EGU General Assembly 2020

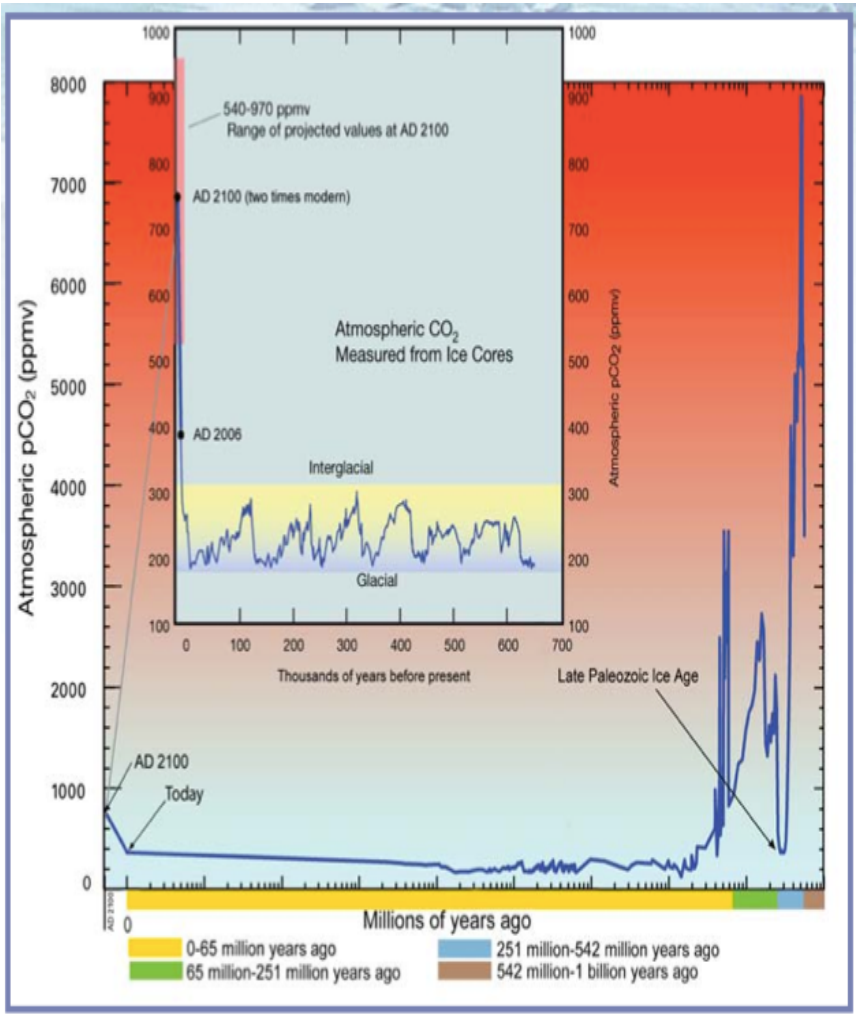
Orbital forcing, tectonics and global climate change

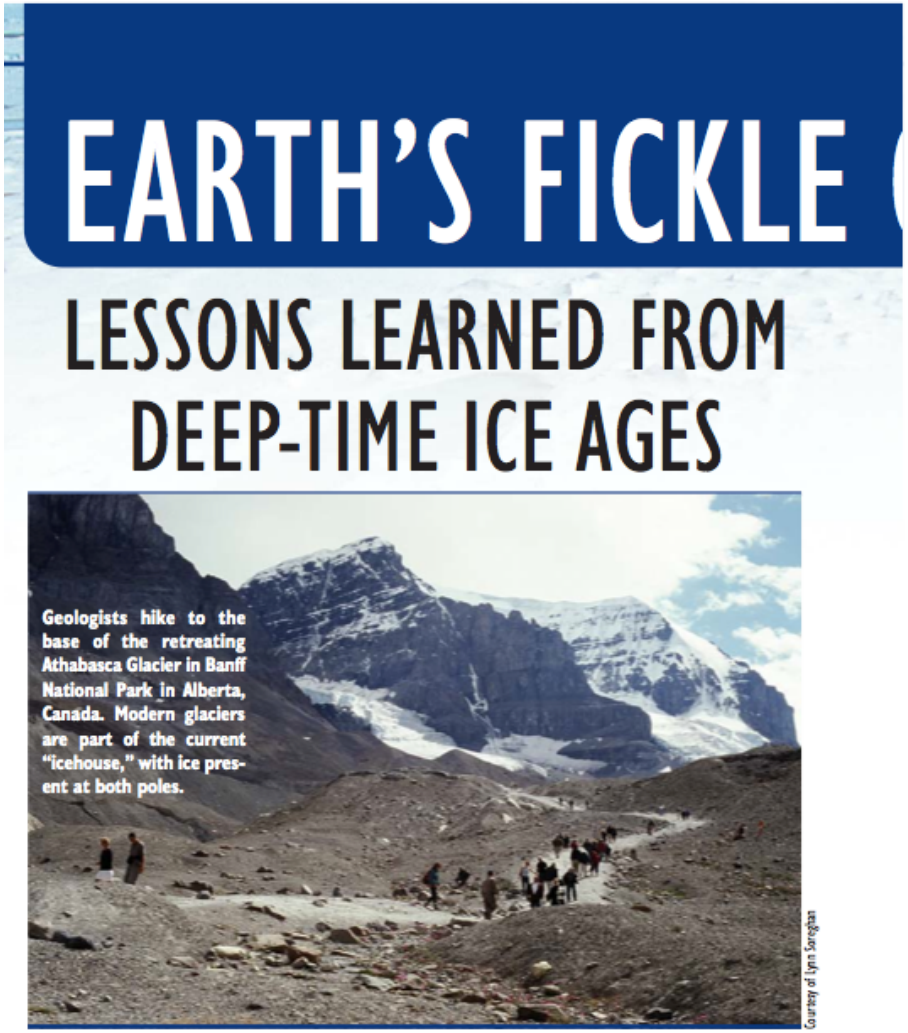
Astronomical pacing of the demise of the penultimate icehouse

Qiang Fang

State Key Laboratory of Biogeology and Environmental Geology, China University of Geosciences (Beijing)

Late Paleozoic ice age

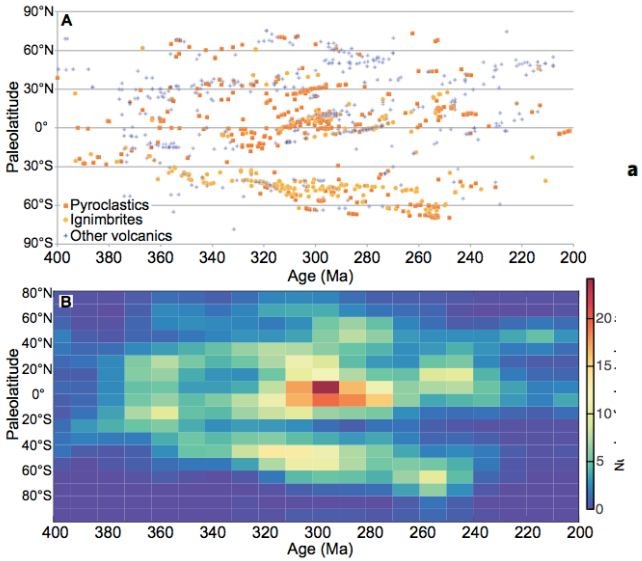




Montañes and Soreghan, 2006

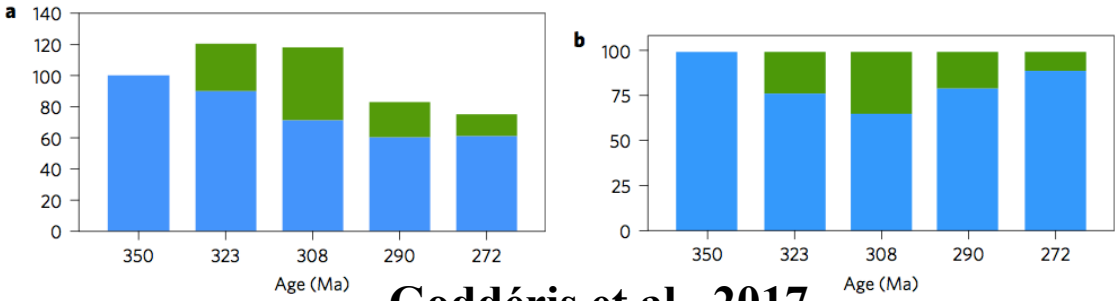
Late Paleozoic ice age: tectonic and volcanism

Spatial and temporal distribution of volcanism



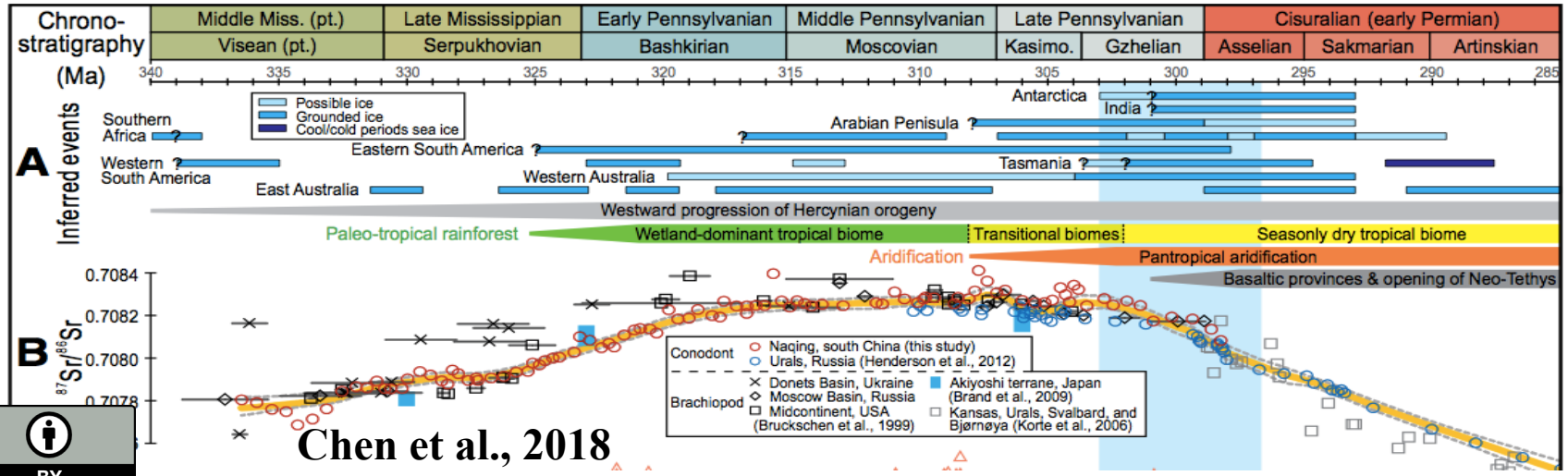
Soreghan et al., 2019

Contributiom of the weathering of the Hercynian mountains to the global weathering flux



