

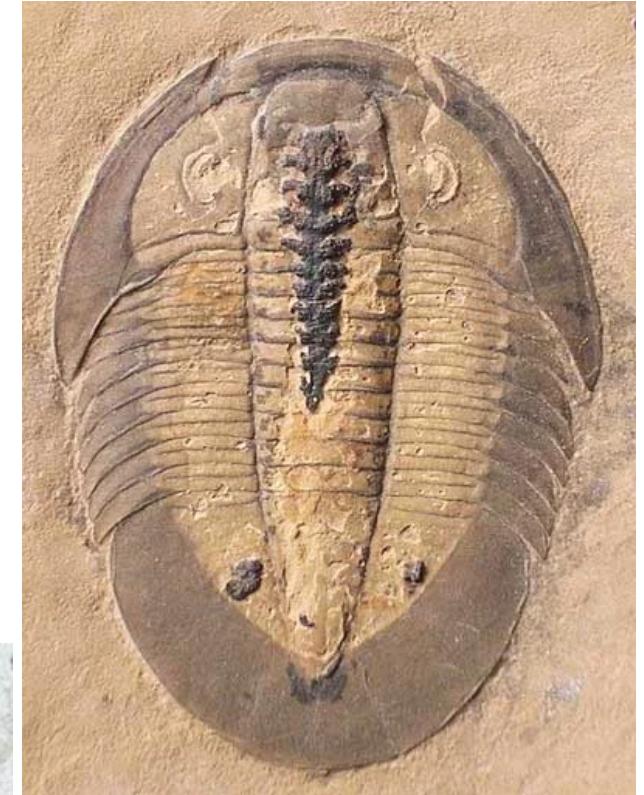
Analytical Paleobiology

Trilobite regional α -diversity pattern

Fabian Dirscherl

- **Introduction**

- Cambrium to Permian
- Highly diverse class
- Index Fossil



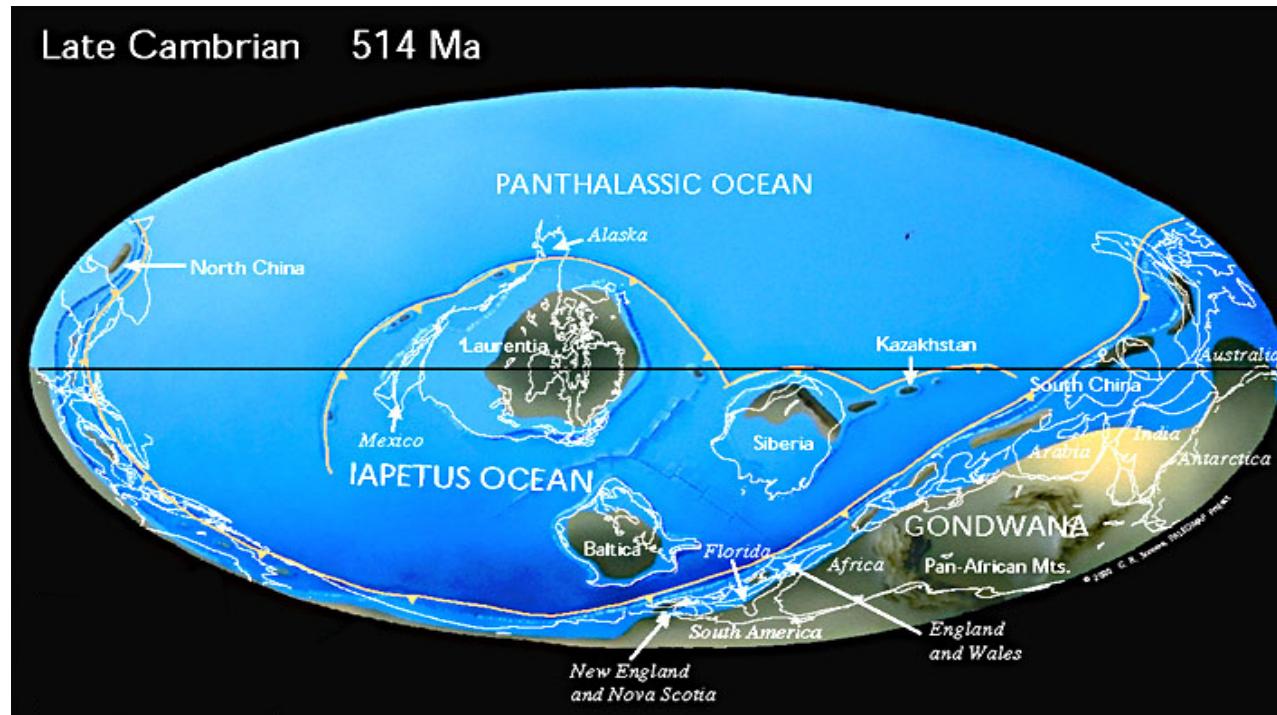
Scinexx.de

Fossilien.de

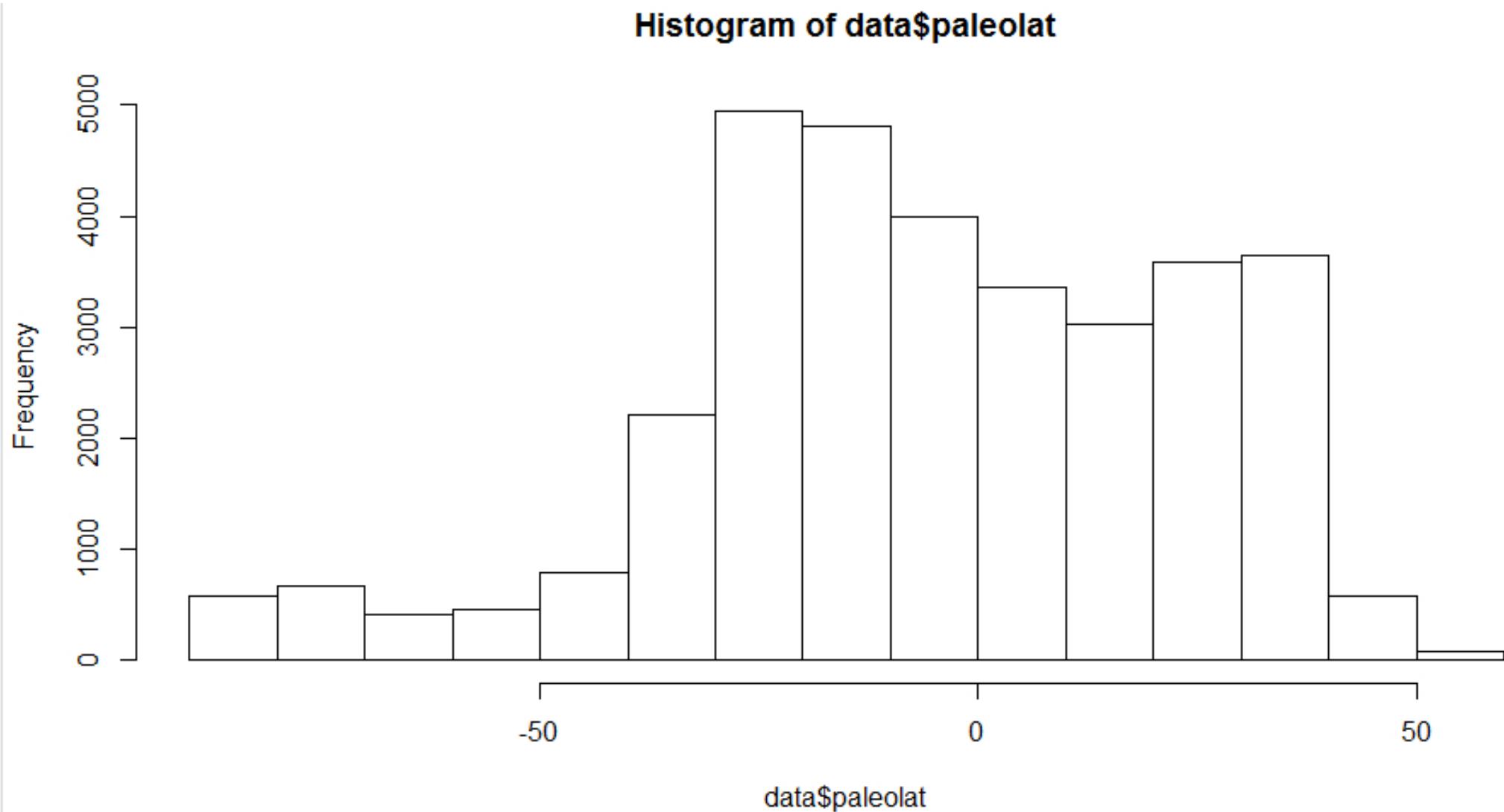
- **Aim**
 - Hypothesis:

