DATING THE SERPENTINITE MUD PRODUCTION OF FANTANGISÑA SEAMOUNT USING CALCAREOUS NANNOFOSSILS AND PLANKTONIC FORAMINIFERA BIOSTRATIGRAPHY (IODP EXPEDITION 366)

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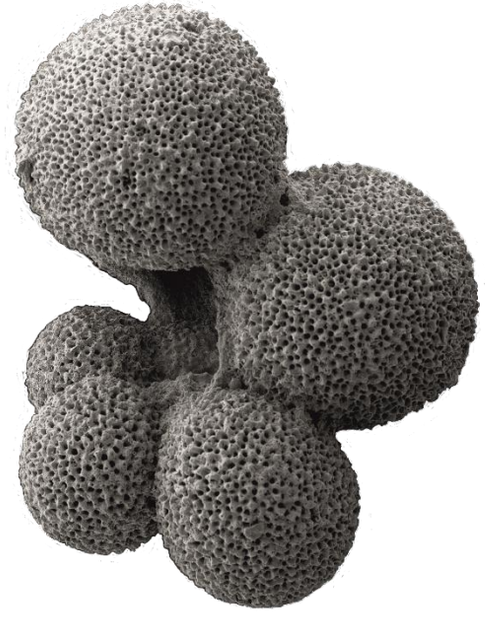
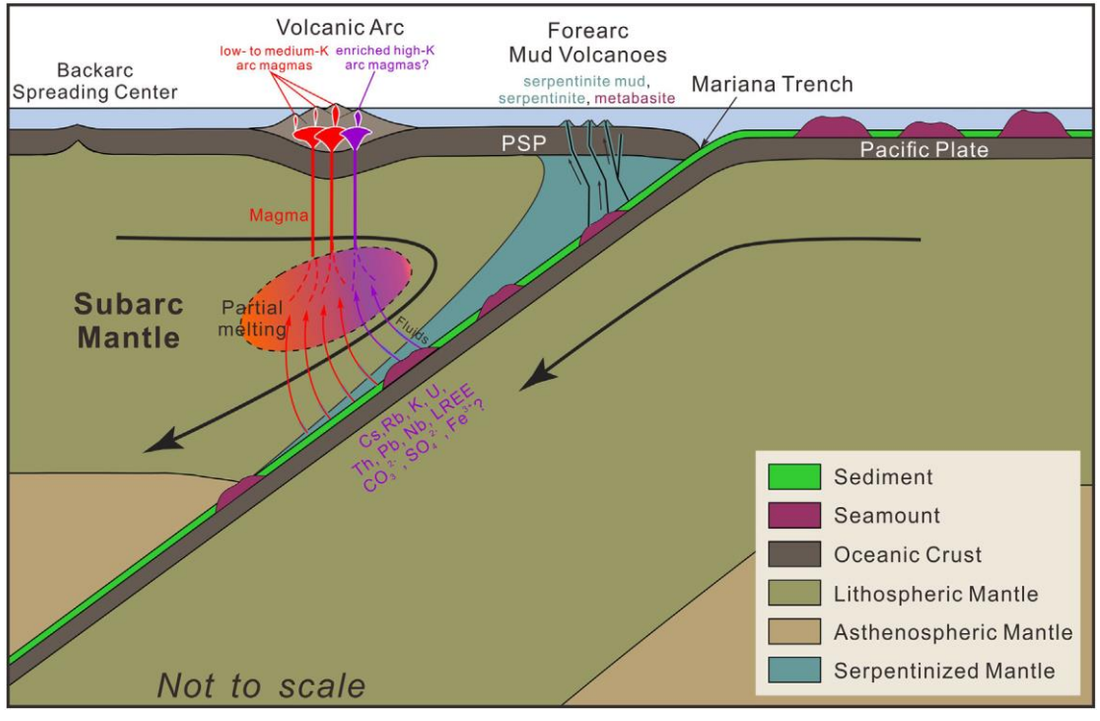
Aims of the study

- Establishing a stratigraphically well-calibrated record of serpentinite mud flow activity.
- Producing an age-depth model for the Fantangisña seamount.
- Sedimentation rates estimates.

