Implications of models for opening of the South Atlantic on geometry and timing of salt deposition

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Variable age of the continent-ocean boundary (COB) in the South Atlantic reflects diachronous separation between Africa and South America. South of the Walvis Ridge, the COB is about 5 million years younger in than in the far south. This age progression has generally been interpreted to continue to the north as far as the Niger Delta, with first oceanic crust at the delta younger still than at the Walvis Ridge. Along the non-volcanic margins north of the Walvis Ridge there are extensive salt basins developed on highly extended continental crust. Seismic and potential field evidence suggests that the COBs in these basins coincide with the outer edge of salt. It is generally assumed that the edge of salt is an isochron, i.e. salt deposition stopped at the same time along the entire 2,000 km strike length of the salt basins. Plate reconstructions that attempt to match the COBs from South America and Africa along the entire South Atlantic demonstrate, however, that it is not possible to match the COBs along the length of the salt basin margins. This means that the edges of salt and thus the COBs are not isochrons. We favor a diachronous model for salt deposition. This talk discusses our tectonic observations and implications of the diachronous model for our understanding of salt deposition in evolving rift basins and the transition from continental to oceanic crust.

Breakup of Eastern Gondwanaland: Genesis of Bangladesh's Petroleum System

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The geological evolution of Bangladesh is related to the breakup of eastern Gondwanaland, the associated northward movement of the Indian Plate and its ultimate collision with the Asian Plate. The movement and interaction of these plates has defined the pattern of basin formation, structure, and the development of petroleum systems within Bangladesh.

The palaeogeographic reconstructions of the region suggest three post rift tectonic stages in the sedimentary section of the Bengal Basin, Bangladesh: the drift stage (Late Cretaceous to Eocene), an early collision stage (Oligocene to Middle Miocene) and a late collision stage (Late Miocene to Recent). The sedimentary units comprising coal, coaly shale and sandstones that exist within the pre-rift and rift stage are confined in the Platform Shelf of the basin. This coal-bearing interval can be considered as a potential source within the Permo-Carboniferous Gondwana section. During the drift stage, shallow marine conditions prevailed in the western and northern parts of the basin while the rest of the area was under deep marine conditions. An associated stratigraphic play is developed along the Eocene shelf edge with the deposition of potential oil prone source rocks within the Paleocene-Eocene Cherra and Kopili Formations and defined as the Bogra Petroleum System of western Bangladesh. The collision stage is represented by voluminous (>10km) clastic sedimentation contemporaneous with the uplift of the Himalayan and Indo-Burma ranges during Oligocene-Recent time. The Oligocene Jenam Formation, the major source component of the current proven petroleum system of the Surma Basin in northeast Bangladesh, and the Miocene Bhuban Formation, the possible source for the Hatia Petroleum System of southern Bangladesh, were deposited during this major influx of sediments. Although the Surma Petroleum System has been the historic focus of exploration, significant wildcat opportunities may exist in the underexplored Hatia and in the largely unexplored Bogra Petroleum Systems.

Oil from the South: Mesozoic Petroleum Systems, Proven and Potential, in Mid to High Southerly Latitudes

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The majority of world's oil is located in the Tethyan Belt, lying between the equator and mid northern latitudes; and running from Venezuela through the Middle East to China and Indonesia. Tethyan petroleum systems are characterised by facies deposited in tropical environments - carbonate and evaporites, and prolific source rocks laid down in warm lakes and shallow epeiric seaways.

However, about a third of global petroleum is in the mid to high northerly latitudes of the Boreal Realm. Though some petroleum systems rely on Palaeozoic source rocks originally deposited in low paleo-latitudes (e.g. Late Devonian shales of Timan-Pechora Basin), most are sourced from marine Jurassic-Cretaceous shales deposited in restricted rift basins in high paleo-latitudes. These include the world class source rocks of the Neocomian of the North Slope of Alaska and the Late Jurassic of the North Sea, Eastern Canada, and West Siberia. Is there a corresponding belt of petroliferous basins in the southern hemisphere?

Notable oil provinces do occur in mid to high southerly latitudes. Oil source rocks include marine Early Cretaceous shales (San Jorge and Magallanes/Austral basins, South America; Bredasdorp Basin, South Africa) and Late Cretaceous to Eocene coaly sediments (Gippsland Basin, south-east Australia; Taranaki Basin, New Zealand). Frontier Mesozoic rift basins occur in offshore East Africa, along Australia's southern margin (Bight and Mentelle basins), on the Lord Howe Rise, offshore New Zealand and in the Falklands. Regional studies of the shared history of Gondwana breakup and paleoclimatic and environmental reconstructions can guide exploration in these frontier areas.

Applied Rock Mechanics in the Ram Powell Redevelopment Project, Deepwater USA, Gulf of Mexico

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This paper describes the method used in the Ram Powell Redevelopment Project for defining a stable pressure window to maximize the efficiency of the drilling process. The method combines formation evaluation, log and laboratory derived rock properties, well site pressure integrity testing, geophysical data, and actual minifrac results. As a result of using this

synergistic approach, the subject extended reach wells were drilled with no wellbore-related down time.
The process begins with a definition of the pore pressure cells, both in magnitude and position, generally delineated by studying the seismic profile along the projected wellbore and analyzing log and pressure testing data. The pore pressure data and rock properties are used to model the minimum wellbore pressure for stable drilling. A study of the changing seafloor profile along the well path is used to adjust the overburden pressure, which is then combined with rock properties to estimate the in-situ stresses, resulting in an estimate of the fracture gradient, or the maximum allowable wellbore pressure to avoid drilling fluid losses.
The approach is applied to two extended reach wells and the paper documents the entire process from planning to drilling and completion.

The Petroleum Potential of Antarctica

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Antarctica is the only continent where no petroleum exploration wells have been drilled. Its petroleum potential has been the subject of (mostly poorly informed) debate and political controversy. It is now protected under the terms of the Madrid protocol to the Antarctic Treaty, but speculation continues. This paper reviews the development of Antarctic sedimentary basins in the context of Jurassic-Tertiary breakup of Gondwana and outlines current knowledge of the elements of potential petroleum systems.