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Preliminary bio-magnetostratigraphy and magnetic signature of basement for IODP Exp. 322: NanTroSEIZE Subduction Inputs

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Integrated Ocean Drilling Program (IODP) Expedition 322 was designed to document characteristics of incoming sedimentary strata and igneous basement prior to their arrival at the subduction front. To accomplish these objectives, coring was conducted at two sites in the Shikoku Basin on the subducting Philippine Sea plate. Site C0011 is located on the northwest flank of the Kashinosaki Knoll, whereas Site C0012 is located near the crest of the knoll. Here, we present the bio-magnetostratigraphy and possible age models for these sites.
Preliminary bio-magnetostratigraphy was constructed for Sites C0011 and C0012 onboard during Expedition 322 based on the biostratigraphic datums of nannofossil and planktonic foraminifera, and the magnetostratigraphic datums. Paleomagnetic measurements onboard were conducted using the spinner magnetometer with stepwise AF demagnetization technique for the whole samples. The biostratigraphic datums of nannofossil and planktonic foraminifera did not completely agree with each other. The nannofossil datums were used as primary datums over foraminifera because of the better preservation and reliability. Most of the paleomagnetic results suffered from intense secondary magnetization during drilling, however, AF demagnetization field up to 10 mT was usually enough to remove the overprint to allow interpretation of polarity of magnetization. Magnetostratigraphic interpretation was primarily based on the long normal or reversed polarity chrons consistent with biostratigraphic datums.
According to the biostratigraphic datum events, the composite sequence for Site C0011 ranges from middle to upper Miocene, roughly equivalent to 13.65 Ma at the base up to 8.52 Ma at 425 m CSF. The paleomagnetic data indicate ages ranging from 7.6 Ma to 13.9 Ma. Combining biostratigraphic and magnetostratigraphic datums together, we observed changes in the rate of sedimentation from 9.4 cm/kyr to 4.0 cm/kyr at the boundary of Unit II/III (480 m CSF) and from 4.0 cm/kyr to 9.5 cm/kyr in the middle of Unit III (540 m CSF).
For Site C0012, nannofossil biostratigraphy identified two hiatuses in sedimentation at around 9.6-10.9 Ma and 14.9-18.9 Ma. Magnetostratigraphy could be constructed with confidence for the age interval of 5-8 Ma, however, the magnetostratigraphic interpretation branched into two models backwards. One follows nannofossil datums faithfully, whereas the other relies on sequences of magnetozones without core breaks. The latter model shows that the sedimentation rate change from 6 to 1 cm/kyr at 180 m CSF, from 1 to 7 cm/kyr at 190 m CSF and from 7 to 3 cm/kyr at around 210 m CSF. The age model for the older part is less certain, however, sedimentation rate is mostly constant down to 430 m CSF. The sedimentation rate increases significantly from 6 to 46 cm/kyr below 430 m CSF down to 470 m CSF, where thick sandstones were recovered. Sedimentation rate decreases to 8 cm/kyr below 470 m CSF down to 500 m CSF, where significant hiatus was observed.
Paleomagnetic measurements on basaltic basement rocks from Site C0012 (538-561m CSF) show that the stable magnetization has reversed polarity. Ike et al. (2008) interpreted that the magnetic

anomaly crossing the Kashinosaki Knoll is anomaly 6A (20.55 Ma) and there is a dipolar anomaly on the summit that is negative on NE. Considering that the Shikoku Basin rotated clockwise after the formation in Miocene (Sdrolias et al., 2004), the negative dipolar anomaly on NE of the Knoll could be restored back to north of the Knoll. In that case, the reversed magnetization for the basalt agree with the dipolar anomaly on the Knoll. To proceed the hypothesis further, careful investigation is needed based on the detailed analysis of magnetic anomaly and the demagnetization of basaltic rocks in combination with the radiometric dating to be planned.

Keywords: Integrated Ocean Drilling Program, off Kumano Nada, Nankai Trough, magnetostratigraphy, biostratigraphy, basalt