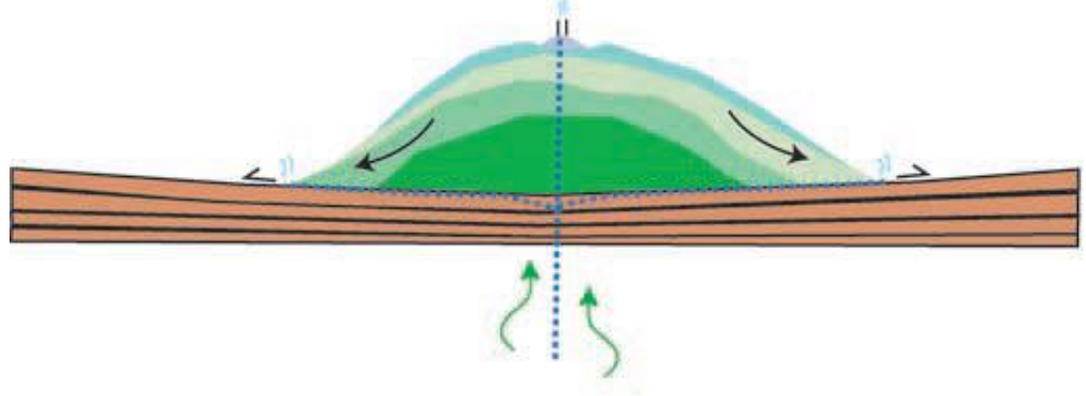


Serpentinite mud formation



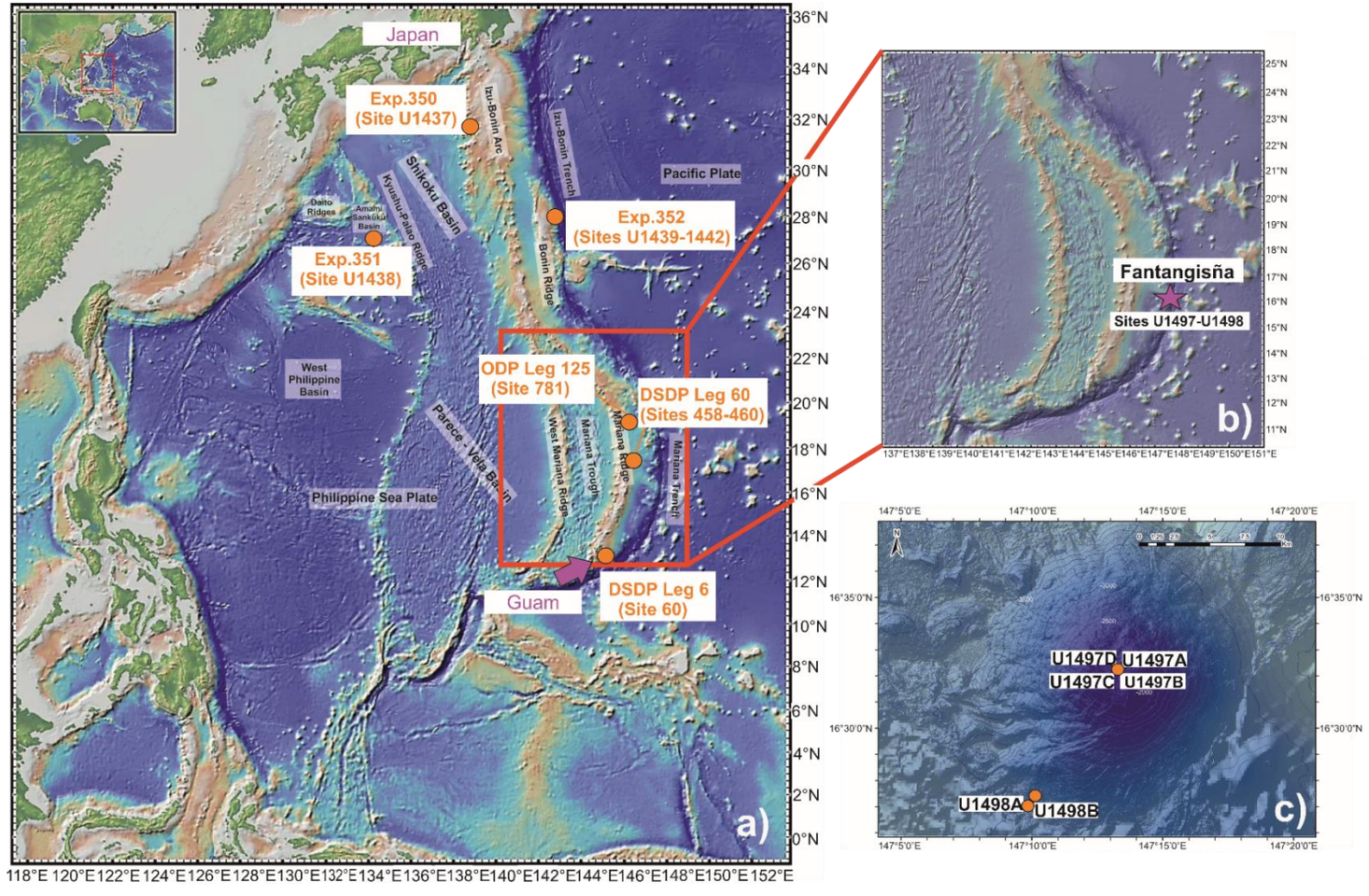
Deng *et al*. 2021

- The slab-derived fluids cause the serpentinization of the harzburgite.
- Fluids episodically arise to the surface through a series of faults and extrude.



