

Application of C-14 dating on *Calyptogena* shells for historical fault activity analysis off Tokai, Nankai Trough

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Cold seeps are frequently found at tectonically active continental margins including areas such as the Nankai and Tokai regions. The fluid conduits created by the tectonic activities often form cold seeps, releasing hydrocarbon rich fluids such as methane. Substances such as this are essential for supporting *Calyptogena* bivalve communities to survive through a symbiotic process with the chemosynthetic bacteria. The lifespan of bivalves can be ephemeral due to the conduits altering from tectonic events of converging plate margins, or the source of the hydrocarbon depleting over time. These characteristics may suggest that the *Calyptogena* bivalve shells may hold important information on historical fault activities of the area.

Marine samples originating from the deep sea have often been difficult to radiocarbon date due to the complicated calibration processes involved. Deep circulating ocean currents and sub seafloor seepage of hydrocarbons are main factors responsible for the necessary complex calibration calculations, referred to as the dead carbon effect. DSV *Shinkai* 2000 discovered an unusually large *Calyptogena* bivalve colony in 1997, ranging approximately 200m² off the Daini Tenryu Knoll off Tokai in Japan. Bivalve colonies found are composed mainly of dead shells with few spots of living communities remaining. Past tectonic events may have influenced the methane hydrate layer below to destabilise, releasing significant amounts of methane fluid and gas to the seafloor, consequently allowing bivalves to flourish (Kuramoto, 2001; Ashi et al., 2002; Otsuka et al., 2010).

Amino acid racemisation dating technique was employed on the same shells by Misawa (2004) revealing two different age groups of 0~500 years (white shells) and 1000~2000 years (brown shells), yet the technique was prone to temperature and pH change. This study therefore proposes a novel application of radiocarbon dating of such bivalves to further understand the interaction between local active faults and the bivalve community. Current ¹⁴C age measured range between 1868~1949 year cal AD, coinciding with the 1854 Ansei Tokai earthquake (M8.4). Seafloor mapping, seawater analysis and EPMA and SEM structural analysis of shells from ROV *HyperDolphin* Dives 1355 and 1377 during NT14-07 and NT02-08 respectively, will also be reported.

Keywords: Radiocarbon dating, Cold seep, *Calyptogena* shell, Active fault, Methane