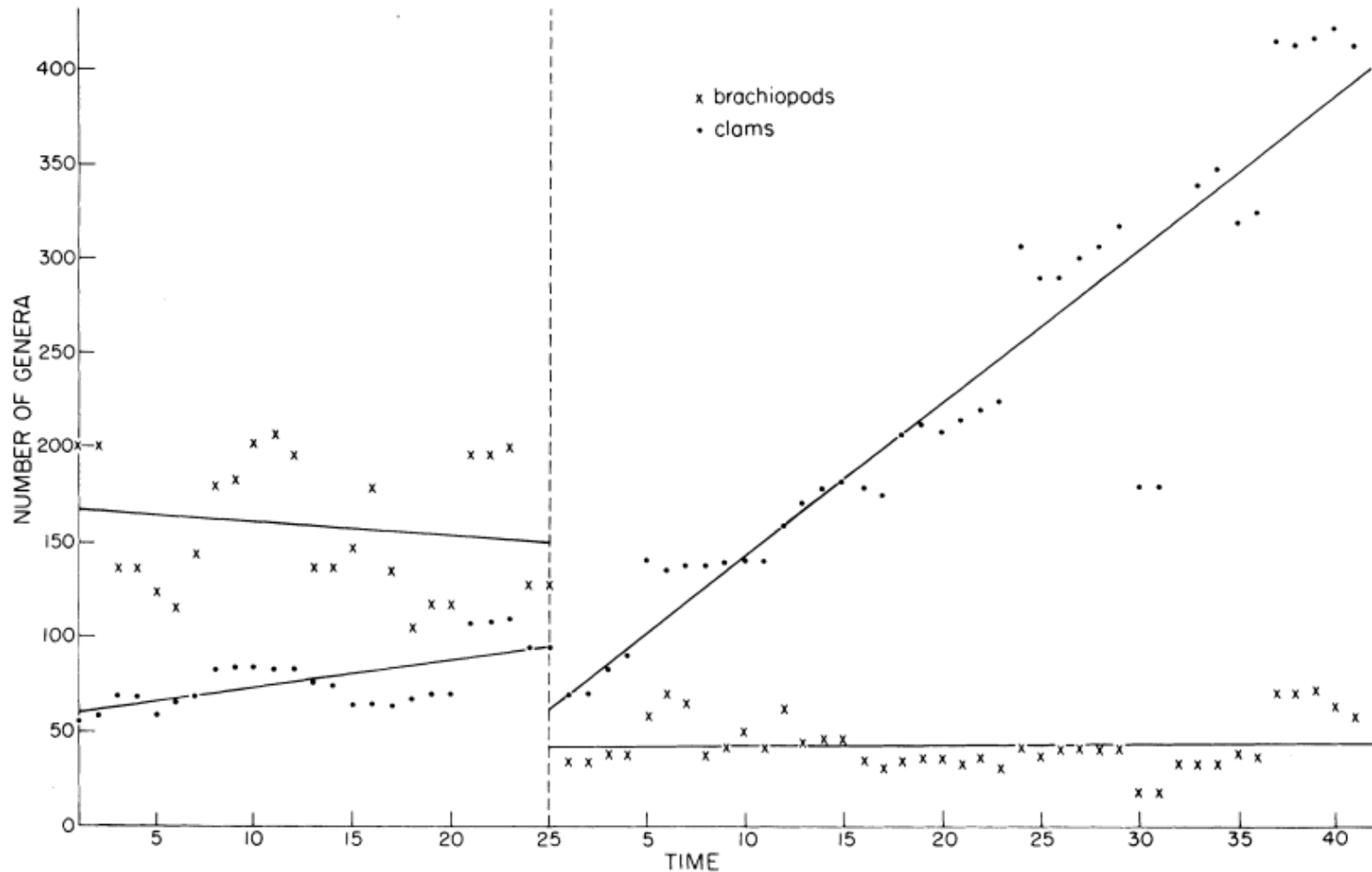


Phanerozoic scale modulation of brachiopod longitudinal expansion fitness forced by plate tectonics