Oakley *et al*. 2007

Geological setting/Sites location

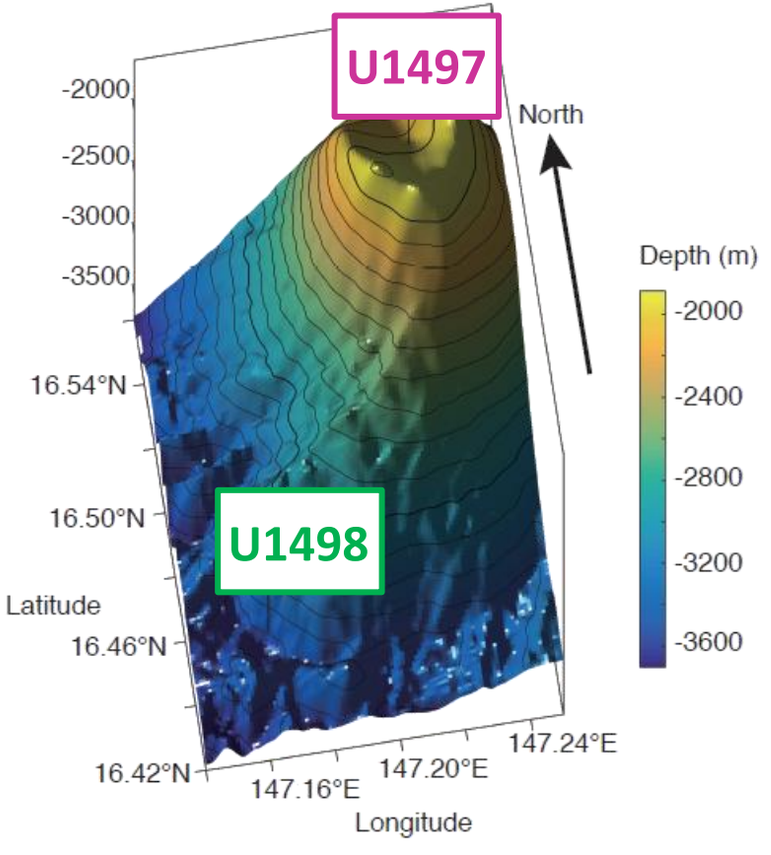


IODP Site	Latitude	Longitude	Water depth (m)
U1497A	16 32.2536 N	147 13.2642 E	2019.24
U1497B	16 32.2528 N	147 13.2606 E	2018.22
U1498A	16 27.0898 N	147 09.8502 E	3496.21
U1498B	16 27.3716 N	147 10.1166 E	3284.70

