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Exploring Pakistan's Indus Basin – Applying Knowledge from Western Canada

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Oil and gas exploration in Pakistan's Indus Basin dates back to 1866, when the first exploratory well was drilled on an oil seep. When Pakistan gained its independence in 1947, the new government put a regulatory regime into place to encourage oil and gas exploration. While many discoveries have been made, production has levelled off in recent years around 86,000 BOPD and 3.8 BCF/D – well short of domestic demand. For a country needing more electrical power supply and considering construction of coal-fired power plants, augmenting domestic gas and oil supplies is essential.

Although relatively favourable terms are available to international companies, most of their activity has been offshore, where prospects are larger and security concerns less pressing. Much of the recent activity in the onshore Indus Basin has been driven by a small number of Pakistan-based companies, and the basin is very lightly explored by North American standards.

The onshore Indus Basin is highly analogous geologically to the well-documented Western Canada Sedimentary Basin. A western Foothills province (Kirthar and Sulaiman fold belts) bounds a deep foreland basin, which shallows eastward to platform areas with thinner sedimentary sections over basement (Fig. 1). While the Indus Basin lacks the rich Paleozoic section of the WCSB, there are multiple source rock and reservoir intervals throughout the thick Mesozoic and Tertiary section with production and potential comparable to western Canada (Fig. 2).

Thick Triassic and Jurassic carbonate platforms suggest reservoir potential like the Mississippian Rundle and Debolt of western Canada. Younger, clastic-dominated successions show stratigraphic trap potential comparable to the Mannville, Cardium, Viking and Belly River – and unconventional reservoir potential analogous to Wilrich tight sands and Colorado shales. Work is now taking place to better understand basin-scale hydrodynamics, petroleum systems (hydrocarbon generation and migration) and reservoir quality distribution throughout the Indus Basin, with reference to advanced datasets and knowledge in Western Canada.

Future exploration success in Pakistan's Indus Basin will be greatly enhanced with more widespread application of analogue knowledge from western Canada.

Acknowledgements

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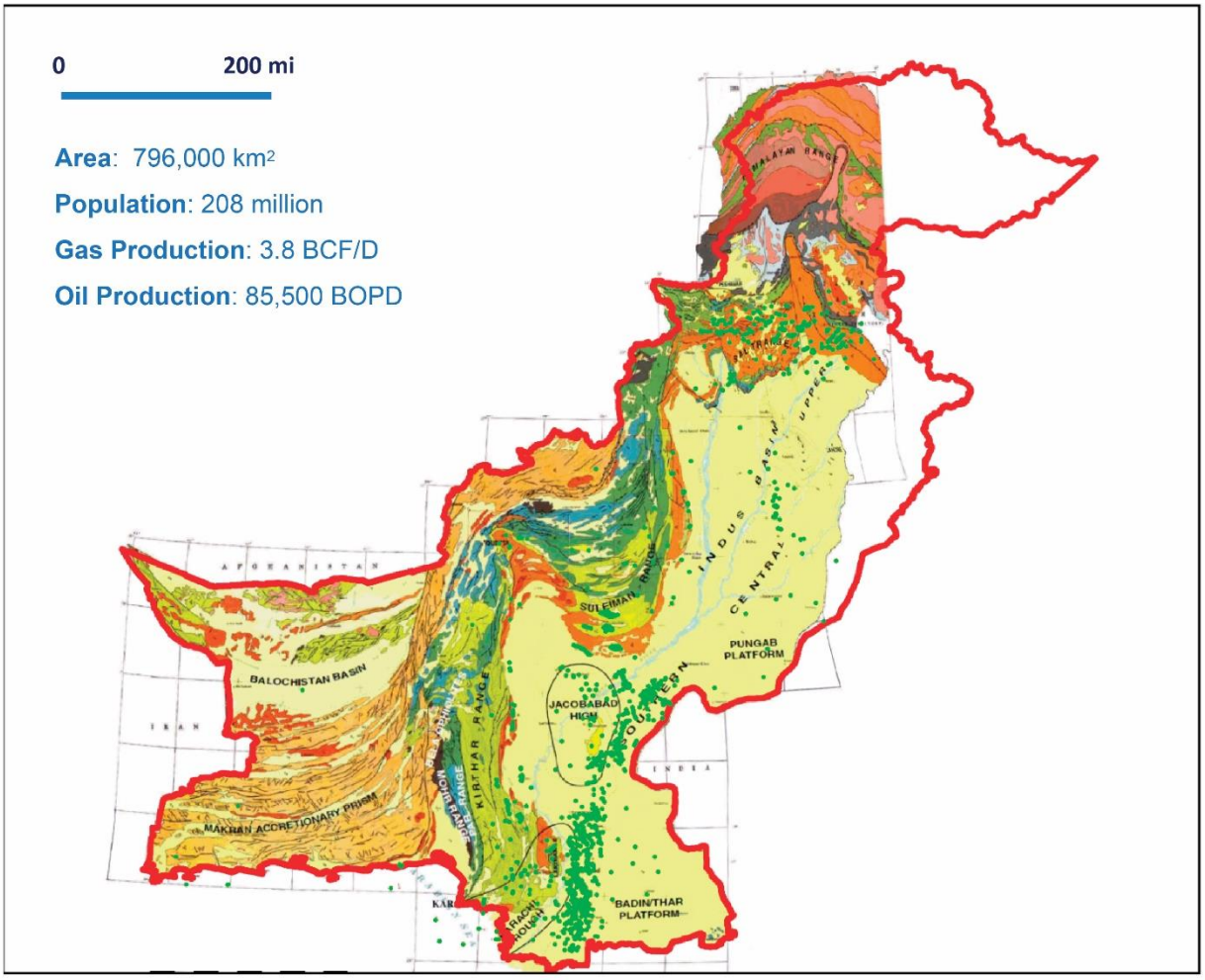