Goddéris et al., 2017

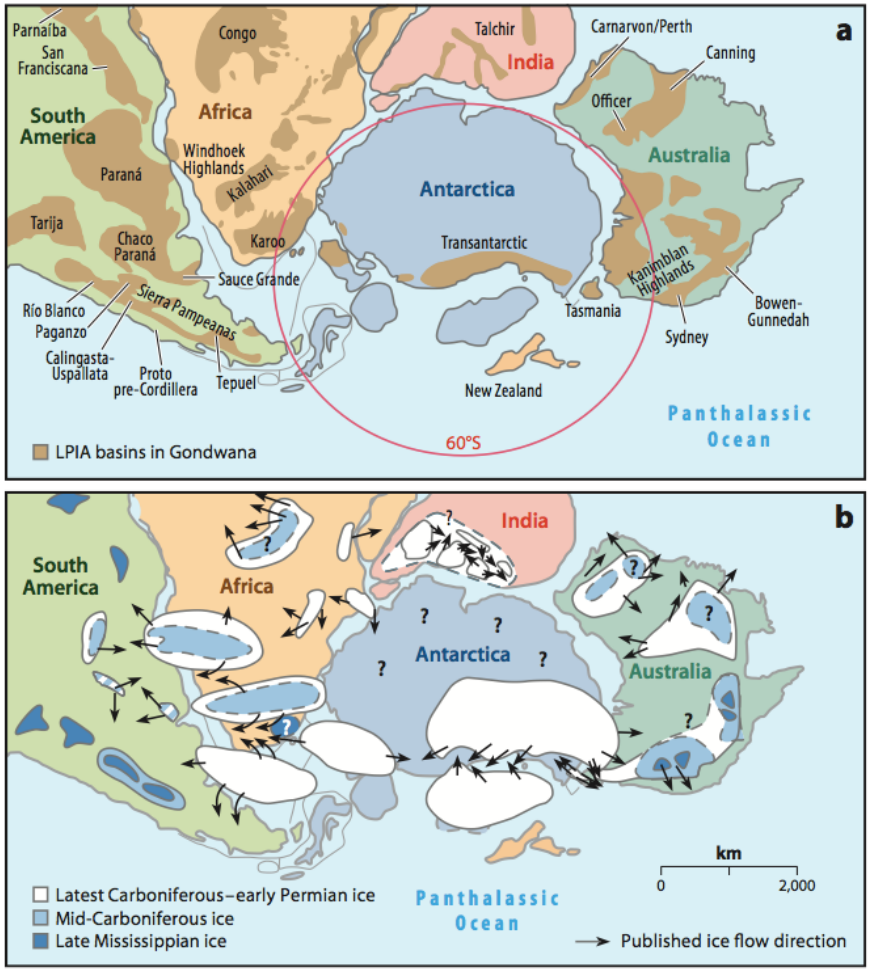
Conodont-based $^{87}Sr/^{86}Sr$ record



Chen et al., 2018

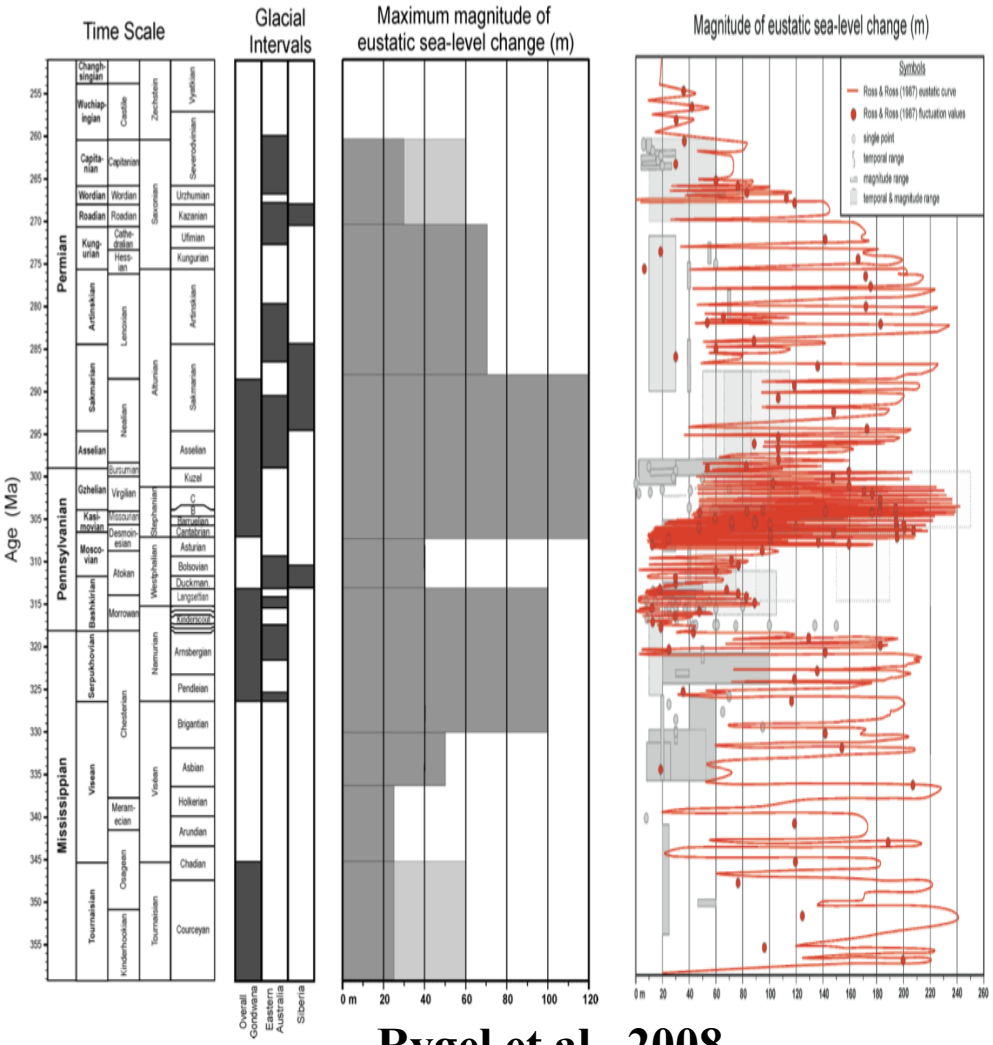
Late Paleozoic ice age: glaciation and glacioeustasy

Polar-perspective paleogeographic maps



Montañez and Poulsen, 2013

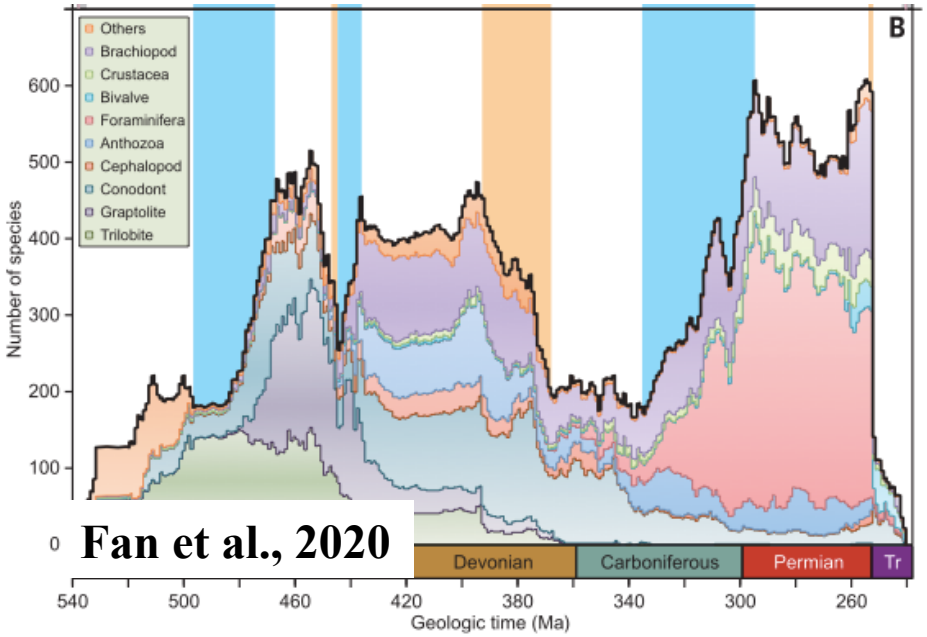
Magnitude of Late Paleozoic glacioeustasy



