History of the Petroleum System Analysis

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The concept of petroleum system analysis evolved over many years and is based on three disciplines studied by many investigators in geology, organic geochemistry, and computer technology and codified in the award winning AAPG Memoir 60: The Petroleum System—From Source to Trap that was published in 1994. The oldest of these disciplines is geology, which dates to 1669 when Nicholaus Steno (1638-1686) published De Solido, which enumerated rules to interpret sedimentary rocks. The second discipline involves the importance of time and was recognized in 1788, when James Hutton (1726-1797) presented a paper to Royal Society of Edinburgh where he concluded that "….we find no vestige of a beginning, no prospect of an end." Sir Charles Lyell (1797-1875) gets credit for popularizing rock and time through his publication of the Principles of Geology in 12 updated editions. Lyell's publication convinced Charles Darwin (1809-1882) that the Earth's age was much more than 6000 years as interpreted by Archbishop James Ussher from the bible (Sunday at noon on October 23, 4004 B.C.), thus giving more time for evolution. Since the 1960's, discoveries in geology, geophysics, and age dating have profoundly changed the way we look at Earth. The third discipline required to make the petroleum system analysis viable is organic geochemistry. In 1936, Alfred E. Treibs (1899-1983) correctly proposed the genetic link between the green pigment chlorophyll in living plants and many porphyrin pigments in crude oil, shale, and coal. He is generally acknowledged as the Father of Organic Geochemistry.

The petroleum system is nature's distribution system for hydrocarbon fluids, such as oil and gas. The deposition of sedimentary rock into a basin provides the setting into which this fluid system develops. Development of the petroleum system analysis required refining and extending its vocabulary and establishing a series of graphic diagrams as a folio sheet. Generation-migration-accumulation, critical moment, and the pod of active source rock are important new terms needed for the visualization of the concept. The petroleum system map, cross section, and table, burial history chart and events chart are required to fully understand how the fluid system works in nature over time. This analytical technique provides a new understanding of the independent variables - rock, fluid, time - needed to assess risk relative to petroleum prospects.