R004-P05
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宮古島礁性石灰岩の古地磁気層序および岩石磁気の特徴

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Magnetostratigraphy and Rock magnetic signatures of reefal limestones from Miyakojima Island

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Reefal limestones are composed of corals and other organisms fossils with significant heterogeneity in the samples and their magnetizations are weak in general. Previous studies on the reefal limestones in Miyakojima Island (e.g. Anai et al., 2018) suggest that magnetite seems to be the main carrier of their weak magnetism, and the origin of magnetite is considered to be biogenic (fossil magnetotactic bacteria) and/or detrital. In the reefal limestones, other magnetic minerals (e.g. hematite and/or goethite) are also present, which prevents to extract primary magnetizations carried by magnetite. Thus, standard magnetization measurement using superconducting magnetometer, and AF or thermal demagnetization or thermal is not easy for paleomagnetic studies including magnetostratigraphy. Anai et al. (2018) was successful in minimizing the influence of secondary magnetizations carried by hematite and/or goethite using reductive chemical demagnetization (RCD). With this new technique, magnetostratigaphy of reefal limestone provides reliable age constraints. In addition, reefal limestone is known to be an excellent recorder of paleoenvironment, such as sea-level change and/or climate change. Here, we present preliminary results of magnetostratigraphic and rock magnetic studies using specimens of nineteen sites collected in 2021 from the outcrops including two consecutive sections from the southern coastal area of Miyakojima Island.

We have taken samples from seven (MK3~MK9) and eight (MK11~MK18) sites along the western and eastern road sections, respectively. We conducted NRM measurements on all paleomagnetic specimens and stepwise AF demagnetization experiments on pilot specimens for all sites. The results suggest that the paleomagnetic polarity boundaries corresponding to Matuyama-Brunhes transition are between MK4 (normal) and MK5 (reversed), and MK12 (normal) and MK13 (reversed), which has the approximate altitude of 35 m. Rock magnetic measurements were conducted on a selected specimen for each site using Lake Shore VSM 8604; i.e. hysteresis, back field DC demagnetization, IRM acquisition and first order reversal curve (FORC). FORC analysis suggest that there are varying proportions of single domain (SD), multidomain (MD) and vortex state grains, which is considered as mainly magnetite. Specimens with corals and coral fragments are generally unstable, whereas specimens with rhodolith are stable with prominent central ridge suggesting biogenic magnetite. Although IRM acquisition curves are noisy with low SN-ratio, IRM unmixing suggests the presence of higher coercivity minerals, which is considered as hematite or goethite. Day-plot of hysteresis parameters show distribution around PSD range, which is consistent with FORC results. SIRM, $S_{-0.1T}$, $S_{-0.3T}$ and hysteresis parameters plots versus stratigraphic level suggest that

B_{cr}/B_c is around 2.5 for the horizon around Matuyama-Brunhes polarity boundary and above, which increases gradually downward and increase further 5m below the boundary suggesting more contribution of MD grains. Although M_{rs}/M_s between the two sections are not completely overlapping, the general trend shows that the values are higher for the horizon above Matuyama-Brunhes polarity boundary with a peak just below the boundary suggesting more contribution of SD grains. The other parameters are not consistent between the two road sections. Four sub-specimens are selected from a specimen of MK1 to understand heterogeneity. Some specimens show significant scatter from the mean values. However, after RCD, the scatter of the parameters is suppressed. This indicates that secondary magnetic minerals such as hematites and goethites are removed by RCD, which contribute to improve the reliability of rock magnetic parameters.

Acknowledgements
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References

Anai et al. (2018) Reductive chemical demagnetization: a new approach to magnetic cleaning and a case study of reef limestones, Earth, Planets and Space, 70, 184.