

## 赤道太平洋東部地域における中期中新世以降の生物生産性および底層水循環変動 Surface Productivity and bottom water circulation changes in the Eastern equatorial Pacific

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Integrated Ocean Drilling Program Expedition 320/321 Pacific Equatorial Age Transect (PEAT I and II) was carried out to recover complete paleoceanographic record in the Eastern equatorial Pacific during Cenozoic. Especially clarifying accumulations of biogenic carbonates and carbonate compensation depth (CCD) fluctuations were one of the highest priorities in these expeditions. The cruise we attended (PEAT II) were recovered cores from two locations (Sites 1337 and 1338) to understand equatorial paleoceanography since middle Miocene in the Pacific. In this study, we performed geochemical analysis in order to reveal the bottom water hydrography in the eastern Equatorial Pacific from the middle Miocene to Holocene.

The cores U1337 and U1338 were pelagic sediments composed of calcareous chalk with laminated diatom bulbs. Inorganic carbon (IC) and total organic carbon (TOC) was analyzed shipboard using coulometry and CHN analyzer. IC contents of core was 0-99% and 30-90% through the cores in U1337 and U1338, respectively and indicated mostly good preservation of calcium carbonates. On the other hand, the carbonate crash representing anomalous decreasing of carbonate accumulation was detected both sites at Middle-Late Miocene (ca. 11-9 Ma), and it affected more strongly in U1337 rather than U1338. TOC contents was mostly very low (~0.1%) through both cores but showed 0.3 - 0.5% in some layers that were indicated laminated diatom concentrated layers. It suggested that frequent productivity changes had occurred during middle - late Miocene.

Trace metal analysis was performed for benthic foraminifers in core U1338 to understand deepwater temperatures and other geochemical properties. *Cibicides mundulus* and *Oridorsalis umbonatus* were used for Mg, Sr, Mn/Ca analysis. Mg/Ca showed that 0.4 - 1.5 mmol/mol through the core. This fluctuation showed similar trend with global  $\delta^{18}O$  fluctuations of benthic foraminifera. It suggests that bottom water temperature was affected with global climate changes related to ice volume effects.

Keywords: PEAT, Eastern equatorial Pacific, Middle Miocene, CCD, benthic foraminifera, bottom water circulation

## オマーンオフィオライトにおける上部白亜系スヘイラ層の岩相層序と放散虫化石年代 Lithostratigraphy and radiolarian age of the Upper Cretaceous Suhaylah Formation of the Oman Ophiolite

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オマーンオフィオライトの噴出溶岩上には、遠洋性堆積物であるスヘイラ層が分布している。スヘイラ層は、下位よりアンバー（メタリフェラス堆積物）、赤色頁岩・チャート、ミクライト質石灰岩から構成される。本層については、Fleet and Robertson (1980) などにより詳しく研究され、その分布域、溶岩層との関係および堆積環境の復元が行われた。放散虫化石については、Tippit et al. (1981) により後期白亜紀 Cenomanian 前期～Santonian の放散虫化石が報告された。しかし、放散虫化石の詳細な層序分布は不明であり、報告された化石の産出層準も限られたものである。また、これ以降は放散虫による生層序学的研究は行われていない。本研究では、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、オマーンオフィオライト北部の Wadi Jizzi 地域においてスヘイラ層の岩相層序の記載と生層序学的検討を行った。

Wadi Jizzi 地域は、スヘイラ層の模式地となっており、下位よりアンバー、チャートを挟む赤色頁岩、ミクライト質石灰岩から構成される。アンバーは金属光沢のある暗赤紫色を呈する。層厚は3～8 m である。赤色頁岩はメタリフェラス堆積物から漸移し、下部は暗赤紫色、上部へ行くほど赤色となる。上部ではチャートの挟みも卓越するようになる。層厚は3～12 m とセクションにより変化する。ミクライト質石灰岩は、下部の1 m 程が赤褐色を呈し、上部へ行くにつれて灰緑色となる。しかし、セクションによっては、下部から上部まで一律に赤色である。葉理構造が発達し、葉理に沿って板状に割れる。層厚は9 m 以上である。

Wadi Jizzi 地域において、3つの放散虫化石群集を認識した。群集Aは、赤色頁岩中のチャートから産出した *Thanarla pulchra* (Squinabol), *Guttacapsa biacuta* (Squinabol) などから構成され、Cenomanian 後期の群集である。群集Bは、赤色頁岩とミクライト質石灰岩に認められる。 *Rhopalosyringium scissum* O'Dogherty, *Dictyomitra formosa* Squinabol などから構成され、Turonian 前期の群集である。群集Cは、ミクライト質石灰岩から産出したもので、 *Mylocercion* sp., *Schadelfusslerus* sp. などから構成される。本群集は Turonian を示すと考えられる。これらの結果から、ミクライト質石灰岩直下の赤色頁岩中には Cenomanian/Turonian 境界が存在すると考えられる。

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

## オマーンオフィオライト・ヒルチ地域の噴出溶岩層上における後期白亜紀遠洋性堆積物と放散虫化石

### Late Cretaceous pelagic sedimentary rocks on the extrusive rocks of the Oman Ophiolite and their radiolarian age

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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 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). Pelagic sediments with metalliferous sediments (umber) commonly occur at the boundaries between these volcanic units. We are now reinvestigating radiolarian biostratigraphy of the pelagic sediments, and here we present newly-obtained Turonian radiolarians from micritic limestone overlying the V2 lava.

Radiolarian study for the micritic limestone was conducted in "South of Wadi Hilti" section, located in an area about 40 km west of Sohar. At this section, the radiolarian-bearing micrites with a total thickness of 6 m conformably overlie the uppermost part of the V2 lava. In this section, basaltic rocks of the V3 lava thrust over the micrite. The micritic limestone is thinly bedded (3 to 5 cm thick) and light brown in color in the lower part and red in the upper part. Numerous radiolarian shells can be observed in the muddy matrix of micrite but they are commonly calcified. Total 11 samples were collected from this section for radiolarian biostratigraphic analyses. Well-preserved radiolarians were recovered from two samples of red micrite. From these samples, we recovered *Dictyomitra formosa* Squinabol, *Pseudotheocampe tina* (Foreman), *Amphipyndax stocki* (Campbell and Clark), *Myllocercion* sp., and *Rhopalosyringium scissum* O'Dogherty. According to O'Dogherty (1994), the first appearances of *P. tina* and *R. scissum* are near the base of Turonian. Thus, these radiolarians are assignable to early Turonian or slightly younger age.

Very recently, the details of volcanostratigraphy and geochemical features for the upper part of the V2 lava including boninite are becoming clearer (S. Miyashita, pers. comm.). Compilation of the present result, in combination with the volcanostratigraphy and future reinvestigation of radiolarian biostratigraphy across a much wider area, will provide essential information on age constraints and formation process of the Oman ophiolite.

キーワード: オマーンオフィオライト, 後期白亜紀, 放散虫, 遠洋性堆積物

Keywords: Oman Ophiolite, Late Cretaceous, radiolarians, pelagic sedimentary rocks