Rygel et al., 2008

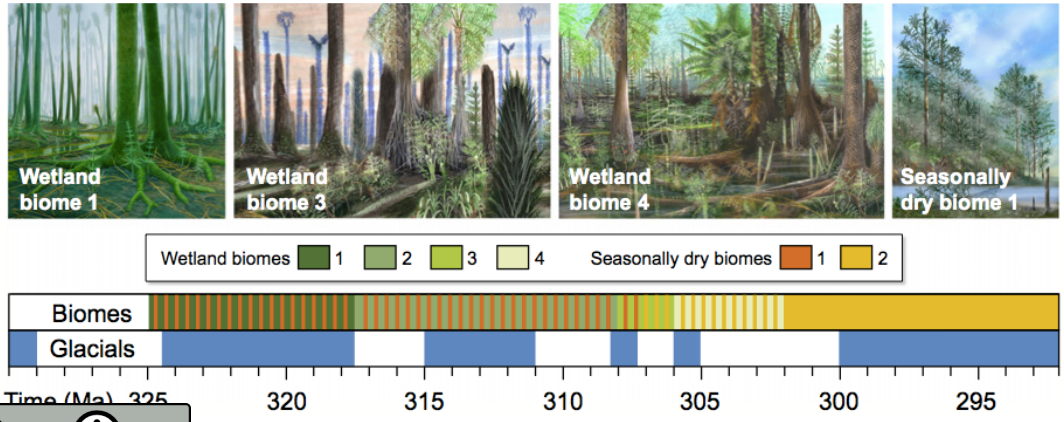
Late Paleozoic ice age: biotic world

Carboniferous–Permian Biodiversification Event



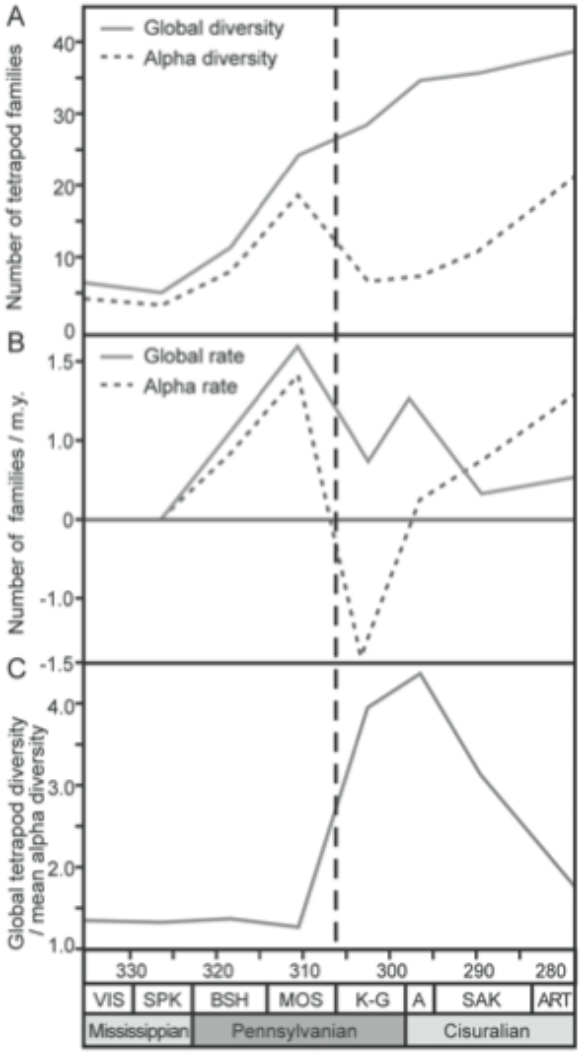
Fan et al., 2020

Vegetation shifts of the tropical biomes



Wilson et al., 2017

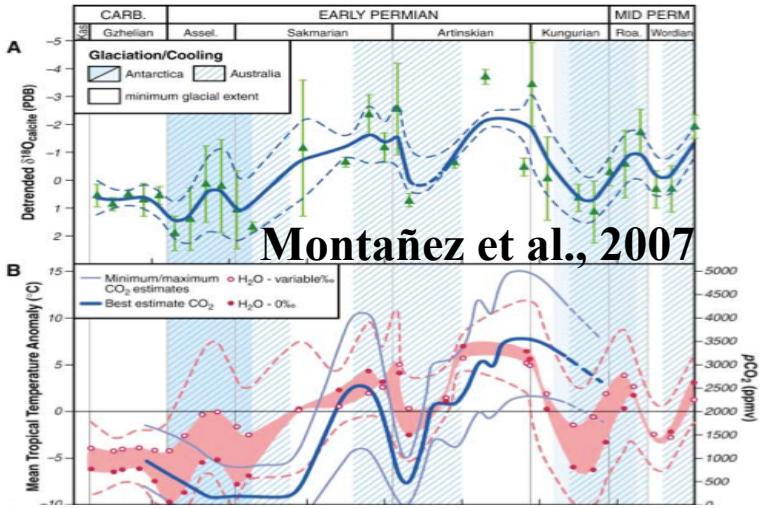
Tetrapod diversification



Saheny et al., 2000

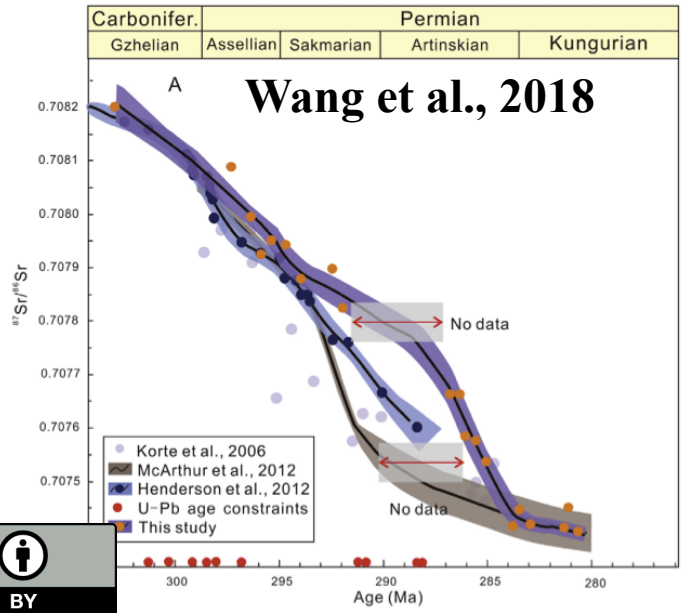
Late Paleozoic deglaciation

Rise of atmospheric CO_2



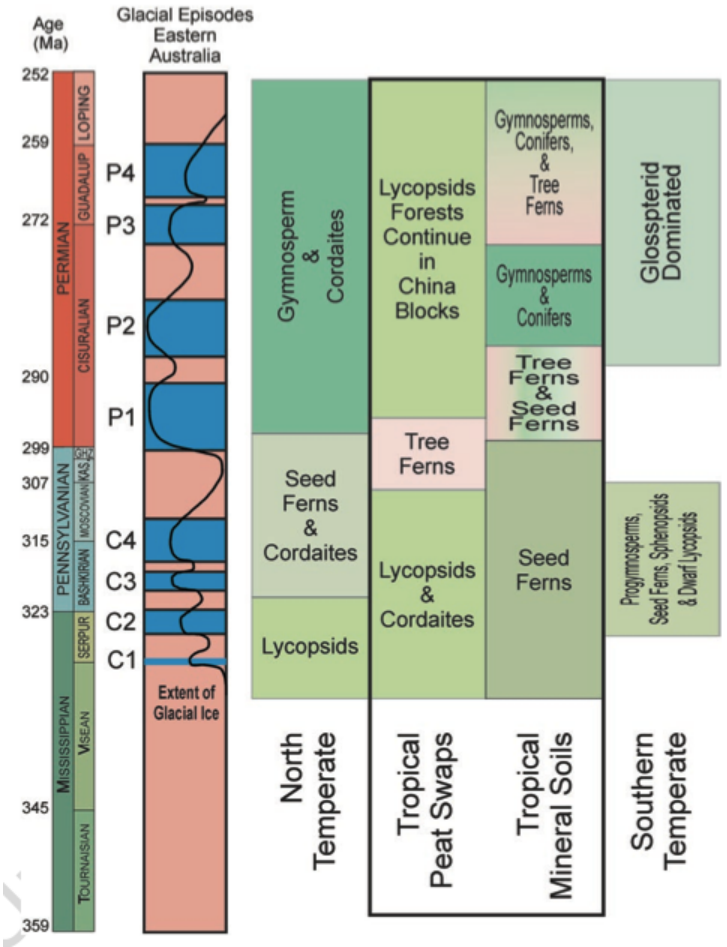
Montañez et al., 2007

Decreased $^{87}Sr/^{86}Sr$ record



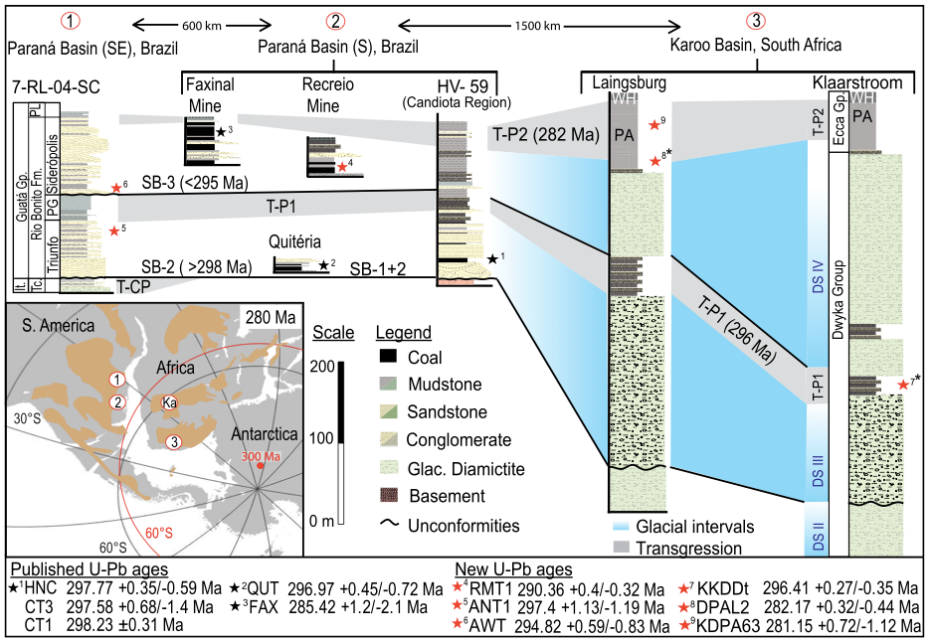
Wang et al., 2018

Demise of wetland biome and rise of seasonally dry biome

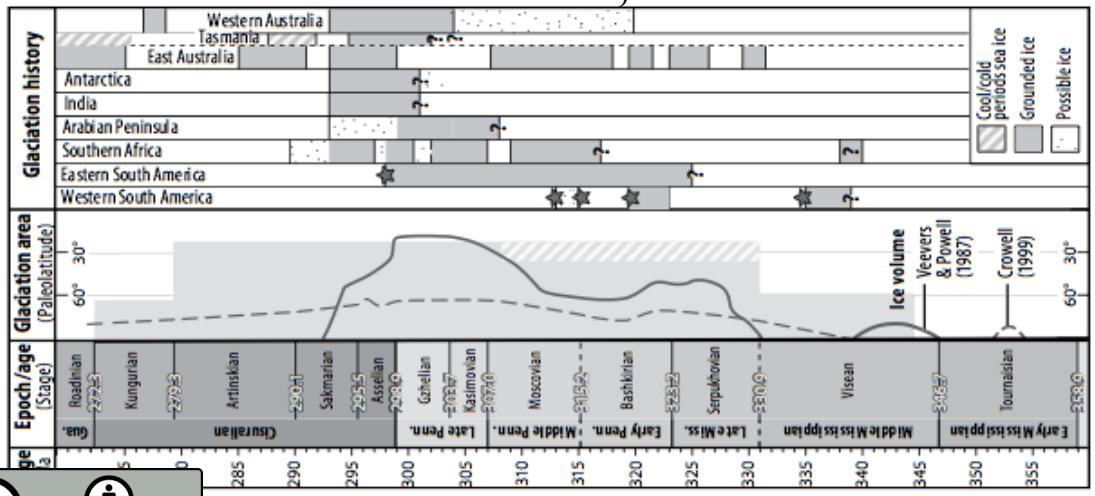


Gastaldo et al., 2020

Late Paleozoic deglaciation: Gondwana



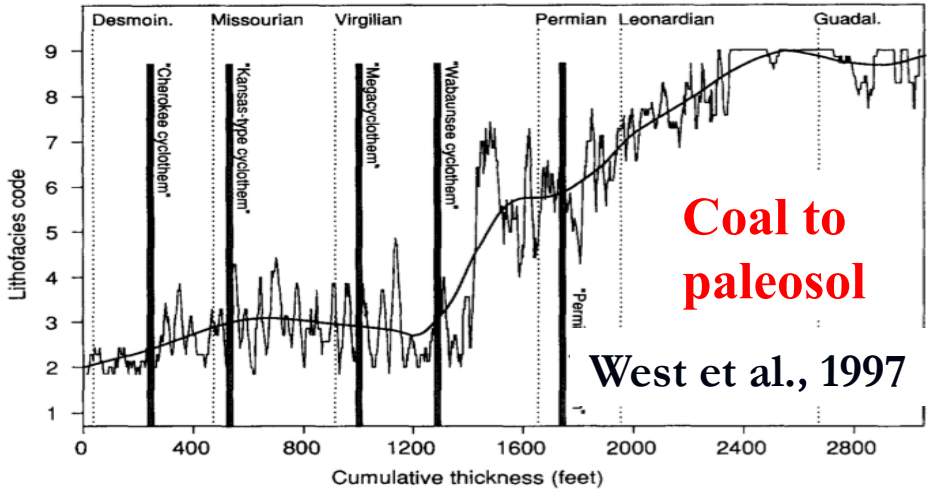
Griffis et al., 2019



Griffis et al., 2018

Scotese, 2016

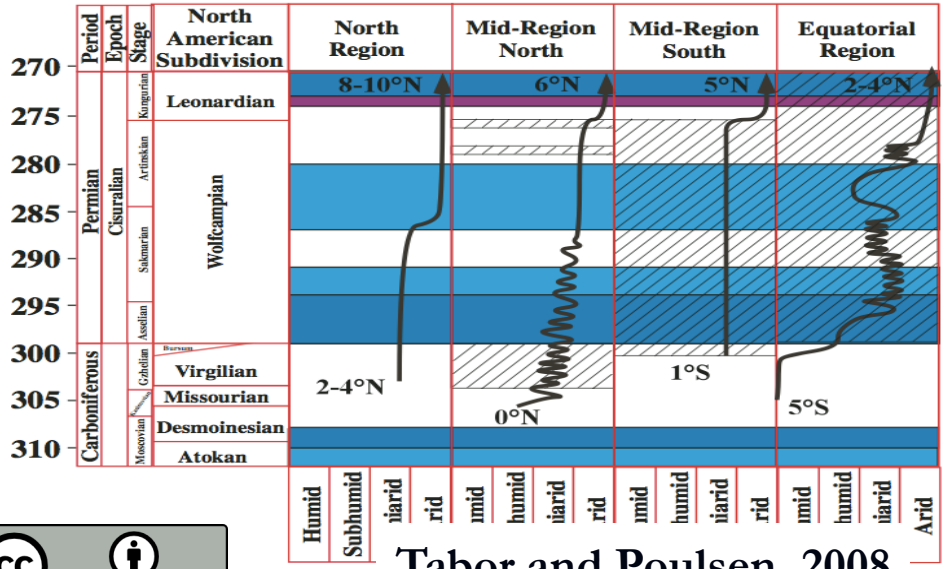
Late Paleozoic deglaciation: Western Pangea



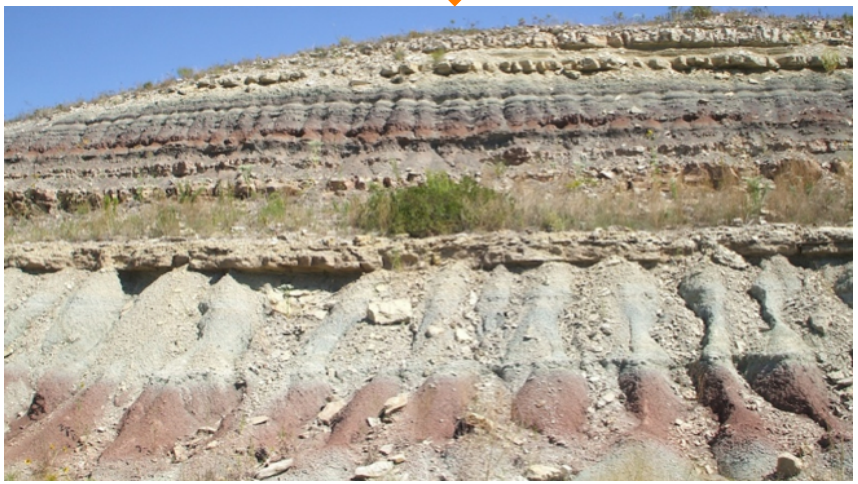
Coal to paleosol

West et al., 1997

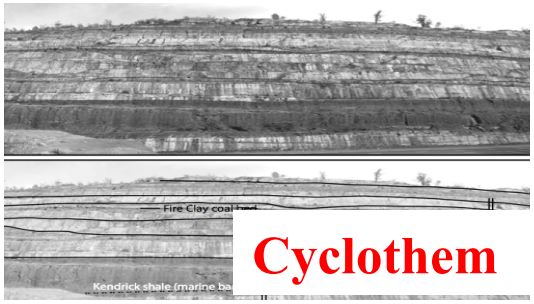
Jerrett et al., 2010



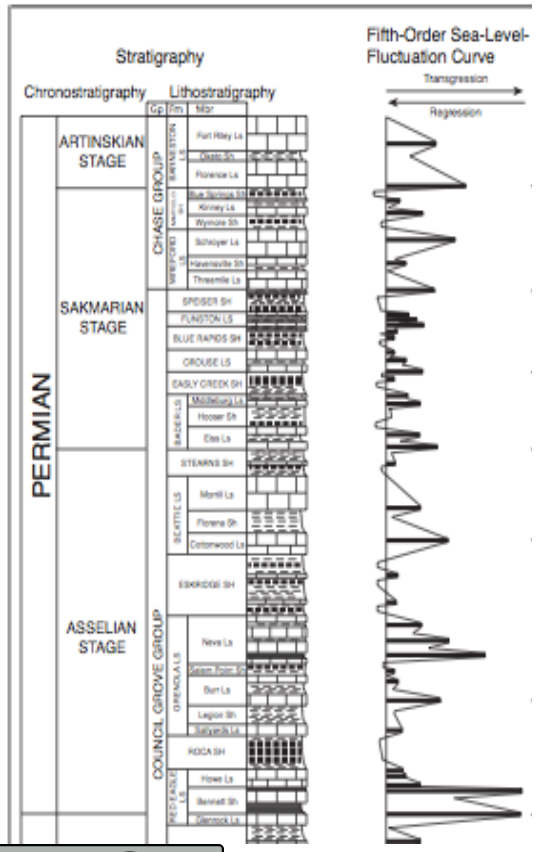
Tabor and Poulsen, 2008



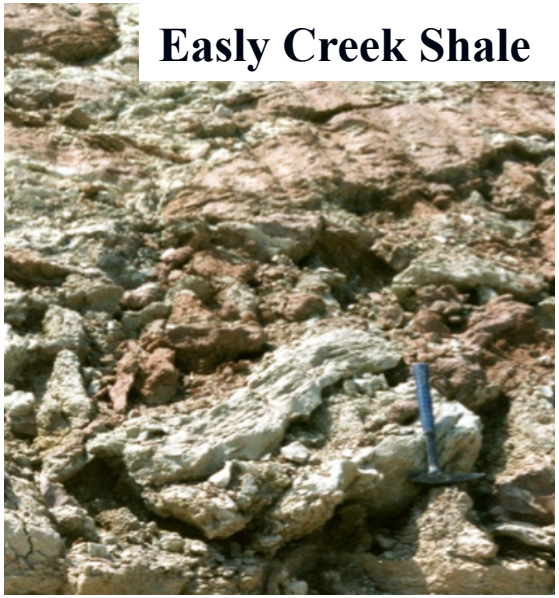
Late Paleozoic deglaciation: Western Pangea



