite

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Radiolarites and micritic limestone within the northern Oman Ophiolite contain essentially continuous pelagic sedimentary records of the central Tethyan Ocean from Cenomanian to Coniacian or Santonian (Tippit et al., 1981; Hara and Kurihara, 2012). We are now reinvestigating the lithostratigraphy and radiolarian biostratigraphy of Late Cretaceous pelagic sedimentary rocks distributed in the Wadi Jizzi and surrounding areas, 40 km west of Sohar, northern Oman. We here present lithofacies of the pelagic sediments and radiolarian faunal change from late Cenomanian to Turonian.

Pelagic sediments associated with metalliferous sediments (umber) in the ophiolite are overlaying basaltic extrusive rocks. Based on the geochemical feature, the basaltic rocks have been subdivided into three volcanic units: the V1 lava with the N-MORB signature, the V2 lava formed by intra-oceanic volcanism, and the V3 lava generated by intra-plate seamount magmatism (Ernewein et al., 1998). We investigated the stratigraphic distribution of radiolarians in pelagic sedimentary sequences overlying the V1 lava at Suhaylah section. The sequence of the analyzed section consists of lower metalliferous and siliceous rocks (umber and red mudstone with chert intercalations) and upper micritic limesotne. In these lithologies, numerous radiolarian tests are loosely packed within the matrix, and well-preserved specimens can be extracted by a combined HF-HCl etching technique. In this section, a profound faunal change was detected; *Thanarla pulchra* and *Guttacapsa biacuta* were recovered from lower chert, indicating late Cenomanian in age, and *Rhopalosyringium scissum* and *Dictyomitra formosa* occur abundantly in upper chert and micrite. *R. scissum* first appeared near the base of Turonian (Musavu-Moussavou et al., 2007). Radiolarian occurrences indicate that the Cenomanian/Turonian boundary is present in the lower siliceous sequence. At Lasail and South Zabyan sections, pelagic sedimentary sequences overlying the V2 lava are well developed. The sequence at Lasail section consists of highly altered metalliferous sediments, red mudstone with chert intercalations, and micritic limesotne, in stratigraphic ascending order. Hara and Kurihara (this volume) presents the result of detailed lithologic observation and radiolarian biostratigraphy of this section, and reports the occurrence of *Dictyomitra koslovae*, indicating late Coniacian to Santonian. In the Hilti area, we also have observed several good sections of chert and micrite overlying the V2 lava (Kurihara and Hara, 2012). A preliminary biostratigraphic result of this area has been presented by Kurihara and Hara (2012), and additional detailed lithostratigraphic descriptions are presented by Hara et al. (this volume).

At this time, we have obtained late Cenomanian to Coniacian (or Santonian) radiolarians from several sections of different tectonic settings deduced from the volcanostratigraphy and geochemistry of basaltic extrusive rocks. Time scale given by the radiolarian biostratigraphy shows potential usefulness to give age constraints for change in the tectonic setting of basaltic rocks. In addition, faunal transition of radiolarians will provide information on marine environmental changes in the central Tethys during Late Cretaceous.

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Upper Cretaceous radiolarian biostratigraphy of the Suhaylah Formation in the Wadi Jizzi area of the Oman Ophiolite

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The Oman Ophiolite, a member of the Tethyan ophiolites, crops out over 600 km long and up to 150 km wide in the Oman Mountains. The ophiolite suite consists of mantle peridotites, gabbros, a sheeted dyke complex, and extrusive lavas overlain by pelagic sediments. The pelagic sediments, called the Suhaylah Formation, have been studied by Fleet and Robertson (1980) in terms of depositional environments. Tippit et al. (1981) reported Late Cretaceous radiolarians from the Suhaylah Formation and estimated their age as early Cenomanian to Santonian; however detailed stratigraphic distributions of radiolarians were not shown in their study. In this study, the lithostratigraphy and radiolarian biostratigraphy of pelagic sediments overlying extrusive lavas of the Oman Ophiolite are reinvestigated in order to understand the history of the pelagic sedimentation and the faunal transition process and evolution of radiolarians during Late Cretaceous.

Radiolarian study has been conducted at Lasail section, about 35 km west of Sohar. The pelagic sediments of this section are subdivided into three lithologies: hydrothermal sediments (5 m), red shale with chert intercalations (13 m), and micritic limestone (18 m). Basal lava could not be observed at this section. The hydrothermal sediments are highly altered and intercalated with dark red to orange chert. The red shale is dark red purple in color in the lower part and dark red in the upper part. Several chert layers are interbedded with the red shale. The micritic limestone is muddy and red purple in color in the lower part. The upper part consists of red purple and greenish gray micritic limestone with fine lamination.

