Geophysical Research Abstracts
Vol. 18, EGU2016-3391-1, 2016
EGU General Assembly 2016

Analysis of past recurrent methane seep activity using radiocarbon dating of *Calyptogena* spp. shells in the eastern Nankai subduction zone, Japan

Kazuhiro Yagasaki (1), Juichiro Ashi (1), Yusuke Yokoyama (1), Yosuke Miyairi (1), and Shin'ichi Kuramoto (2)

(1) Atmosphere and Ocean Research Institute, University of Tokyo, Kashiwa, Japan (yagasaki@aori.u-tokyo.ac.jp), (2) Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan (s.kuramoto@jamstec.go.jp)

Fault activity around subduction zones have been widely studied and monitored through drilling of oceanic plates, studying piston cores, use of monitoring equipment or through visual analysis using submersible vehicles. Yet the understanding of how small scale faults near shallow regions of the seabed behave in relation to cold seep vent activity is still vague, especially determining when they were active in the past. In tectonically active margins such as the Nankai and Tokai regions off Japan, dense methane hydrate reservoirs have been identified. Cold seeps releasing methane rich hydrocarbon fluids are common here, supporting a wide variety of biological species that hold a symbiotic relationship with the chemosynthetic bacteria. In 1998 a large dead *Calyptogena* spp. bivalve colony (over 400m^2 in size) was discovered off Tokai, Japan. It is unusual for a bivalve colony this size to mostly be dead, raising questions as to what caused their death. In this study we document the radiocarbon ^{14}C age of these bivalve shells to attempt analysing the possible methane seep bahaviour in the past. The measured ^{14}C age ranged in three age groups of 1396±36–1448±34, 1912±31–1938±35 and 5975±34. The ^{14}C age of shells that were alive upon collection and the dissolved inorganic carbon (DIC) in seawater show little difference (∼100 ^{14}C age) indicating that shells are not heavily affected by the dead carbon effect from cold seeps that is of biogenic or thermogenic origin, which can make the age to become considerably older than the actual age. Thus the novel calibration model used was based on the seawater DIC collected above the *Calyptogena* spp. colony site (1133±31), which resulted in the dead shells to be clustered around 1900 Cal AD. This proves to be interesting as the predicted epicenter of the Ansei-Tokai earthquake (M 8.4) in 1854 is extremely close to the bibalve colony site. Using geological data obtained using visual analysis and sub-seafloor structural analysis that show multiple shallow faults and chaotic sediment structure below the colony site, the *Calyptogena* spp. shells have a strong connection to the coseismic faulting activity and could show potential for radiocarbon dating to be applied on marine samples providing the necessary calibration tools are available.