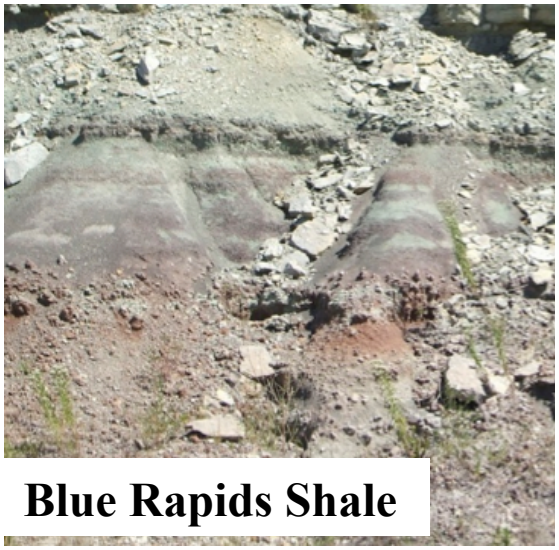
Cyclothem



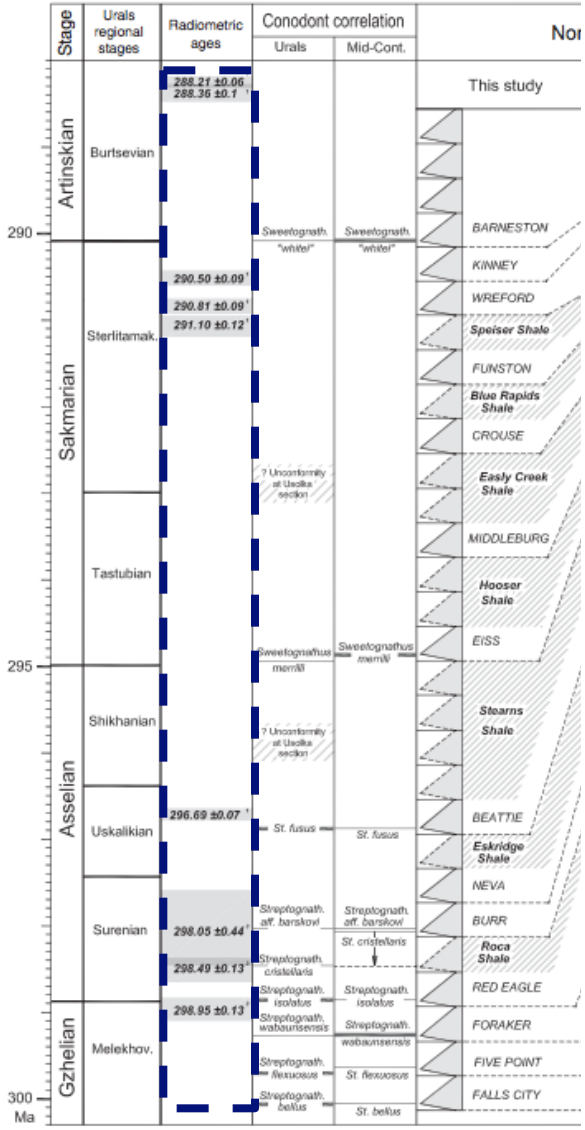
Schmitz et al., 2009



Easly Creek Shale

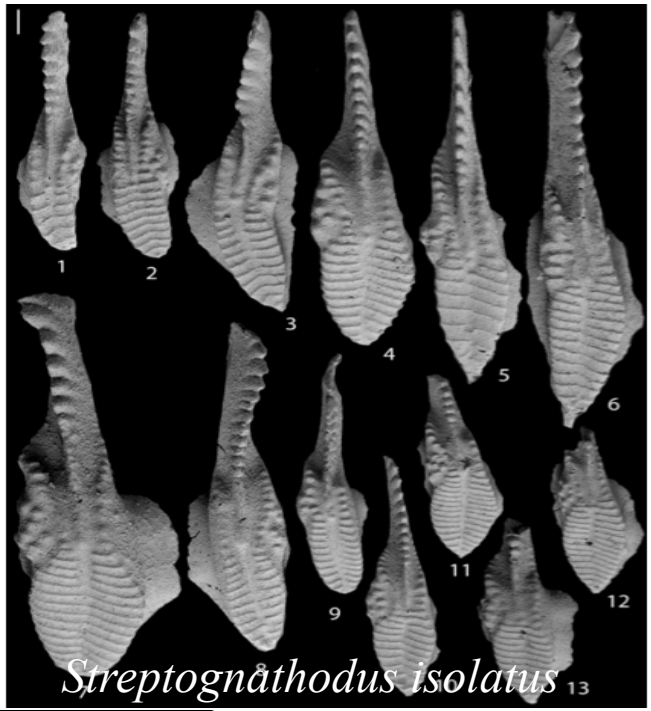


Blue Rapids Shale

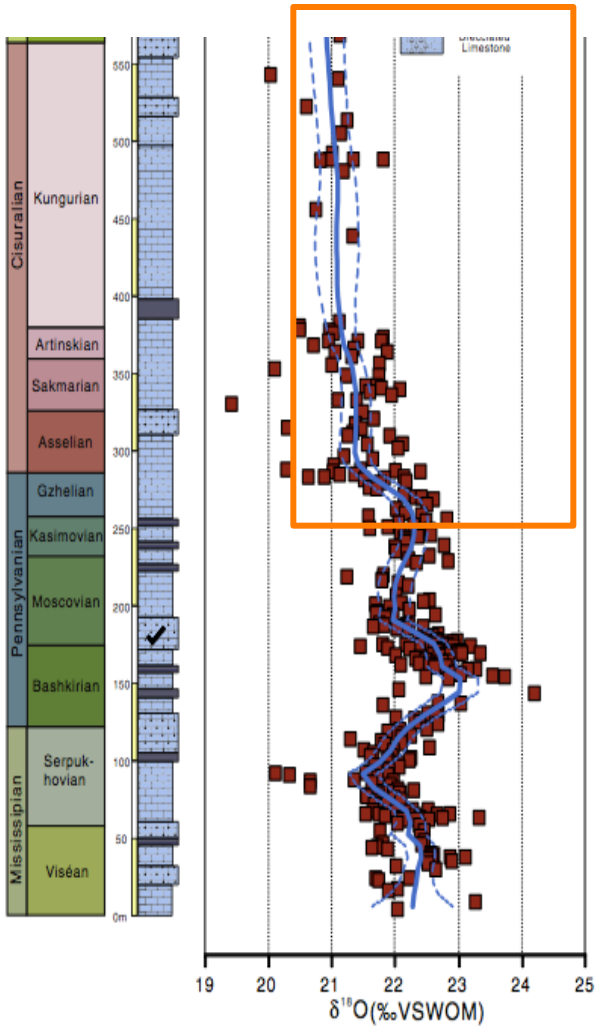


Schmitz and Davydov., 2012

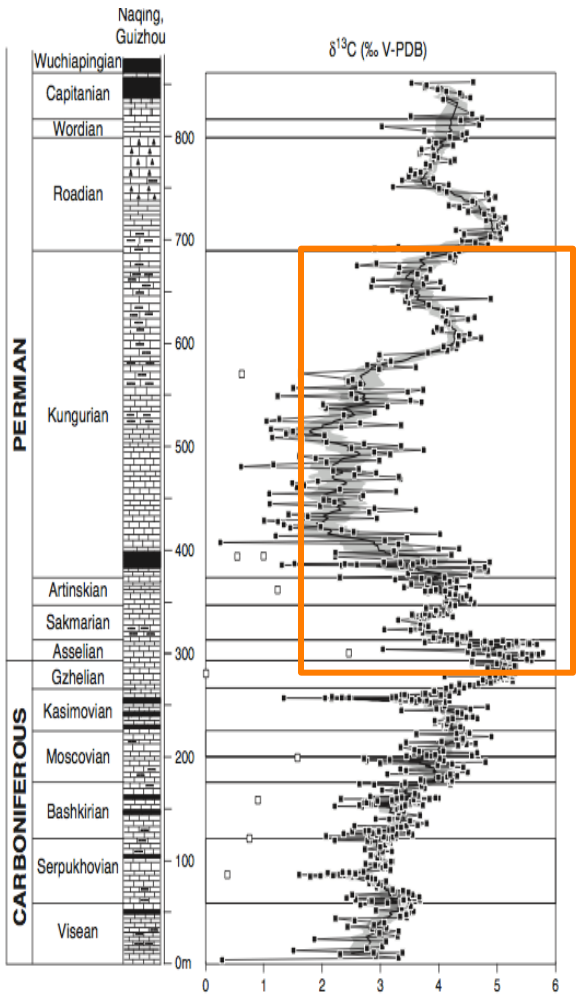
Late Paleozoic deglaciation: Eastern Paleotethys



