

Late Paleocene-Early Eocene continental weathering and deposition into the northern Gulf of Mexico

1: Context

The USA Gulf Coastal Plain (GCP) represents predominantly siliciclastic sediments deposited into, and around, the Gulf of Mexico during the early Paleogene. Offshore, these sediments are major hydrocarbon reservoirs thousands of feet thick. Transported sediments are the product of a complex set of interactions including Laramide tectonics, basin subsidence, and continental weathering leading to discharge through the paleo-Mississippi, paleo-Colorado and paleo-Rio Grande rivers. Fossil pollen, spores, and dinoflagellate cysts provide a means of dating these rocks and can also fingerprint eastern from western delta sources that are represented offshore as well as onshore.

A significant switch in source sediments occurs at the Paleocene-Eocene boundary interval resulting in a massive increase in sediment discharge from the US western interior through the paleo-Colorado and Rio Grande rivers at the expense of the paleo-Mississippi. Enlarged deltas extended across Texas into central Louisiana. High sediment volume was transported offshore. Age constraints cannot directly pin this to the PETM but to a window of time that includes and lags the PETM. Siliciclastic weathering, erosion, and sediment burial is an important climate feedback. Data support previous published geochemical analyses of a probable coupled climate change leading to enhanced continental, siliciclastic weathering, erosion and final offshore dumping via Texas during the latest Paleocene-early Eocene.

Early Eocene:
Sneddon *et al.* 2018, Sharman *et al.* 2017 → strengthened paleo-Colorado and Rio Grande draining entire US western Interior as far as southern Wyoming. Blum *et al.* 2017 → Sediment might also be dumped via Holly Springs delta from this same Laramide area.

Paleocene:
Sneddon *et al.* 2018, Sharman *et al.* 2017 → Paleo-Mississippi more dominant from Midwest and Appalachian sources as well as continental interior.

2: Data types and age model

>68 onshore and offshore wells and outcrops that contain >5500 palynomorph samples representing >1500 different palynomorph taxa. Spans Danian through Lutetian and centred on the Wilcox Group. Data employ same counting procedure from 7 analysts. Taxonomy harmonised and cut to important terrestrial taxonomic groups. Count data scaled using Hellinger transformation. Represent Rosita, Rockdale and Holly Springs delta systems.