We obtained moderately preserved radiolarians by a combined HF-HCL etching technique. We recovered poorly preserved *Pseudodictyomitra pseudomacrocephala* (Squinabol) from the hydrothermal chert of the lowermost part. *Rhopalosyringium scissum* O' Dogherty was obtained from chert in the lower red shale. Based on these occurrences, the hydrothermal chert in the lowermost part and the lower red shale are Turonian in age. In addition, *Dictyomitra koslovae* Foreman is recovered from muddy micritic limestone in the lower part of micritic limestone. The range of *D. koslovae* is late Coniacian to Maastrichtian based on Hollis and Kimura (2001). Thus, age of the lower part of micritic limestone is probably younger than late Coniacian.

Keywords: Oman Ophiolite, Suhaylah Formation, radiolarians, Upper Cretaceous

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Sulfur isotope profiles in the pelagic Panthalassic deep sea during the Permian-Triassic transition

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Mesozoic accretionary complexes in Japan and New Zealand contain Panthalassic low latitude and southern mid-latitude deep-water sedimentary rock respectively. These sedimentary rocks record environmental changes in the pelagic Panthalassic Ocean during the transition associated with the severe Permian-Triassic mass extinction. This study presents sulfur isotope records of sulfide from continuous deep-sea Permian-Triassic boundary sections located in northeast Japan (the Akkamori section-2, the most continuous section amongst other previously reported deep-sea sections) and North Island of New Zealand (the Waiheke-1 section, providing the first sulfur isotopic record from a southern hemisphere deep-sea section). Both sections show sharp minus 15 permil drops of the sulfur isotope ratio coupled with a negative shift of organic carbon isotope ratio. Similar decreases in sulfur isotope ratio of carbonate-associated sulfates by minus 10 permil accompanied with a negative shift of inorganic carbon isotope ratio at the end-Permian mass extinction horizon have been reported in some shallow water Paleotethyan sections. These sulfur isotope changes suggest that a massive release of 32S-enriched sulfur from the H2S-rich water to the oxic surface-waters coincided with the end-Permian mass extinction.

Keywords: Mass extinction, Panthalassa, Pelagic deep sea, Permian, Triassic, Sulfur Isotope

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Towards an integrated Triassic magneto-bistratigraphic time scale for the pelagic Panthalassa Ocean

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The aim of this study is to contribute to the development of an integrated geologic time scale for the Middle and Upper Triassic Panthalassic sites. The chronology for the Triassic pelagic deposits in the Panthalassa Ocean is based on the radiolarian zonation, which is well establisished in the Middle and Upper Triassic bedded chert successions in the Japanese accretionary complex. Although accurate calibration for the chronostratigraphic stages and substages are established basically by means of ammonites and conodonts, most of the Japanese radiolarian zones were calibrated through correlation with zonal schemes established in other regions, and have not been calibrated with magnetostratigraphy and conodont biostratigraphy. Here we present the results of magneto- and biostratigraphic study of two Triassic sections in Japan: (i) Middle Triassic Ajiro section in the Tsukumi area, Chichibu Terrane and (ii) Upper Triassic Sakahogi section in the Inuyama area, Mino Terrane. The study sections are correlated with the Triassic geomagnetic polarity timescale by means of radiolarian and conodont biostratigraphy.

Keywords: Triassic, radiolaria, conodont, magnetostratigraphy, chert

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Quantitative Evaluation of Molphology for the Planktic Foraminifer Globigerinoides ruber

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Recently we can obtain three dimensional details of skeleton of foraminifer and radiolaria using micro X-ray CT. Globigerinoides ruber is an abundant planktic foraminiferal species often used in reconstruction of sea surface conditions in the globl ocean. Within the G.ruber, two variations in shell color are recognized, G.ruber ”white” and G.ruber ”pink” with pink colored chambers. Results from molecular phylogenetic anallysis supported the separate treatment of the two chromotypes. In this study, we present results from morphometric measurements on three dimensional information of G. ruber white and pink using micro X-ray CT.

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Creating exact 3D models for scientific research

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We involved with 'Research on the recognition of 3D objects by visually handicapped persons and development of 3D geometrical teaching materials' project in Japan (FY2006 - FY2009). One of our main aims is to develop teaching materials to enrich the world of observation of blind people by touch. We have been creating models that blind people have never touched. The models have innumerable topics, but can be divided into two categories. The first includes models with objects that we cannot actually touch because of their size-gigantic or microscopic objects. As concrete examples, we are developing models of the planets in the solar system (Earth, Mars, Venus, and Moon). Enlarged models of microorganisms like radiolarian and foraminifera are also examples of such models. The second category consists of models with abstract objects. We created models related to mathematics. Models include ring torus, horn torus, spindle torus, hula-hoop surface, Bohemian dome, Klein bottle, regular polyhedra, semi-regular polyhedra and crystallographic structures. Touchable models are significant for not only visually impaired people but also sighted people. The models are useful for systematic and intuitive learning of mathematics and sciences.

Keywords: 3D models