High resolution analysis of carbon isotopic composition of organic matters of the core taken by Chikyu off Shimokita Peninsula

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Seismic and side-scan sonar surveys were conducted 15-200 km off Simokita Peninsula by CDEX/JAMSTEC in 2002. Strong and characteristic seismic profiles such as BSRs(Bottom Simulating Reflector), pull-downs and umbrella-shaped high amplitude reflections. These features strongly suggest the formation of methane hydrate and migration of methane fluid. BSRs occur at 0.50 to 0.70 seconds (TWT), indicating that the BGHS(Bottom of Gas Hydrate Stability) is about 600mbsf. In 2005, a number of piston cores were retrieved off Shimokita during KT05-7 Tansei-maru cruise. The depth of SMI(Sulfate Methane Interface) was 3.5 to 12.0m, suggesting strong methane flux off Shimokita Peninsula. In 2005 and 2006, three drilling core C9002A(26m), C9002B(70m), C9001C(365m)) were retrieved during D/V Chikyu expedition. We measured water content, TOC (total organic carbon) content and the carbon isotopic composition of TOC of the core C9002A, with an intention (1) to reveal the origin of methane hydrate, (2) to reconstruct the marine environmental change during Quaternary and (3) to pick out the event of methane hydrate dissociation. Water content and TOC were measured at Shinsyu University and carbon isotope was measured at Tokyo University. The tephra at 29.5mbsf of C9002B has been identified as Spfa-1(43kaBP) then the age of the bottom of C9002A reached 37kaBP. The carbon isotopic composition of TOC varied between -22.5 to -23.5 permil during Last Glacial episode (35-17ka). The positive excursion about +0.5 permil occurred at each interstadial. The isotopic composition shifted -1.0 permil at the end of the Last Glacial (Termination 1A), +0.5 to +1.0 permil during the B-A warming period then it reached -24.5 permil at Younger Dryas. The isotopic composition rapidly became heavy at 10ka with negative spike of -22.5 permil at 5ka. Then it varied between -22.2 to -21.5 permil for the Holocene period. TOC content was 1% during the Last Glacial episode, 1.2% during Y-D and 1.5% to 2.5% during the Holocene. The variation of the TOC content roughly to the excursion of the isotopic composition, but they do not show simple positive correlation. The co-variation diagram between TOC and the isotopic composition depicts two separate domains for samples (a) from the Last Glacial to Y-D and (b) since Holocene. This seems to suggest that the dramatic increase in the primary productivity during the warm Holocene has been caused by characteristic biologic communities which were different from that of the Last Glacial episode. The dissociation of methane hydrate at the interstadial during the Last Glacial have been pointed out by the carbon isotopic composition of foraminifera, however, negative excursions have not been picked out in this study. It may suggest that even if methane emission occurred on the seafloor, seep methane could not influence the sea-surface environment.