石垣島産化石サンゴ骨格の古地磁気試料としての可能性

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Potential use as a paleomagnetic recorder of ceased corals in Ishigaki island, Japan

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Radiocarbon (^{14}C) is produced by the cosmic rays in the atmosphere and is assimilated only by living being. But radiocarbon variability is also controlled by Earth's magnetic field, suggesting that a strong field would shield the planet from high energy charged particles. Also, the short-term movement of the geomagnetic pole to the low latitude, such as geomagnetic jerk, could also lead to an increased cosmic ray flux impinging on the terrestrial atmosphere and thus to a higher ^{14}C production rate. This mimics a stronger value of cosmic rays into atmosphere. Therefore, we need to know the movement of geomagnetic pole position, its field strength and the variability of radiocarbon production during decadal to centennial periods. Many researches, which aim to reveal the decadal to centennial history of paleomagnetic secular variation (PSV), have been performed using datasets obtained from volcanic rocks, sediment, and fired kilns. There are few continuous recorders that can be used for the reconstruction of PSV in a decadal or centennial scale and also the variability of radiocarbon. Korte and Constable (2005) reconstructed the geomagnetic dipole moment for the last 7000 years by fitting a multipole expansion of the geomagnetic field to the measured data set. Here we propose an alternative dataset of the use of fossil coral frameworks as a possible paleomagnetic recorder for PSV research. The coral framework has an advantage in reconstructing both the radiocarbon variability and the geomagnetic field. Although usual corals show extremely weak intensity of remanence and its low stability, it is shown that our recently-ceased coral framework samples from Ishigaki island possess a remanence intensity of 10^{-2} -10^{-3} A/m and a single-domain like stability from Lowrie-Fuller test. We prepared the standard 1-inch core samples cut perpendicular to the growth direction of coral *Porites*, including coral's growth bands for a ten to several tens of years. Our thermal and AF demagnetization experiments of oriented coral samples show that a characteristic remanence direction is parallel to the present Earth's magnetic field with some fluctuations. Moreover, we conducted a thinning experiment to pursue an annual to decadal fluctuations of characteristic remanence directions, and found that the characteristic direction of thinning sample is also consistent with one of standerd samples. Therefore, it is shown that our coral framework samples provide a role as a potential use for paleomagnetic recorder for annual to decadal scales.