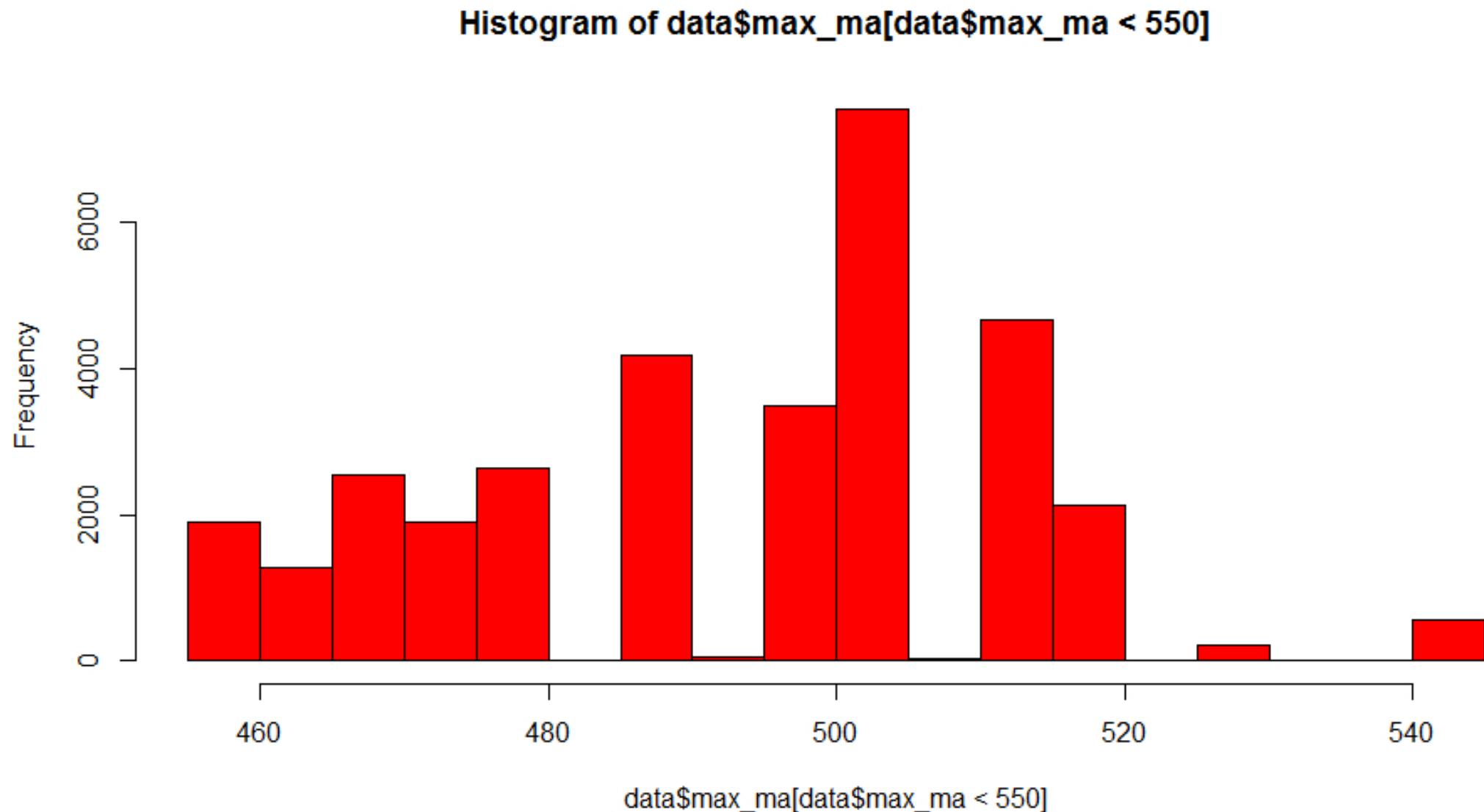
The α -diversity dynamic of trilobites changes significantly in various regions over time

- Creating paleomaps
- Plotting the source
- Calculating α-diversity in different regions
- Compare the results



- **Methods**
 - Checking the dataset
 - Processing the data
 - > Limiting the age
 - > Delete lines and columns
 - Quick first plots





- Creating paleomaps
from Early Cambrian to Late Ordovician
- packages used:
 - > velociraptr
 - > rgdal
 - > RCurl
 - > paleoMap
 - > mapast
 - > divDyn
 - > chronosphere



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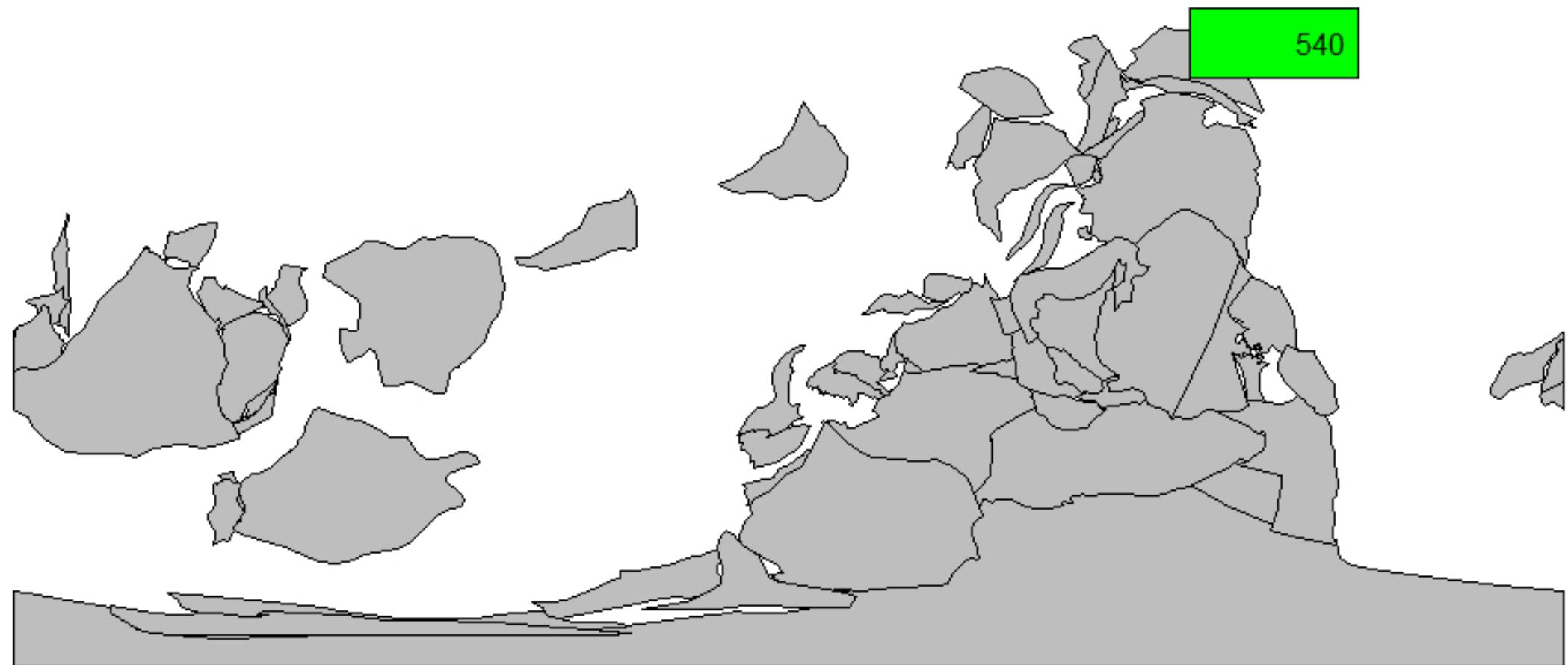


