**Stratigraphy and Depositional Dynamics of the Haynesville-Bossier Sequence: Inferences from Whole-Rock Elemental Data**

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The organic-rich mudstone facies of the late Jurassic Haynesville Formation were deposited under arid climatic conditions in a restricted instrashelf basin on the evolving Gulf Coast passive margin. A high-resolution (< 2 feet sampling) whole-rock elemental geochemical study was performed on cored wells from across the basin in order to: 1) establish a chemostratigraphic zonation that could be integrated with conventional data, 2) assess depositional conditions effective in concentrating organic matter, and 3) assess provenance of siliciclastic input versus carbonate input.

The Haynesville “Shale” can be broadly divided into three correlative chemostratigraphic packages, termed here lower, middle and upper Haynesville. The lower and middle Haynesville consist of silty mudstone facies with TOC values up to 5%, but are differentiated by their concentrations of V, Ni, U, S, As, and Mo. Higher concentrations of these elements in the lower Haynesville indicate bottom waters during deposition were both dysoxic and oxic, with periods of true anoxia and euxinia. The upper Haynesville is more calcareous, with two to three carbonate-rich cycles represented, and relatively low trace metal content. In the middle and upper Haynesville, higher TOC values sometimes correspond to peaks in carbonate cycles, and sometimes to clastic maxima. Mechanisms of organic-matter enrichment appear to have varied over time in the Haynesville, representing a complex interplay of carbonate productivity, clastic input, variable burial rates, and variable bottom water anoxia and euxinia.

A distinctive transition zone to the lower Bossier occurs above the upper Haynesville chemostratigraphic package, and is characterized by the presence of two to three widespread dolomitic beds. TOC and redox-sensitive trace metals generally drop to “average shale” levels above this zone, and a subtle but distinctive shift in immobile trace element composition indicates a slightly different provenance.