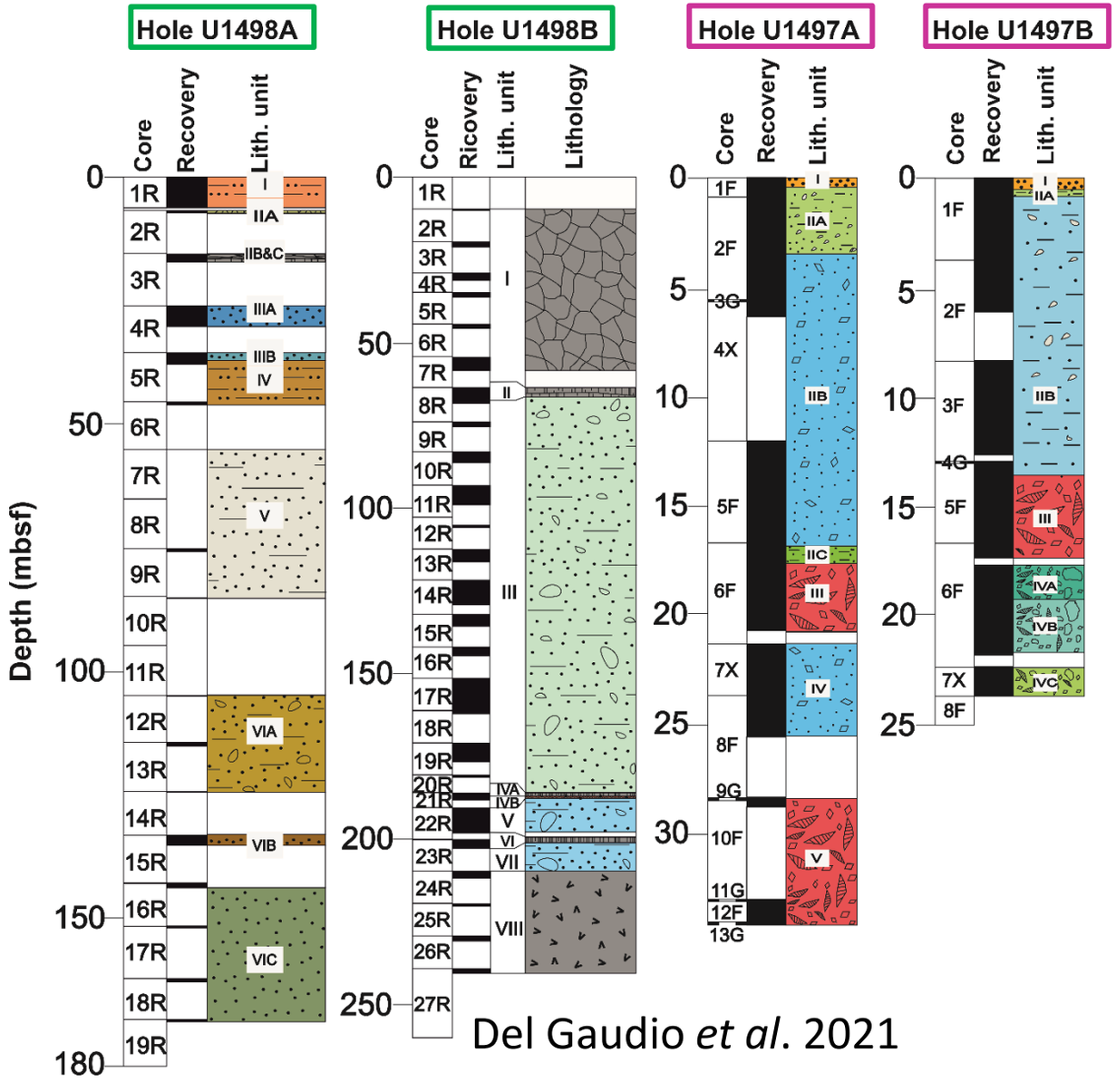
- The Izu-Bonin-Mariana (IBM) is located in the NW Pacific Ocean (12°N to 35°N).
- Targeted seamount: Fantangisña (IODP Expedition 366).
- Previous attempts to date serpentinite mud:
  ODP Leg 125
  DSDP Leg 60
  IODP Exp. 366 (Site U1497-98) **10.77Ma** (Menapace *et al*. 2019)