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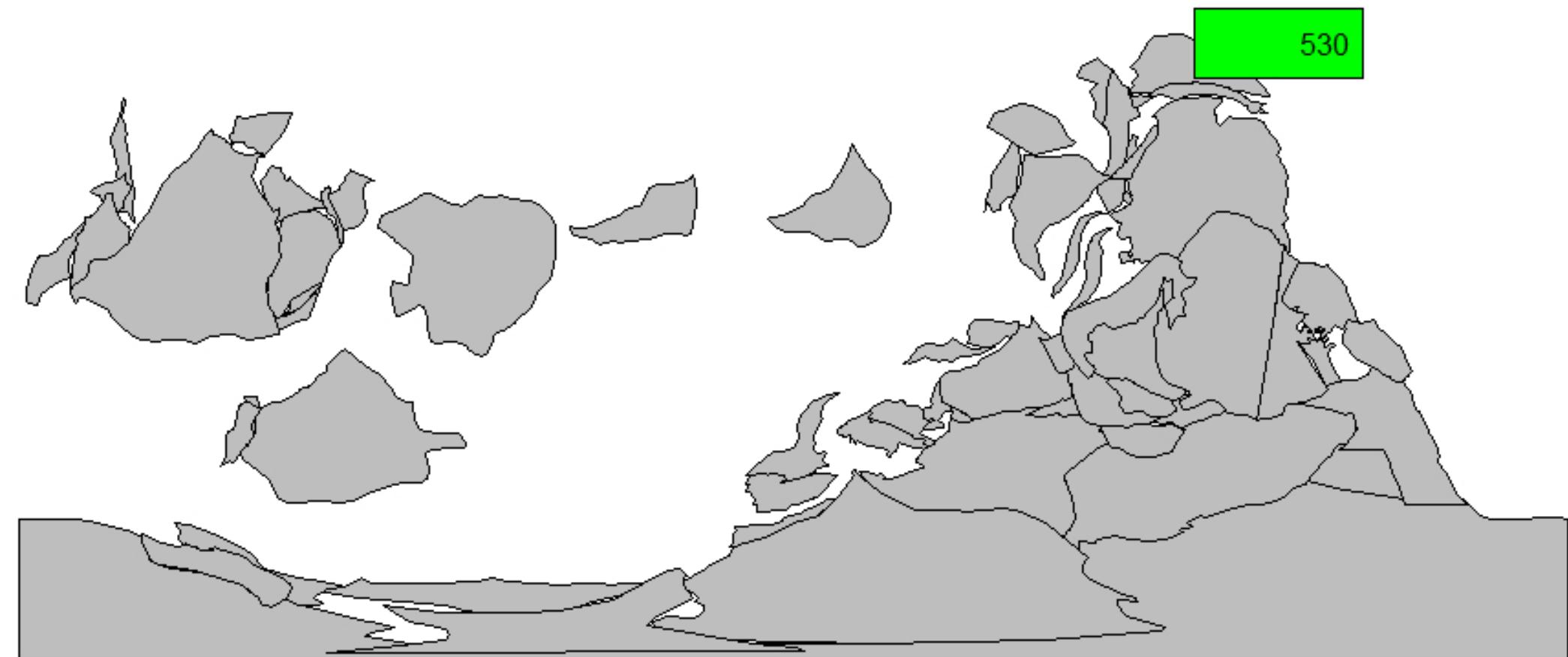


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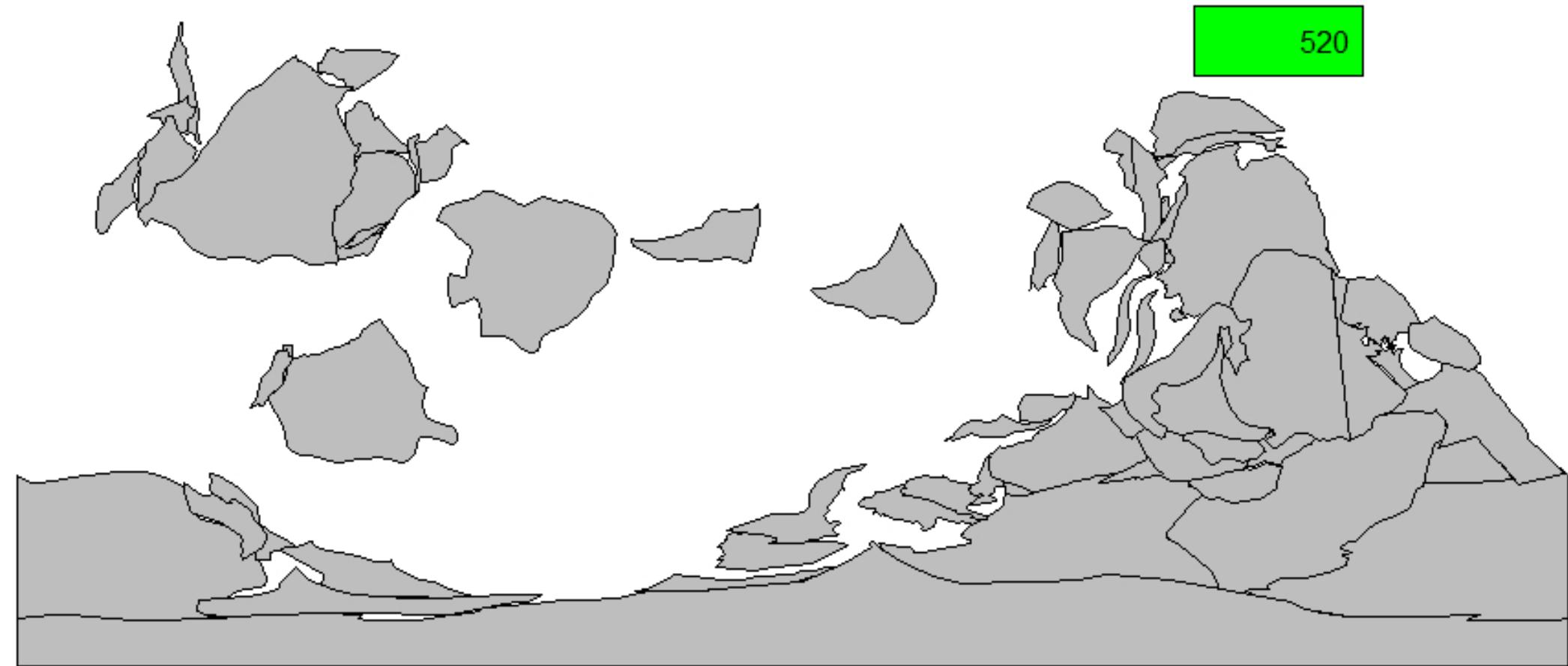


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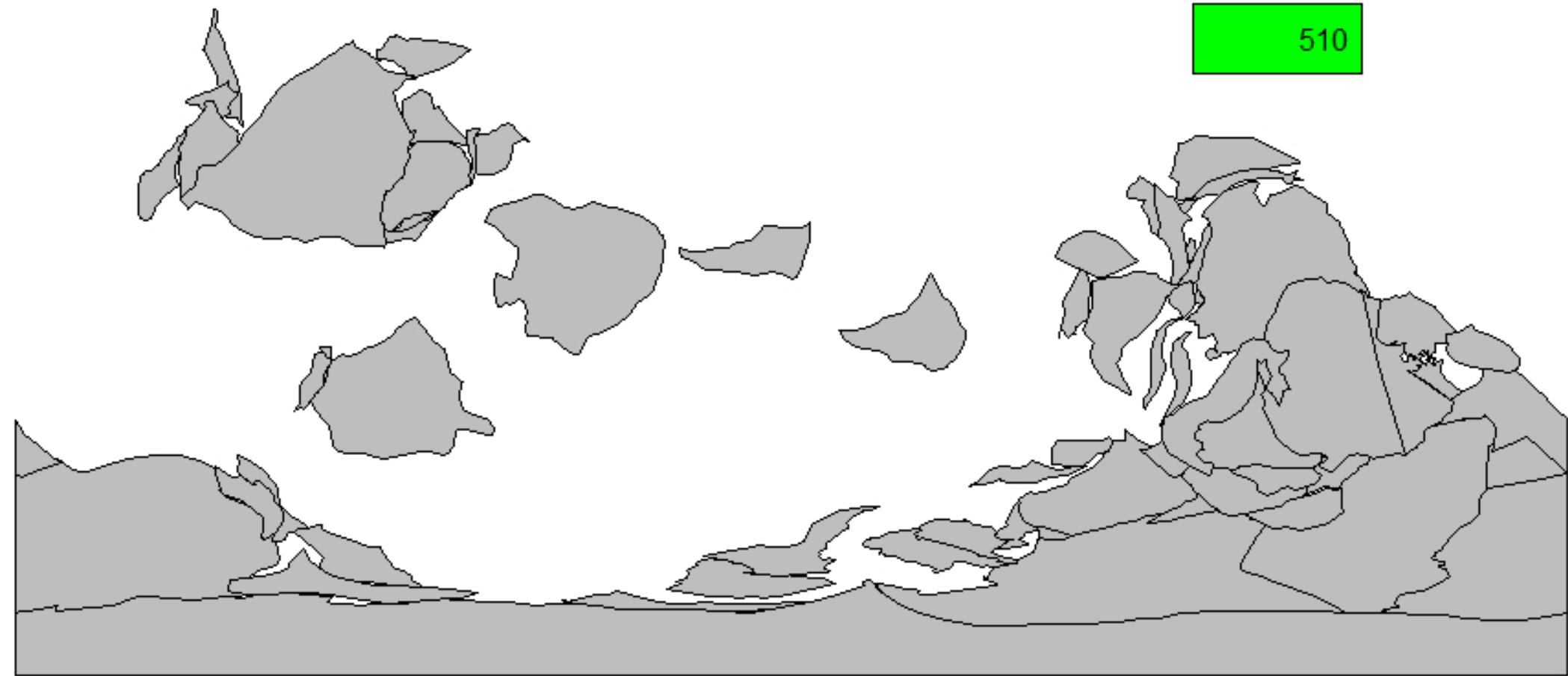


