

琉球列島の硬骨海綿を用いた古環境解析

Paleoenvironmental records in sclerosponges from the Ryukyu Islands, Japan

*浅海 竜司¹、松森 建人²、石原 信司¹、金城 章¹、成瀬 貢³、水山 克²、伊勢 優史⁴、坂巻 隆史⁵

*Ryuji Asami¹, Taketo Matsumori², Shinji Ishihara¹, Akira Kinjo¹, Tohru Naruse³, Masaru Mizuyama², Yuji Ise⁴, Takashi Sakamaki⁵

1.琉球大学理学部物質地球科学科、2.琉球大学大学院理工学研究科、3.琉球大学熱帯生物圏研究センター、4.名古屋大学大学院理学研究科、5.東北大学大学院工学研究科

1.Department of Physics and Earth Sciences, University of the Ryukyus, 2.Graduate School of Engineering and Science, University of the Ryukyus, 3.Tropical Biosphere Research Center, University of the Ryukyus, 4.Graduate School of Science, Nagoya University, 5.School of Engineering, Tohoku University

Sclerosponges, living in dark environments of tropical to subtropical shallow oceans, precipitate calcium carbonate skeleton with growth bands. They grow slowly at an approximate rate of <1 mm/year unlike corals (~1 cm/year) but can be so long-lived for several decades to hundred of years like corals. Skeletal oxygen isotopic ratios reflect variations in sea surface temperature and seawater with the latter being closely related to salinity reflecting the precipitation-evaporation balance at the sea surface and changes in water mass transport. In contrast to zooxanthellate corals, which occasionally show positive correlations between skeletal oxygen and carbon isotopic ratios, there do not exist vital effects in the secretion of sclerosponge skeleton. Previous studies showed significant decrease trends in the carbon isotope records of sclerosponges and corals toward the present, which is probably a result of isotopically-light carbon dioxide had been added into the atmosphere/ocean from fossil fuel burning. Therefore, sclerosponges are shown to provide annually resolved time series of proxy records of the ocean environments since the Industrial Revolution. However, longer (>100 year) proxy records from sclerosponges were derived only from material examined from the Atlantic Ocean. Here we present oxygen and carbon isotope records from sclerosponges collected from Kume-jima, Okinawa-jima, and Miyako-jima, the Ryukyu Islands in the North Pacific. Soft X-ray images showed highly developed skeletal growth bands with >100 high/low density layers. The secular changes in carbon isotopic composition of the sclerosponges were consistent with previously reported data from the Atlantic and the Pacific corals and sclerosponges. The long-term oxygen isotopic trends of the samples are characterized by slight depletions throughout their living periods, indicative of an overall trend toward warmer ocean environment around the Ryukyu Islands. Our sclerosponge-based estimates of the sea surface temperature and salinity may document thermal and hydrologic variations in the Ryukyu Islands, furthering a better understanding of northwestern tropical-subtropical Pacific climate change for the last several centuries in conjunction with coral-based long proxy records.

キーワード：硬骨海綿、骨格、酸素同位体組成、炭素同位体組成、古海洋、琉球列島

Keywords: sclerosponge, skeleton, oxygen isotope composition, carbon isotope composition, paleocean, the Ryukyu Islands