Gulf of Mexico Petroleum Accumulations A Review of Recent Studies on Sources of the Oils, Modes of Source Rock Maturation and Oil Migration

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Recent organic geochemical studies differ radically in their interpretation of the origin of the Gulf coast oils. However all studies since(and including) Thompson, et al., 1989, emphasize the considerable geographic variation in genetic oil types and are in generalized agreement as to the genetic oil types present and their spatial and stratigraphic relationships. In particular it is accepted that the Gulf rim (both north and south) is encircled by a ring of Mesozoic carbonate-sourced oils and that there is also at least one major deep water trend of carbonate-sourced oils in the northern Gulf. It is also generally agreed that many of the Gulf rim oils are of Oxfordian-Kimmeridgian age, though some, like the Sunniland oils of Florida, are of Lower Cretaceous origin.

Major disagreement still occurs over the sources of the Louisiana offshore oils and onshore Wilcox reservoired oils. One "school of thought" assigns all these oils to Mesozoic sources (Comet et al., 1991, 1993).The other school, noting the presence of 18a(H)oleanane, a commonly occurring compound in both the Wilcox and offshore oils , propose that the majority of clastic-sourced oils found in Tertiary and Quaternary reservoirs (onshore and offshore) are of Paleogene origin (Sassen,1990; Kennicutt et al., 1992 ; Wenger et al., 1994 ; Mello et al., 1995). This debate will be developed further, and new theories of Gulf of Mexico oil migration and source rock maturation will be discussed in light of recent work using a new genetic source ratio (sulfur/nitrogen) mapped out in the accompanying Figure 1.

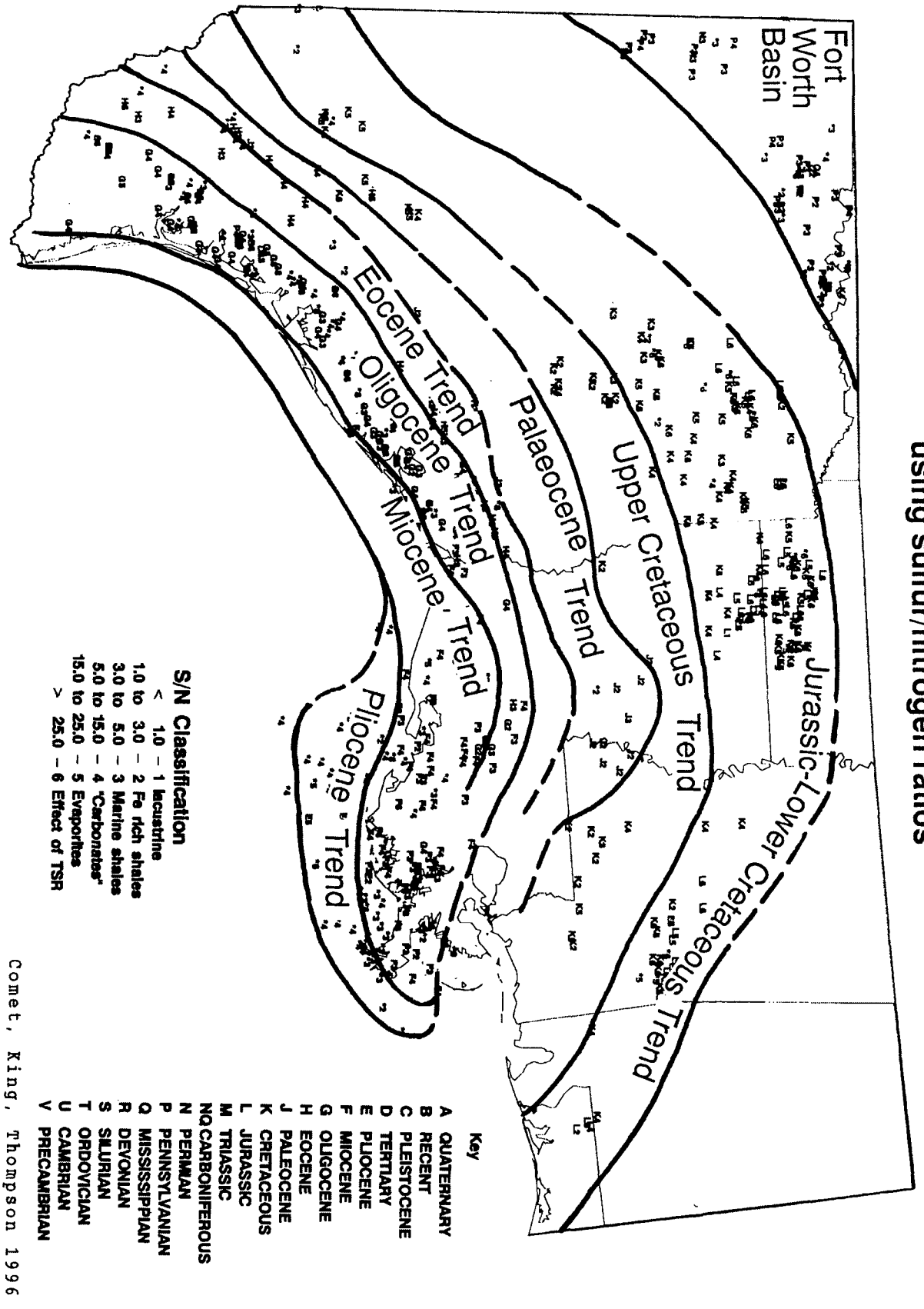
Geographic distribution of Gulf Coast Genetic Petroleum Classes
using sulfur/nitrogen ratios
Fort Worth Basin
Jurassic-Lower Cretaceous Trend
Upper Cretaceous Trend
Palaeocene Trend
Eocene Trend
Oligocene Trend
Miocene Trend
Pliocene Trend
S/N Classification
< 1.0 – 1 lacustrine
1.0 to 3.0 – 2 Fe rich shales
3.0 to 5.0 – 3 Marine shales
5.0 to 15.0 – 4 "Carbonates"
15.0 to 25.0 – 5 Evaporites
> 25.0 – 6 Effect of TSR
Key
A QUATERNARY
B RECENT
C PLEISTOCENE
D TERTIARY
E PLIOCENE
F MIOCENE
G OLIGOCENE
H EOCENE
J PALEOCENE
K CRETACEOUS
L JURASSIC
M TRIASSIC
NQ CARBONIFEROUS
N PERMIAN
P PENNSYLVANIAN
Q MISSISSIPPIAN
R DEVONIAN
S SILURIAN
T ORDOVICIAN
U CAMBRIAN
V PRECAMBRIAN
Comet, King, Thompson 1996

Figure 1