Geophysical Research Abstracts
Vol. 16, EGU2014-4847, 2014
EGU General Assembly 2014

Carbon isotopic composition of both authigenic carbonate and benthic foraminifera recovered from site U1328 and U1329 as co-indicators of episodic methane seep events during late Pleistocene and Holocene, IODP Expedition 311

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Methane seeps play a significant role in the evolution of pore water dissolved inorganic carbon (DIC) via anaerobic oxidation of methane (AOM), which could precipitate authigenic carbonates and influence benthic foraminifera tests. Two independent proxies, the carbon isotopic composition of authigenic carbonate and benthic foraminifera (Uvigerina peregrina) were studied to verify the potential relationship between authigenic carbonate and foraminifera as co-indicators of episodic methane seep during late Pleistocene and Holocene in northern Cascadia margin gas hydrate geo-system. Both authigenic carbonate and benthic foraminifera show episodic carbon excursions during the past 1.6Ma at site U1328 and 8.5Ma at site U1329. Carbon isotopic excursions of benthic foraminifera coincide with those of authigenic carbonate at several methane seep stages, even though profound carbon isotopic disequilibrium exists between authigenic carbonate and benthic foraminiferas. Methane seeps related AOM favoring authigenic carbonate precipitation and also leave imprints on the DIC that could be recorded by the calcification of benthic foraminifera. The carbon isotopic coincidence between authigenic carbonate and benthic foraminifera demonstrates two proxies could record the same methane seep events. Combine the authigenic minerals and benthic foraminifera in revealing the methane seep events could preclude the post-depositional alterations of the authigenic carbonate and delineate the specific episodic methane seep history.
This research was supported by NSFC (41306062)