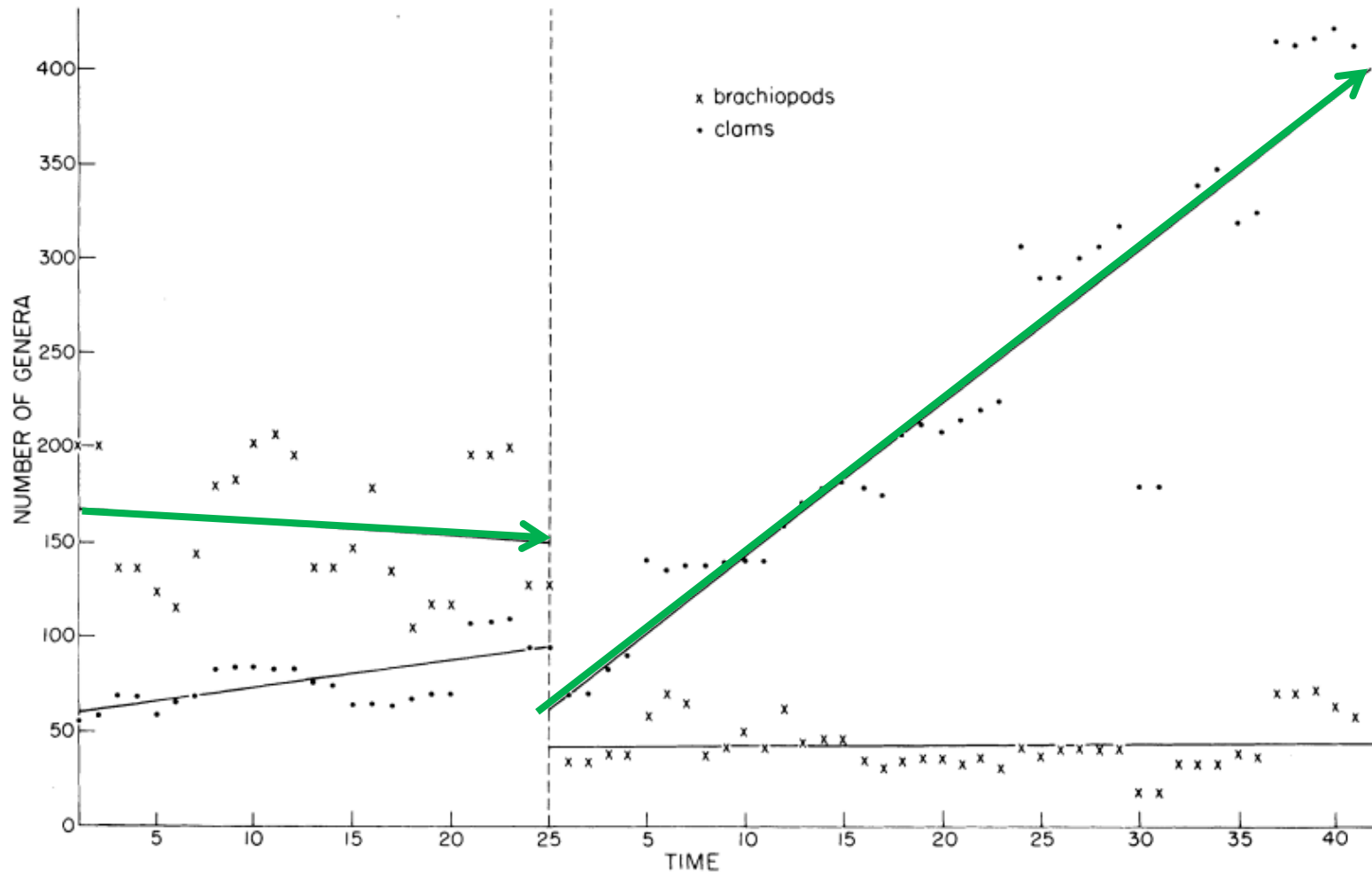
Andrej Spiridonov, Lauras Balakauskas, Shaun Lovejoy