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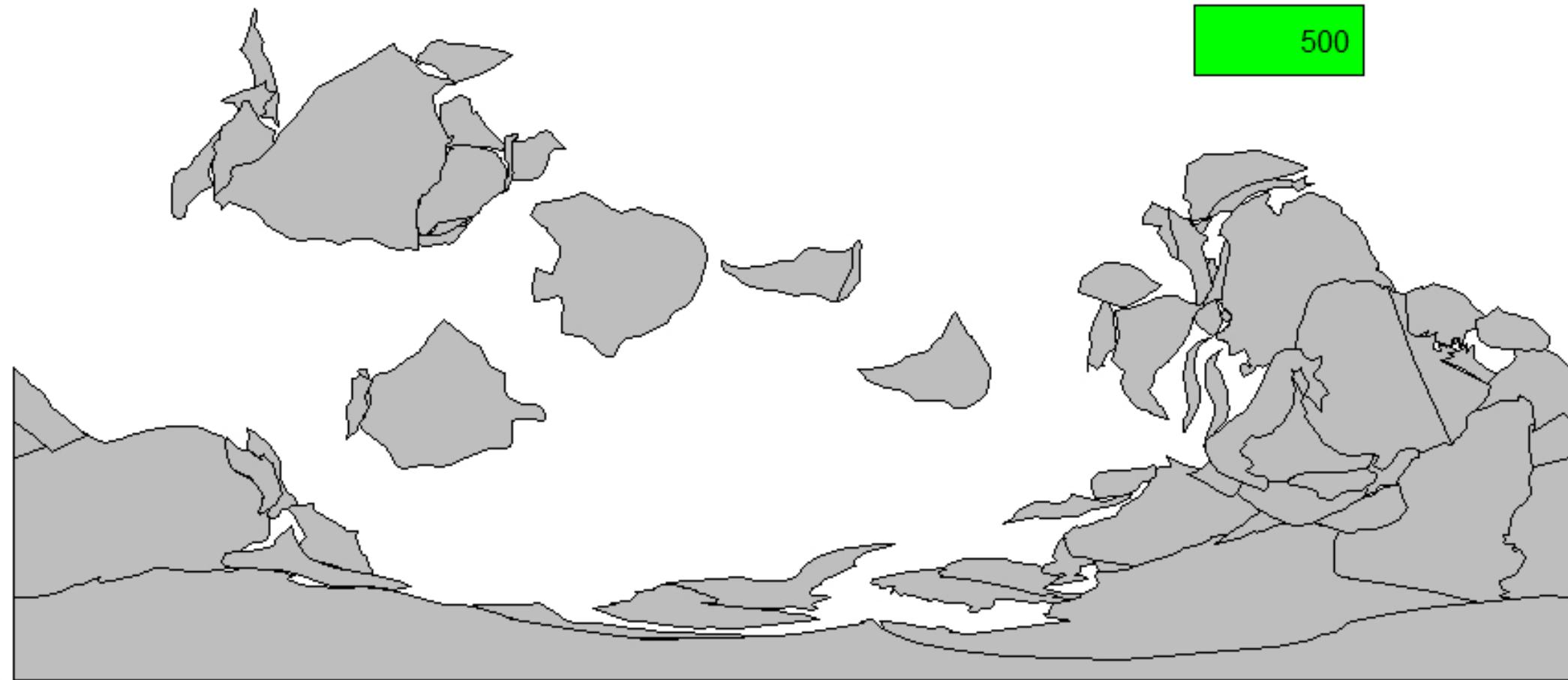


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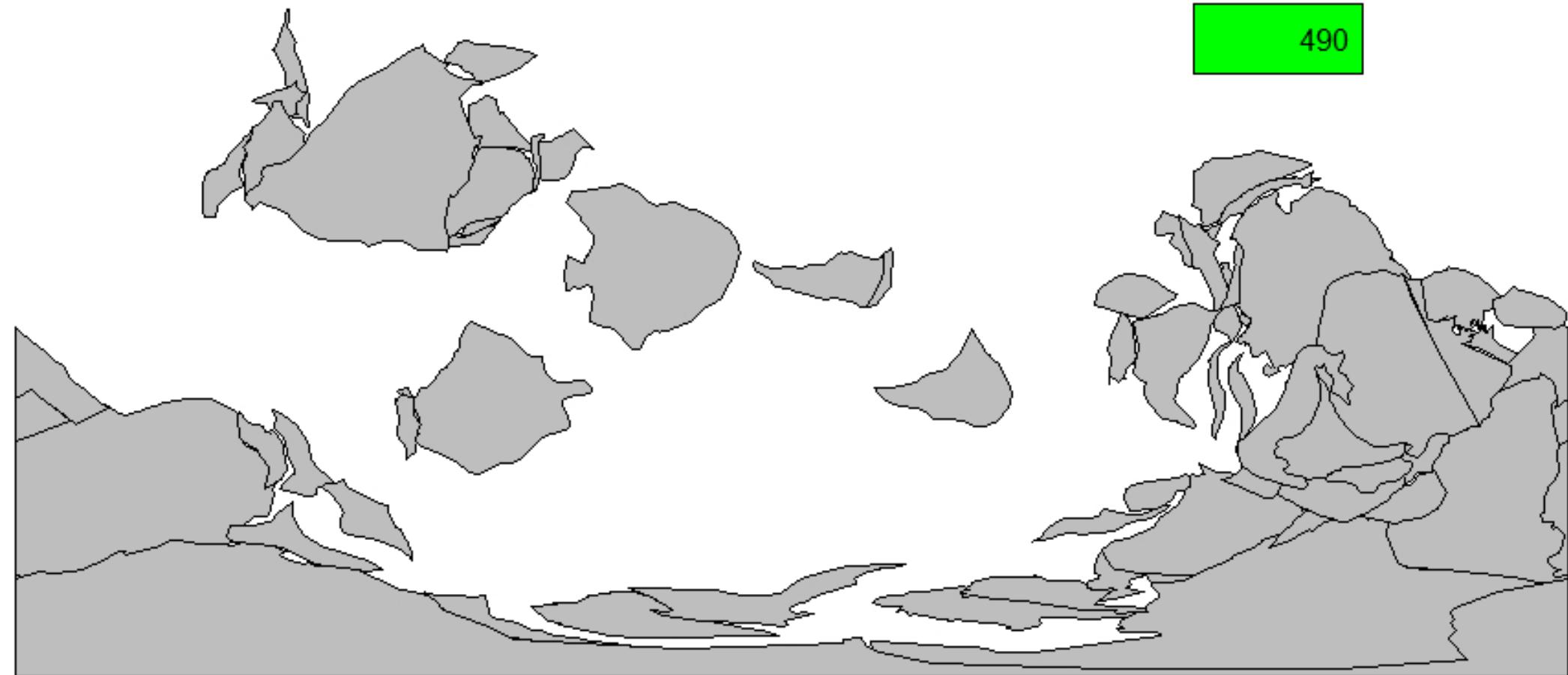


