

CL1.1.1 – Deep-time climate change :
insights from models and proxies

SPATIAL HETEROGENEITY OF THE LATE MIOCENE BIOGENIC BLOOM

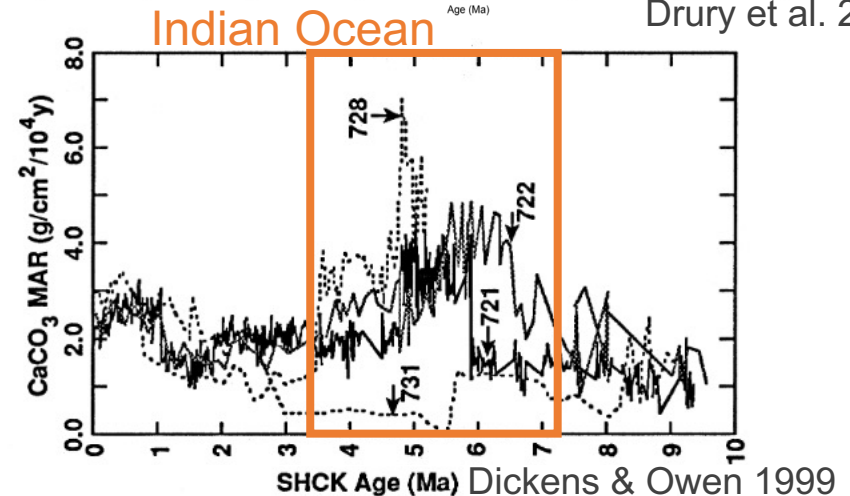
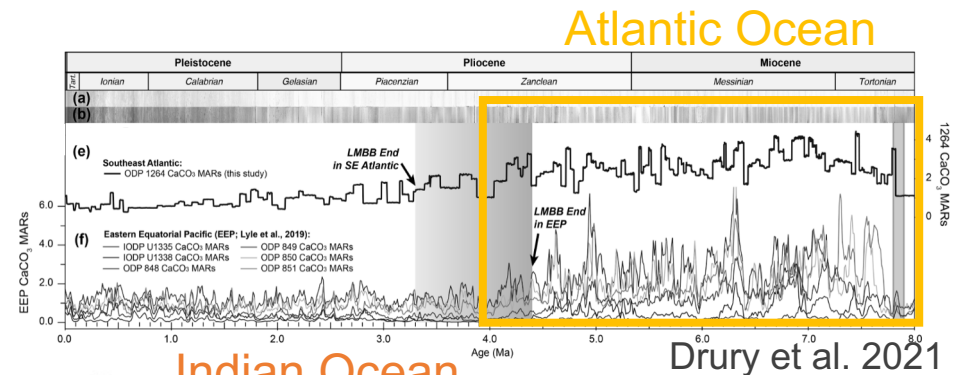
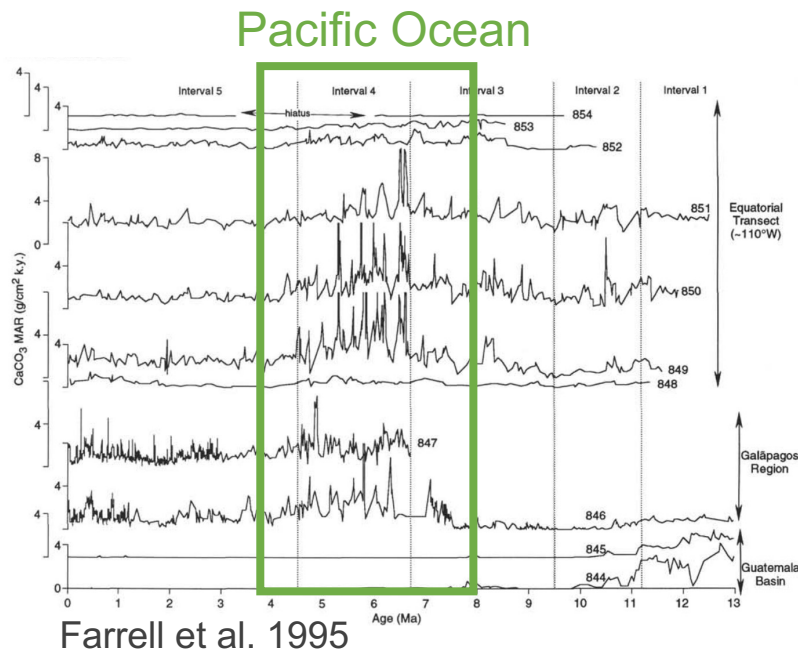
Quentin Pillot ^{1*}, Baptiste Suchéras-Marx ¹, Anta-Clarisse Sarr ¹, Clara T. Bolton ¹,
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INTRODUCTION

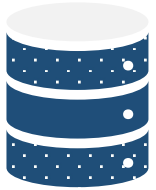
The Late Miocene Biogenic Bloom (LMBB) is characterized by **high accumulation rates** of opals from diatoms and **high calcite accumulation rates** from calcareous nannofossils and planktic foraminifera.