Del Gaudio *et al*. 2021

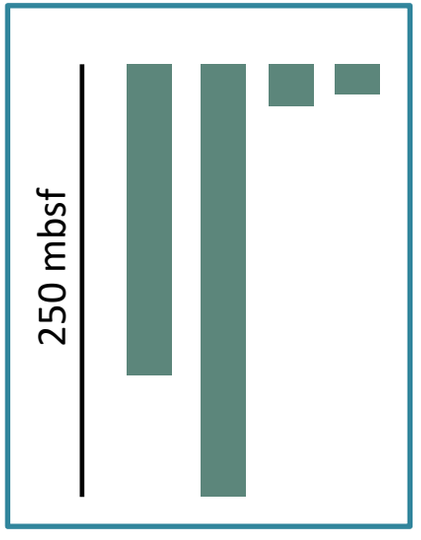
Lithological overview



Fryer *et al*. 2018



Del Gaudio *et al*. 2021



Analyzed material from each site **in scale**

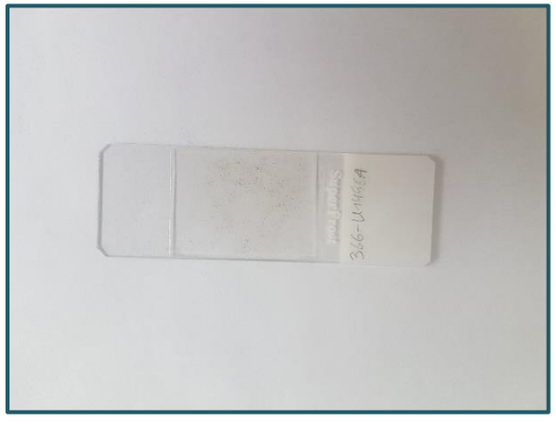
Methodology

Planktonic foraminifera

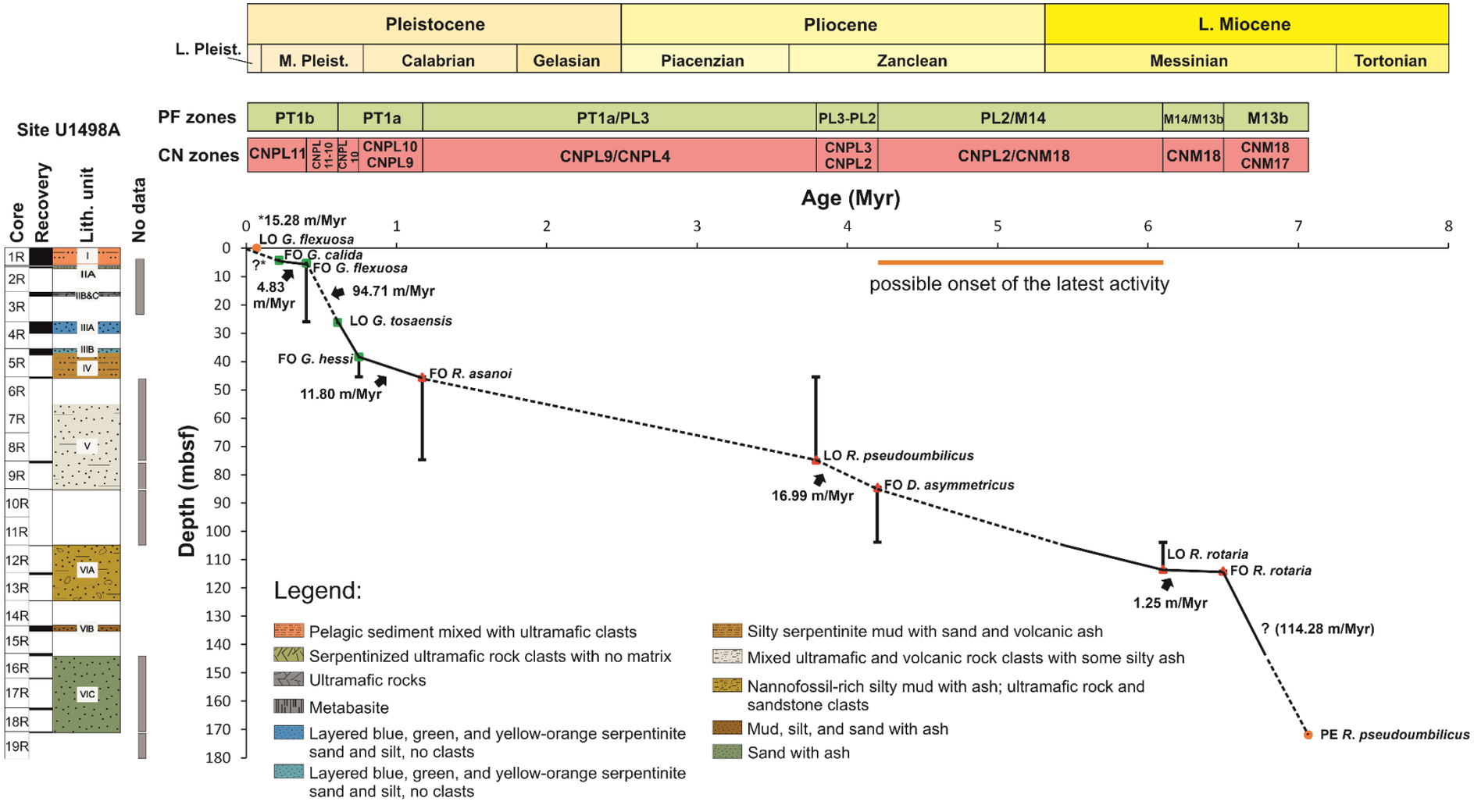
- 98 samples processed
- Sample preparation: Sieving
- Stratigraphic distribution
- Abundances (e.g., common, abundant)
- FO (first occurrence) and LO (last occurrence) of marker taxa