Chen, 2011



Chen et al., 2016



Buggisch et al., 2011

Late Paleozoic deglaciation

Western Pangea

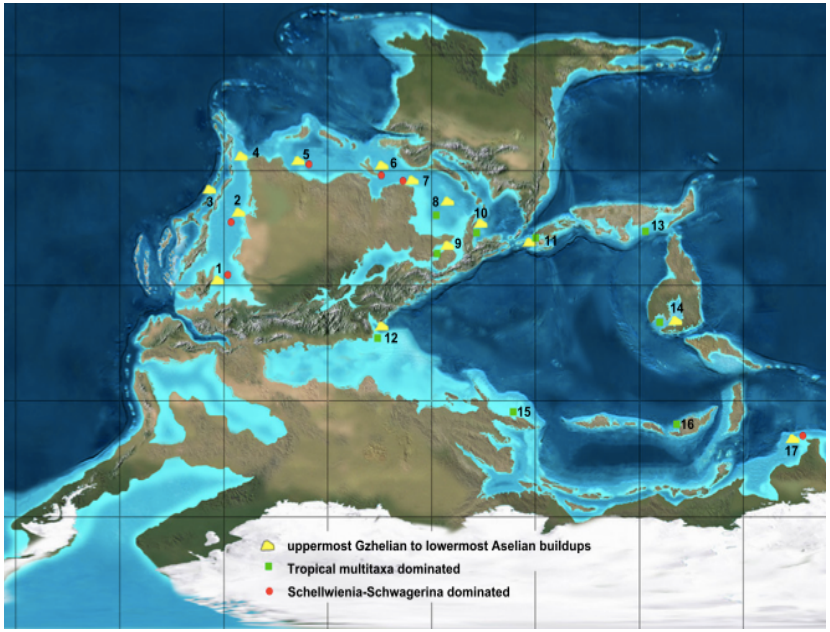
Climate-sensitive lithology ; Cyclothem

Discontinuity

Gondwana

Direct evidence of deglaciation

Sporadic absolute age and biostratigraphic control



Eastern Paleotethys

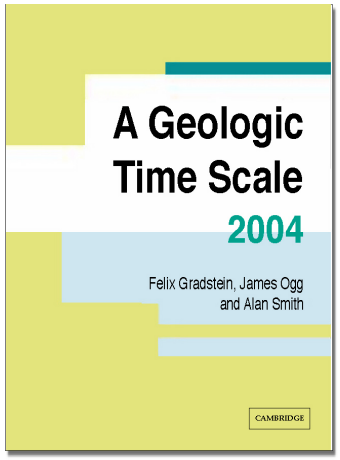
Continuous marine deposits

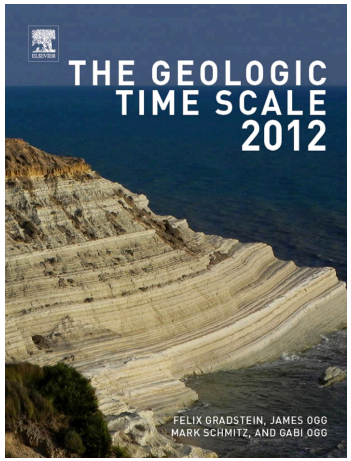
Geochemical proxies

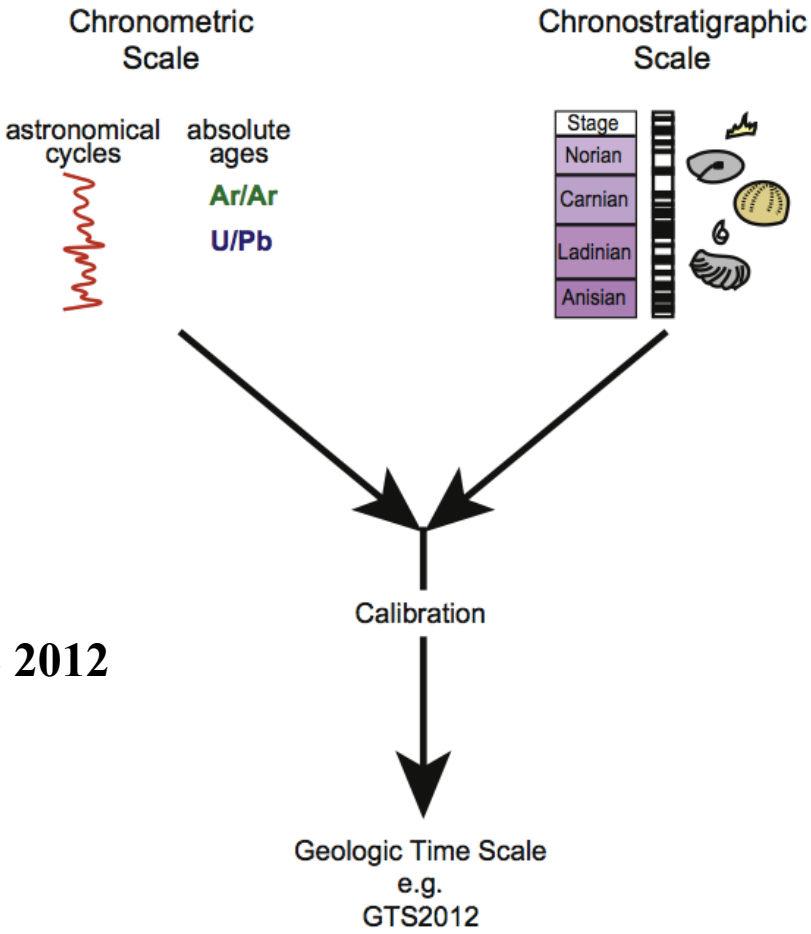
NO high-resolution geochronology control

Cyclostratigraphy

Cyclostratigraphic record of 405 k.y. cycles is often used to correct chronologies affected by variable sedimentation.