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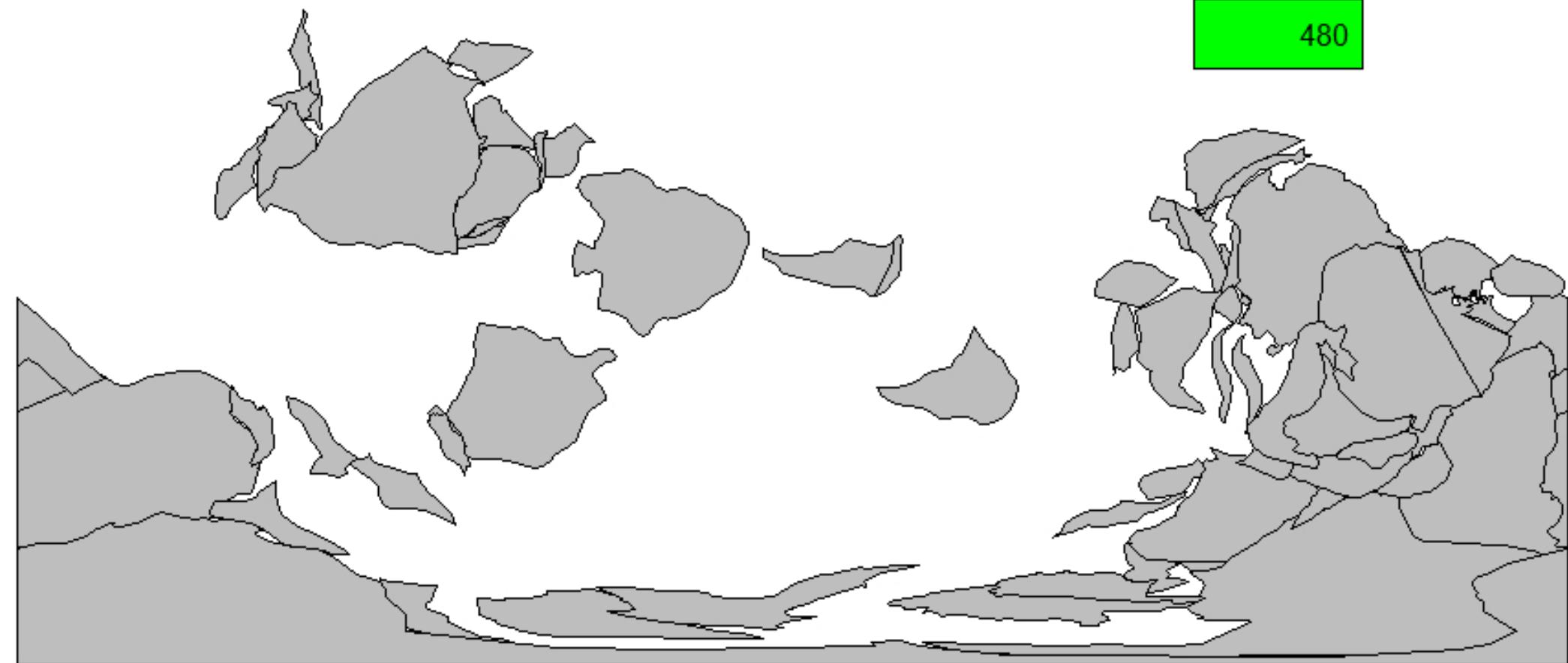


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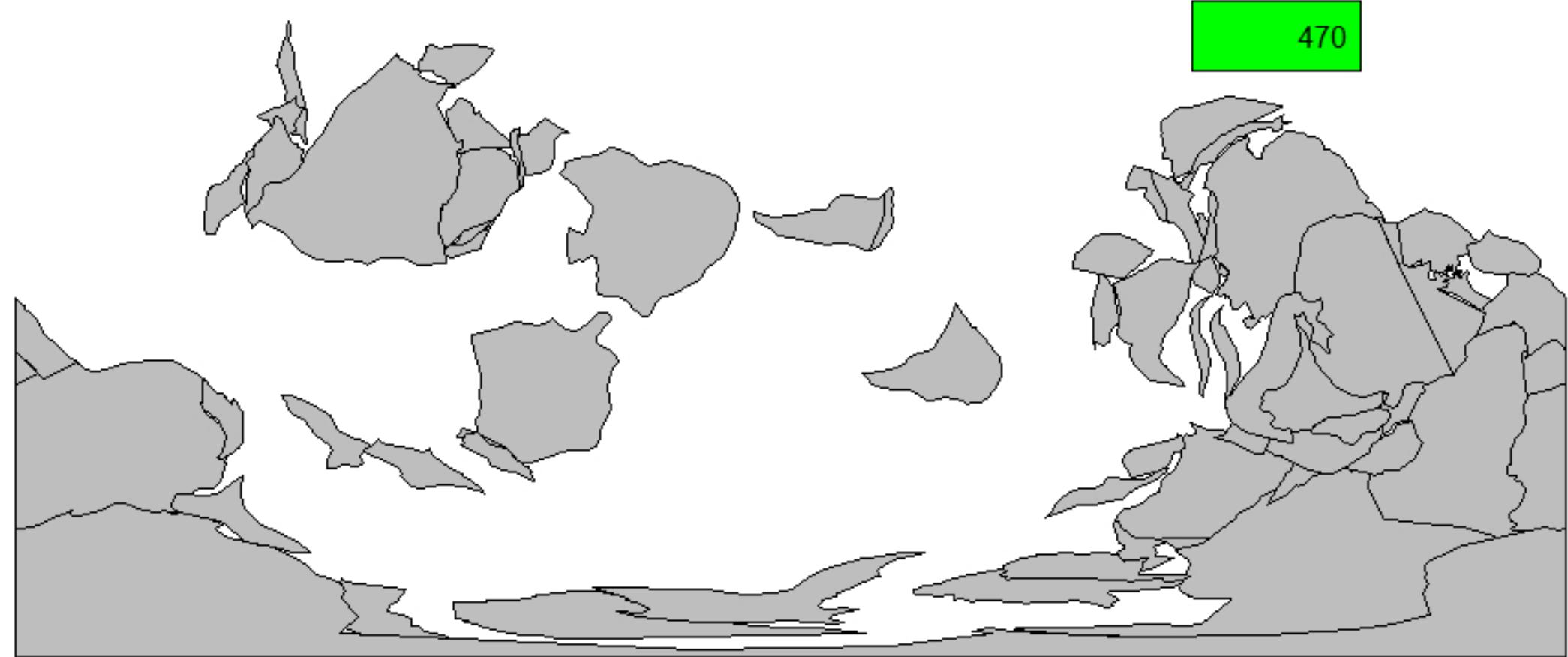


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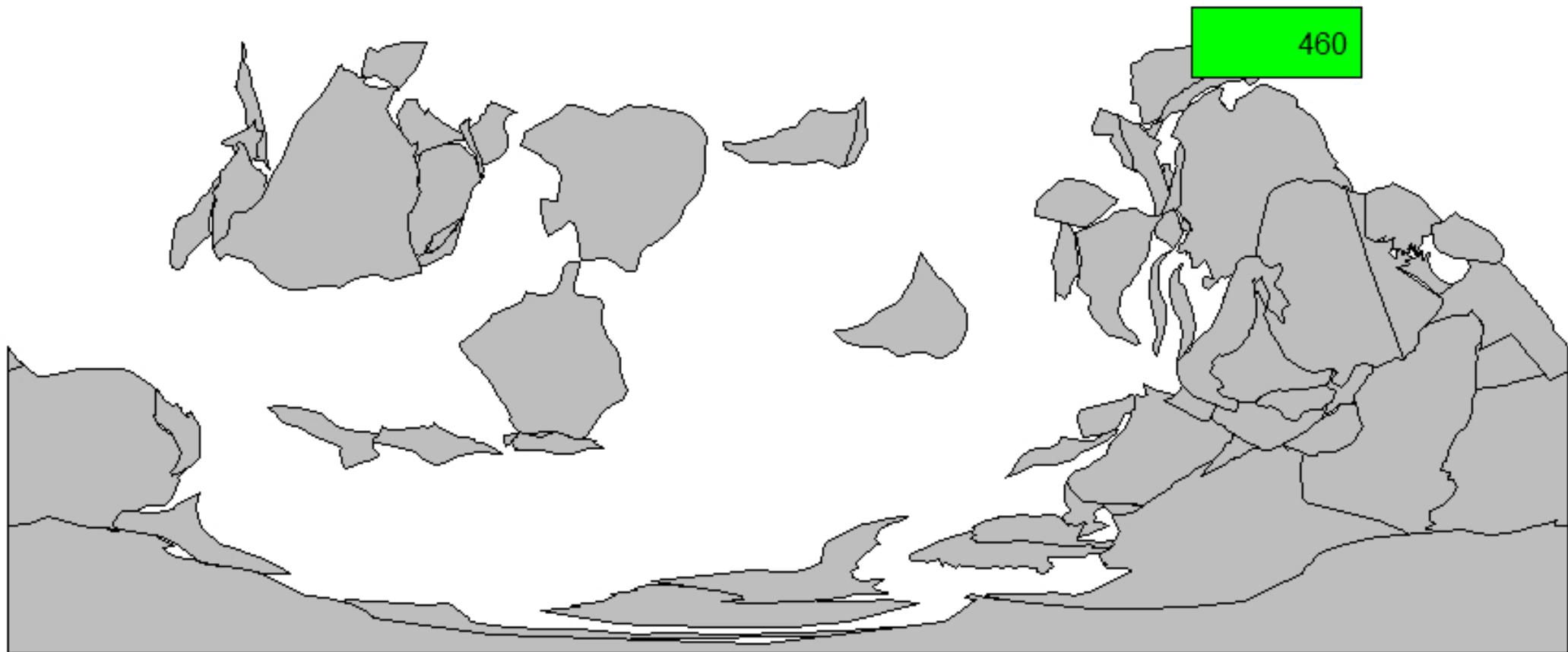