Calcareous nannofossils

- 81 samples processed
- Sample preparation: smear slide technique
- Stratigraphic distribution
- Abundances (e.g., common, abundant)
- FO and LO of marker taxa



Results

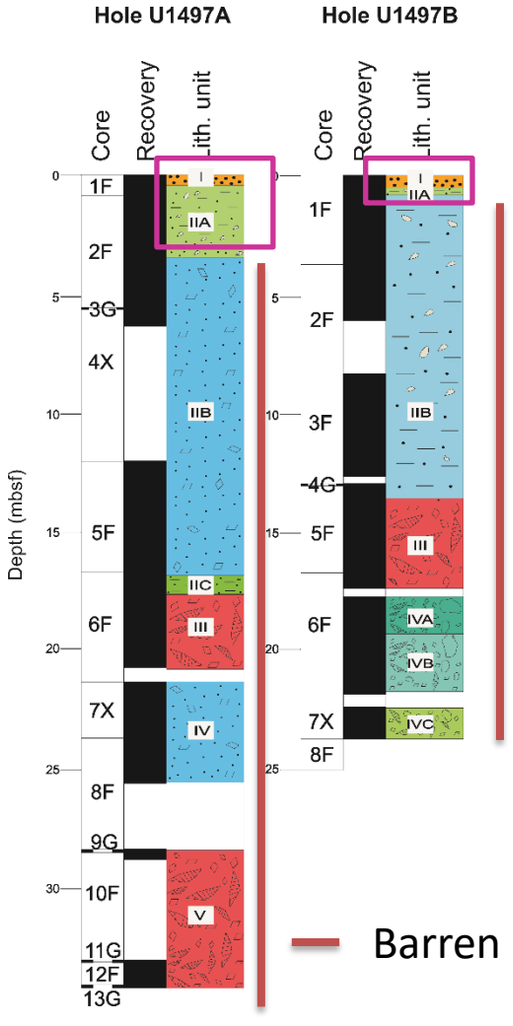


- Latest phase of activity between 6.10 Ma and 4.20 Ma.
- Forearc deposits not older than 7.10 Ma.
- Onset coincident with Mariana Through rifting (6-7 Ma).
- Changes in sed. rates linked to tectonic processes.

Del Gaudio *et al*. 2021

Results

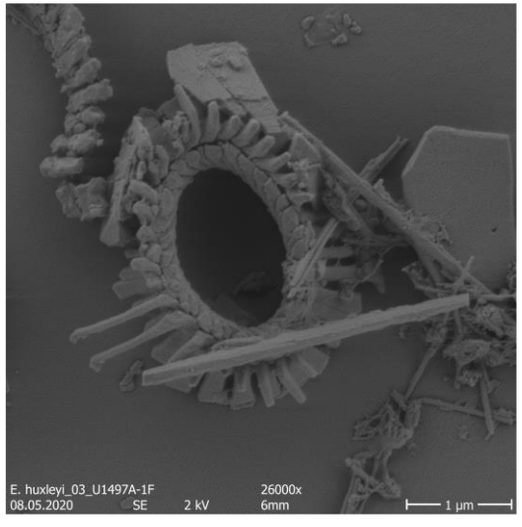
Site U1497



Barren intervals

Pleistocene events

FO. *G. calida* 0.22 Ma (Wade *et al*. 2011)