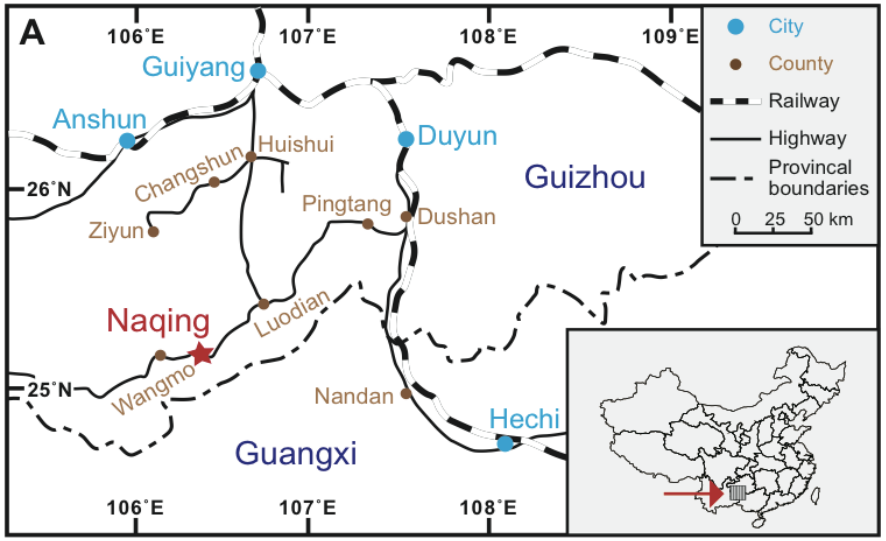


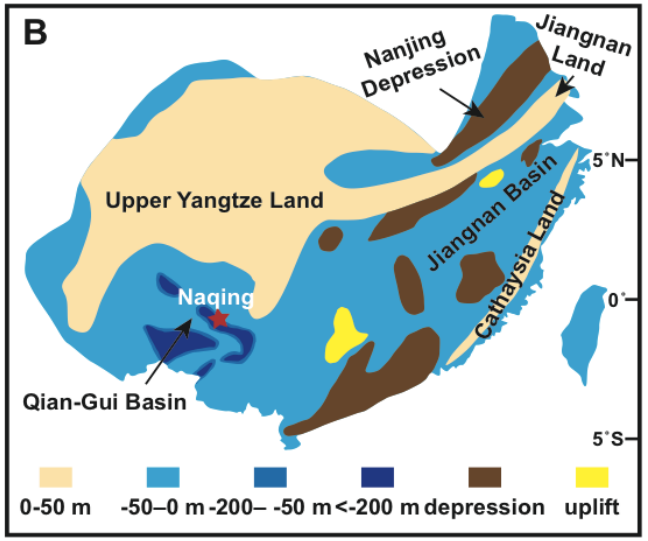




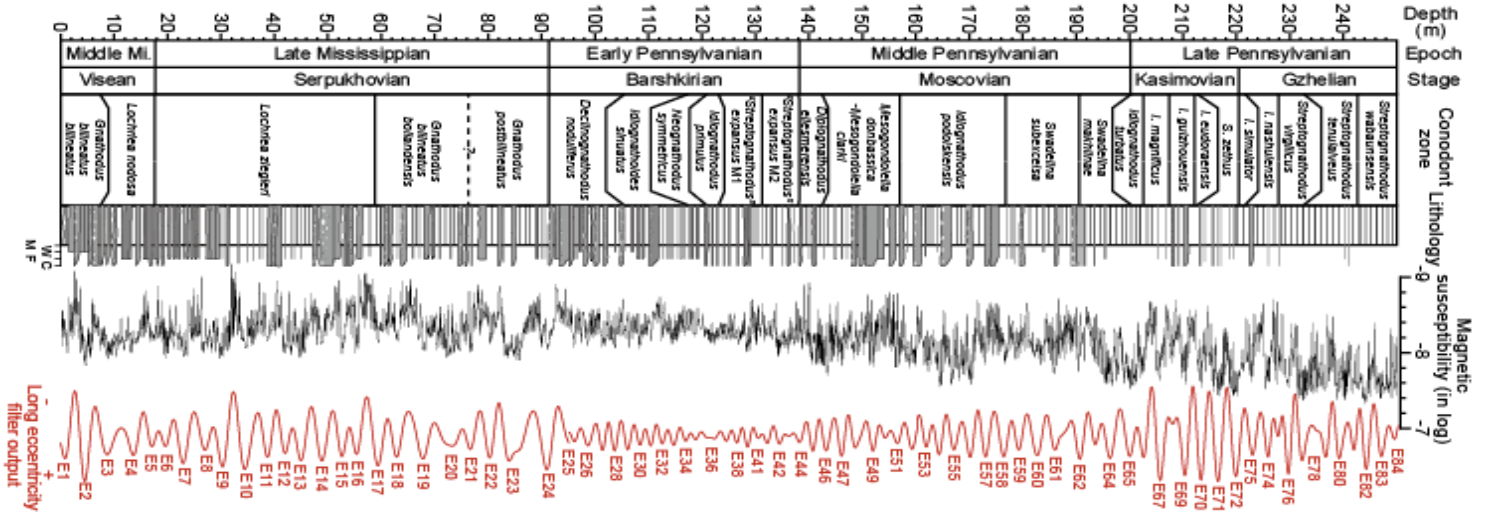
GTS 2012

Study section





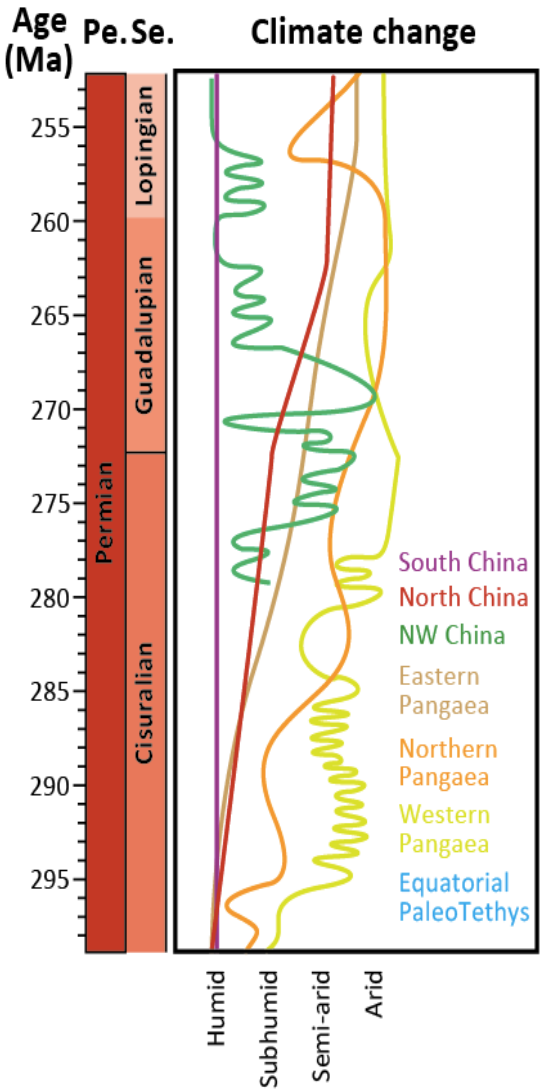
Carboniferous ATS for Naqing

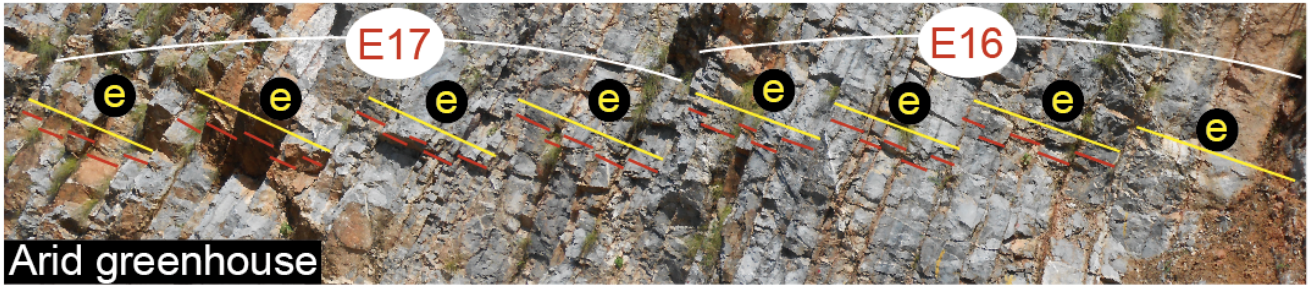


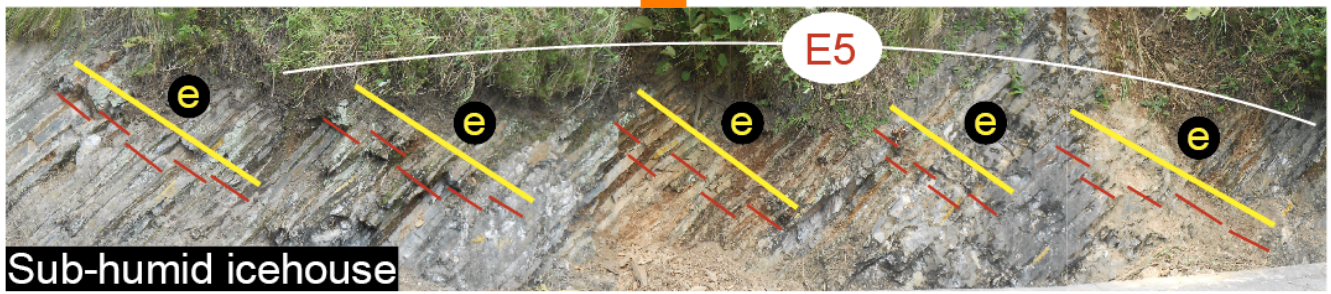
Wu, Fang et al., 2019

Sedimentary cycle

Fang and Wu, 2019



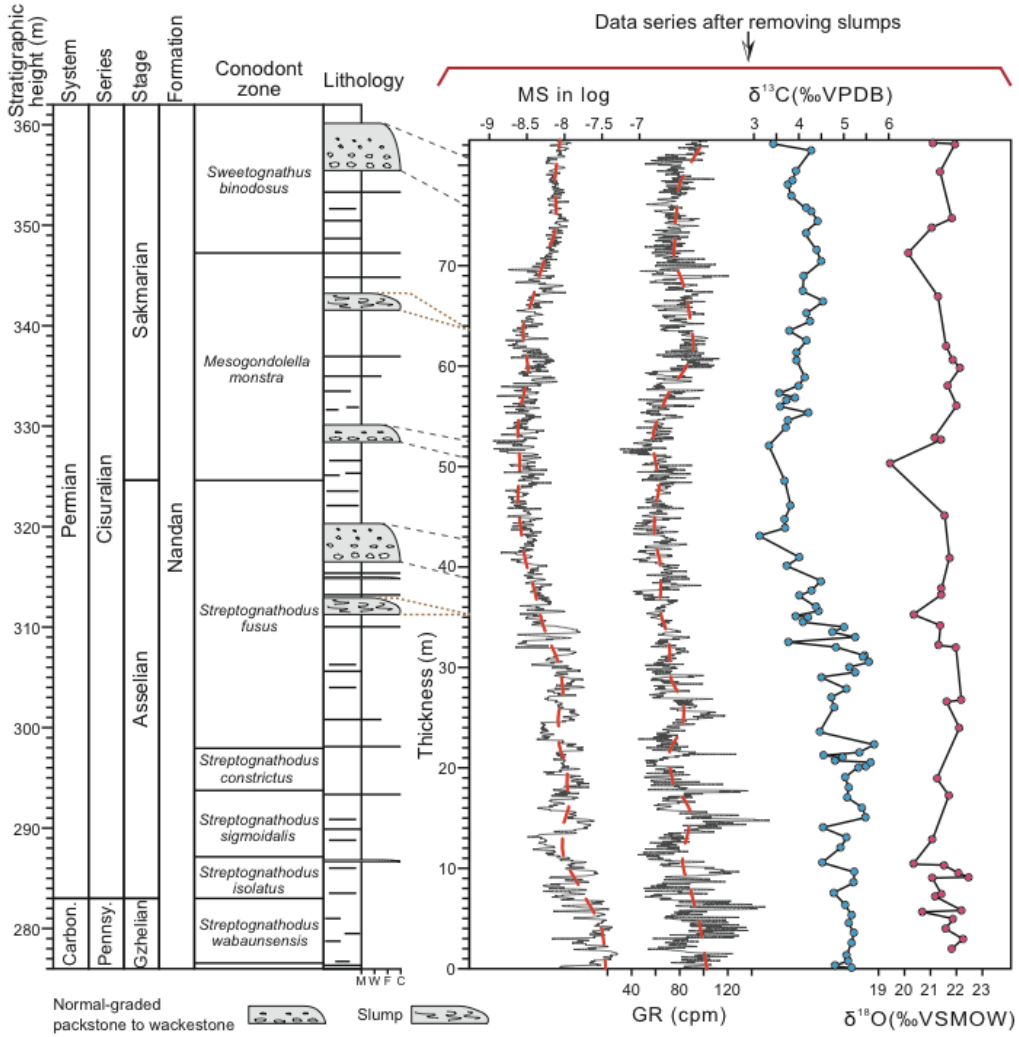




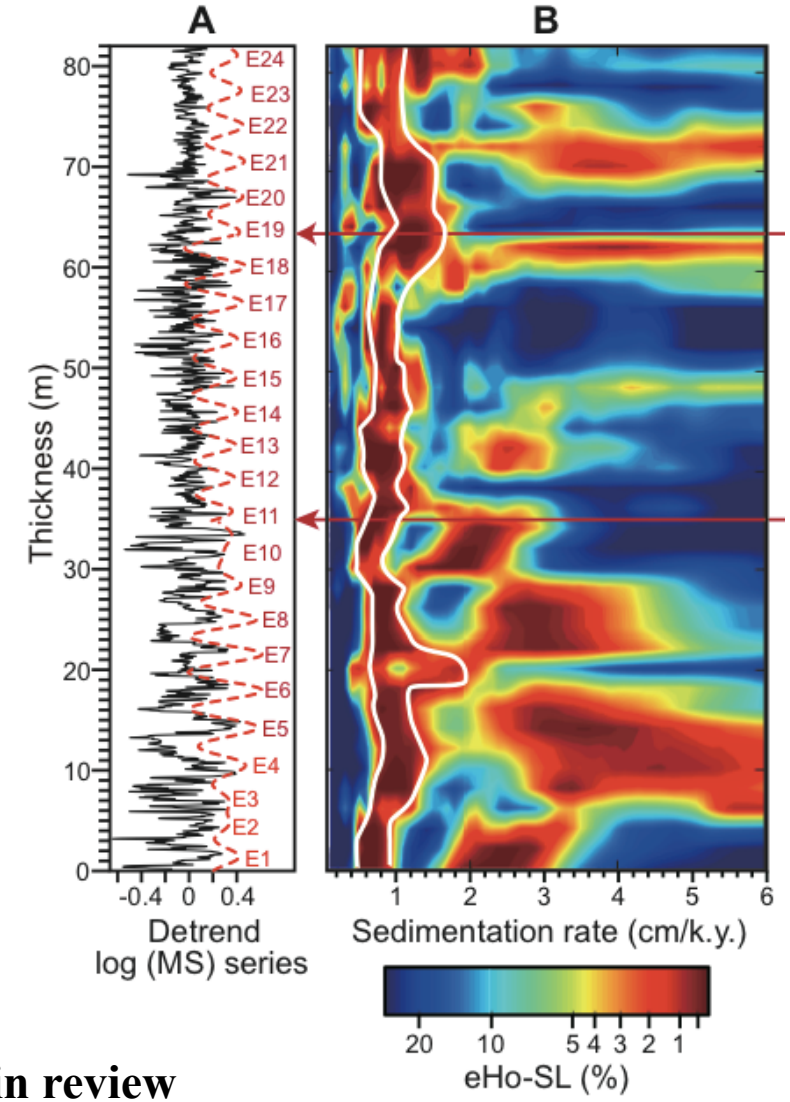
