



# Cenozoic evolution of the Indonesian Throughflow and the origins of Indo-Pacific marine biodiversity

Willem Renema & the THROUGHFLOW team



# Talk outline

1. Introduce the project

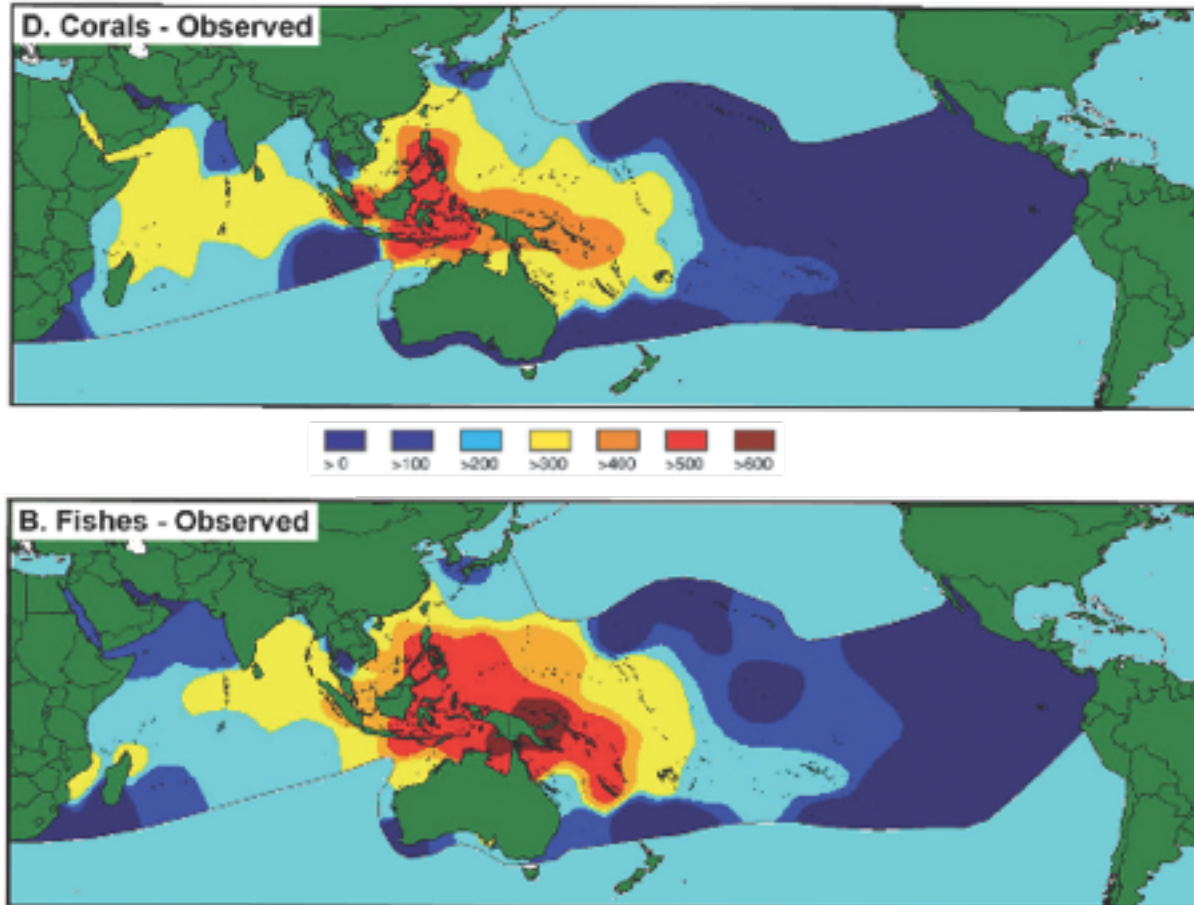
2. Preliminary results of the 2010 fieldwork



Coral reefs are the most diverse ecosystem in the world

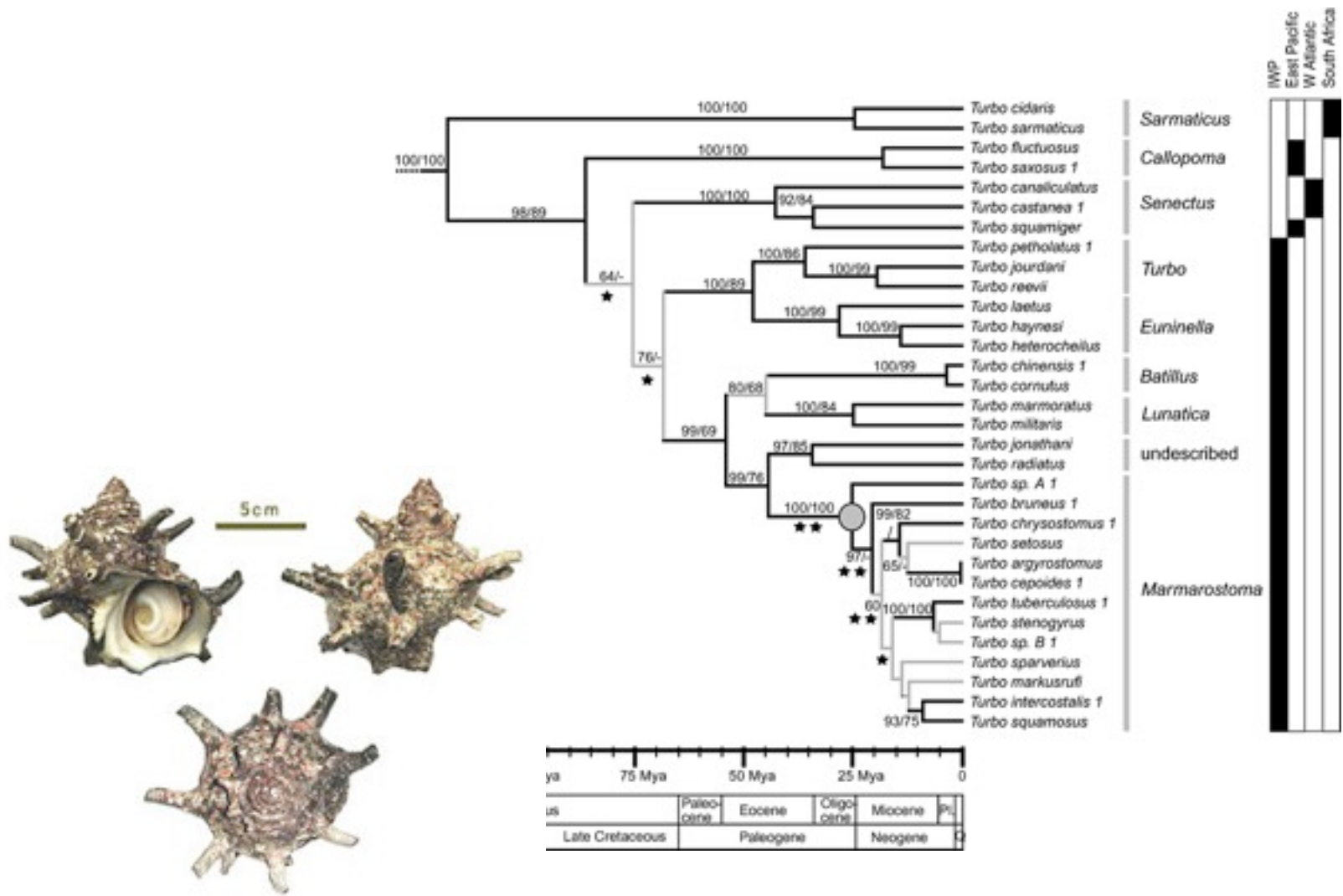


Indonesian shallow marine habitats of SE Asia are the most diverse on earth.



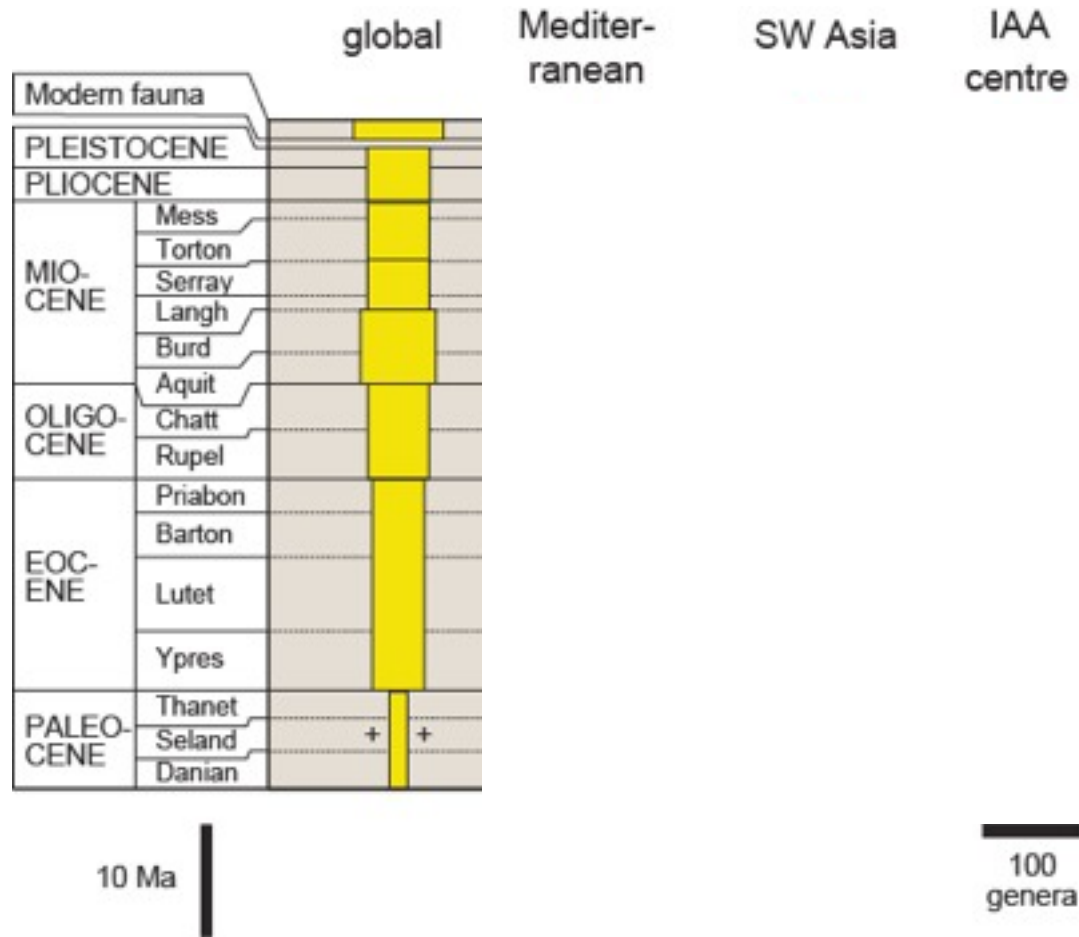
Contours of extant species richness of reef corals and reef-fish in the Indo-West Pacific (Bellwood et al., 2005).