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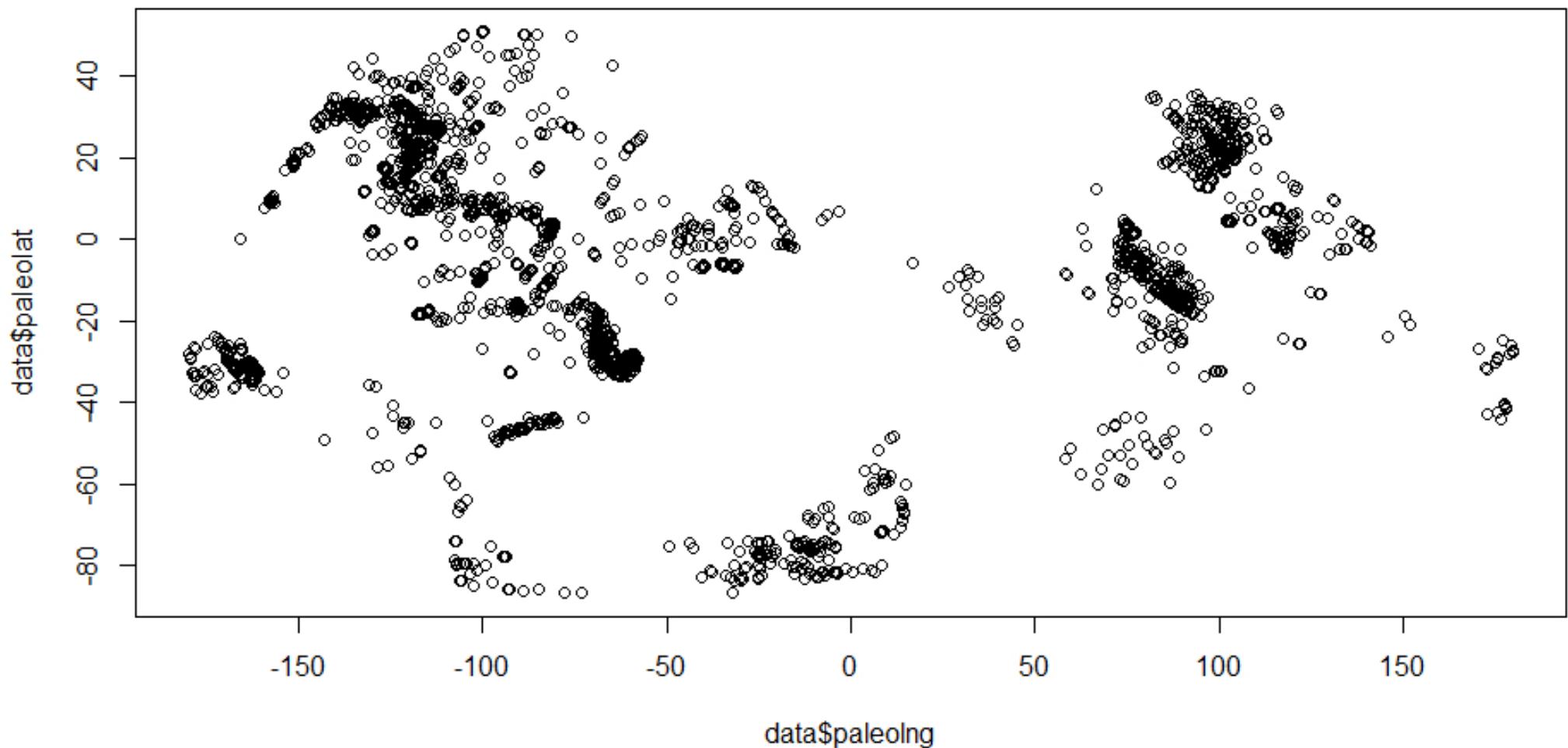


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- Geoplates for specific areas

```
> table(data$geoplate)
```

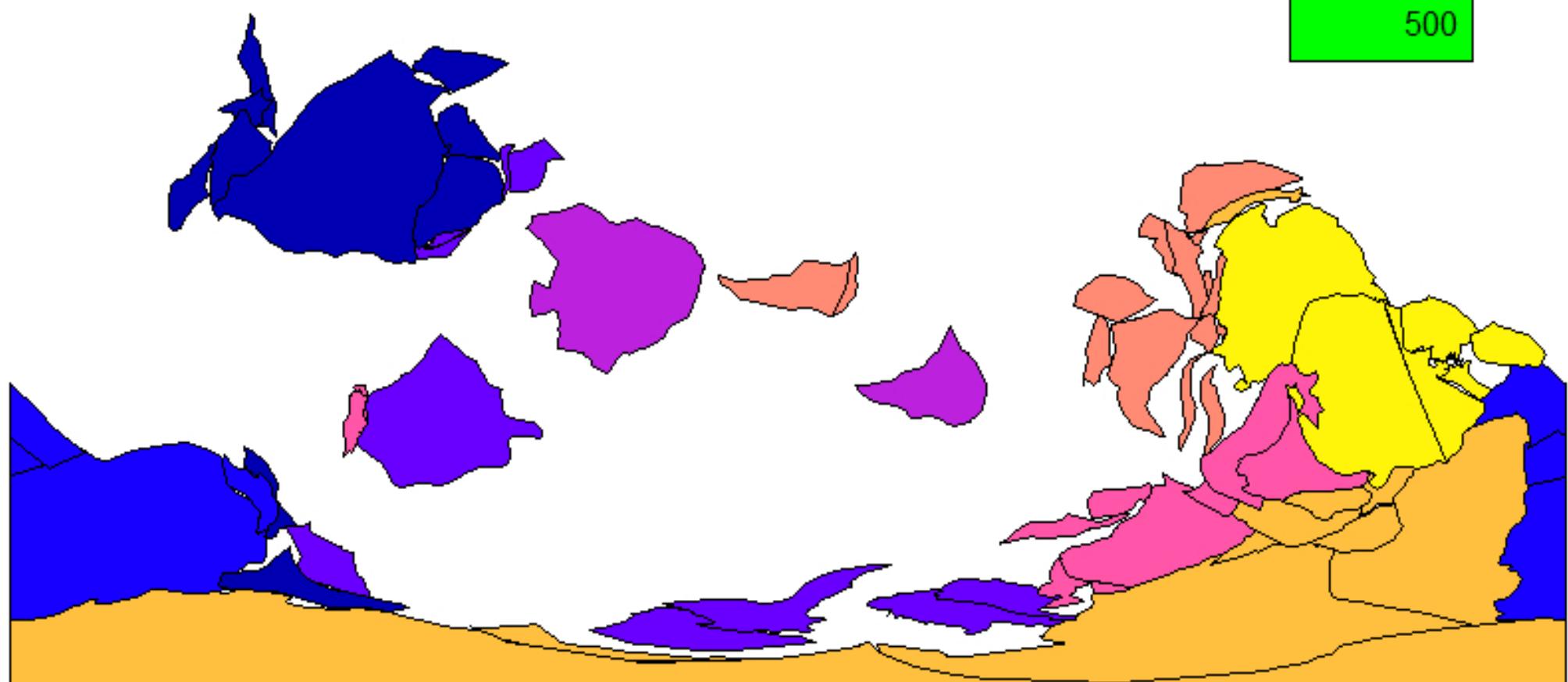
101	102	103	104	106	108	109	123	127	201	202	291	302	304	305	311	313	315
12096	372	28	158	13	102	11	13	274	1523	6	413	3059	525	1030	233	618	725
401	402	501	503	504	505	512	601	602	604	611	612	616	628	707	714	801	802
1453	2521	160	71	13	71	18	239	12	1623	4657	3	1	16	21	294	712	59
806																	
2																	
,																	