Vienna, 2022

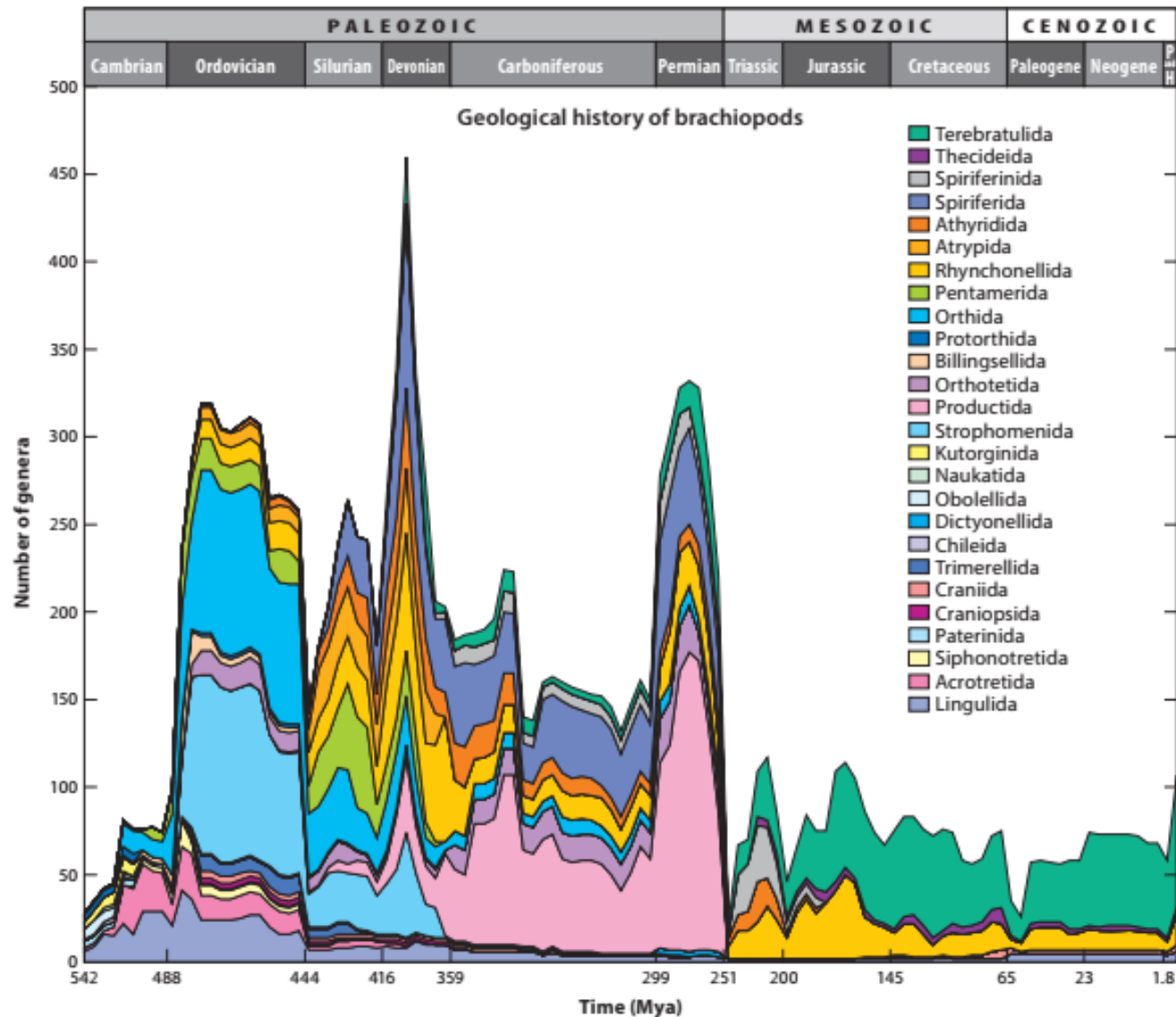
Brachiopods – once thriving and now fallen phylum