# Our main question is: How and when did it get so diverse?



Williams (2005)

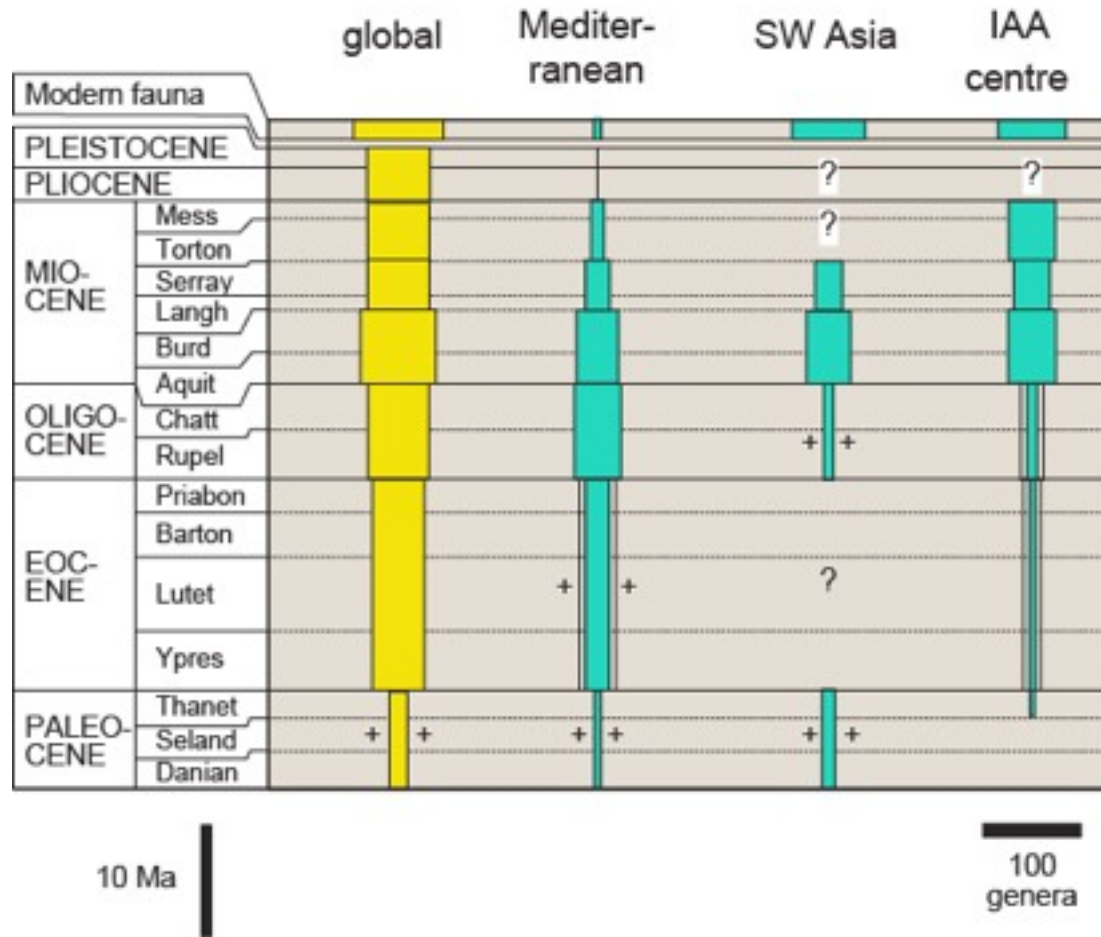
# Have biodiversity patterns always been like this?



Wilson and Rosen, 1998

coral genera through time

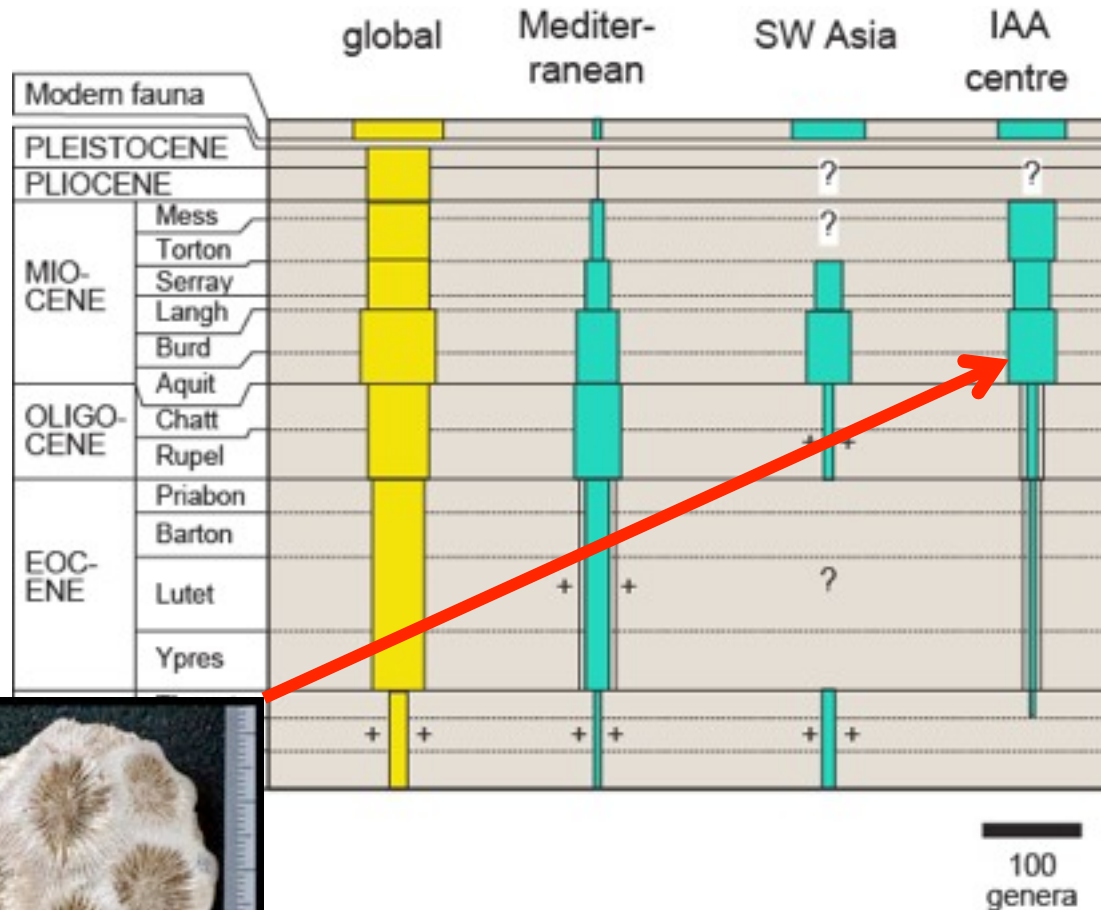
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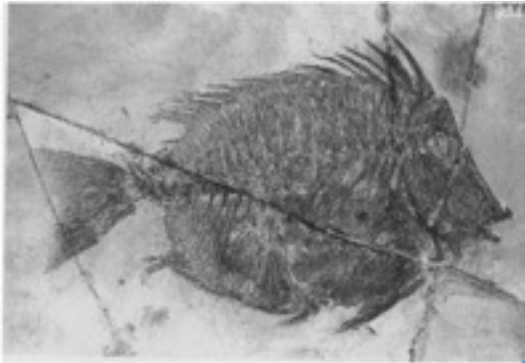
coral genera through time



