

Method for Characterizing Source Rock Organofacies Using Bulk Rock Composition

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We present a straightforward and effective method to predict source rock organofacies using basic compositional data and a ternary discriminant plot (Fig. 1), prior to analyzing suitable pyrolysis data. Associating compositional data with organofacies can tie into previously correlated depositional environments and expelled hydrocarbon types. Other advantages of using organofacies as a source rock classification are that it can remove the problem of a lack of an agreed upon shale classification scheme and it may discontinue the comparison of source rock plays based on production information.

Four basic source rock affinities (Fig. 2) have been noted: 1) clay-quartz affinity w/ minor carbonate; 2) clay-quartz affinity w/ carbonate; 3) carbonate affinity; and 4) bimodal clustering and affinities. Trends in the compositional data can predict the lateral and/or vertical changes in depositional systems and can help reduce the risk for certain organofacies being present in an area. Each source rock can have multiple organofacies and these can vary within a basin or separate basins. Ternary plots also distinguish more brittle lithofacies and therefore, more suitable unconventional reservoirs. This technique does not directly indicate quality of the source rock. TOC and other analyses are still needed to identify highly organic-rich source rocks.

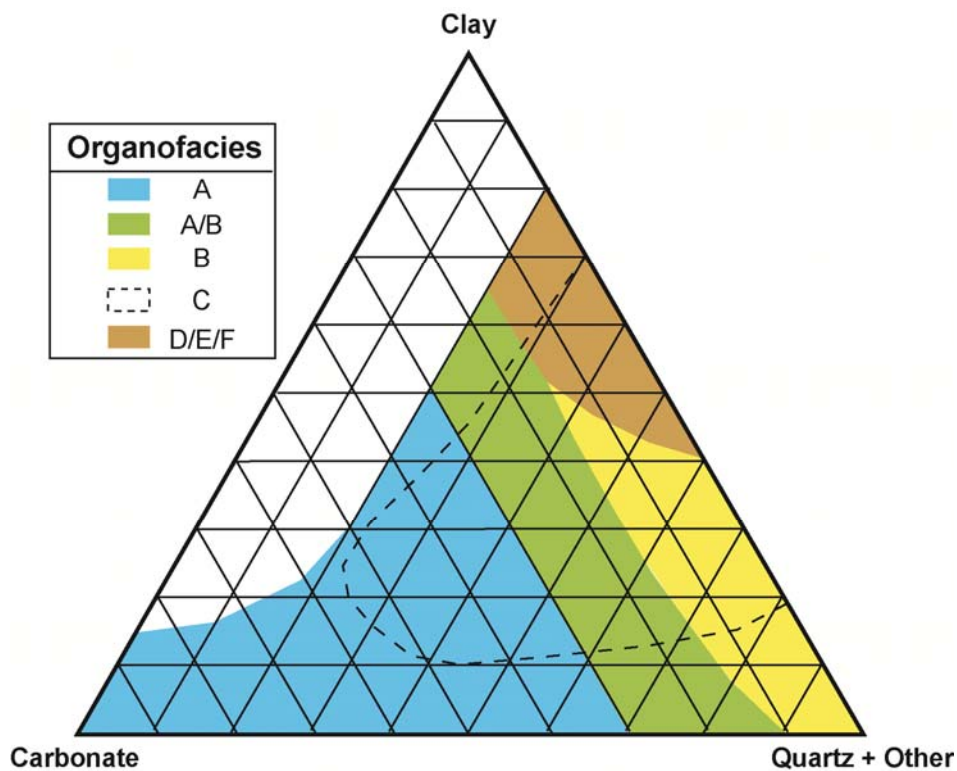


Figure 1. Ternary discriminant plot with an overlay of organofacies distributions. No shale compositional data plotted in the white area and was therefore not interpreted.

