

オマーンオフィオライトにおける後期白亜紀遠洋性堆積物の岩相層序と放射虫化石年代

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 overlying 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 limestone. 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 limestone, 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.

オマーンオフィオライト Wadi Jizzi 地域のスヘイラ層における上部白亜系放散虫生層序

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

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オマーンオフィオライトは、テーチスオフィオライトの一部であり、アラビア半島東端のオマーン山脈に沿って露出する世界最大級のオフィオライトである。オフィオライト最上部の噴出溶岩層上には遠洋性堆積物が分布し、スヘイラ層と呼ばれている。スヘイラ層は Fleet and Robertson (1980) によって詳しく研究され、堆積環境の復元が行われた。スヘイラ層から産出する放散虫化石については、Tippit et al. (1981) により概要が報告され、その時代は後期白亜紀 Cenomanian 前期 ~ Santonian とされた。しかし、放散虫化石の詳細な層序分布は不明であり、これ以降、生層序学的な研究は行われていない。本研究は、テーチス海中央部の遠洋性堆積物の発達史とそこに記録された放散虫の進化・変遷を明らかにすることを目的としている。本講演では、Wadi Jizzi 地域の Lasail セクションにおいて行った遠洋性堆積物の岩相層序と産出した放散虫化石について報告する。

Lasail セクションの岩相は、下位より熱水沈殿性の堆積物（以下、熱水堆積物）、頁岩・チャート、ミクライト質石灰岩から構成される。基底の溶岩層については、本セクションでは確認できなかった。熱水堆積物は、暗赤色や橙色のチャートや淡緑色や白色、黒色を呈する変質の著しい粘土質の堆積物からなる。層厚は約 5 m である。頁岩は、熱水堆積物から漸移し、下部は暗赤紫色で上部ほど赤色を呈する。また、頁岩中には、チャートの挟みが発達している。層厚は約 13 m である。ミクライト質石灰岩は、下部の約 4 m は泥質となっており、赤紫色を呈し頁岩から漸移する。上部のミクライト質石灰岩は赤紫色から緑灰色を呈する。また、葉理が発達している。層厚は、泥質部も含めると約 18 m である。

本セクションから採取したサンプルをフッ化水素酸および塩酸で処理することにより放散虫化石が得られた。現在、最下部の暗赤色チャートから保存不良ながら *Pseudodictyomitra pseudomacrocephala* (Squinabol) が得られている。また、赤色頁岩下部に挟在するチャートからは、*Rhopalosyringium scissum* O'Dogherty が得られた。このことから本セクション最下部の熱水堆積物から赤色頁岩下部は、Turonian であると考えられる。赤色頁岩最上部から 1 m ほど上位の赤紫色泥質ミクライト質石灰岩からは、*Dictyomitra koslovae* Foreman が得られた。Hollis and Kimura (2001) では、*D. koslovae* のレンジは Coniacian 後期 ~ Maastrichtian となっており、赤色頁岩からミクライト質石灰岩へ漸移する付近は Coniacian よりも若い年代だと考えられる。

キーワード: オマーンオフィオライト, スヘイラ層, 放散虫, 上部白亜系

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

遠洋域ペルム紀三畳紀境界層における硫化物硫黄同位体比の挙動 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.

キーワード: 大量絶滅, 遠洋域深海相, ペルム紀, 三畳紀, 硫黄同位体比

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

三畳紀パンサラサ海遠洋域の古地磁気・化石層序の統合に向けて Towards an integrated Triassic magneto-biostratigraphic 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 established 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.

キーワード: 三畳紀, 放散虫, コノドント, 古地磁気層序, チャート

Keywords: Triassic, radiolaria, conodont, magnetostratigraphy, chert

Globigerinoides ruber の定量的形態評価について Quantitative Evaluation of Morphology 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 global 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 analysis 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.

科学研究の為の精確な立体模型の作製 Creating exact 3D models for scientific research

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著者らは、視覚障害者の触覚鑑賞の世界を豊かにするべく、精確な立体模型を開発するプロジェクトに携わってきた。これらの模型は、晴眼者の立体教材としても有用である。さらに、最先端の研究を誤りなく推し進めるためにも、精確な立体模型が果たすべき役割は大きい。本講演では、遠洋域の進化や惑星の地形を研究する上で、精確な立体模型がどのように貢献しうるかを考える。

キーワード: 立体模型
Keywords: 3D models