Using biogeochemical models to constrain ancient carbon fluxes

Benjamin J. W. Mills

University of Leeds, UK
I make box models of global biogeochemistry, linked to the long term geological carbon, sulfur and oxygen cycles.
Models make predictions for atmosphere/ocean composition and also predict key geochemical records.

Comparing model predictions to the geological record lets us test hypotheses, or reconstruct climate at times where proxy data is sparse.
Example:

‘COPSE’ model predictions for climate and geochemistry

(also produces reasonable fits to $\delta^{13}C$, $\delta^{34}S$, [SO$_4$])

Mills et al., 2019

*Gondwana Research*
A warmer world may not mean more marine new production.
Conclusions:

Deep-time warm climates may be poor analogues for future warming, because they are not driven entirely by excess CO$_2$ input, but a complex combination of changes to carbon sources and sinks.