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Sclerochronology and high resolution isotopic profiles (δ^{18}O and δ^{13}C) in bivalve shells from methane seeps.

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Various bivalve species (*Myrtea aff. amorpha, Bathymodiolus boomerang, Bathymodiolus sp., Mytilidae type 1* and *Vesicomya sp.)* from cold seeps environments have been used as proxies of venting system variability, i.e. temperature, water composition and methane flux

Bivalve shells were collected in active methane seeps from mud volcanoes and pockmarks, by submersible dives during French oceanographic cruises, in the Barbados accretionary prism (Diapisub, 1992-1993) and in the Eastern Mediterranean (Medinaut, 1998 and Nautinil, 2003).

The isotopic compositions of carbonate from the shells exhibit characteristic values depending on the site location: in Barbados accretionary prism 3.5 < δ^{18}O ‰ V-PDB < 4.6; -9.4 < δ^{13}C ‰ V-PDB < 3.9 and in Eastern Mediterranean 1.7 < δ^{18}O ‰ V-PDB < 3.4; -10.23 < δ^{13}C ‰ V-PDB < 2.2. Moreover, the stable isotope compositions display a large dispersion in shells from a same location, for example, δ^{18}O vary by about 1.3‰ V-PDB whereas δ^{13}C vary up to 12‰ V-PDB.

High resolution isotopic profiles of bivalve shells were obtained from successive microsampling of calcium carbonate following the growth increment direction.

The shells collected from Eastern Mediterranean present various isotopic profiles. Some of them exhibit decreasing δ^{18}O and δ^{13}C values with age. They record high frequency isotopic variations of about 1.6‰ for δ^{18}O values and 1.5‰ for δ^{13}C values. One shell displays much larger δ^{13}C variations by about 9‰. Another shell exhibits a carbon isotopic profile with a progressive and important change of δ^{13}C values along her life from -10 to 0‰.

The carbon isotopic composition of the shells from Barbados accretionary prism depends on bivalve species: *Bathymodiolus* and *Mytilidae* species exhibit very low δ^{13}C values (-9 to -3‰) whereas *Vesicomya* species show positive δ^{13}C values (0 to 4‰). These differences are explained by the ecological requirements and life habitats of bivalve shells.

To replace isotopic profiles in a chronological scope and thus understand relationships between growth increments and the environmental parameters it is necessary to know growth mode. Cathodoluminescence is a simple and no destructive technics to follow the growth rythms of bivalve shells. We have found a significant correlation between cathodoluminescence spectra and δ^{18}O records of shells; by this combined approach we try to rely the growth rate of bivalve shells with the variations of methane seep activity at the sea floor.