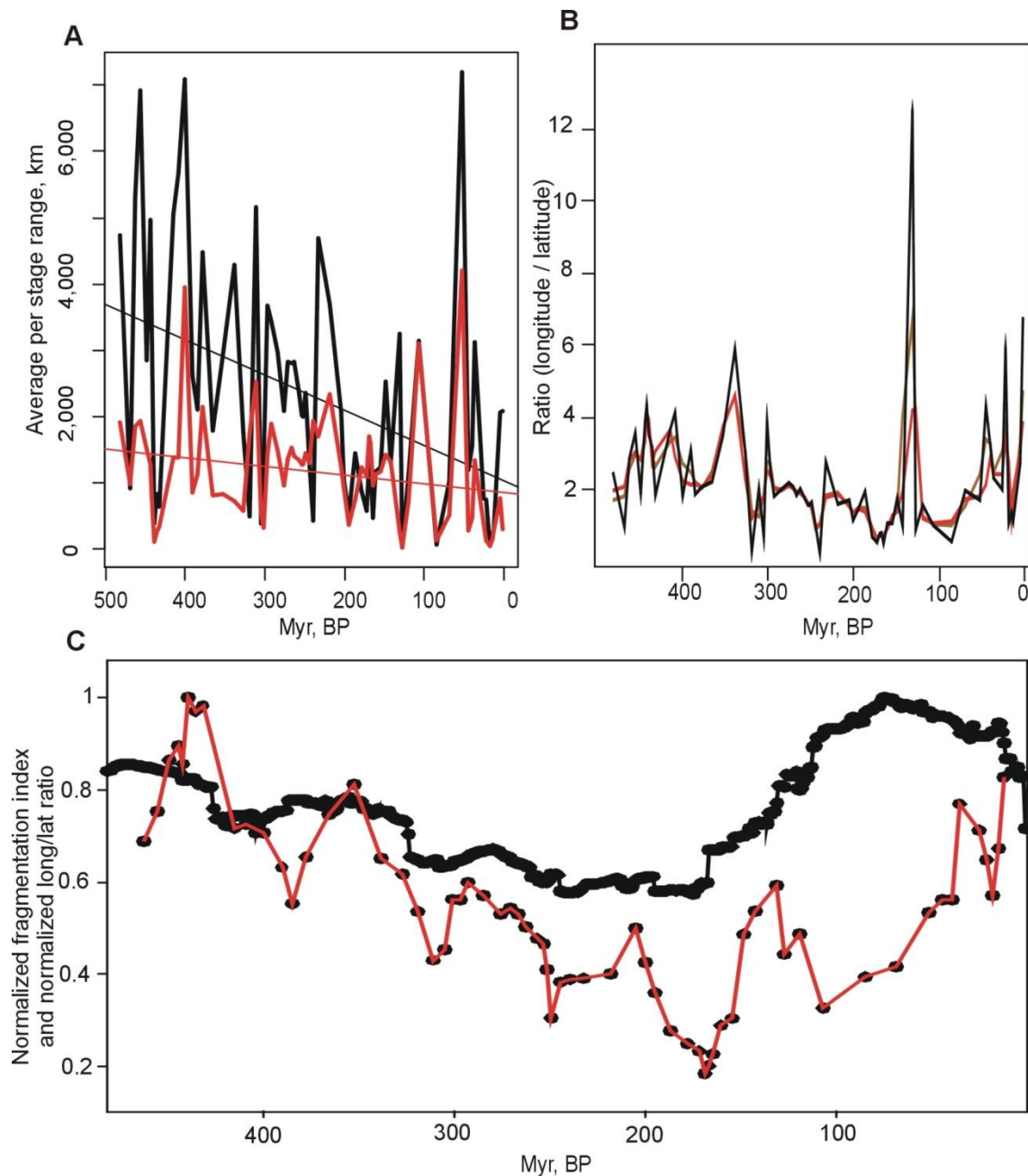
Brachiopods – once thriving and now fallen phylum