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200

400

600

800

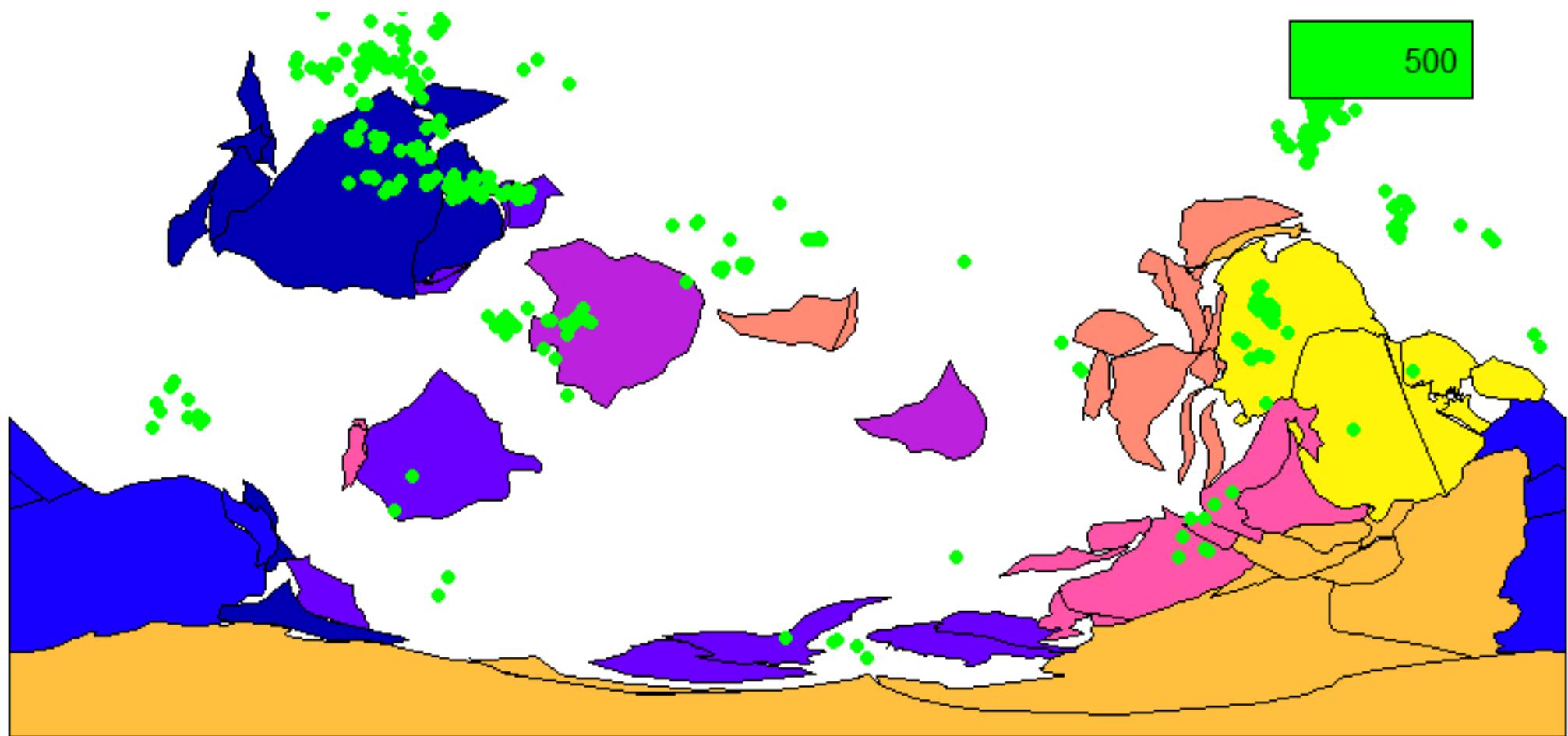
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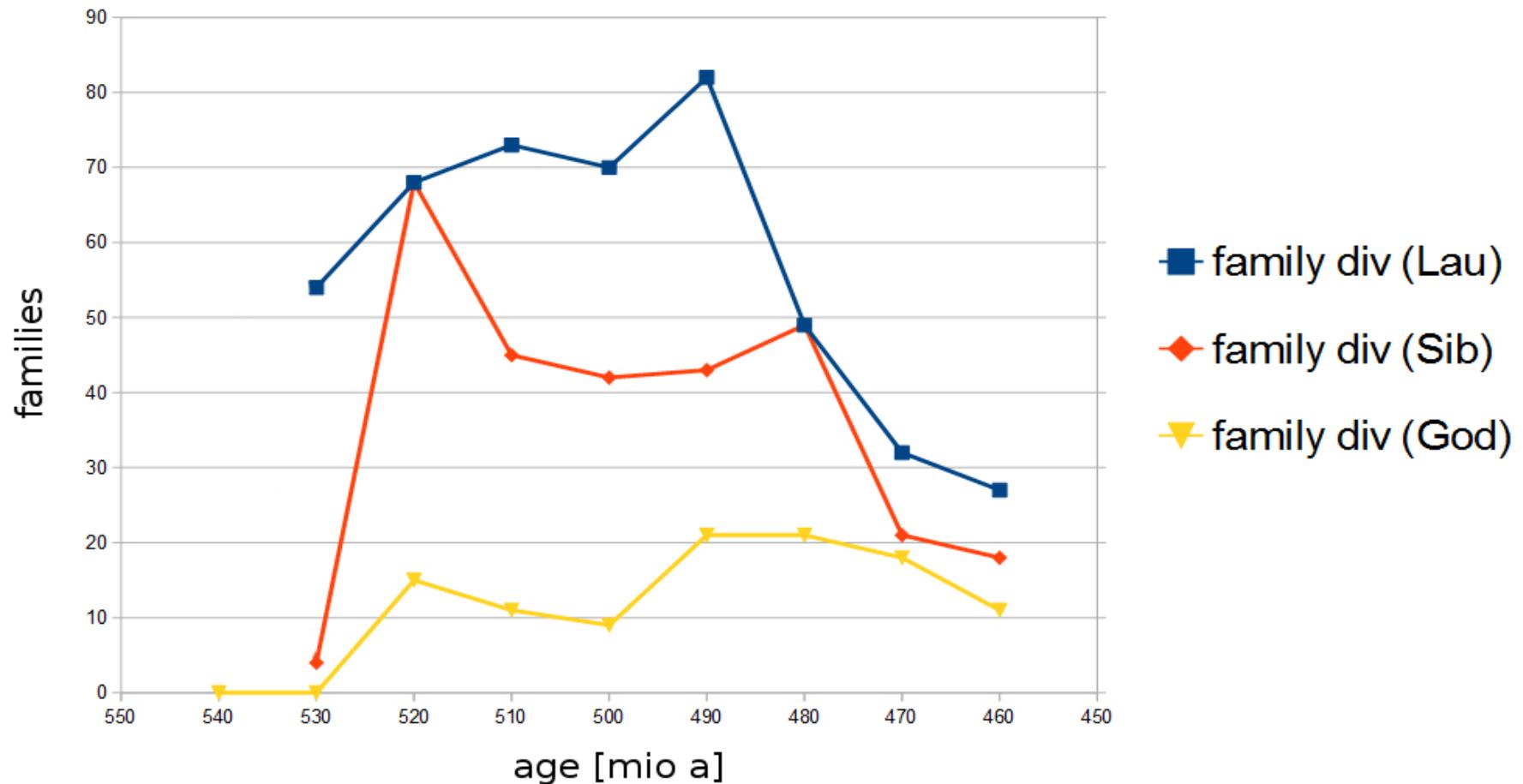
- α -diversity for three regions