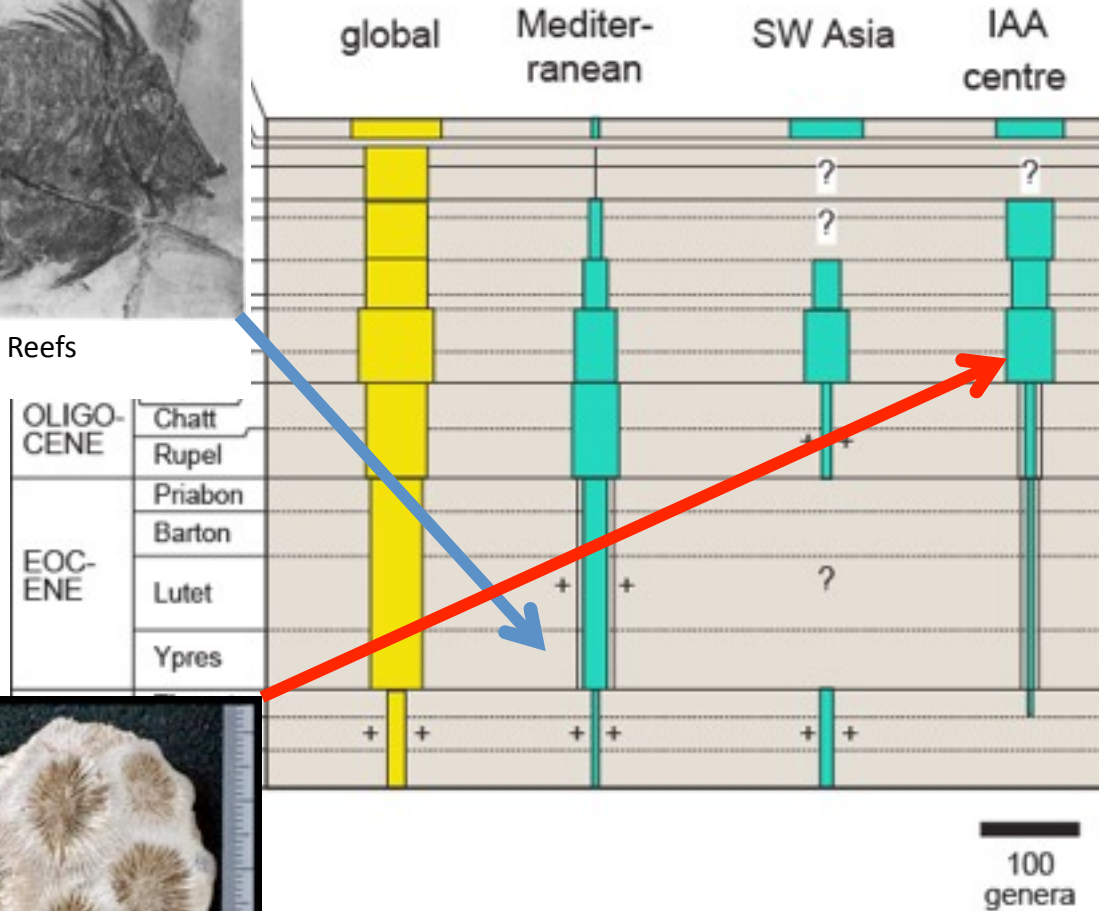
Leloux and Renema, 2007



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Bellwood, 2005 Coral Reefs



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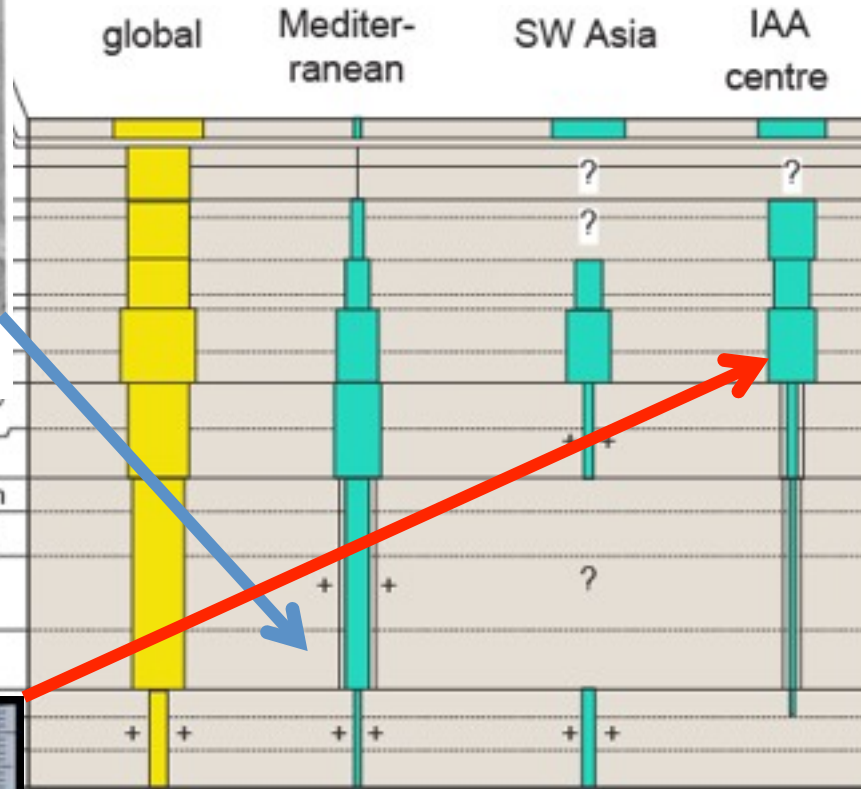


Leloux and Renema, 2007

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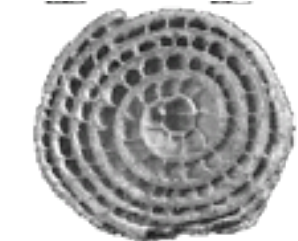


Wilson and Rosen, 1998

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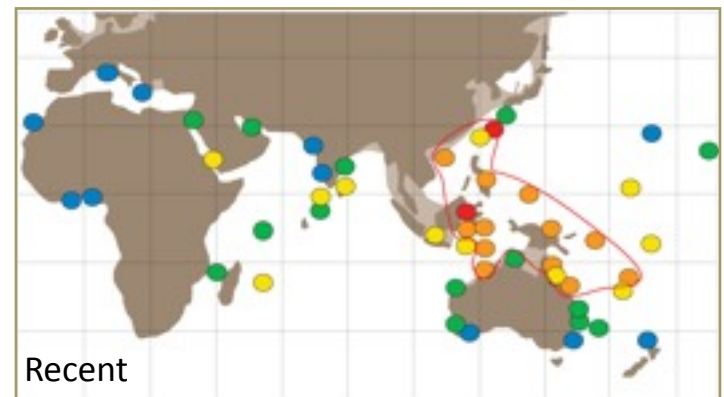
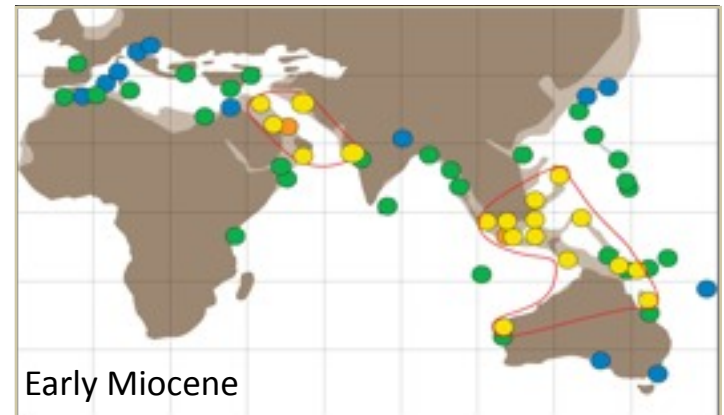
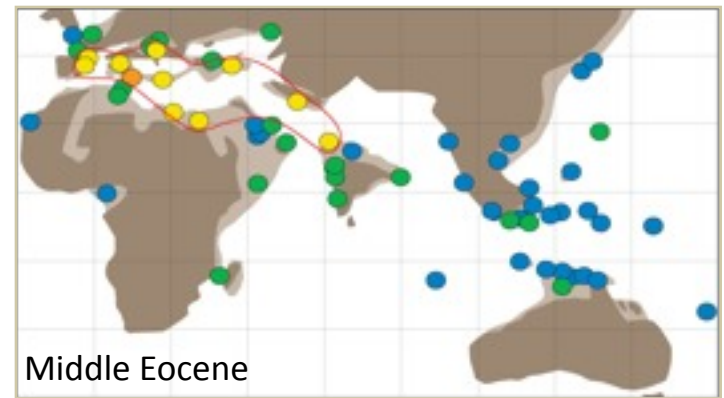
Leloux and Renema, 2007



Renema, 2007

100  
genera

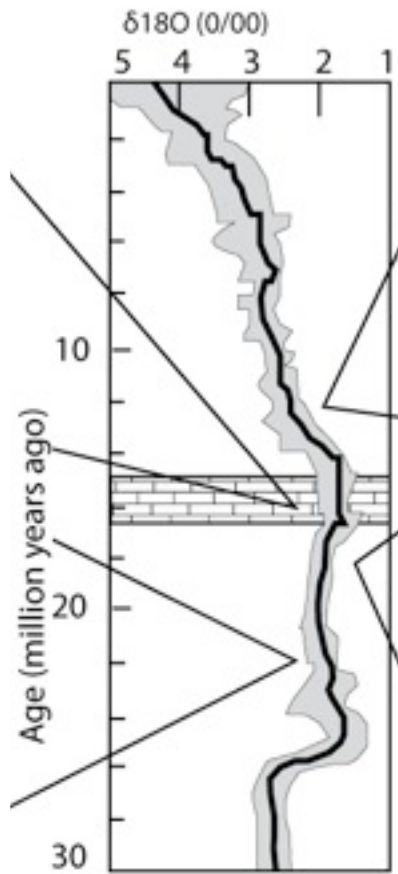
The current bulls eye of maximum marine biodiversity in Indonesia is relatively young



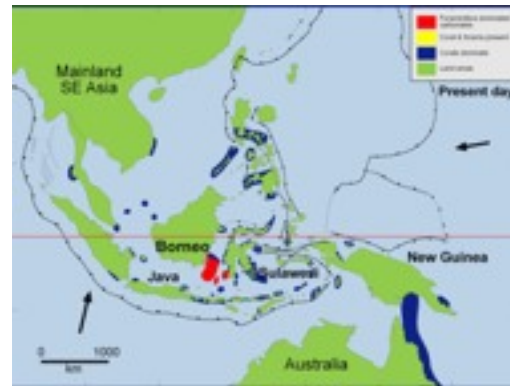
Renema et al (2008)

# Global Climate

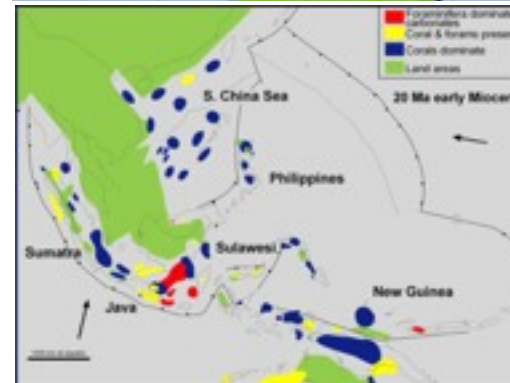
# Regional environment



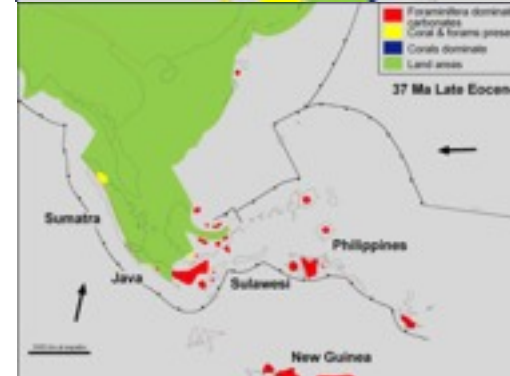
Zachos et al. (2008)



