

# Evaluating the Eocene-Aged Coaledo Formation, Oregon: Integrating Palynology, Geochemistry and Thermal Maturity to Improve Paleodepositional Models and Hydrocarbon Resource Characterization

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## Abstract

Shelf-margin depositional systems are prolific petroleum reservoirs, and to characterize these systems, it is essential to study analogs. However most key outcrops are located in Russia, Europe or South America. The Coos Bay Basin, on the southwest coast of Oregon, is a synclinal trough that contains exceptionally preserved Eocene-Oligocene deltaic and shallow marine sediments. Specifically, the deltaic to deep marine Coaledo Formation provides the perfect analogue to conduct an in-depth analysis of deltaic deposition in the United States. Through a multi-proxy analysis, combining palynology, kerogen characterization, organic petrography, thermal maturity and geochemistry (TOC and C and N isotopes), this study will reassess depositional models of the deltaic system while providing an improved hydrocarbon resource assessment for the Coaledo Formation. Dott and Bird (1979) interpreted the paleodepositional environment in Coos Bay as a steep shelf to shelf-margin paleogeographic setting. One of the targets of this study is the unconformity bound sequence composed of deep-water turbiditic beds of Sacchi Beach and the Lower/Middle Coaledo Formations. The Coaledo Formation has been roughly dated by molluscs and benthic foraminifera, however, paleodepositional environments and associated flora have yet to be accurately determined. Preliminary palynology work by Hopkins

(1967) suggests the bulk of the Coos Bay flora indicate a warm to subtropical environment for the entire Paleogene section, but sampling was sparse and did not capture changes at the parasequence scale. The Lower Coaledo Formation alone is composed of ~20 coarsening-upward parasequences. We will present the first results of our new high-resolution study and summarize how pollen, spore and dinoflagellate assemblages allow us to identify discrete depositional settings. Preliminary results indicate mixed kerogen types that are mostly of marine origin with varying degrees of fluvial influence. We will also discuss the TOC distribution in the various discrete layers within the paleo-delta, evaluate the thermal maturity of the organic matter in each studied section, and present how the C/N isotope ratio allows us to differentiate the sources of organic matter.

*Keywords: Biostratigraphy, TOC, thermal maturity, shelf-margin deltaic system, kerogen characterization*