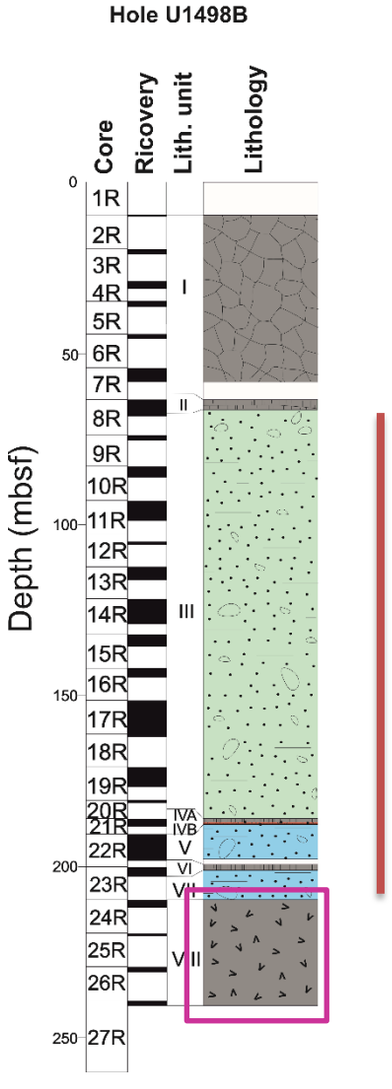


Gephyrocapsa spp. and *E. huxleyi* shift in dominance 0.09 Ma (Gradstein *et al*. 2012).

- Youngest serpentinite mud flows deposited in late Quaternary.

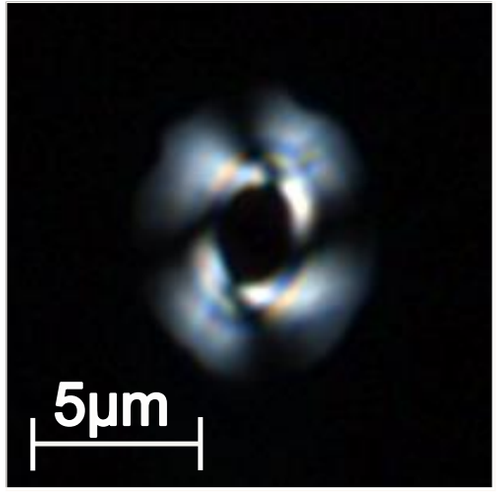
Results

Site U1498B

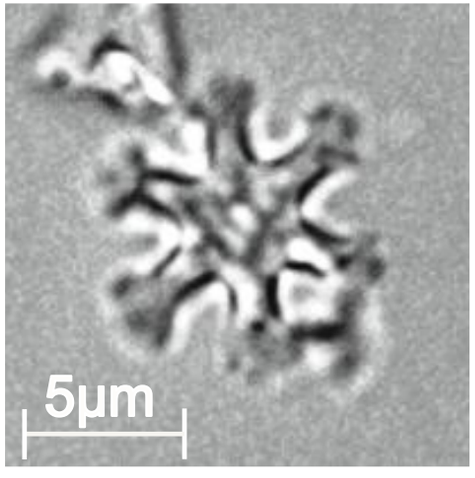


Barren intervals

Late Miocene events (Messinian)



PE *R. pseudoumbilicus*
7.10 Ma (Gradstein *et al.*, 2020)



FO. *D. surculus*
8.29 Ma (Young, 1998)

- Forearc deposits in U1498B coeval with U1498A.

Conclusion

- The refinement of the biostratigraphy for Fantangisña seamount.
- The construction of a better-defined age-depth model and sedimentation rate estimates for the whole studied stratigraphic sequence at Site U1498A.
- Latest phase of activity of Fantangisña at 6.10-4.20 Ma linked to Mariana rifting.
- Evidence of the relationship between variations in sedimentation rates (mud production) and tectonic processes in the Mariana region during the past 7 Ma.
- Youngest serpentinite mud deposits in U1497 (0.09-0.22 Ma).
- Forearc deposits in U1498 Hole A and B coeval (<7.10 Ma).

Thanks for the attention

Sunset in Guam before departure of Exp. 366 (Credit: Barbara Bekins & IODP)