Recent



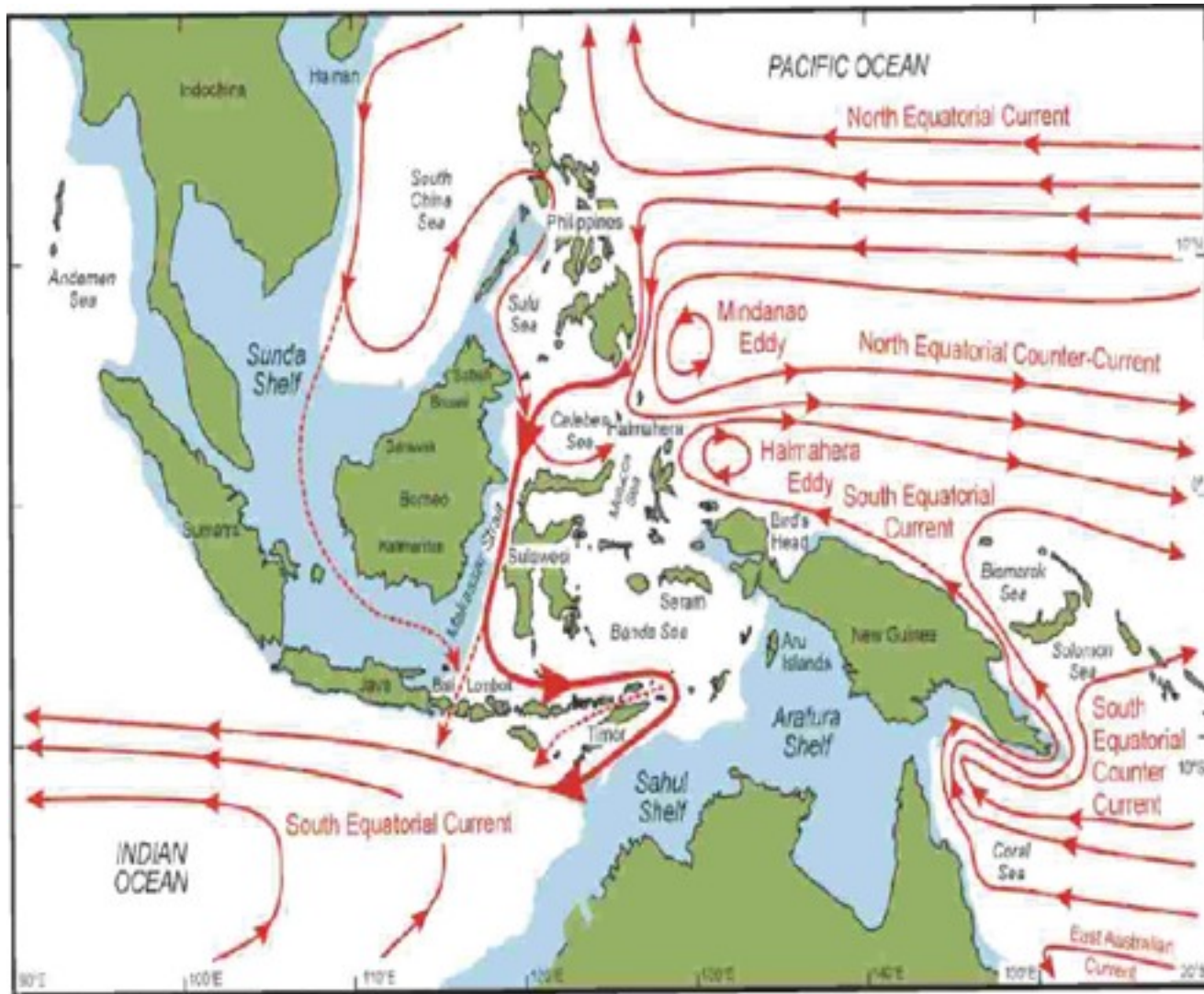
Early Miocene

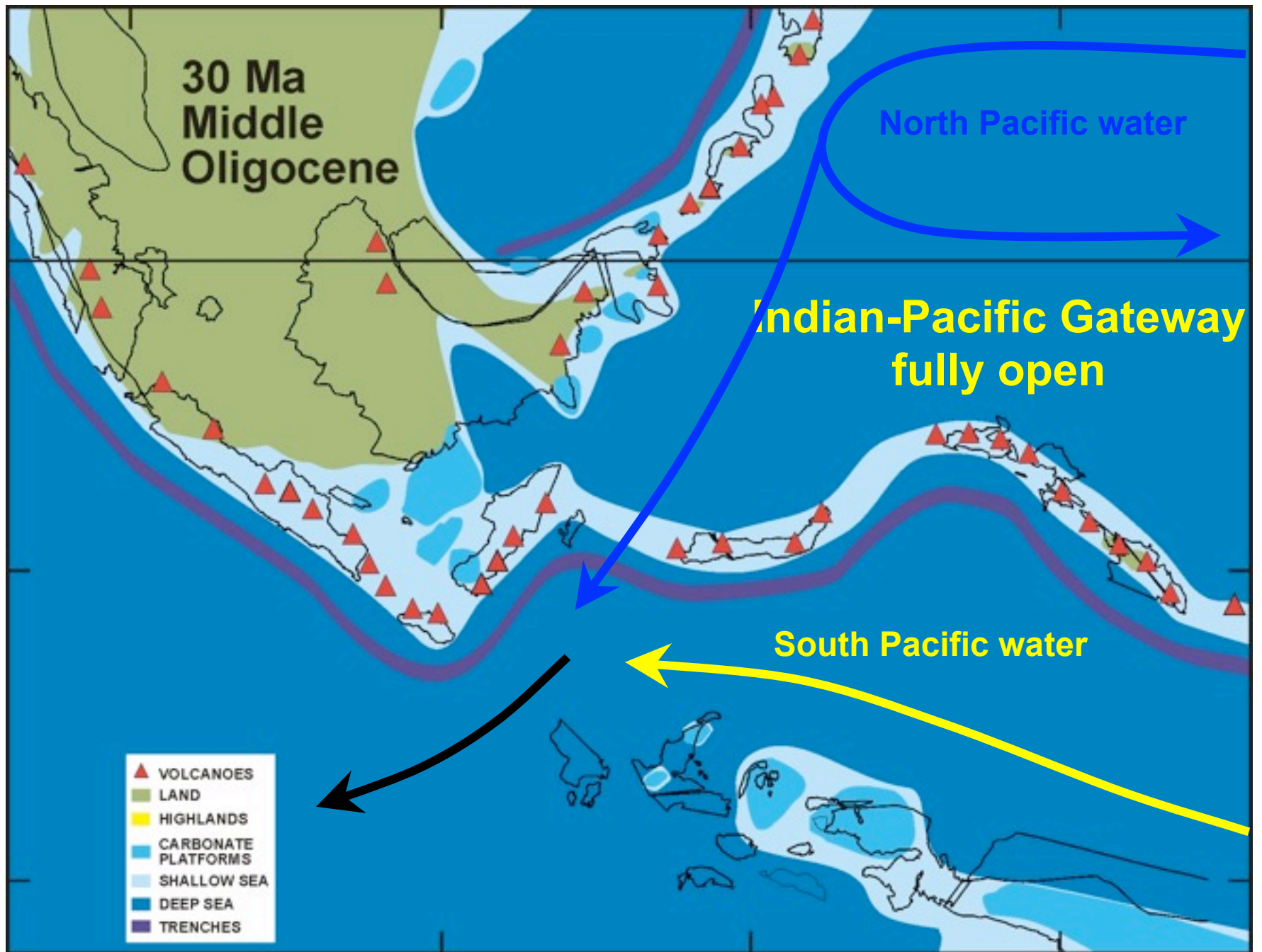


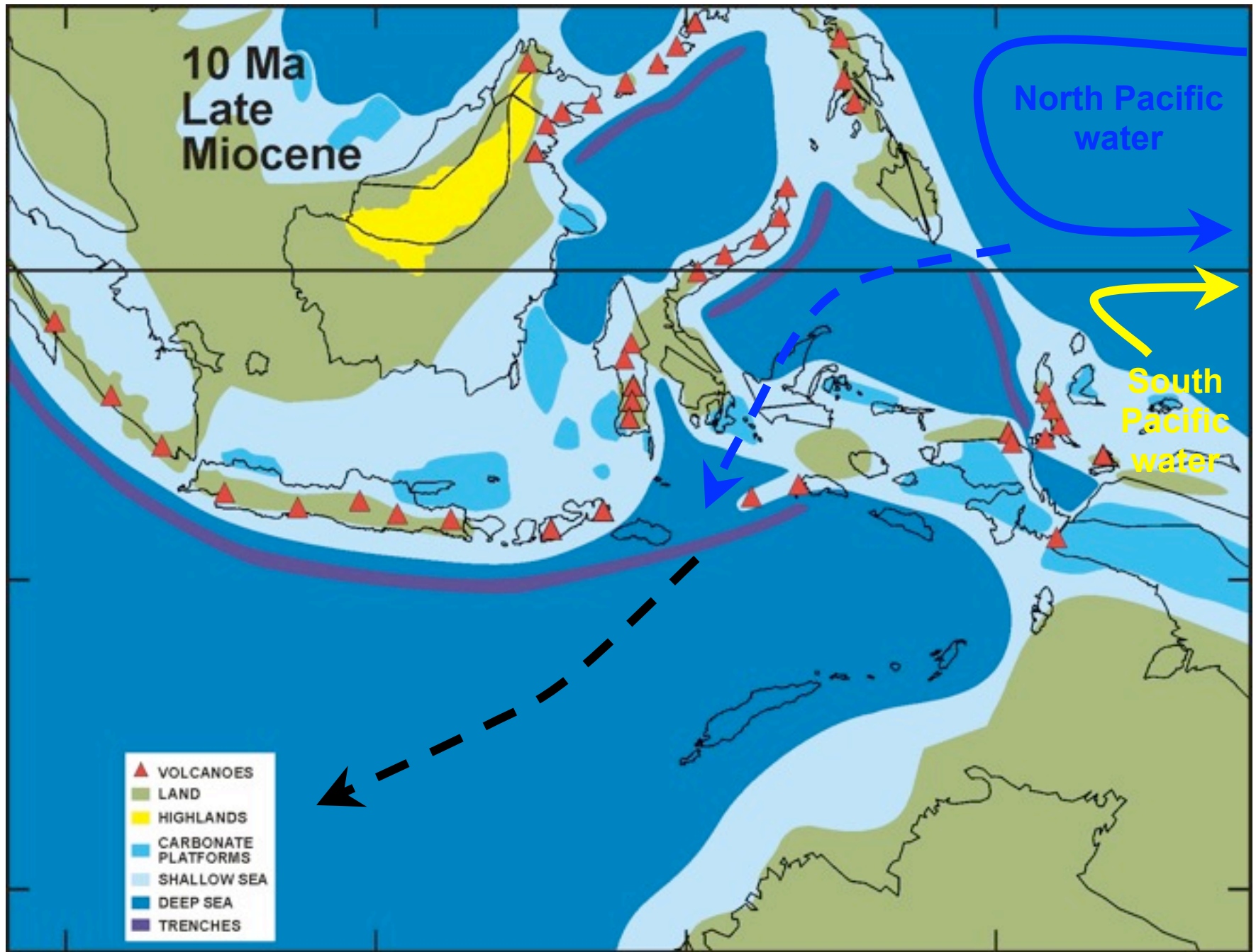
Late Eocene

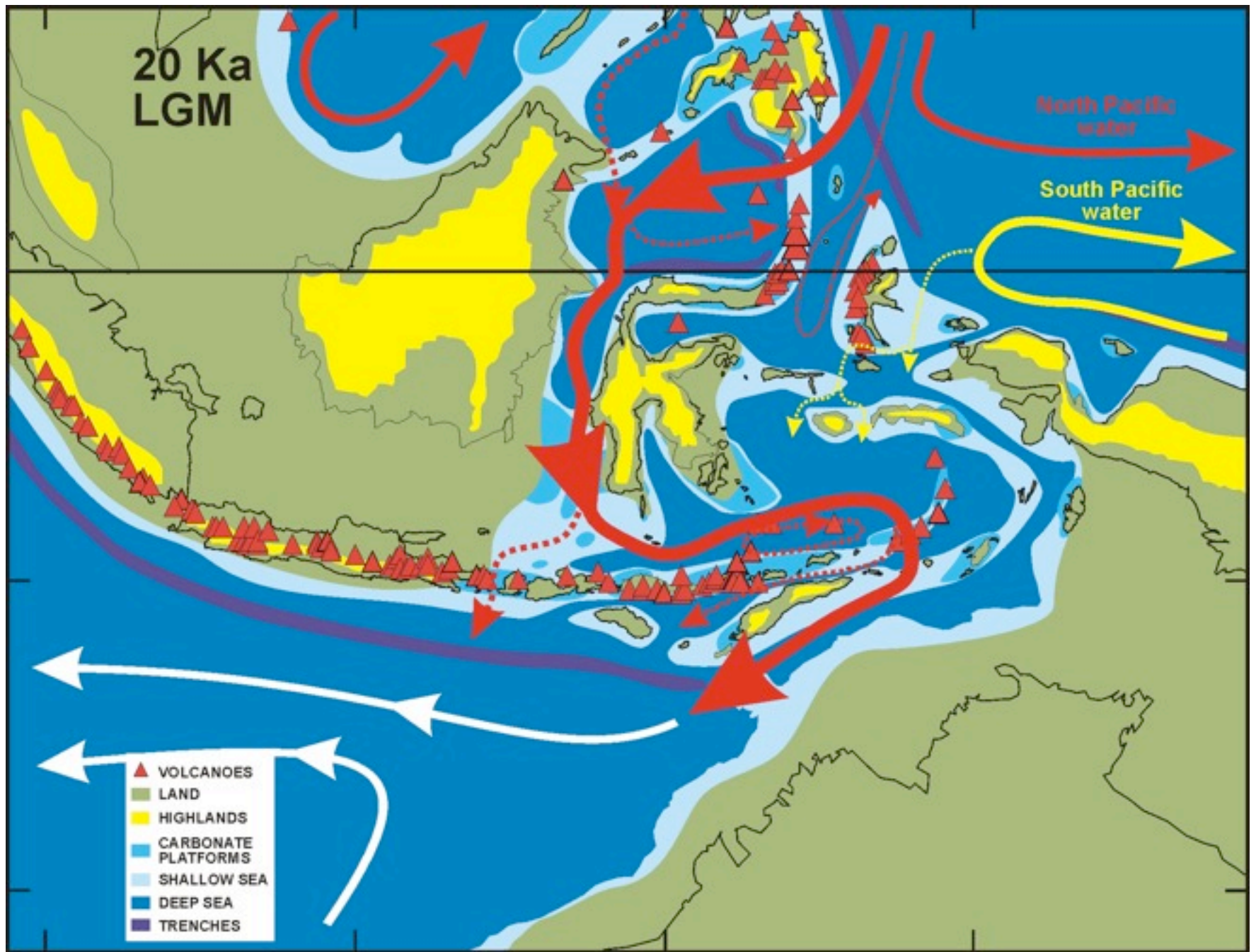
Wilson and Rosen (1998)

The Indonesian Throughflow is the only tropical ocean gateway and a major control on the global climate.











Our main questions are:

- 1) When did it get so diverse?
- 2) What processes drove this diversification?
- 3) Is it possible to distinguish between regional and global drivers?



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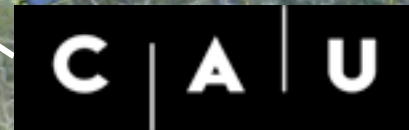
We want to address these questions using the fossil record





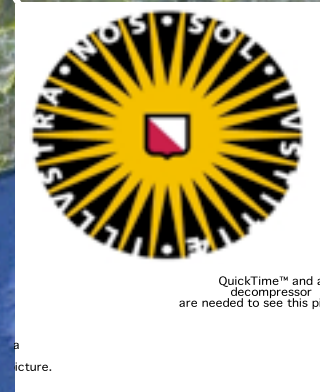
THROUGHFLOW includes participants from seven European Research Institutions, and four partners from outside Europe

