下部三畳系深海チャートギャップの成因
Origin of the Lower Triassic deep-sea chert gap

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Carboniferous to Jurassic pelagic deep-sea sediments that accumulated in the pelagic Panthalassa Ocean are mostly composed of bedded chert lithofacies (Matsuda and Isozaki, 1991). Among them, the Lower Triassic interval is characterised by siliceous claystone dominant lithofacies instead of bedded chert lithofacies (the deep-sea chert gap) (Ishiga and Yamakita, 1993; Isozaki, 1997). The age of the deep-sea chert gap (ca. 252–247 Ma) corresponds to the time interval of ecosystem recovery from the end-Permian mass extinction, the largest mass extinction event in the Phanerozoic (Chen and Benton, 2012). Therefore, the deep-sea chert gap may reflect anomalous environmental conditions during the Early Triassic that possibly delayed the re-establishment of complex ecosystems after the mass extinction. The deep-sea chert gap may either be a result of an increase in burial flux of fine clastic material, or a decline in burial flux of biogenic silica in the Early Triassic pelagic Panthalassa. However, previous studies have not calculated burial fluxes of fine clastic material and biogenic silica based on well-dated sedimentary sequences. In order to identify the mechanism that led to the formation of the deep-sea chert gap, we estimated the burial fluxes of clastic material and biogenic silica in deep-sea sedimentary sequences, which were newly described in this study.
Detailed geological mapping and reconstruction of lithostratigraphy was carried out at Ogama in the Kuzuu area, Tochigi Prefecture, and in the Tsukumi area, Oita Prefecture, and consequently, several continuous sections were identified. Based on conodont biostratigraphy, the studied sections are correlated to the *triangularis-collinsoni* Zone, the *homeri* Zone, the *timorensis* Zone and the *bulgarica* Zone of Koike (1981), which corresponds to the Spathian (upper Olenekian; uppermost Lower Triassic) to middle Anisian (lower Middle Triassic). Using the conodont biostratigraphic framework, absolute ages of volcanic tuff beds in South China were projected onto the reconstructed lithostratigraphic columns of the deep-sea sections. Consequently, the lower limit of the linear sedimentation rate (LSR) was obtained for the Spathian and lowermost Anisian siliceous claystone dominant lithofacies.
In addition, major element concentrations were measured for rock samples obtained from the studied sections by X-ray fluorescence (XRF) analysis. The SiO_2 and Al_2O_3 concentrations were were combined with measured rock density data and the lithostratigraphic data of the studied sections to calculate the burial fluxes of clastic material and biogenic silica for the stratigraphic intervals for which LSR was estimated. For the lowermost Anisian in Ogama, the minimum burial fluxes of clastic material and biogenic silica are 1030 g/cm^2·m.y. and 1040 g/cm^2·m.y., respectively. For the Spathian in the Tsukumi area, the minimum burial fluxes of clastic material and biogenic silica are 960 g/cm^2·m.y. and 1130 g/cm^2·m.y., respectively. The estimated minimum burial flux of clastic material for the deep-sea chert gap greatly exceeds the burial flux calculated for the Anisian bedded chert lithofacies in the Tsukumi area (80 g/cm^2·m.y.), calculated based on LSR by Soda et

al. (2015). The estimated minimum burial flux of biogenic silica for the deep-sea chert gap is also higher than that of Anisian bedded chert in the Tsukumi area (390 $g/cm^2 \cdot m.y.$), calculated based on LSR by Soda et al. (2015). These results indicate that, during the deposition of sediments in the deep-sea chert gap, burial fluxes of clastic material and biogenic silica were both elevated, but the increase is greater in the former. Hence, the deep-sea chert gap is a result of anomalously high flux of clastic material to the pelagic realm, which diluted biogenic silica in deep-sea sediments.

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