2 SCENARIOS

- A global **increase** in the supply of **nutrients to ocean** basins through chemical alteration of the continents
- A major **redistribution of nutrients** in the oceans

METHODS



Ocean drilling data compilation (ODP-IODP)

- From **25** publications
- **155** datasets (122 from Pangea)
- **118** different deep-sea drilling Sites

BIOGENIC BLOOM

Biogenic Bloom is **clearly identifiable** with a reasonable resolution

CONTROVERSIAL

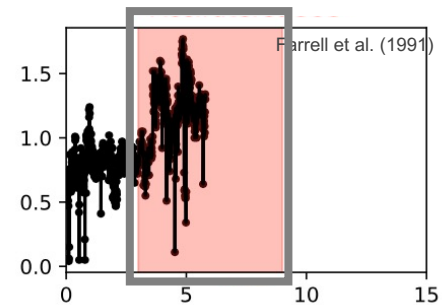
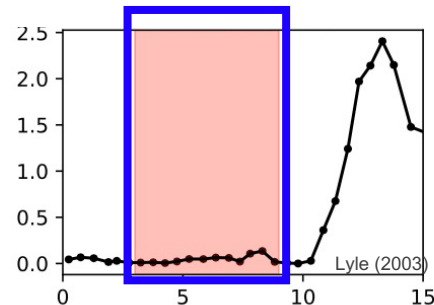
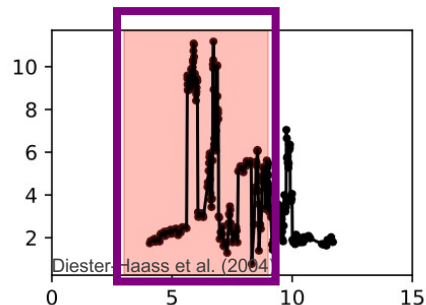
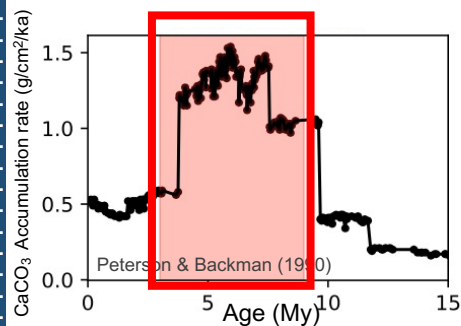
Occurrence of the Biogenic Bloom is **controversial**

NO BIOGENIC BLOOM

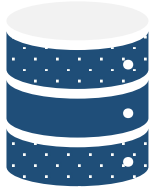
No Biogenic Bloom signature in the signal

UNKNOWN

Not enough data **before or after** the interval of interest to robustly identify an increase



METHODS



Ocean drilling data compilation (ODP-IODP)