NCB **naturalis**



Royal Holloway  
University of London

Christian-Albrechts-Universität zu Kiel



Google

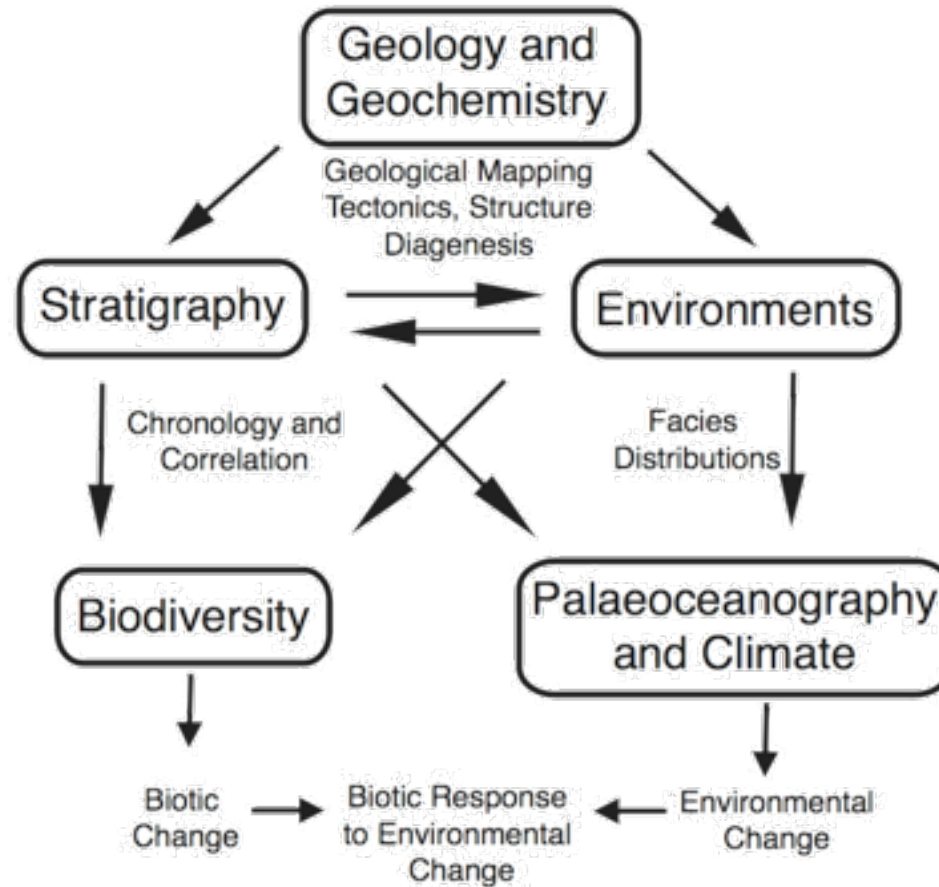


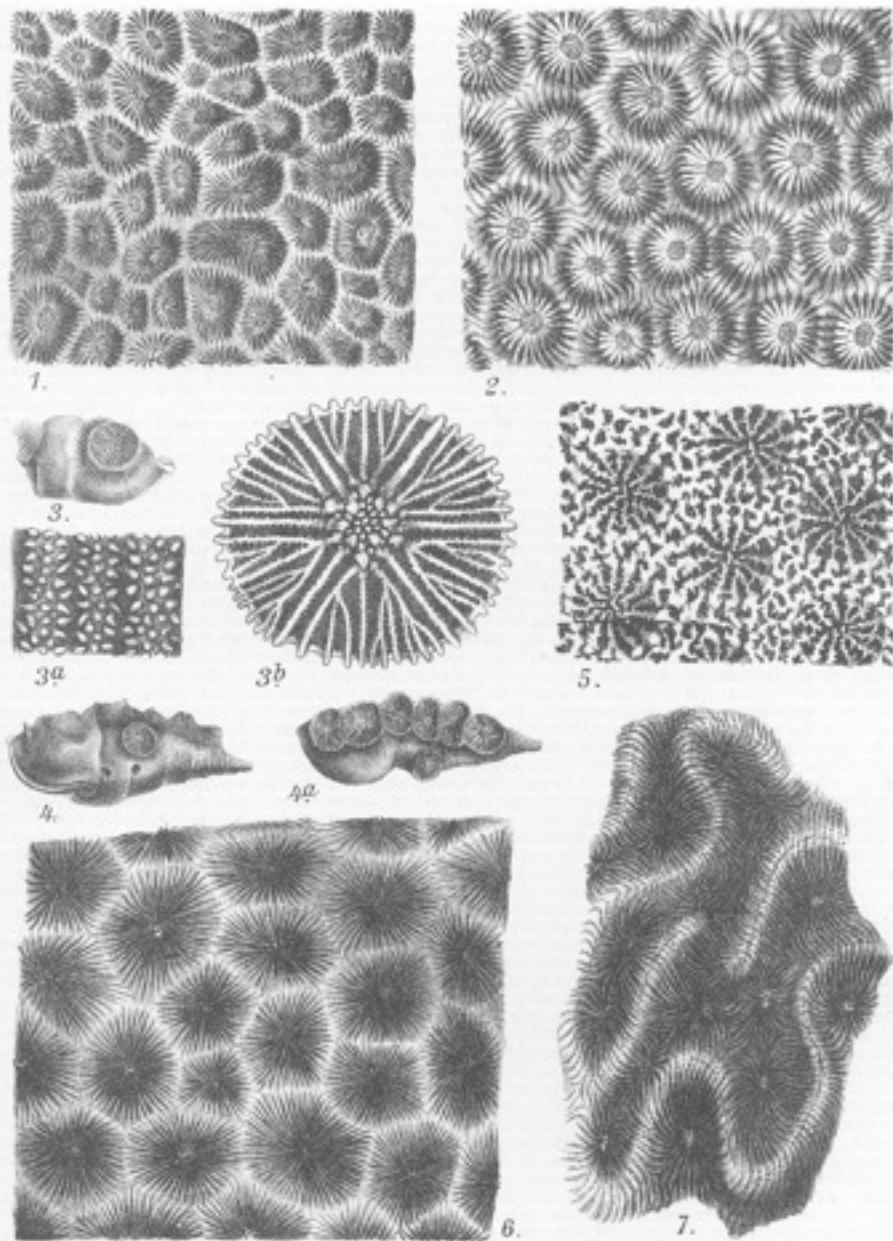
We work closely with the  
Geological Agency in  
Bandung



Wednesday, 26 October 2011

What do we need to know to answer this question?

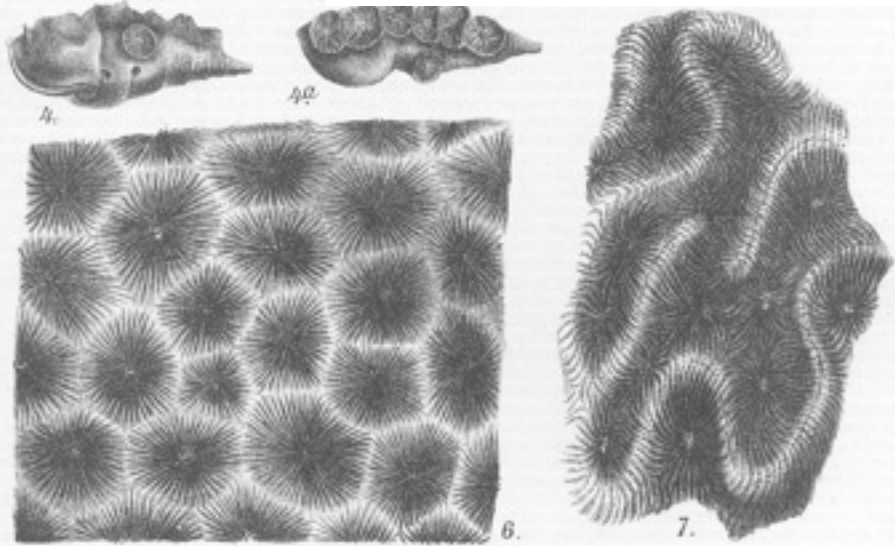
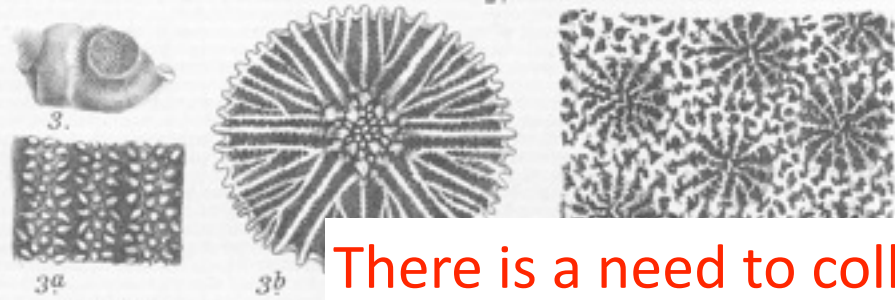
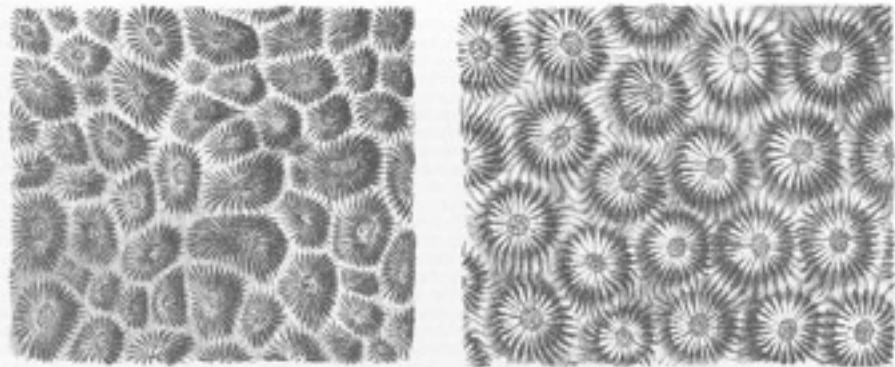




J. Felix: Jungtertiäre und quartäre Anthozoen von Timor und Obi.

Collections in museums  
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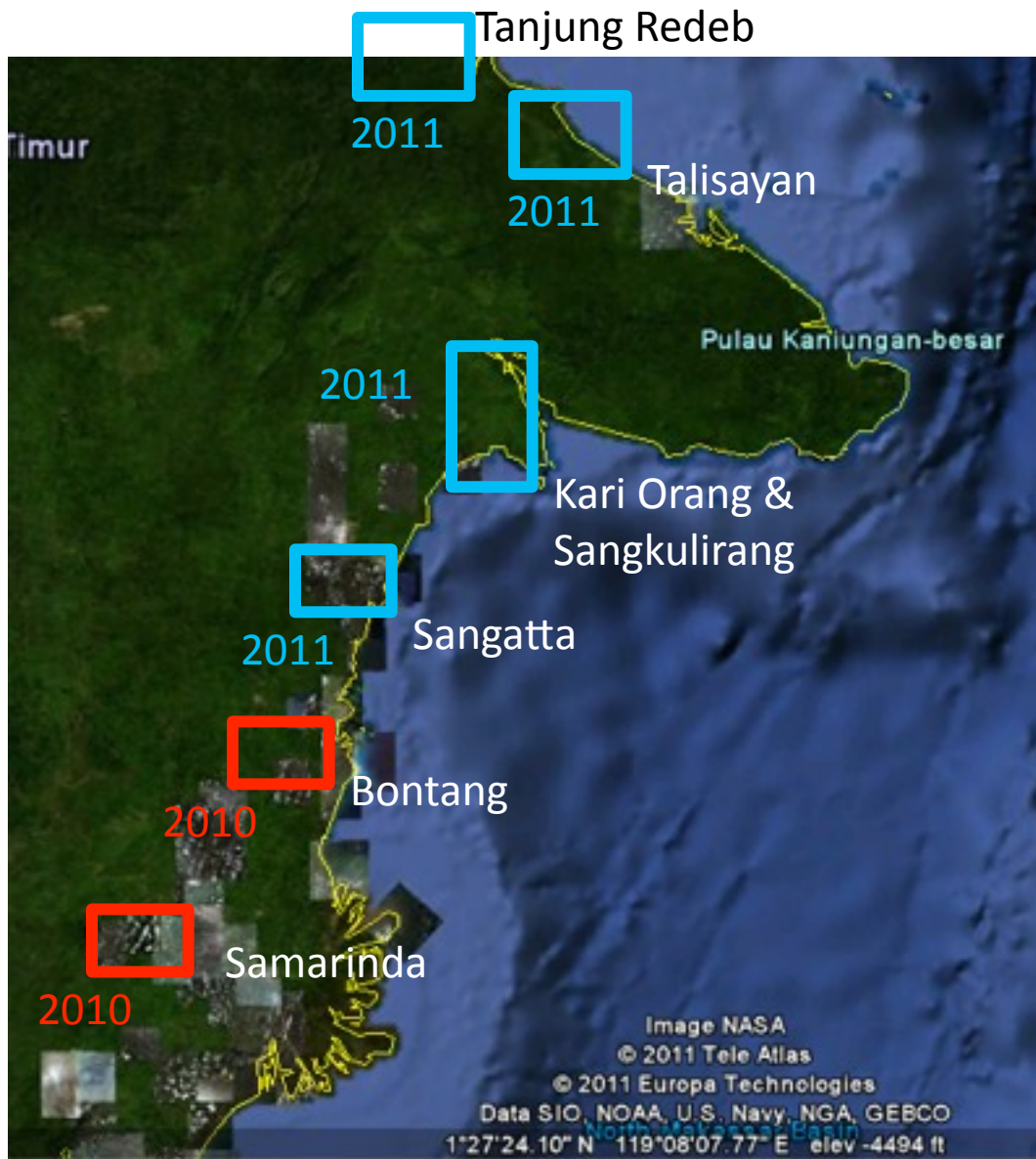
There is a need to collect more evidence