-> Laurencia, Sibiria and Gondwana

```
> table(data55$family)
```

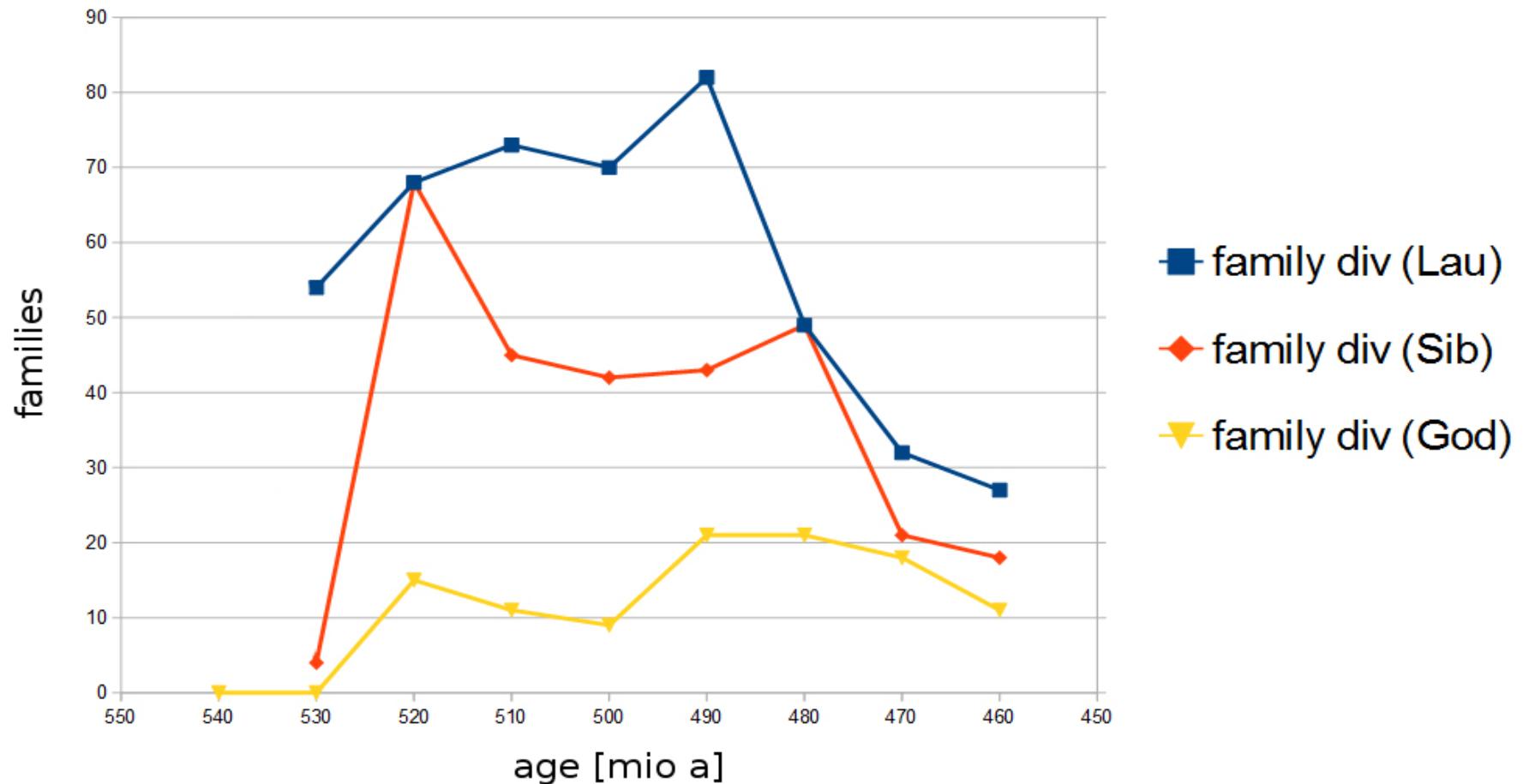
Acrocephalitidae		Agnostidae	Agraulidae	Alokistocaridae	Alsataspididae
1		218	4	32	8
Anomocarellidae		Antagmidae	Aphelaspididae	Asaphiscidae	Bolaspididae
6		3	188	34	4
Burlingiidae		Catillicephalidae	Cedariidae	Centropleuridae	Ceratopygidae
1		125	47	1	6
Cheilocephalidae		Clavagnostidae	Conocoryphidae	Corynexochidae	Crepicephalidae
66		9	1	3	283
Diceratocephalidae		Dikelocephalidae	Diplagnostidae	Dokimokephalidae	Dolichometopidae
6		131	187	330	29
Dorypygidae		Ellipsocephalidae	Ellipsocephaloïdidae	Elviniidae	Eodiscidae
17		1	35	289	
Eulomidae		Eurekiidae	Harpetidae	Harpididae	Holocephalinidae
1		41	24	6	1
Hungaiidae		Idahoiidæ	Illaenuridae	Kingstoniidae	Leiostegiidae
6		93	58	257	29
Llanoaspididae		Loganellidae	Lonchocephalidae	Marjumiidae	Menomoniidae
70		10	118	40	62
Metagnostidae		Missisquoïdæ	Nileidae	NO_FAMILY_SPECIFIED	Norwoodiidae
11		17	5	57	43
Odontopleuridae		Olenellidae	Olenidae	Oryctocephalidae	Parabolinoididae
1		4	52	5	124
Peronopsidae		Phalacromidae	Phylacteridae	Plethopeltidae	Pterocephaliidae
20		1	115	99	234
Ptychagnostidae		Ptychaspididae	Ptychopariidae	Raymondinidae	Remopleurididae
15		159	17	8	22
Shumardiidae		Solenopleuridae	Spinagnostidae	Tricrepicephalidae	Zacanthoididae
1		13	17	124	7

α -diversity curves



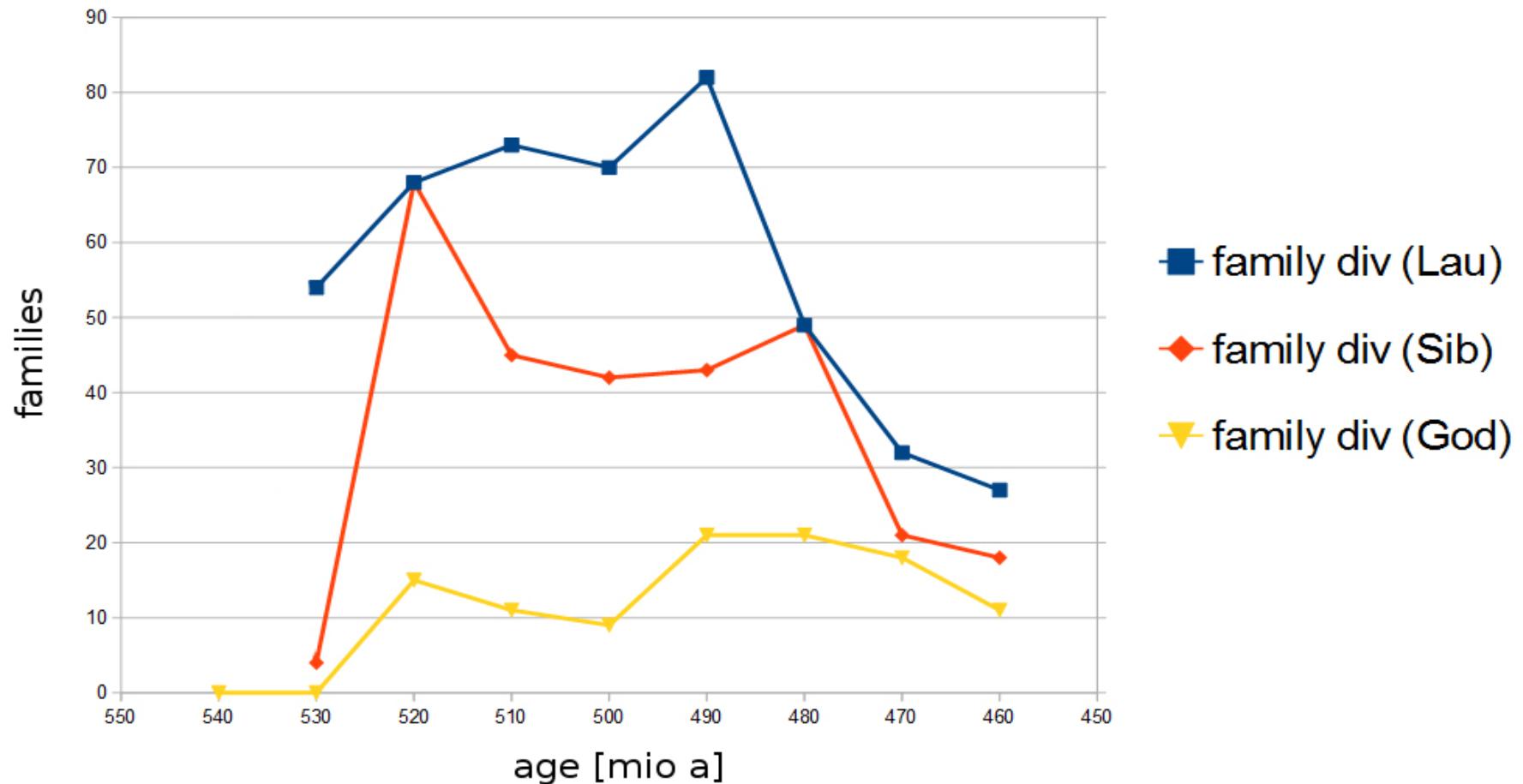
- all three regions show a similar diversity curve
- what are the reasons for the curve structure?
 - + first increase
 - > Cambrian Explosion

α -diversity curves



- all three regions show a similar diversity curve
- what are the reasons for the curve structure?
 - + first increase
 - > Cambrian Explosion
 - + peak in Late Cambrian
 - > warm climate -> less glaciation -> more habitats?

α -diversity curves



- all three regions show a similar diversity curve
- what are the reasons for the curve structure?
 - + first increase
 - > Cambrian Explosion
 - + peak in Late Cambrian
 - > warm climate -> less glaciation -> more habitats?
 - less diversity
 - > extinction events Cambrian/Ordovician

References

- Literature
 - R. Lerosey-Auril and R. Feist (2012): Quantitative Approach to Diversity and Decline in Late Palaeozoic Trilobites, *Springer Science*, p- 535-555
 - J. Javier Álvaro et al. (1999): Trilobite diversity patterns in the Middle Cambrian of southwest Europe: a comparative study, *Elsevier: Palaeogeography, Palaeoclimatology, Palaeoecology*, Vol. 151, Issua 4, p. 241-254
- Internet
 - cran.r-project.org
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 - spektrum.de
 - wikipedia.org
 - scotese.com
 - mineralienatlas.de
 - youtube.com

Thank you for your attention!