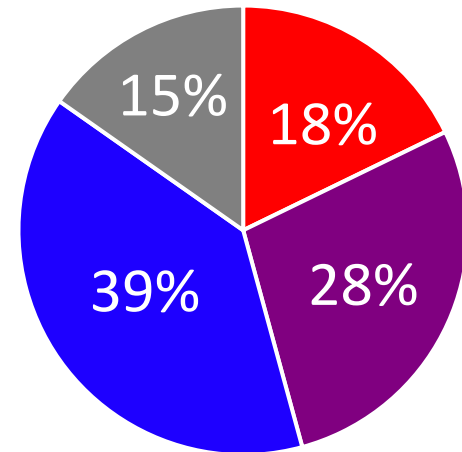
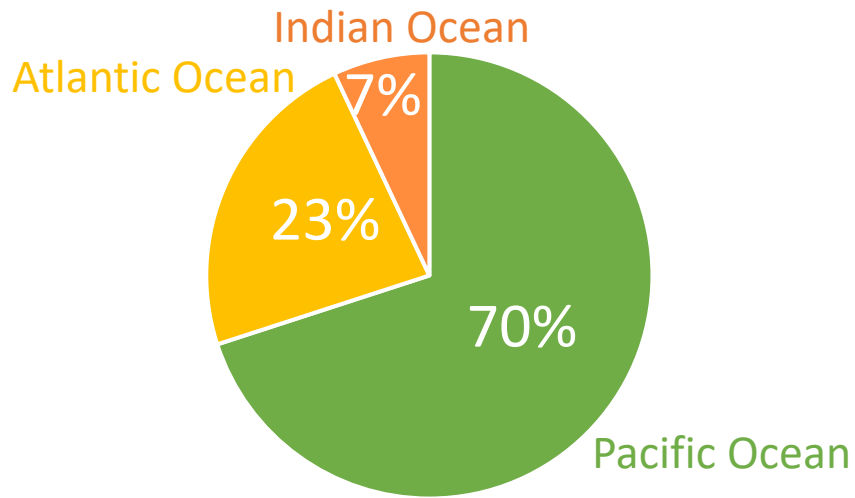
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- **155** datasets (122 from Pangea)
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BIOGENIC BLOOM