Figure 1. Geological map of Pakistan, showing eastern Indus Basin and western fold belts. Green dots are existing wells

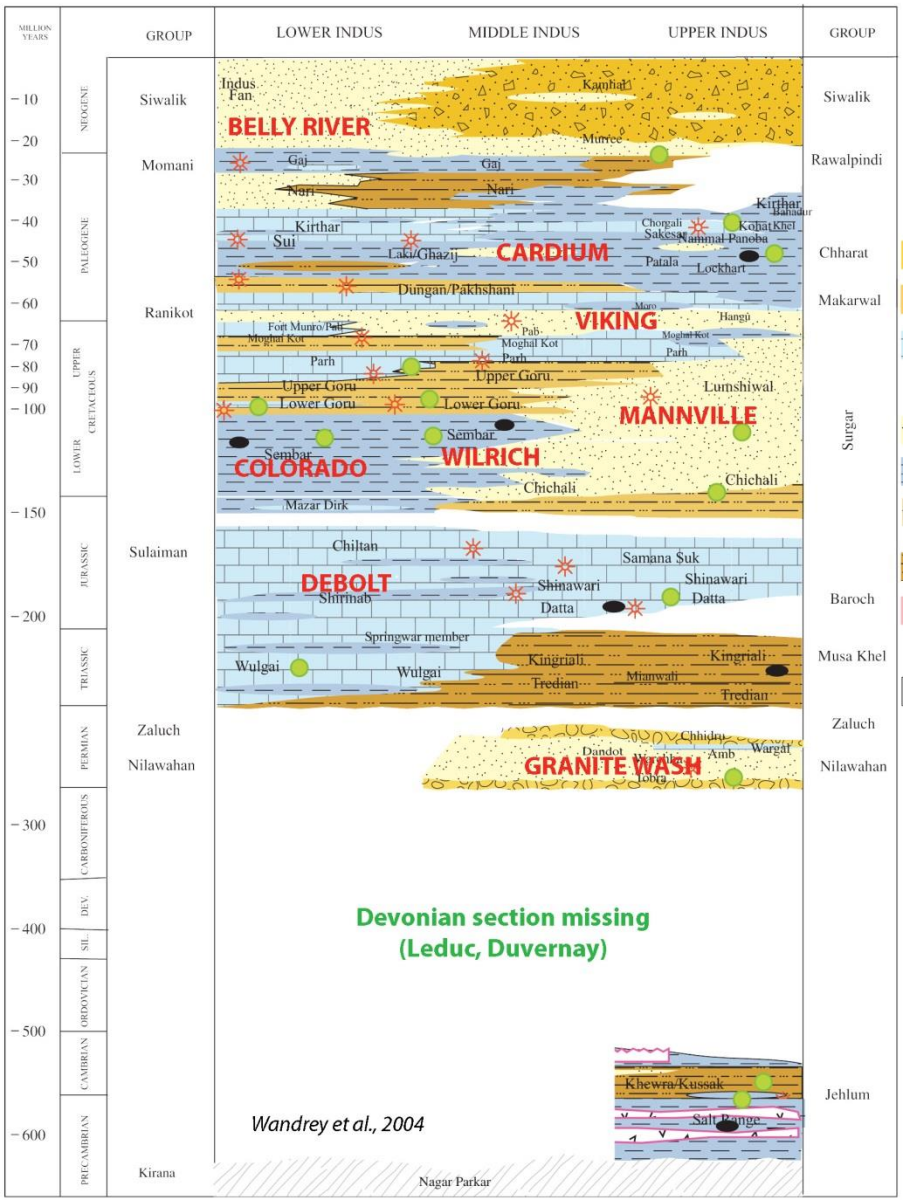

Figure 2. Stratigraphic column, Indus Basin, indicating potential Western Canada play analogue intervals (after Wandrey et al., 2004).

References

Wandrey, C.J., B.E. Law and H.A. Shah, 2004. Sembar Goru/Ghazij Composite Total Petroleum System, Indus and Sulaiman-Kirthar Geological Provinces, Pakistan and India. U.S. Geological Survey Bulletin 2208-C.