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Accumulation and removal of the worlds light oil and gas deposits with changing climate and hydrology.

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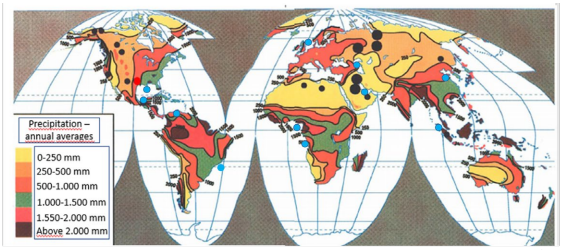

Figure 1. Richest oil provinces on land (outside deltas) tend to be where precipitation is low. Black circles, small: 1 million bbl/day; large: 2-4 million bbl/day; blue circles (added in 2021): oil provinces offshore and in recent deltas (Mississippi, Niger, Congo, Hoang Ho). Modified from Szatmari 1992 Geology v 20, n 12, p. 1143-1146

Light oil and gas deposits are thought to be formed from organic matter at moderate temperatures in the deep subsurface of sedimentary basins, under favorable conditions of migration and accumulation.

During the Cenozoic glaciation first in the south from 34 Ma, then bipolar glaciation from 2.5 Ma, and finally deglaciation in the Holocene, have turned terrestrial climate highly differentiated.Differentiation increased by mountain building along the plate margins. [1] (Miller et al al 2020).

Water, the most abundant liquid in the crust, is a good solvent of both salt and hydrocarbons generated. Water flows seaward both on the surface and in several horizons underground. Solubilities of light hydrocarbons increase with temperatures and decrease with dissolved salt content. As the water passes through a salt basin, its salinity increases causing the hydrocarbons fall out of solution. Water flowing into arid basins covered with glaciation or permafrost similarly releases its dissolved HCs as evaporation or cooling of water removes salt and HC solutes, adding to giant fields [2] (Lafargue and Barker 1988).Water flowing in several horizons is unsaturated in HCs upstream. Downstream it may become supersaturated in ancient salt basins,arid basins, below permafrost and in the sea nearshore, contributing to petroleum giants. As a result, giant petroleum fields are concentrated in the driest, coldest portions of each continent, such as the SW USA, European Russia, western Siberia, S. Asia, and N.Africa, being largely absent on land in the warm humid portions of each continent, as E. USA, W. Europe or Brazil [3] (Szatmari, 1992; [4] Szatmari and Milani, 2016). Offshore giants occur at the mouth of large rivers, such as the Mississippi, Volga, Ob, Tigris- Euphrates, Yellow River, Congo, Niger,Nile,Paraiba do Sul, often associated with salt diapirs.

References

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