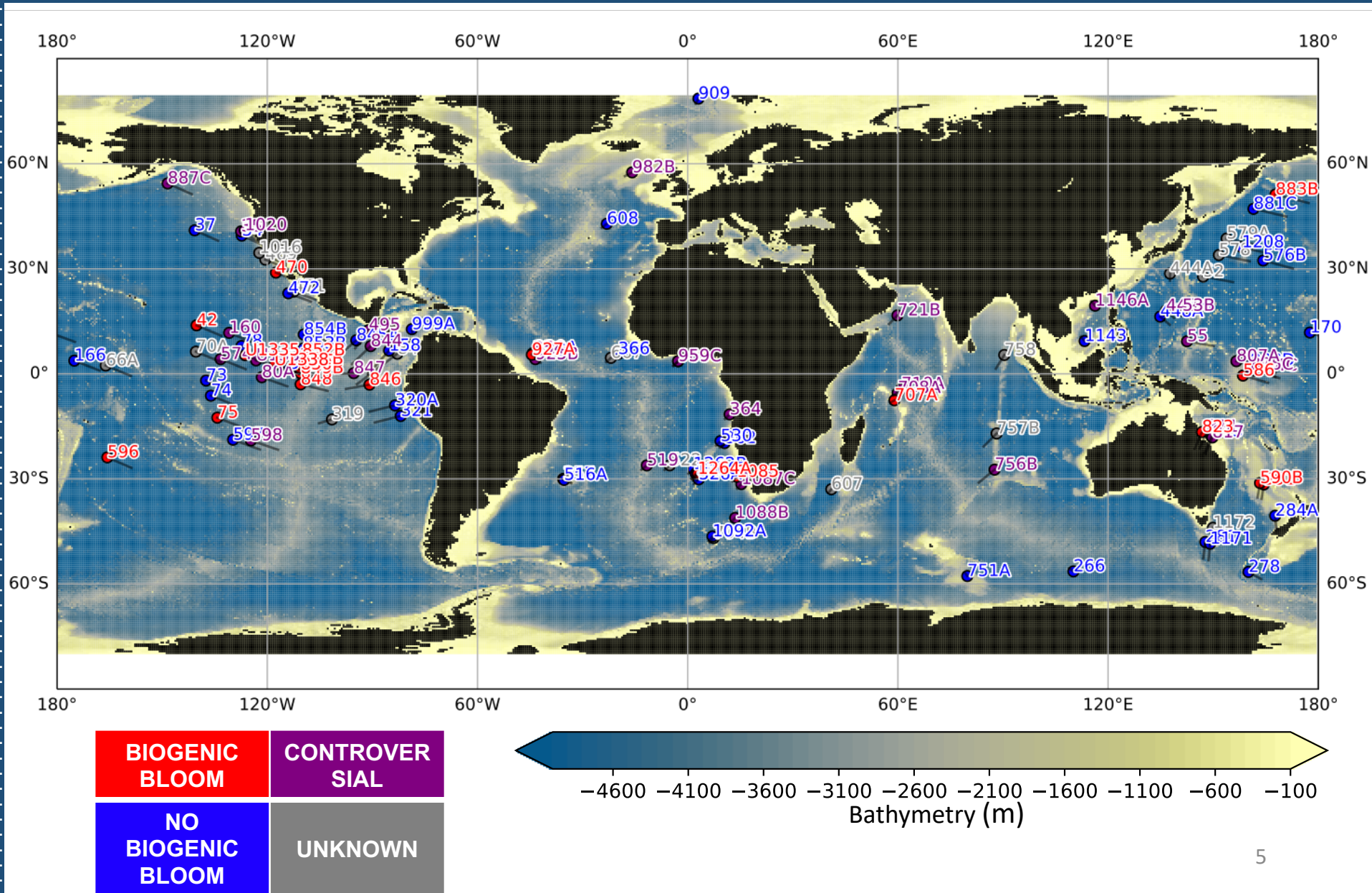
CONTROVERSIAL

**NO BIOGENIC
BLOOM**

UNKNOWN



RESULTS

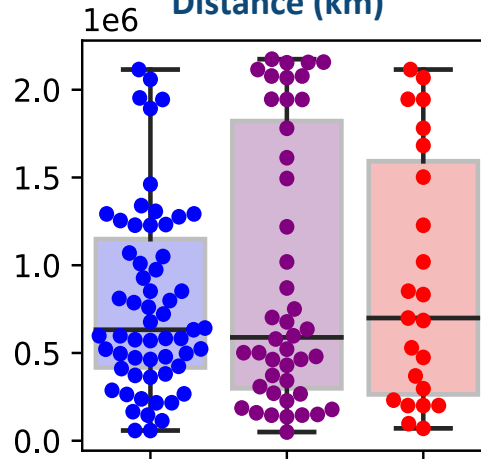


RESULTS AND DISCUSSION

STATISTICAL STUDIES

- Latitude
- Depth
- Resolution
- **Paleoproductivity**
- Actual productivity
- **Distance from the nearest coast**

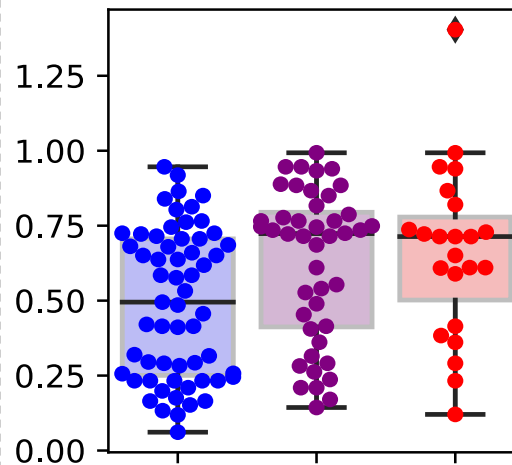
Distance (km)



Sites "Biogenic Bloom" are **not closer to the coast** than the sites "No Biogenic Bloom"

Contradict the scenario "increased nutrient input from the continents"

Paleoproductivity ($\text{g}/\text{m}^2/\text{day}$)



The Biogenic Bloom is **mostly present** at sites located in areas of **high productivity**