Fang et al., in prep

Asselian + Sakmarian

Stratigraphy and data series



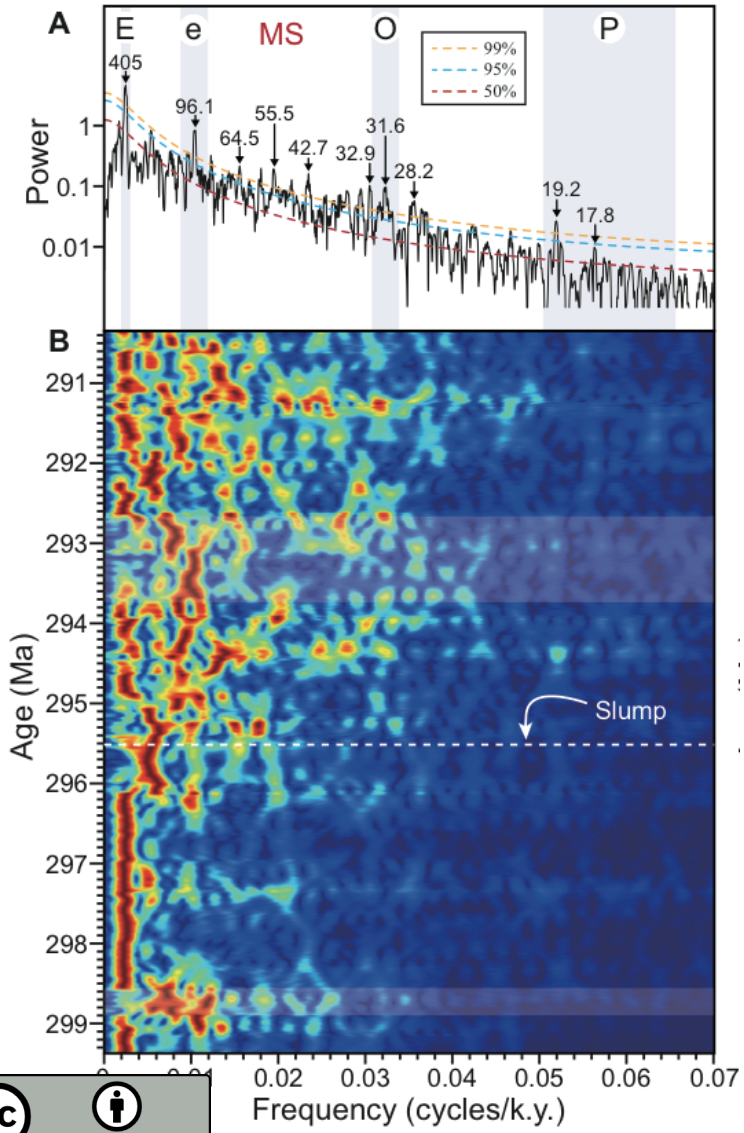
Ecoco and filter output

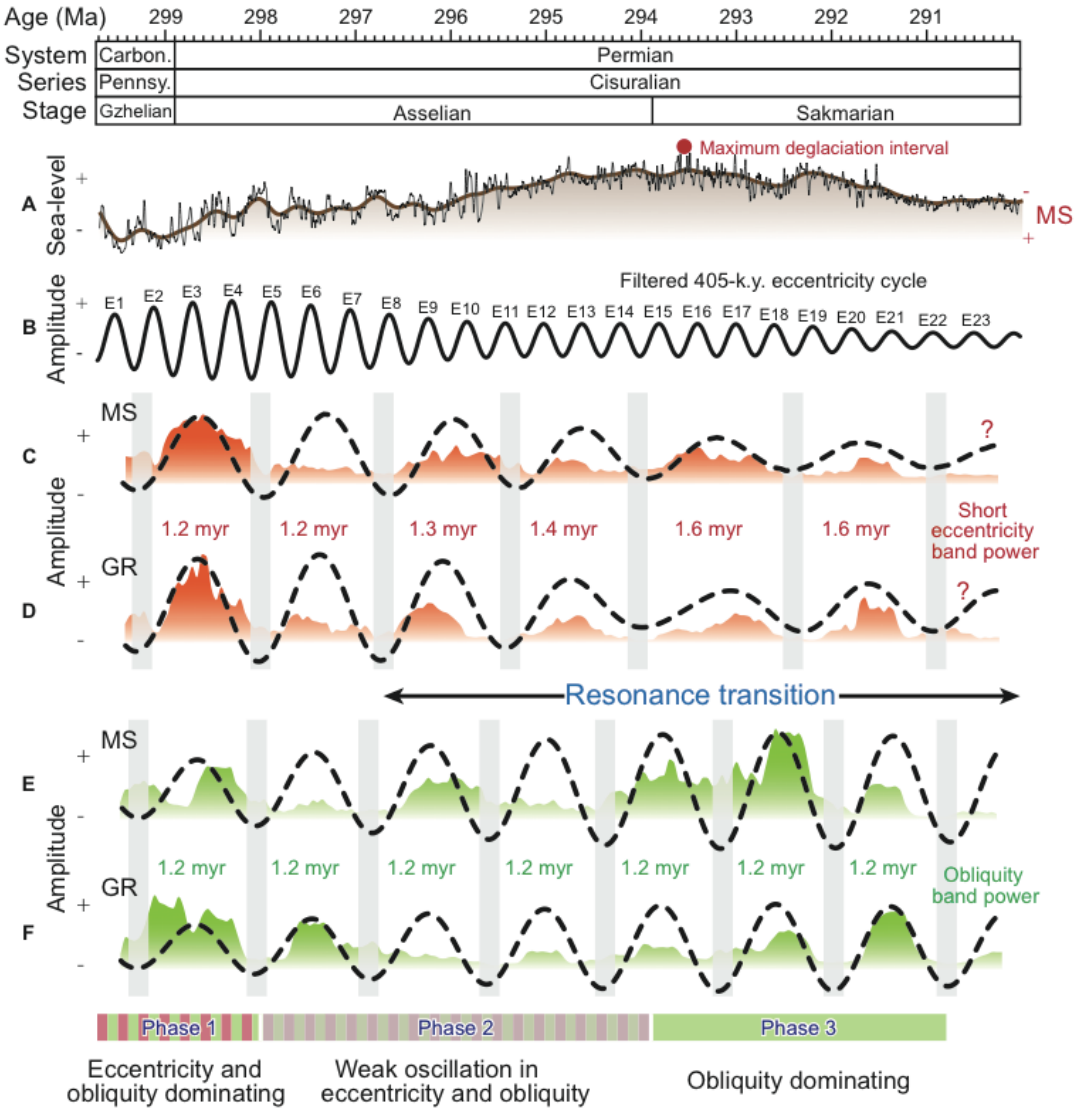


Fang et al., in review

Asselian + Sakmarian

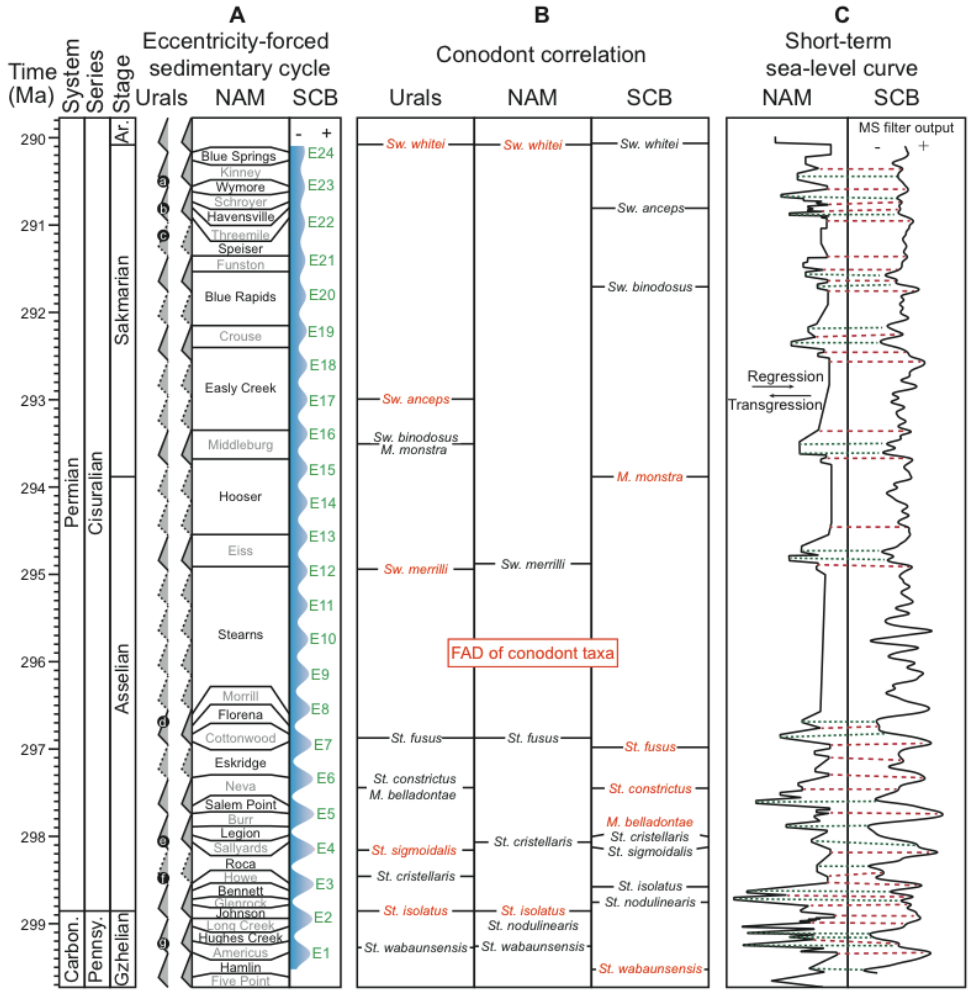
Milankovitch cycle: Period and amplitude





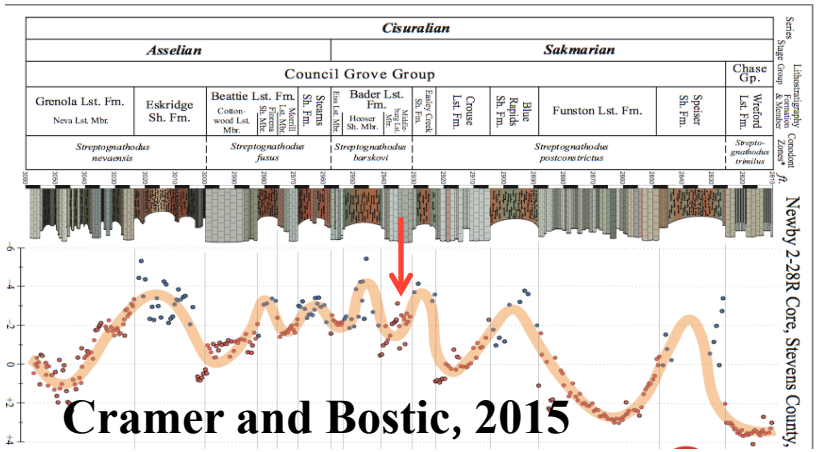
Asselian + Sakmarian

Composite correlation chart comparing the cyclostratigraphy, biostratigraphy and sea-level curve