Brachiopod taxonomic diversity macroevolution

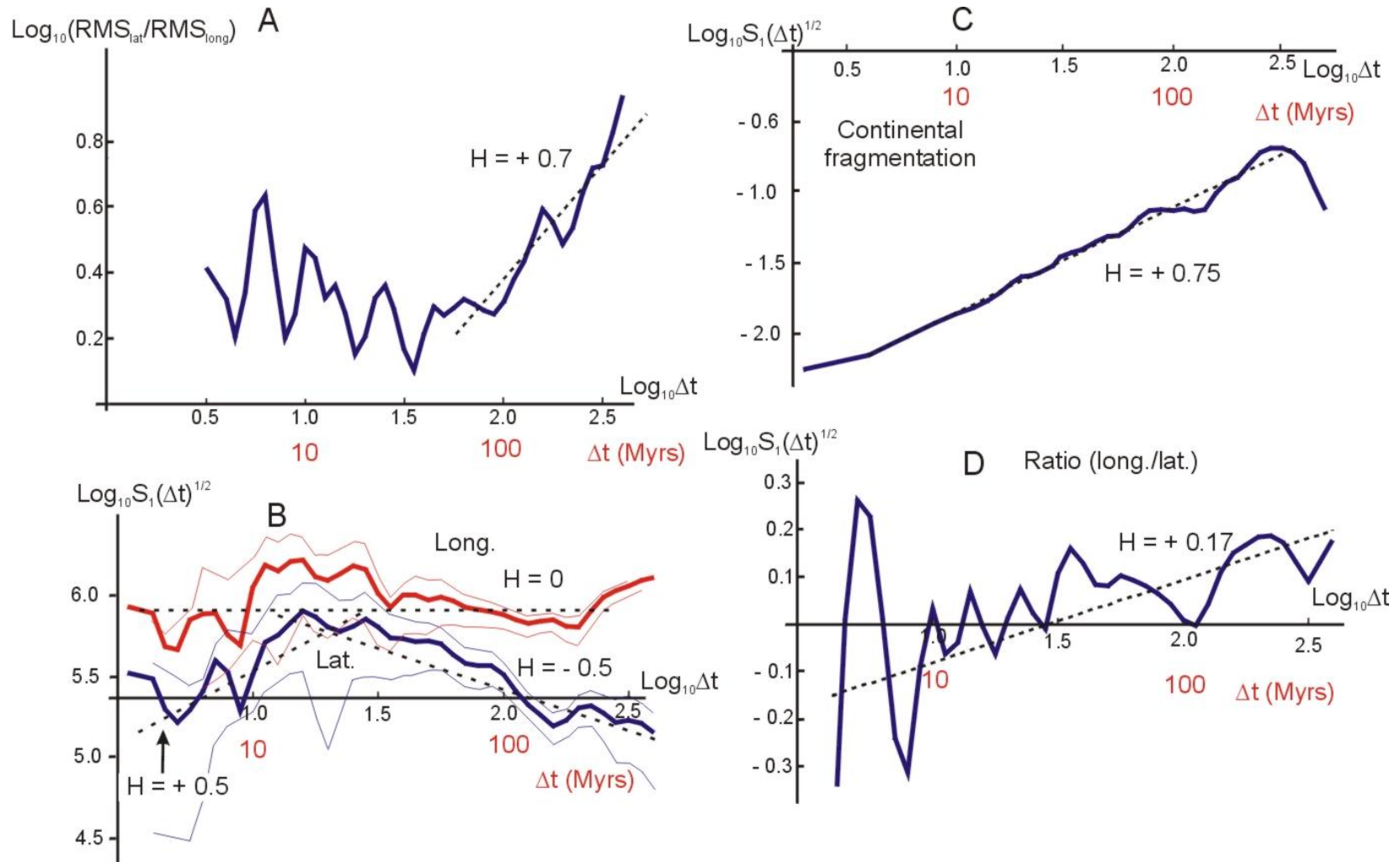


The screenshot shows the PDB Navigator web application. At the top, there's a search bar with the text "Time, taxa, authorizer, stratigraphy". Below it, the main map area displays a paleogeographic reconstruction of the Carboniferous period (328 Ma). The map shows the distribution of brachiopods, with green dots indicating collection sites. To the right of the map, there's a sidebar with a taxonomic filter showing the hierarchy: Carboniferous (328 Ma) > Back to main map. Below this, a list of taxa is shown with their respective percentages: Productida 38%, Spiriferida 21%, Athynoida 12%, Orthotetida 6%, and Spiriferinida 5%. At the bottom, a detailed geological time scale is displayed, ranging from 541 Ma to the present. The Carboniferous period is highlighted in green, and the time scale is divided into Paleozoic, Mesozoic, and Cenozoic eras.



