

Proposition de thèse de doctorat

Début : 2017-2018

Titre de la thèse : **Reconstructions of interannual and seasonal climate change during the mid-Holocene period derived from fossil bivalves and corals from Belitung Island, Sunda Shelf.**

Laboratoire : LPG

Equipe : Système Marin en Transition

Localisation de la thèse : LPG, Nantes

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Description du sujet

The Indonesian area is a zone strongly affected by inter-annual climate variability such as the El Nino Southern Oscillation (ENSO) in the western area, the Indian Ocean dipole (IOD) further to the east and the monsoon which are in turn intimately related to seasonal shifts in the position of the Inter Tropical Convergence zone. These modes of climate change affect modern land and ocean ecosystems and have strong repercussions on the economy of the South East Asia and further afield. ENSO is known to have strong teleconnections that affect climate patterns throughout the Pacific and Indian Oceans. Understanding and predicting these modes of climate change have become of primary importance. Our approach is to use marine fossil archives such corals and bivalves to reconstruct past changes sea surface hydrology with interannual and seasonal timescales. Geochemical proxies such as stable isotopes and trace elements measured sequentially on the annuals growth bands can be used to obtain quantitative estimates of past sea surface temperature, salinity and productivity. Such records are required to reconstruct past changes in ENSO or IOD.

This PhD project will focus on fossil and modern shells of giant long-lived bivalves: *Tridacna* sp. and fossil corals collected from Belitung Island on the Sunda Shelf. Fossil corals from this area have very recently provided a rare record of past changes in relative sea level during the mid-Holocene period (Meltzner et al., 2017). We have conducted several field trips to Belitung Island (2015 and 2016) as part of an ongoing collaboration with the LIPI research institute in Bandung. The preliminary data collected on fossil and modern material illustrates the feasibility of this project. Our final field trip is due to take place in May 2017 when we aim to collect a series of giant clam shells (*Tridacna*) and fossil corals of mid-Holocene age. These climate archives will provide unique information on interannual and seasonal climate change during the mid-Holocene. We specifically aim to:

- Measure geochemical profiles : stable isotopes  $\delta^{18}\text{O}$  and trace elements (Sr/Ca, Mg/Ca and Ba/Ca from a series of fossil bivalves and corals.
- Use radiocarbon  $^{14}\text{C}$  and U/Th dating methods to provide a chronology for each sample
- The data collected will be integrated within an international and multidisciplinary research project PACMEDY Belmont project led by P. Braconnot, LSCE. The PhD student will work closely with climate modellers and paleoclimatologists within this working group who will gather information on Holocene changes in inter-annual climate change.

Meltzner, et al., Half-metre sea-level fluctuations on centennial timescales from mid-Holocene corals of Southeast Asia, Nature Communications, (8)14387 EP, 2017.

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Compétences requises
Earth Science, Earth's Climate system, Paleoclimatology and Geochemistry

Commentaires Supplémentaires
<p>Etude en relation :</p> <ul style="list-style-type: none"> <li>- PACMEDY, (<a href="http://www.jpi-climate.eu/2015projects/pacmedy">www.jpi-climate.eu/2015projects/pacmedy</a>) projet Belmont 2016-2019,</li> <li>- PICS Franco-Indonesie, PI L. Husson (ISTERRE, Grenoble ; LPG, Nantes, M2C, Caen and LIPI, Bandung ; UNHAS, Makassar).</li> </ul> <p>Financement prévu : Financement de 30ke obtenu en 2016 (PACMEDY), Indemnité : Oui (pour les étudiants non déjà boursiers)</p> <p>Montant net mensuel envisagé : ??</p>