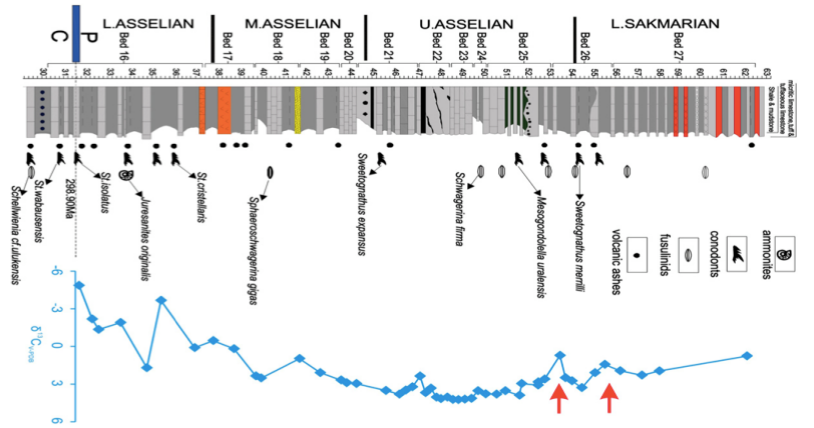
Fang et al., in review

^{13}C data from U.S. Midcontinent



Cramer and Bostic, 2015

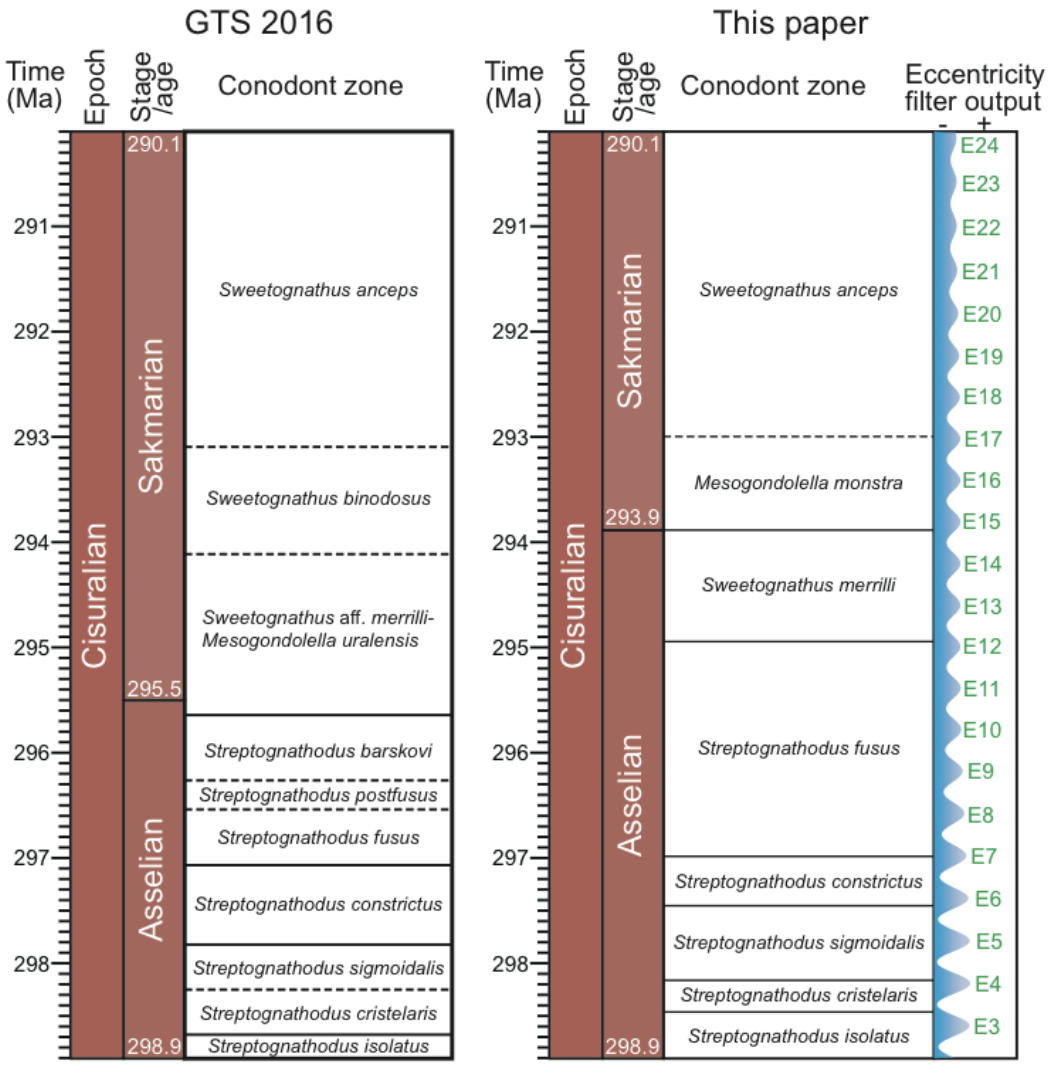
^{13}C data from Urals



Zeng et al., 2012

Asselian + Sakmarian

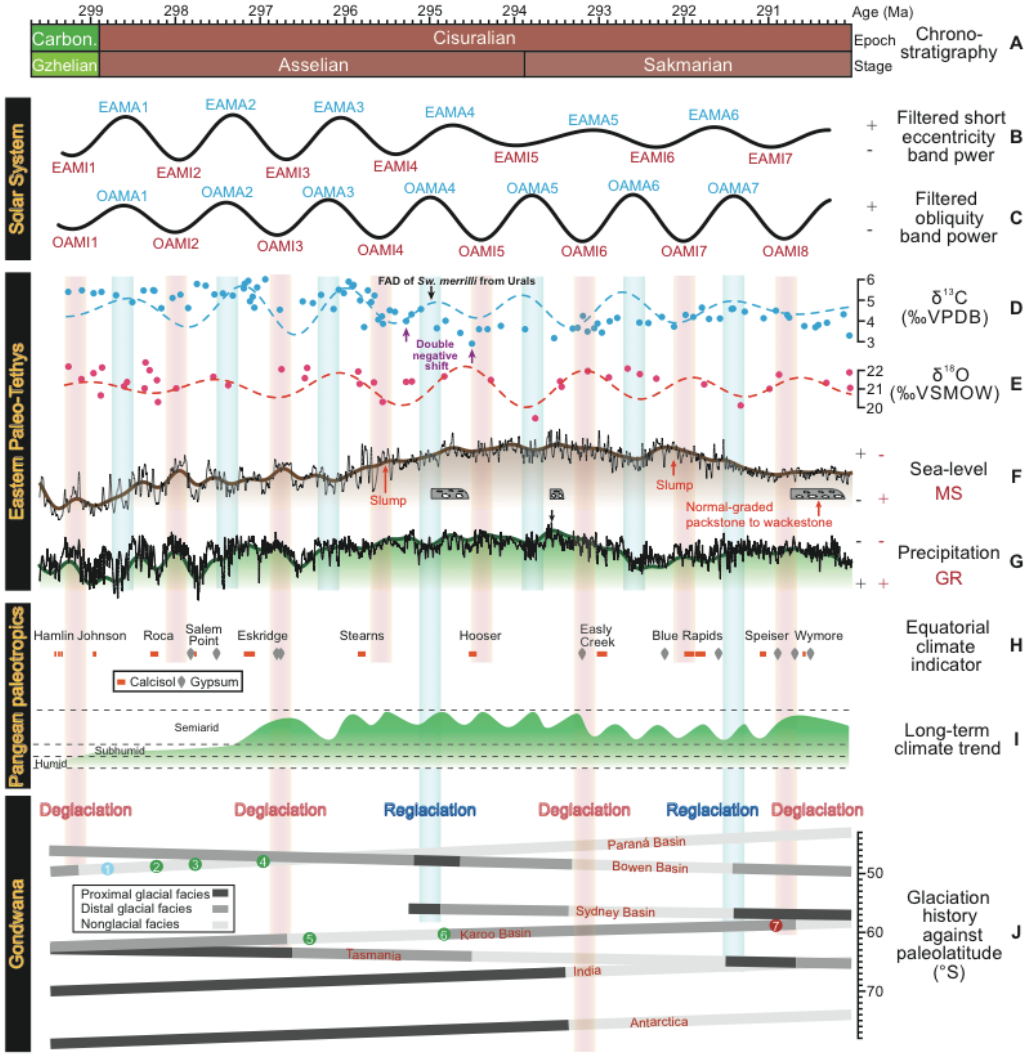
Global composite chronostratigraphy



Fang et al., in review

Asselian + Sakmarian

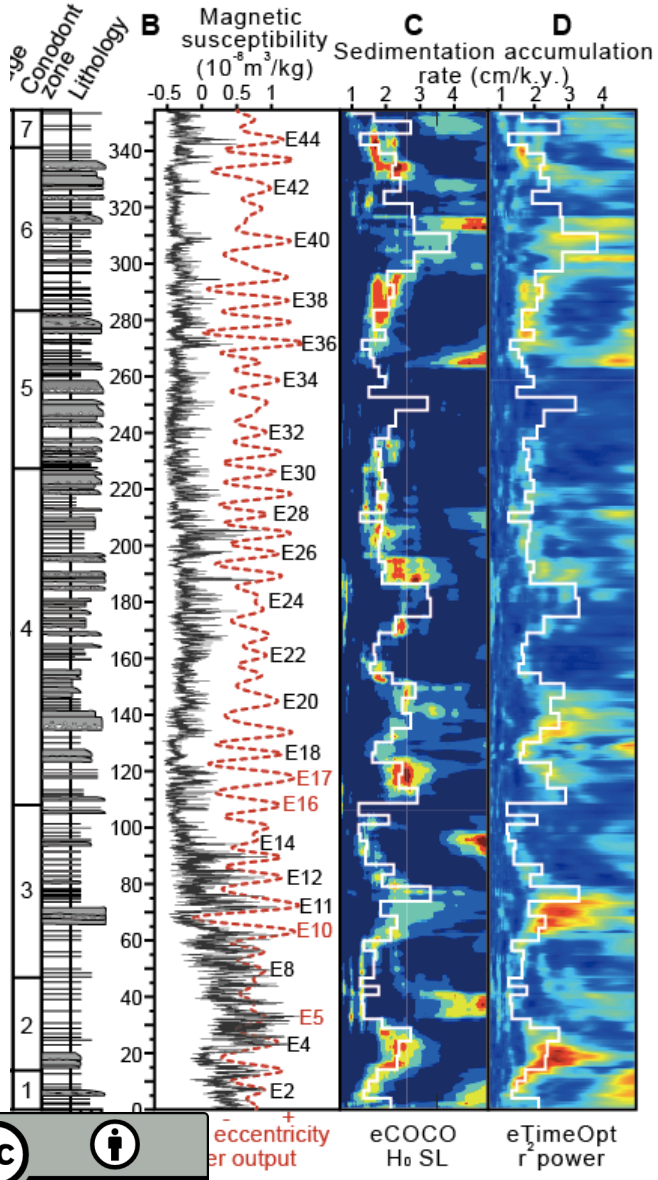
Astronomically paced climate evolution during the demise of the LPIA

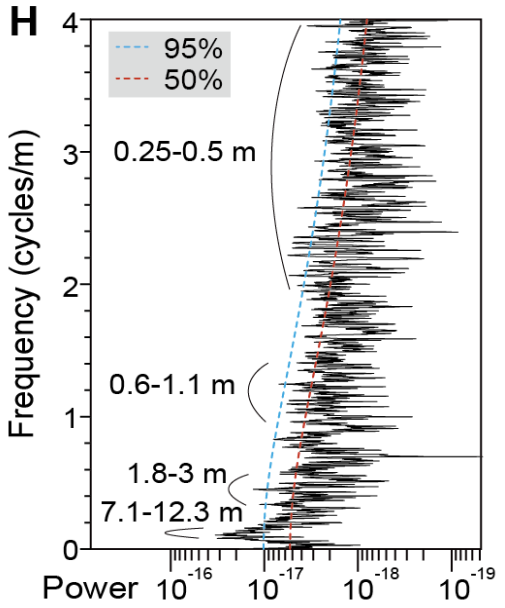


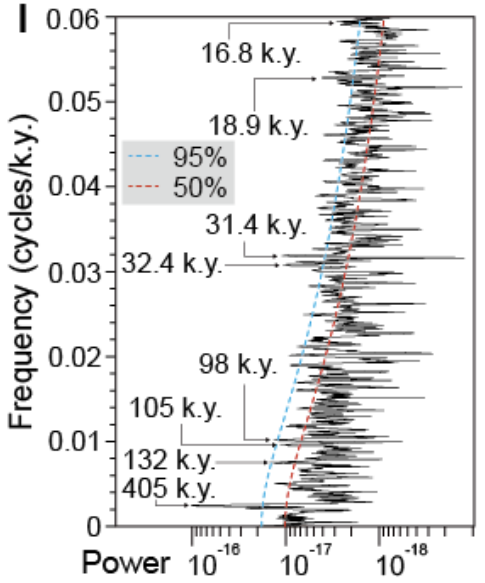
Fang et al., in review

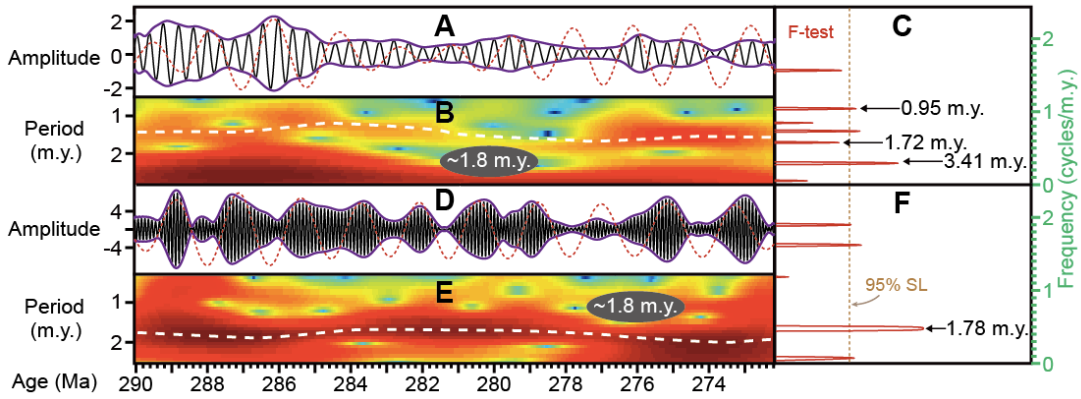
Artinskian + Kungurian

Milankovitch cycle: Period and amplitude





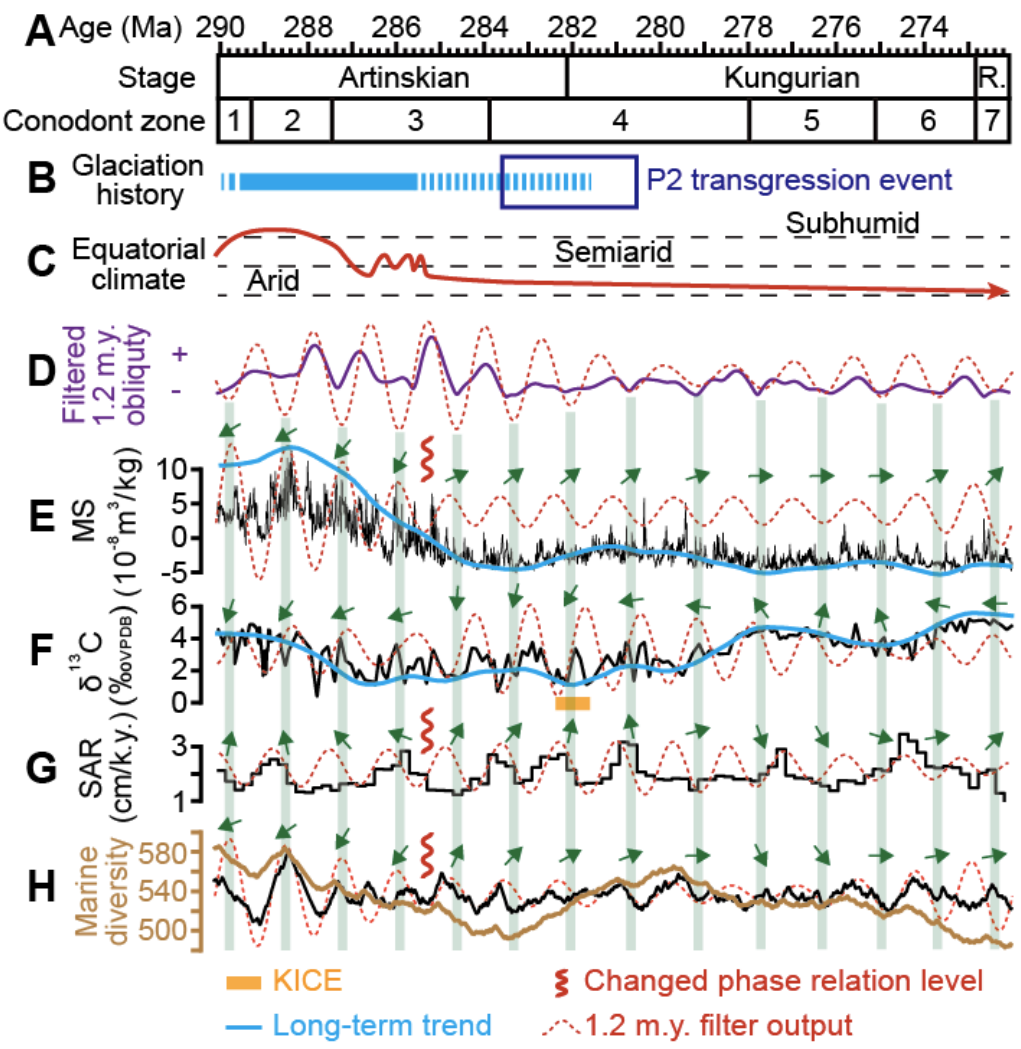


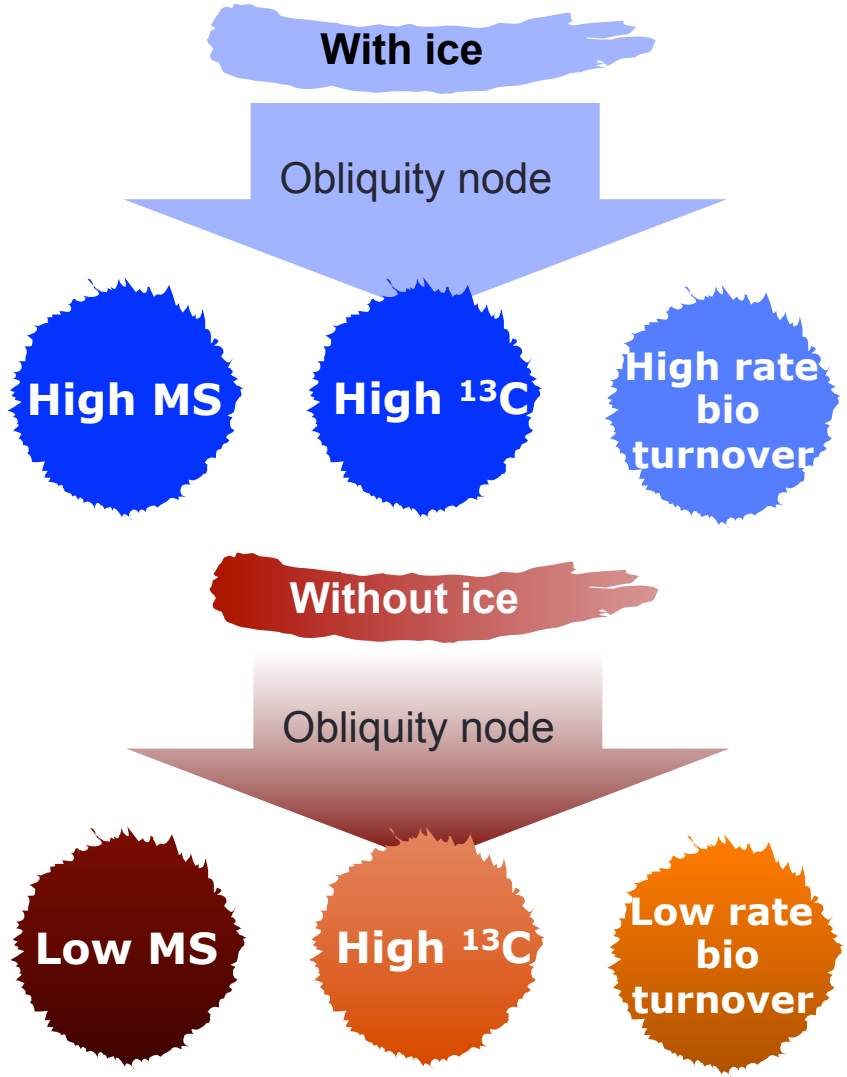


Fang et al., in prep

Artinskian + Kungurian

Astronomically paced climatic and biotic turnovers





Fang et al., in prep

Thank you for your attention

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