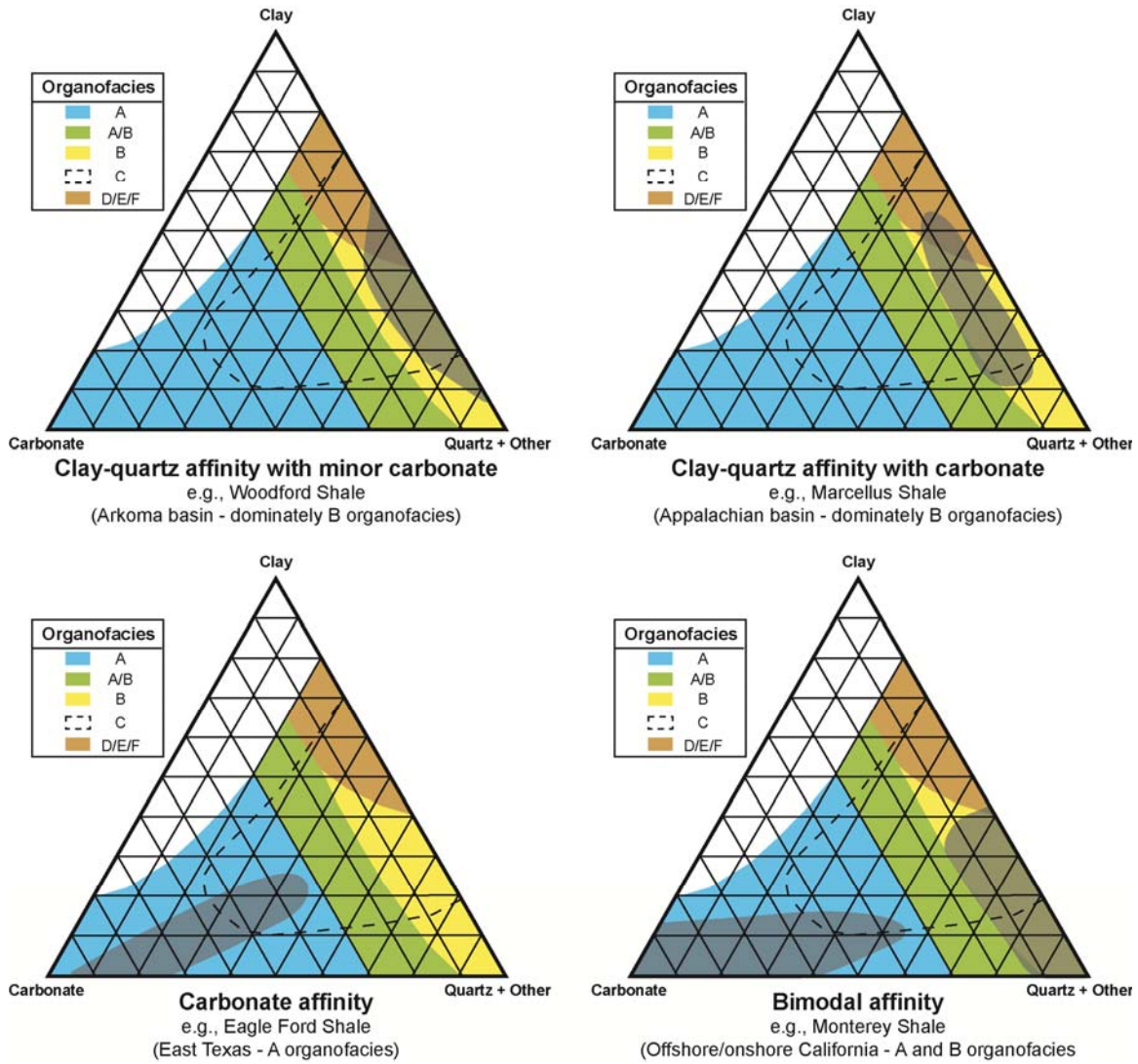


Figure 2. General source rock compositional affinities plots. Orientations of the data clusters give potential insight into both geographic and vertical changes in organofacies.