Consistent with a scenario of intensified ocean circulation

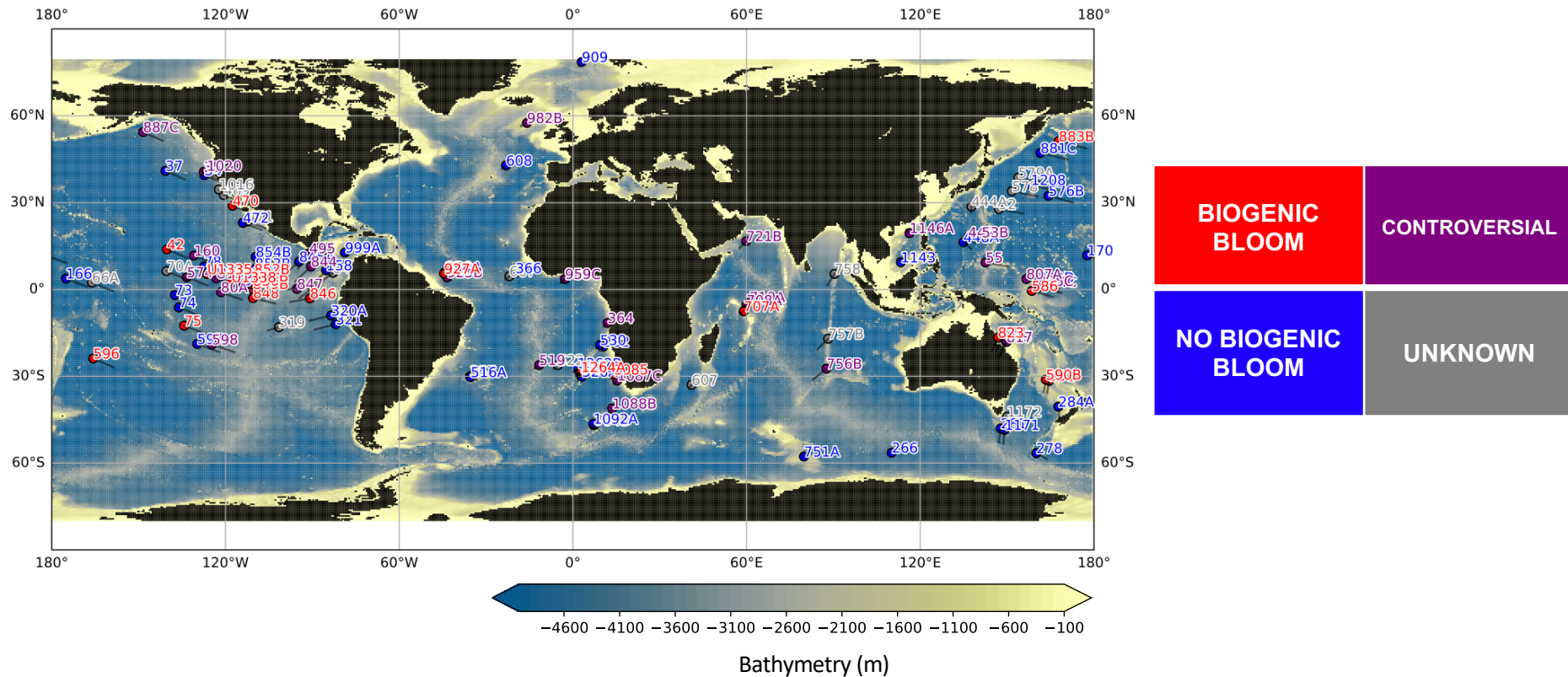
NO BIOGENIC
BLOOM

CONTROVERSIAL

BIOGENIC BLOOM

TAKE HOME MESSAGE

THE LATE MIOCENE BIOGENIC BLOOM IS A GLOBALLY DISTRIBUTED BUT NOT GLOBAL EVENT

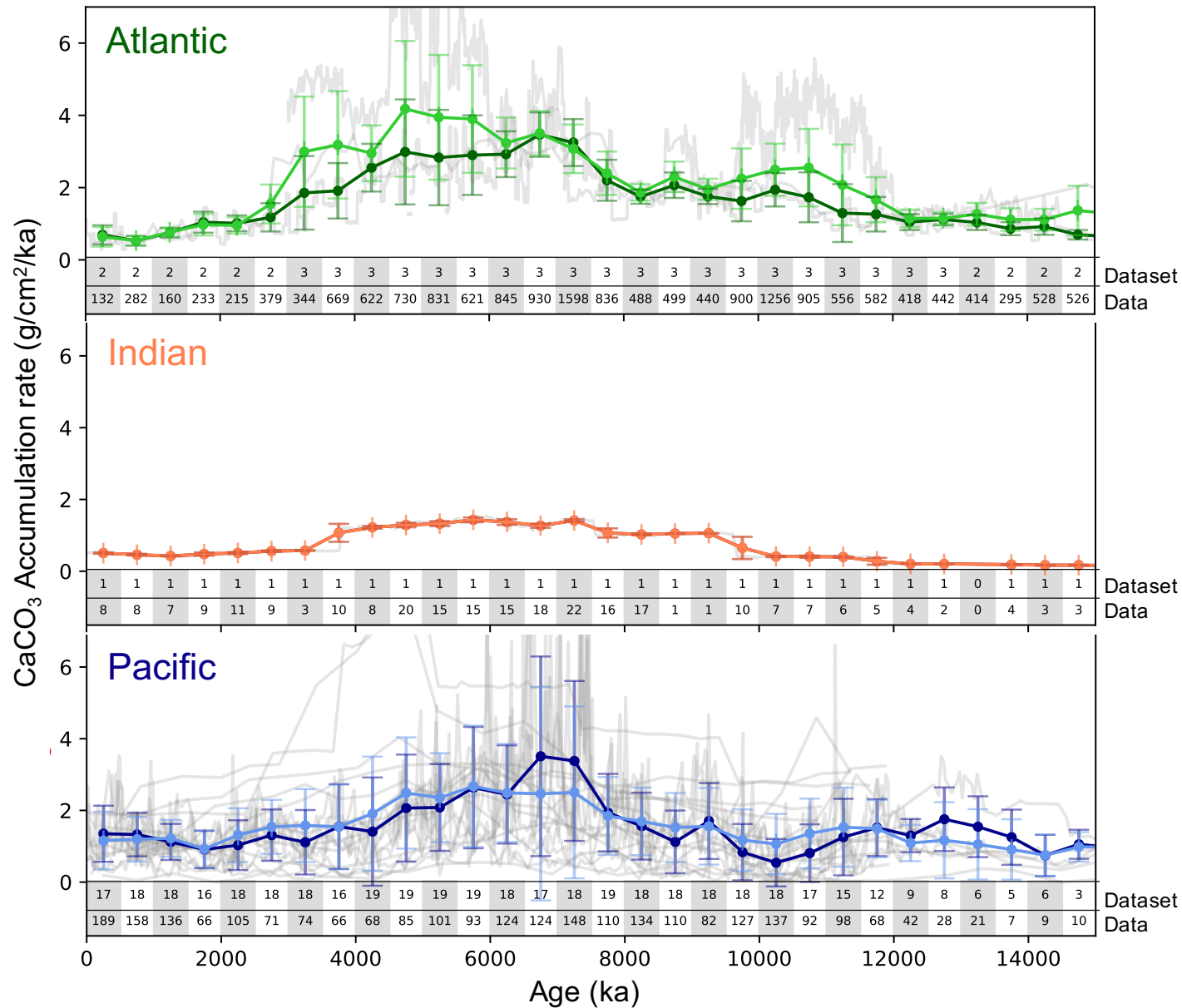


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THANKS YOU FOR YOUR ATTENTION



RESULTS



PUBLICATIONS	NUMBER OF DATA SETS	VARIABLES PRESENT IN THESE DATA SETS
Breza, 1992	1	Sed rate
Diester-Haass et al., 2004	2	Acc rate CaCO ₃
Diester-Haass et al., 2005	3	Sed rate, Acc rate CaCO ₃ , CaCO ₃ , DBD
Diester-Haass et al., 2006	4	Sed rate, MAR, Acc rate CaCO ₃ , CaCO ₃
Drury et al., 2020	1	Sed rate, CaCO ₃ , Acc rate CaCO ₃ , MAR, DBD
Dutkiewicz et al., 2021	16	Acc rate CaCO ₃ , DBD, CaCO ₃ , Sed rate
Farrell et al., 1991	1	Sed rate, Acc rate CaCO ₃ , CaCO ₃ , DBD
