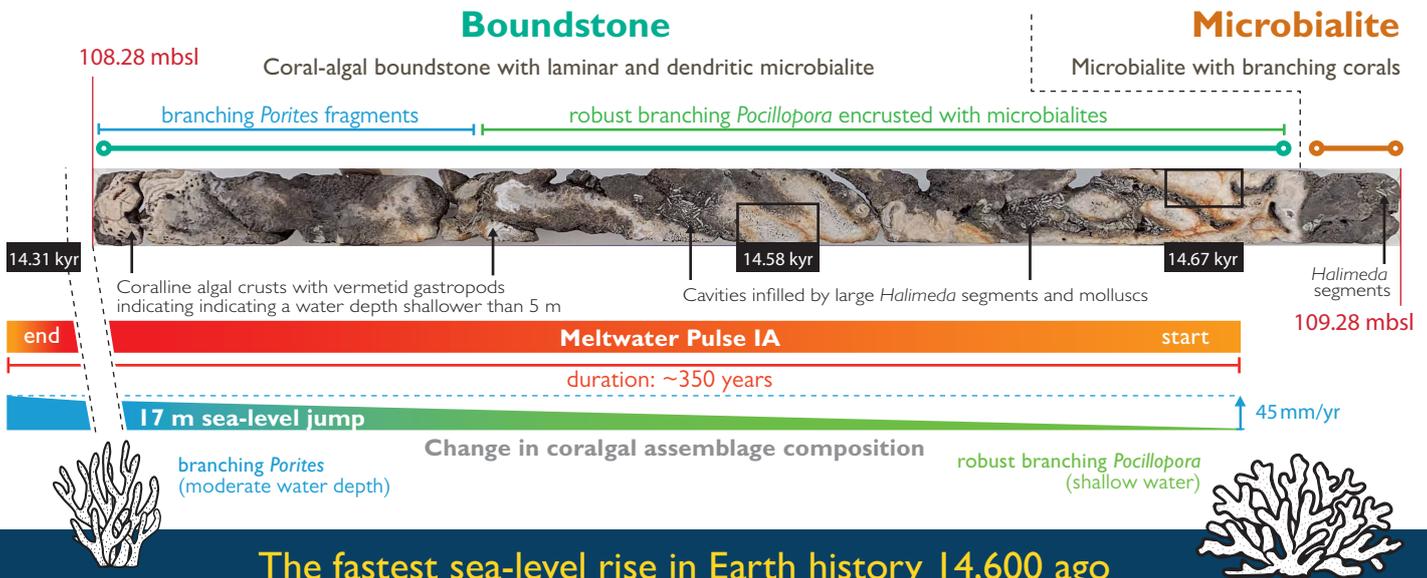


# Coral Reefs off Tahiti

drilled in water depths ranging from 46.65 to 117.54 m

## Exp. 310 Tahiti Sea-Level Change

Core **310-M0024A-10R-1**: Coral boundstone with microbialites (108.28-109.28 mbsl\*)



## The fastest sea-level rise in Earth history 14,600 ago

This core section is one of the critical samples from IODP Exp. 310. It provides an invaluable record of a dramatic sea-level rise (Meltwater Pulse IA; MWP-IA) related to a major collapse of polar ice sheets, which occurred between 14,650 and 14,310 years ago.

Coral reef sequences drilled offshore Tahiti during IODP Exp. 310 provide evidences that the global ocean rose of 17 m in 350 years at a rate of 45 mm/yr (vs 3 mm/yr currently) during the MWP-IA. This episode corresponds to the fastest sea-level rise in Earth history.

Coral reefs live only in shallow tropical waters and have strict ecological requirements especially regarding light conditions and sea-surface temperatures. They are sensitive recorders of past sea-level and environmental changes.

Coral reefs provide reliable estimates of past relative sea-level over the last hundreds of thousands of years, because: 1) reef biological communities live in a sufficiently narrow or specific depth range to be useful as absolute sea-level indicators, and 2)

tropical reef corals can be dated accurately using multiple dating techniques (for example, <sup>14</sup>C and U/Th).

High-resolution records of past global changes, especially temperature and salinity changes, are stored in coral skeletons during their growth (centimetric grooved pairs of light and dark bands) and can be reconstructed with the help of geochemical proxies such as stable isotopes of oxygen and carbon and trace elements like uranium, strontium, magnesium, etc.

## IODP Expedition 310 Tahiti Sea Level, Oct-Nov 2005

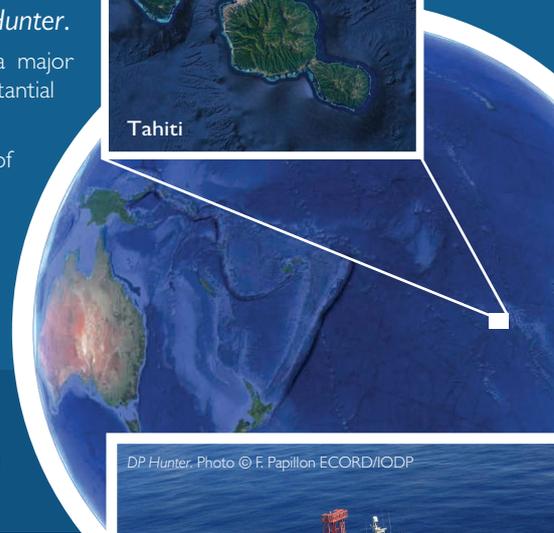
Fossil coral reefs off Tahiti have been drilled and cored by the drillship *DP Hunter*.

The IODP Mission Specific Platform expedition targeted the two prominent terraces that occur at 50–60 mbsl and 90–100 mbsl, respectively, that support abundant relict reefs that rise at 30–45 m above the seafloor. The transects of drill cores allowed the reconstruction of the timing and amplitude of MWP-IA.

Scientific results of IODP Exp. 310 demonstrated the existence of a dramatic rise in sea level 14,650 years ago (Meltwater Pulse IA; MWP-IA)

at a rate of 45 mm/yr related to a major collapse of past ice sheets with a substantial contribution from Antarctica.

Understanding the singular event of MWP-IA will shed light on the dynamical behaviour of large ice sheets in response to external forcing or internal perturbation of the climate system.



DP Hunter. Photo © F. Papillon ECORD/IODP

References Camoin, G.F., Seard, C., Deschamps, P., Webster, J.M., Abbey, E., Braga, J.C., Iryu, Y., Durand, N., Bard, E., Hamelin, B., Yokoyama, Y., Thomas, A.L., Henderson, G.M. and Dussouillez, P. (2012) Reef response to sea-level and environmental changes during the last deglaciation: Integrated Ocean Drilling Program Expedition 310, Tahiti Sea Level. *Geology*, 40, 643–646.

Deschamps P, Durand N, Bard E, Hamelin B, Camoin G, Thomas AL, Henderson GM, Okuno J & Yokoyama Y. 2012, Ice-sheet collapse and sea-level rise at the Bølling warming 14,600 years ago. *Nature* 483, 559–564 (2012). <https://doi.org/10.1038/nature10902>

\* meters below sea level