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# The Eagle Ford Shale, Texas: an initial insight into Late Cretaceous organic-rich mudrock palaeoenvironments

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The hypothesised reduction of oxygen within the oceans during the Cretaceous is believed to have led to extended intervals of regional anoxia in bottom waters, resulting in increased preservation of organic matter and the deposition of black shales. Episodes of more widespread anoxia, and even euxinia, in both bottom and surface waters are associated with widespread black shale deposition during Ocean Anoxic Events (OAEs). The most extensive Late Cretaceous OAE, which occurred $\sim$ 94 Ma during Cenomanian-Turonian boundary times, and was particularly well developed in the proto-North Atlantic and Tethyan regions, lasted for around 500 kyr (OAE2). Although the causes of this and other events are still hotly debated, research is taking place internationally to produce a global picture of the causes and consequences of Cretaceous OAEs. Understanding OAEs will enable a better interpretation of the climate fluctuations that ensued, and their association with the widespread deposition of black shales, rising temperatures, increased $pCO_2$, enhanced weathering, and increased nutrient fluxes.

The Eagle Ford Formation, of Cenomanian – Turonian age, is a major shale gas play in SW and NE Texas, extending over an area of more than 45,000 km2. The formation, which consists predominantly of black shales (organic-rich calcareous mudstones), was deposited during an extended period of relative tectonic quiescence in the northern Gulf Coast of the Mexico Basin, bordered by reefs along the continental shelf. The area offers an opportunity to study the effects of OAE2 in an organic-rich shelf setting. The high degree of organic matter preservation in the formation has produced excellent oil and gas source rocks. Vast areas of petroleum-rich shales are now being exploited in the Southern States of the US for shale gas, and the Eagle Ford Shale is fast becoming one of the countries largest producers of gas, oil and condensate. The Eagle Ford Shale stratigraphy is complex and heterogeneous, making further study essential before these resources can be fully developed. Therefore, a thorough understanding of the subsurface sediments within a coherent stratigraphic framework is required before exploitation can be optimimised.

Here, we present initial palynological data (dinoflagellate cyst abundance), in conjunction with geochemistry, from material obtained from the Maverick Basin in the southwestern area of Eagle Ford Shale deposition. Results are presented as part of a wider study of the Eagle Ford Shale, utilising both core and outcrop material, that is using dinoflagellate cysts and chemostratigraphy to develop an improved stratigraphic framework and to reconstruct depositional palaeoenvironments in the basin.