Farrell et al., 1995	11	Sed rate, Acc rate CaCO ₃ , CaCO ₃ , DBD
Gardner et al., 1986	2	Sed rate, MAR, Acc rate CaCO ₃ , CaCO ₃
Grant et Dickens, 2002	1	Acc rate CaCO ₃ , CaCO ₃
Hayward et al., 2010	1	Sed rate
Hermoyian et al., 2001	5	Sed rate, DBD
Janecek et al., 1985	2	Sed rate, MAR, DBD
Lyle et al., 1995	11	Sed rate, Acc rate CaCO ₃ , CaCO ₃
Lyle et al., 2003	57	Sed rate, MAR, Acc rate CaCO ₃ , CaCO ₃ , DBD
Lyle et al., 2019	7	Sed rate, MAR, CaCO ₃ , DBD, bSiO ₂
Müller et al., 1991	1	Sed rate, MAR, Acc rate CaCO ₃ , DBD
Palike et al., 2012	4	Sed rate, MAR, CaCO ₃ , DBD, Acc rate CaCO ₃
Peterson et al., 1990	3	MAR, Acc rate CaCO ₃ , CaCO ₃
Si et Rosenthal, 2019	14	CaCO ₃ , MAR, Acc rate CaCO ₃ , Sed rate
Stax et al., 1993	4	MAR
Wagner et al., 2002	1	Sed rate, MAR
Wang et al., 2004	1	Acc rate opal, bSiO ₂
Winkler et al., 1999	1	Sed rate, MAR, Acc rate CaCO ₃ , CaCO ₃
Zhang et al., 2009	1	Sed rate, MAR, DBD