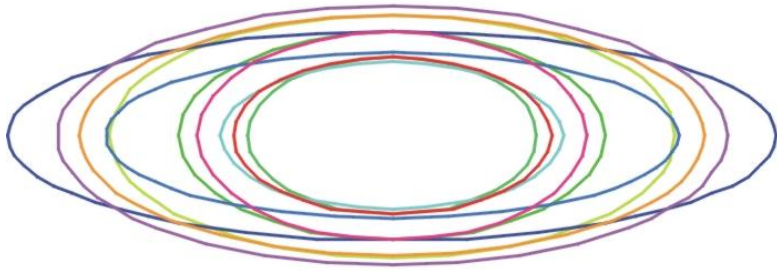
Evolution of average brachiopod genus level geographical latitudinal and longitudinal ranges and continental fragmentation patterns (Zaffos et al., 2017)

Scaling patterns of geographic ranges, their shapes, and the continental fragmentation index

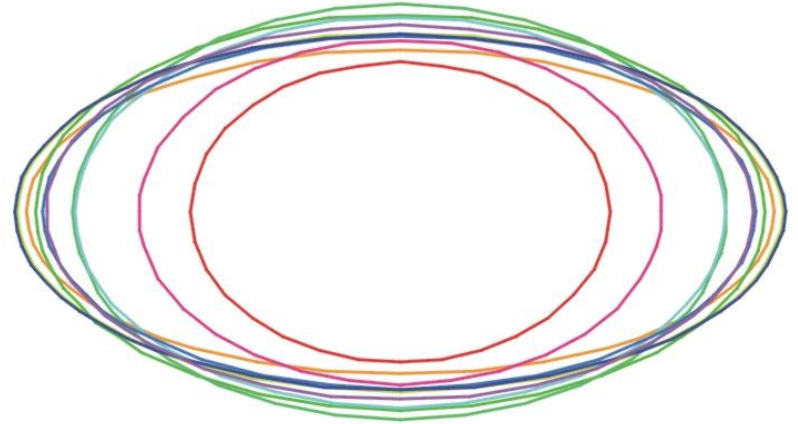


Scaling of latitudinal and longitudinal range size fluctuations – longitudinal fluctuations always (on average) larger

