

Destabilisation of the terrestrial biosphere during past warm climate events

GORDON N INGLIS

University of Southampton

Presenting Author: Gordon.Inglis@soton.ac.uk

Terrestrial organic carbon acts as an important CO₂ sink when transported via rivers to the ocean and sequestered in coastal marine sediments. This mechanism might help to modulate atmospheric CO₂ levels over short- and long- timescales, but its importance during past warm climates remains unknown. Here we use terrestrial biomarkers preserved in coastal marine sediment samples to reconstruct the lateral transport and subsequent burial of terrestrial organic carbon in marine sediments during two ancient warming events: the Paleocene-Eocene Thermal Maximum (PETM; 56 million years ago) and the early Eocene Climatic Optimum (EECO; 53 to 49 million years ago). Our results suggest that past warm climates are associated with enhanced delivery and burial of terrestrial organic matter in shallow marine sediments. This may help to sequester CO₂ and act as a negative climate feedback mechanism. However, the inferred carbon fluxes are relatively modest compared to those in modern erosive mountainous river catchments and large river systems. Regardless, our study highlights the importance of the terrestrial biosphere during past warm climates and its potential role as a negative feedback to stabilize Earth's surface temperature.