The fossil record is  
restricted to specimens  
collected in the early part  
of last century

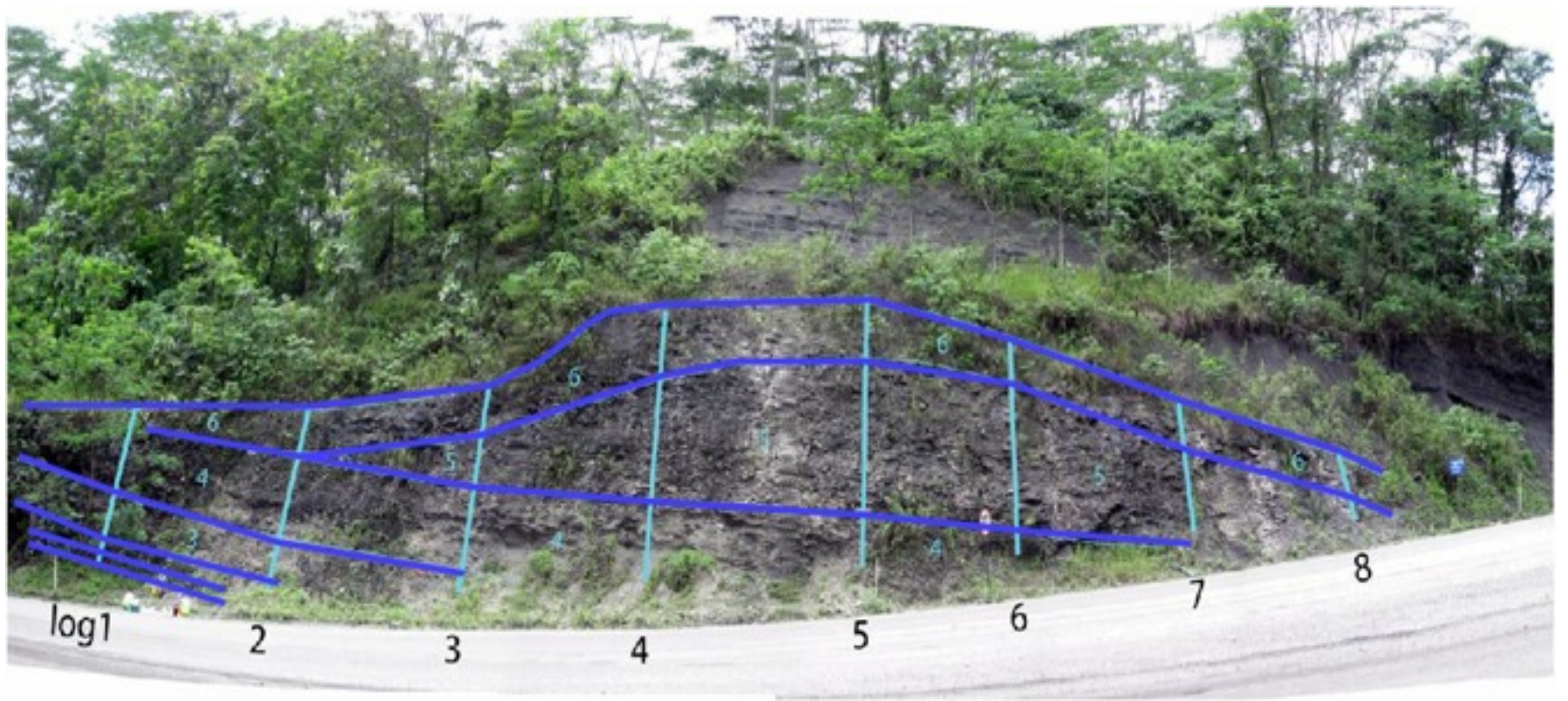




Our main study site is East Kalimantan which we visited in November 2010 and June 2011





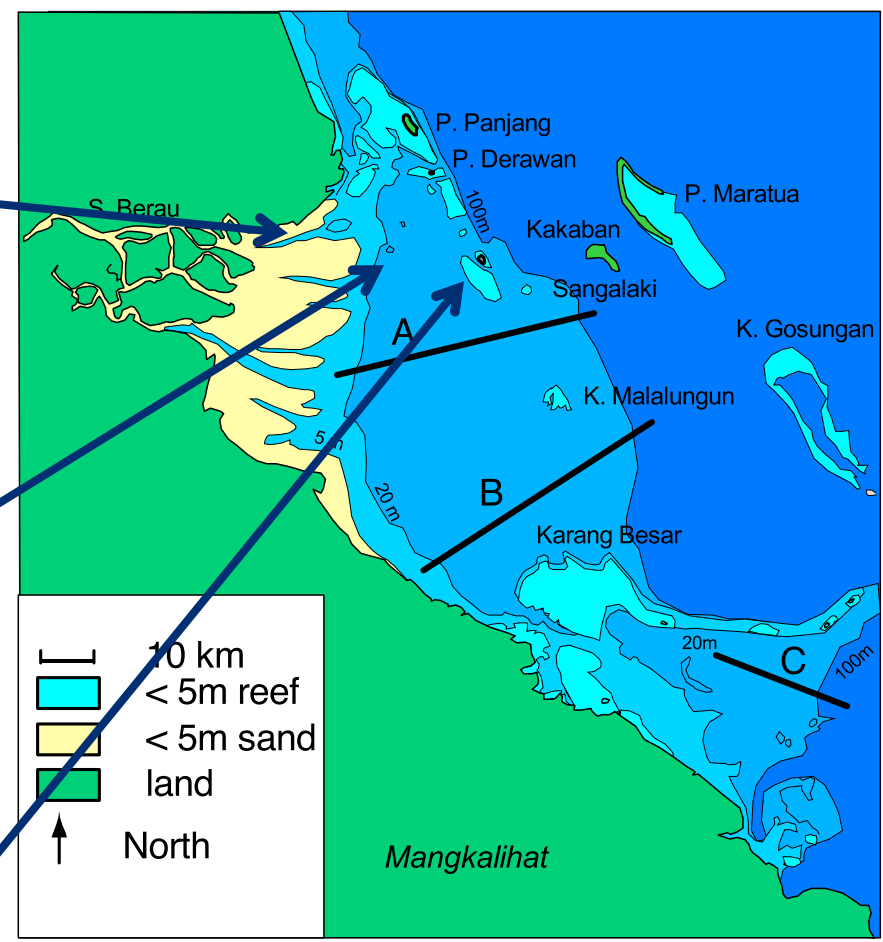
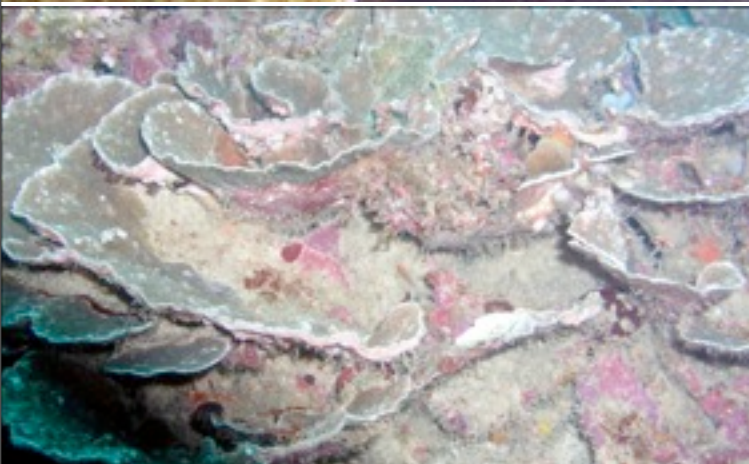