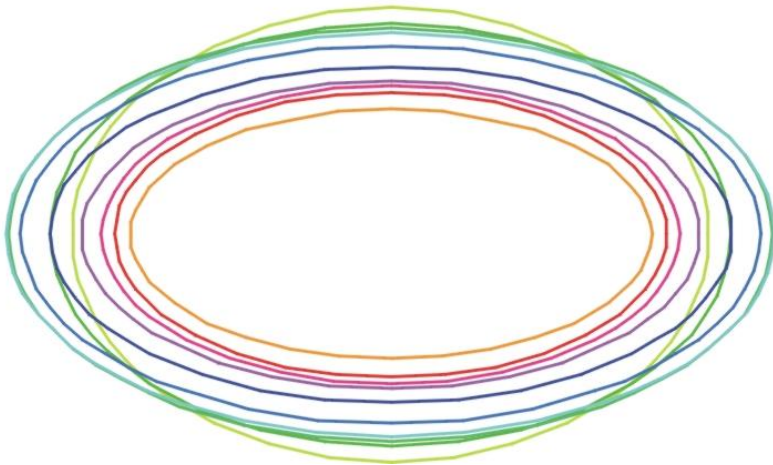
3 - 10 Myrs



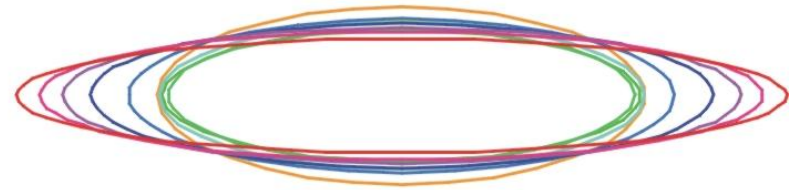
12 - 40 Myrs



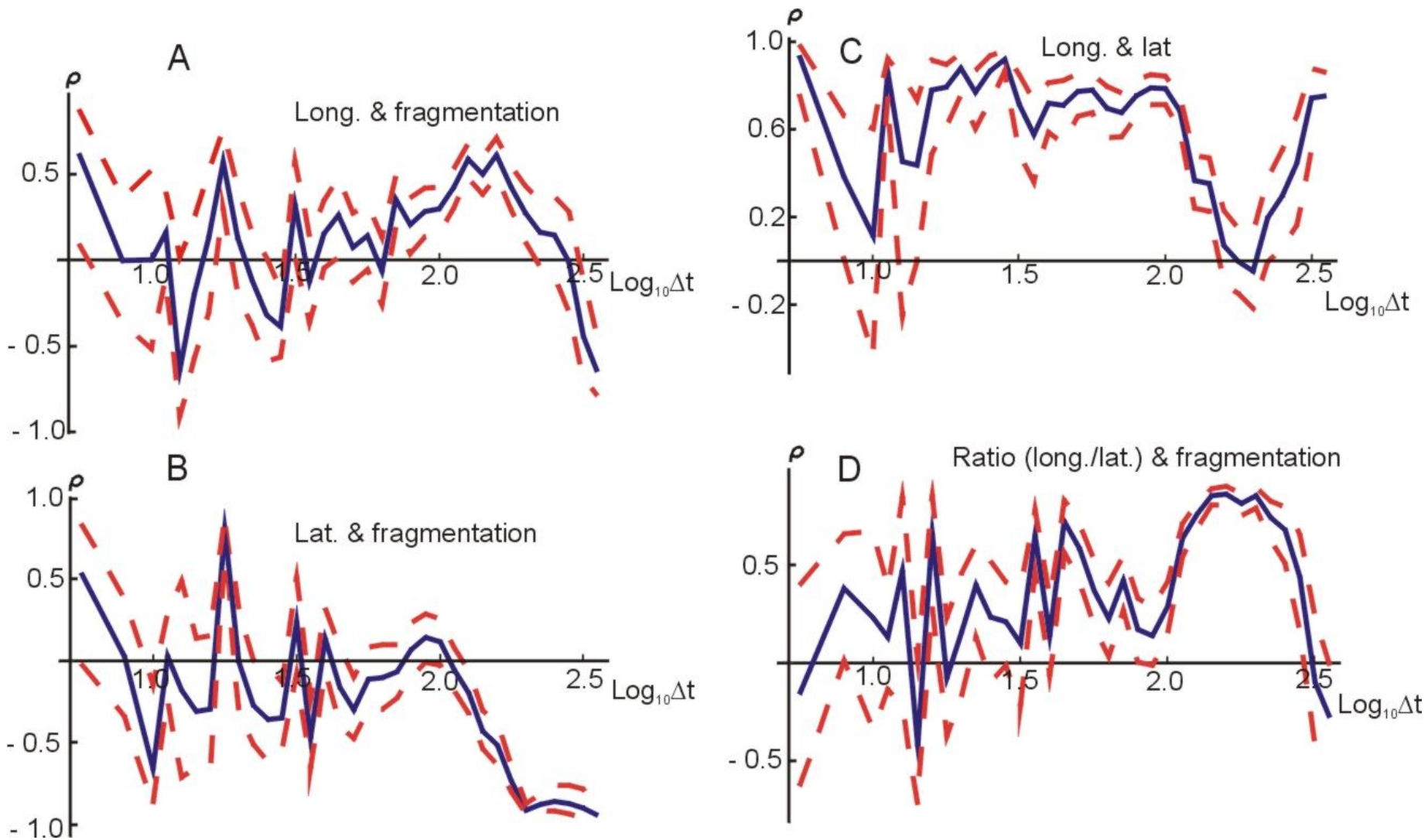
40 - 125 Myrs



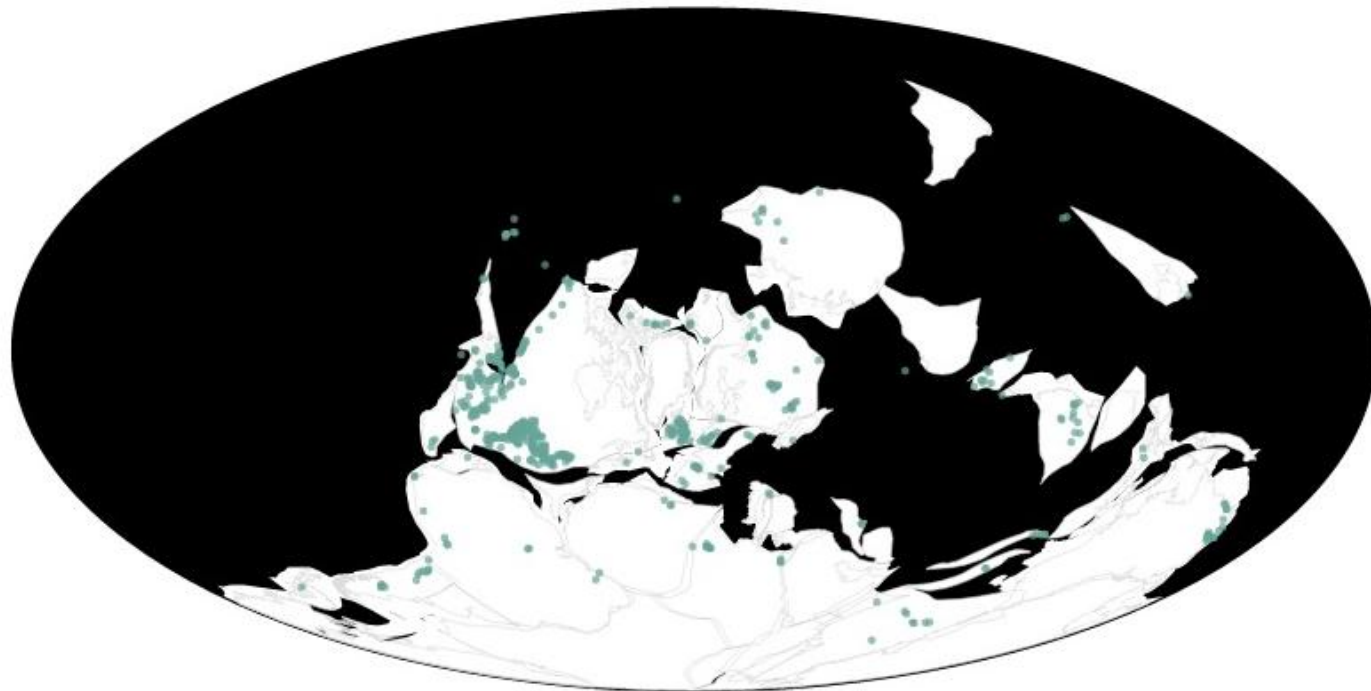
125 - 400 Myrs



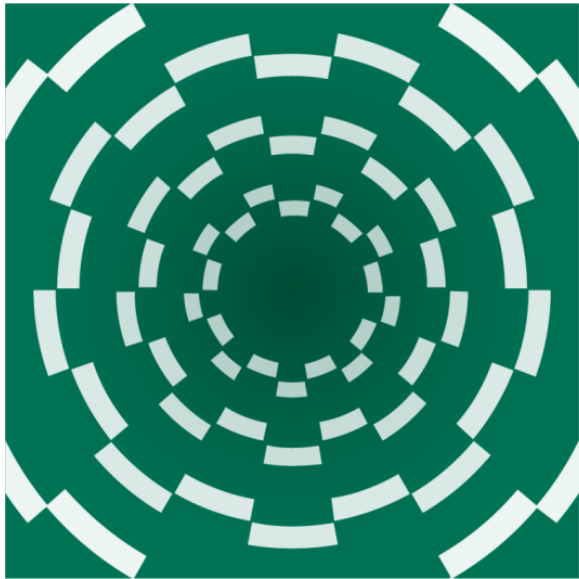
Scaling of correlations



- Continental fragmentation patterns control dynamics of brachiopod ranges at all time scales
- Supercontinental cycle induced the first order trend in brachiopod geographic ranges sizes by means of changes in longitudinal expansion fitness



Thank you for your attention!



Research
Council of
Lithuania

S-MIP-21-9 “The role of spatial structuring in major transitions in macroevolution”