沖縄島サンゴ化石の化学組成から復元される完新世中期の海洋環境変動
Mid-Holocene oceanographic variability reconstructed from geochemistry in fossil corals from Okinawa-jima, Japan

*浅海 竜司[1]、鳥谷部 浩人[2]、善村 夏実[2]、嶺井 翔伍[2]、本郷 宙軌[2]、新城 竜一[2]、藤田 和彦[2]、坂巻 隆史[3]
*Ryuji Asami[1], Hiroto Toriyabe[2], Natsumi Yoshimura[2], Syogo Minei[2], Chuki Hongo[2], Ryuichi Shinjo[2], Kazuhiko Fujita[2], Takashi Sakamaki[3]

1. 東北大学大学院理学研究科、2. 琉球大学理学部、3. 東北大学大学院工学研究科
1. Graduate School of Science, Tohoku University, 2. Faculty of Science, University of the Ryukyus, 3. Graduate School of Engineering, Tohoku University

Quaternary paleoclimate records have been extracted from climate proxies such as deep-sea sediment, ice sheet, trees, speleothems, and coral. Continuous long cores from sediments and ice sheets play a leading role in Quaternary paleoclimate reconstructions, although the slow rates of sedimentation frequently preclude them from reconstructions on seasonal and interannual time scales. On the other hand, fossil coral archives provide high resolution time series during selected windows of generally short duration with which to investigate atmospheric and oceanic conditions at the tropical/subtropical sea surface in the past. Massive *Porites* corals, living in shallow waters of the tropical to subtropical oceans, precipitate annually banded aragonite skeletons. These colonies provide robust chronological control and allow sub-sampling at monthly-to-seasonal resolution. The ages of fossil corals are determined accurately by radiocarbon and uranium-series dating methods. Oxygen isotope composition of coral skeleton reflects variations in sea surface temperature and seawater oxygen isotope composition (salinity) with the latter being closely related to the precipitation-evaporation balance at sea surface and changes in water mass transport. Coral Sr/Ca and U/Ca ratios can be used as a paleo-thermometer. Therefore, long-lived corals can be a powerful proxy for documenting paleoceanography at seasonal, interannual, and decadal time scale, but only a few long-records of several decades have been published from fossil corals.
Here we present bimonthly-to-monthly resolved oxygen isotope, Sr/Ca, and U/Ca time series from modern and mid-Holocene (4,400-5,000 yrs BP) corals in coral reef sediment cores drilled at the west coast of Okinawa-jima, Ryukyu Islands, Japan. X-ray image and geochemical analyses clearly showed annual skeletal growth bands and seasonality in geochemical profiles, which enable to establish robust time series of geochemical composition in corals. Our coral-based climate reconstruction significantly shows seasonal-to-decadal time scale variability of thermal and hydrologic conditions in the northwestern subtropical Pacific during the mid-Holocene. Importantly, the interannual and decadal scale variability of surface ocean environments recorded in the coral geochemistry can be useful for understanding the East Asia Monsoon during the Holocene.

キーワード：サンゴ骨格、化石、酸素同位体組成、Sr/Ca・U/Ca比、古水温・古塩分、琉球列島
Keywords: coral skeleton, fossil, oxygen isotope composition, Sr/Ca and U/Ca ratios, paleo-temperature and -salinity, Ryukyu Islands