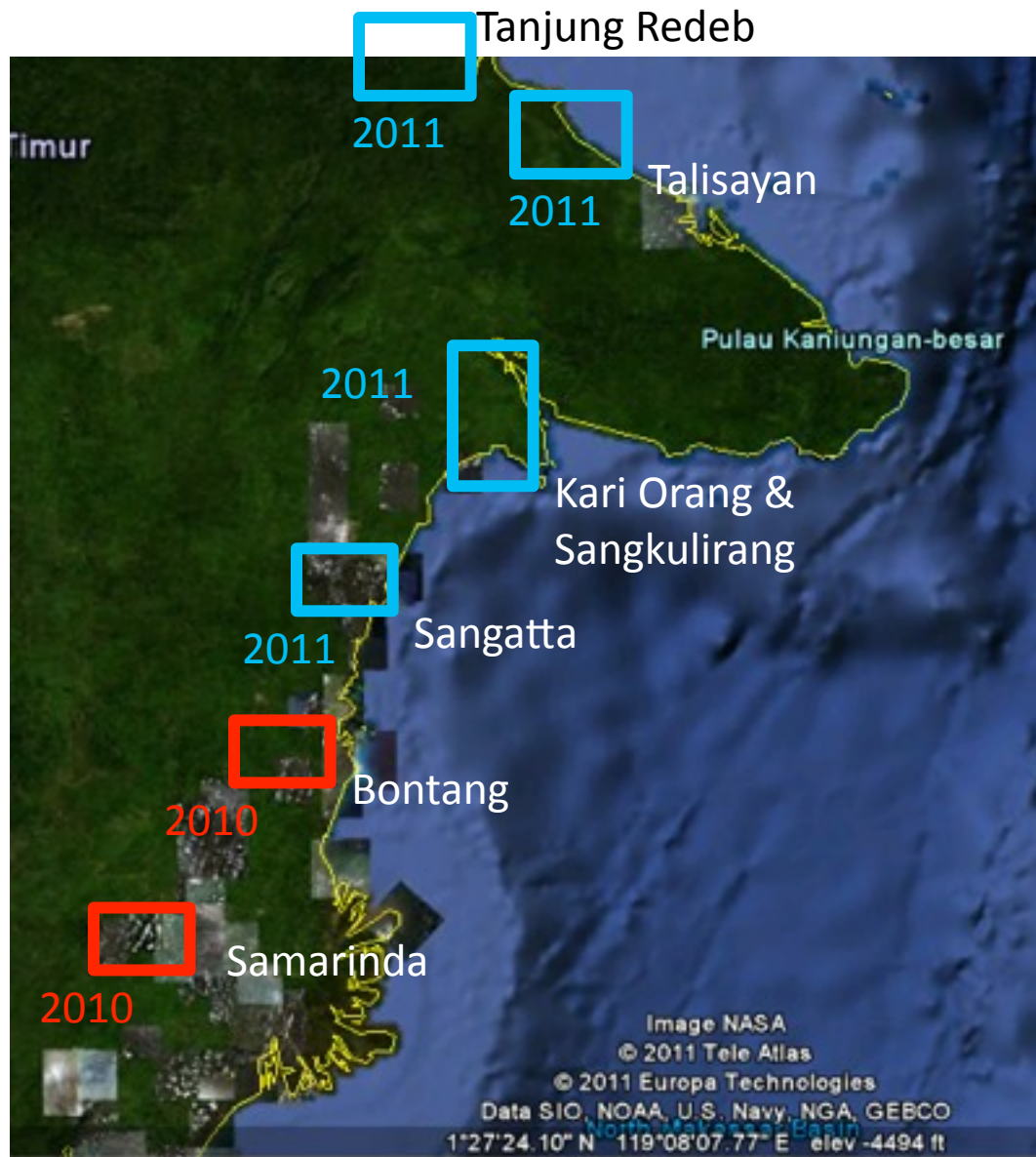




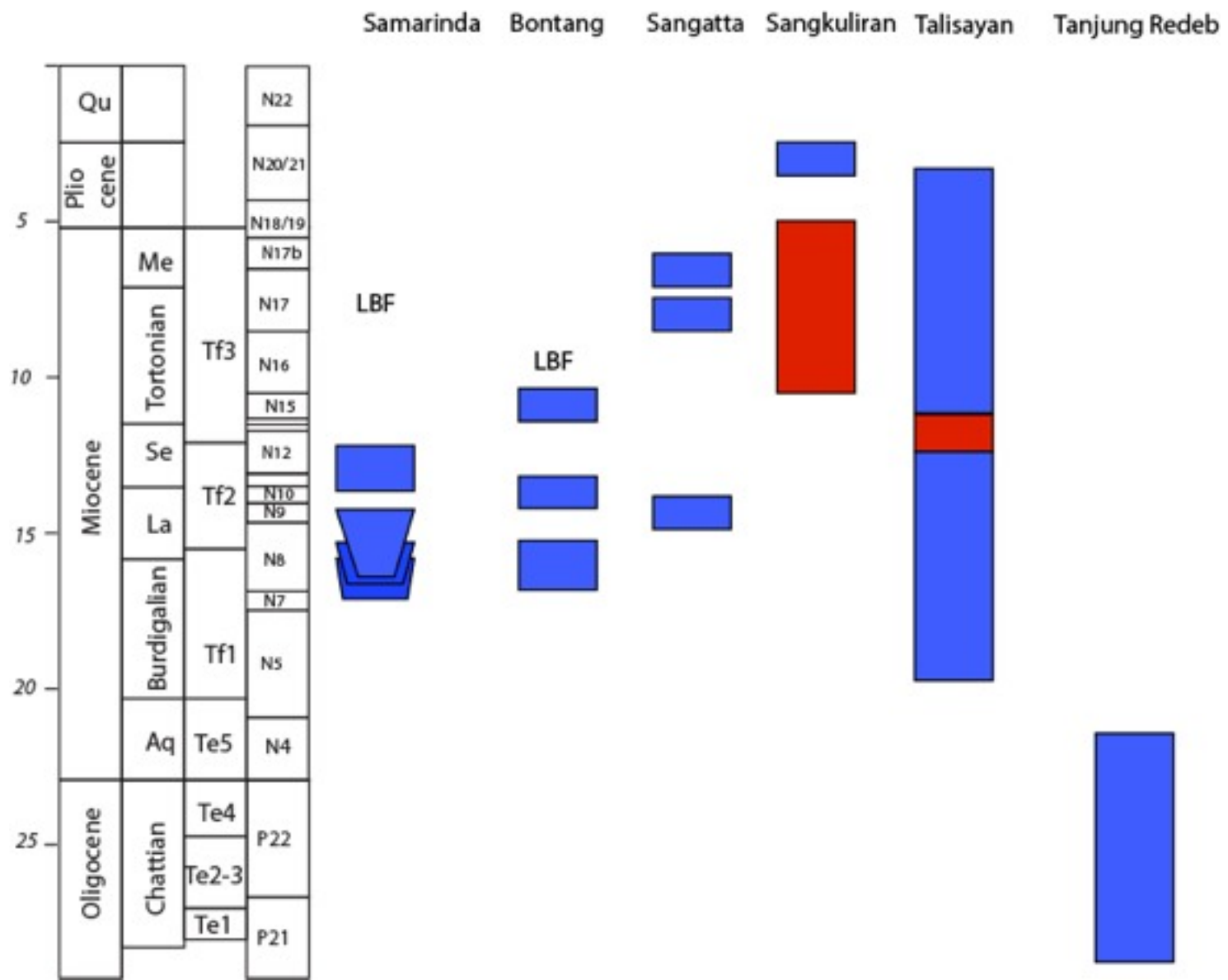




Is the fauna different due to temporal or environmental drivers

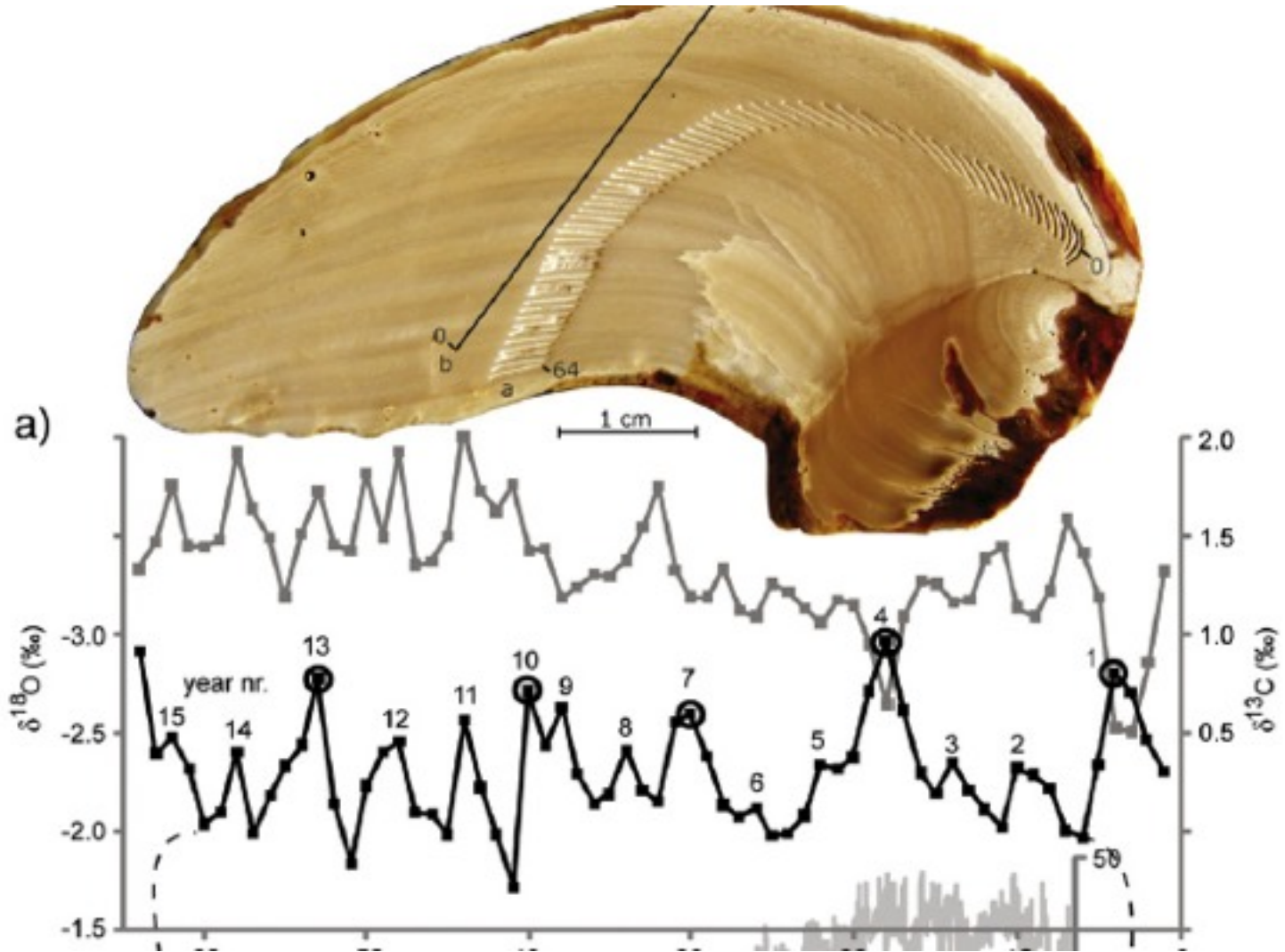


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Well preserved shells and coral colonies can be used to reconstruct past climates



Batenburg et al. 2011

Questions?

