



International Technical Division

Best Practices in Play-Based Exploration: Common Risk Segment Mapping Case Study-Brazil Santos Basin

Presenter: Kent Wilkinson, Technical Manager, CNOOC International

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ABSTRACT

Regional hydrocarbon exploration within a sedimentary basin requires a consistent and systematic approach to successfully evaluate different plays and multiple blocks over large distances. Common risk segment (CRS) mapping is one tool that may be useful to help illustrate key elements within complex geological settings that are relevant to a particular play. This approach can be successfully implemented in frontier, emerging or mature basins or plays. Extensive regional merged 2D and 3D seismic interpretations are an essential basic requirement before any play mapping can be completed. The CRS method uses integrated regional mapping to identify key play and critical risk elements and defines success criteria for each. A single risk map is created for a play element highlighting areas of likely success and possible failure. Additional play elements are defined and then combined into a final composite risk map (CCRS). These maps can then be used to highlight critical risks and rank multiple exploration blocks across a basin scale play.

The South American passive margin has many offshore basins representing large areas where significant exploration opportunities remain across multiple rift and drift basinal settings. The Santos Basin in offshore southern Brazil is used as a case study to illustrate the CCRS method and its application to hydrocarbon exploration. The Santos Basin pre-salt play is a world class lacustrine carbonate play estimated to contain greater than 250 BBO OOIP (ANP, 2020). High quality lacustrine carbonate Middle-Late Aptian reservoirs were deposited over structural basement paleo-highs. The basin was subsequently infilled during the latest Aptian with a thick evaporite sequence which acts as a high-quality top seal for the underlying carbonate reservoirs. Barremian and Aptian source rock presence, maturity, migration distance, reservoir depth (m BML), and salt top seal thickness are criteria that have been defined and integrated using the CCRS method. Final composite risk maps illustrate optimal regional exploration areas as well as regions with increased subsurface risk. Multiple offshore blocks have been auctioned in 6 pre-salt bid rounds over the past decade. CCRS mapping illustrates industry activity has focused on both lower risk blocks in the heart of the pre-salt play as well as acreage in the distal play margins accompanied with increased risk in one or more of play elements.



BIOGRAPHY



Kent Wilkinson is currently a senior technical manager for CNOOC International's Business Development Center (BDC) focused on opportunities within South and Central America. Kent works in conjunction with multi-discipline technical teams based in Calgary, Houston, London, and Beijing. Kent began his career working Saskatchewan oil fields before moving into international projects for Canadian Occidental in onshore Yemen. Kent left Calgary in 2004 for an opportunity to work the US GoM based in Dallas, Texas. Kent worked on a variety of exploration and appraisal projects in both deep and shallow water GoM including

leading the geological technical work and drilling of an operated >10000m pre-salt appraisal project. Following Texas, Kent moved overseas to work CNOOC's North Sea exploration projects based in both Norway and England. After 10 years away from Canada, Kent returned to Calgary in 2014 to focus on working New Venture technical assessment projects in Atlantic Canada and Latin America offshore basins. Throughout his career, Kent has worked in a variety of international onshore and offshore basins including those in Brazil, Suriname, Guyana, Mexico, Colombia, Trinidad/Tobago, US GOM, UK/Norway North Sea, UK West of Shetlands, Yemen, Equatorial Guinea, Congo, Kenya, and Atlantic Canada.

The current mandate of Kent's team is to complete technical evaluations of any farm-in or bid round opportunity within Central and South America. He holds a M.Sc. in geology from the University of Alberta and a B.Sc from the University of Regina.