

New Exploration Leads in the M1 Sandstone, Eden Yuturi Field, Ecuador

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The Eden Yuturi field produces from five sands in the late Cretaceous Napo formation of Ecuador's Oriente Basin. The productive wells are located on the top of structure in a conventional play; fault bounded on the west side and with a water leg confining the remaining sides. The challenge for the 190 km² 3D seismic data is to delineate the water leg, and more importantly to generate new leads for further exploration. Seismic interpretation techniques beyond structural and stratigraphic mapping have been tried, but are not common practice, in Oriente Basin exploration. Amplitude-versus-offset (AVO) techniques provide new interpretational insights, specifically into pore-fluid and lithology prediction. Integral to the AVO process is the analysis of well-based offset synthetics. To uniquely perform these analysis requires compressional, and shear data which are acquired from dipole sonic tools. The independent shear data not only provides for the creation of offset-seismic synthetics, but also for a regression equation of Vs from Vp. This regression allows the computation of synthetic shear logs in wells with only compressional data and therefore offset synthetics at these locations. The comparison between the seismic and the reservoir response via offset synthetics is a critical constraint on the seismic interpretation. The M1 sand, chosen for this study, is the youngest of the five producing sands in the field and is its second largest producer. In the Oriente Basin, the M1 has proved to be a highly productive reservoir and at Eden Yuturi it presents an attractive target for further exploration and development. More than 90 wells are located in the field with 20 wells producing 16,000 BOPD from the M1 and 12 of these wells have dipole sonic logs. In the Eden Yuturi M1 reservoir study, synthetics from 35 wells were studied with pore fluid ranging from oil (20° API) to water (14,000 ppm salinity) and production as high as 2,000 BOPD. In all cases the analyses of the offset synthetics indicate a clear and consistent oil-water AVO separation and comparison with the seismic data indicates a high correlation between AVO anomalies and known production. Proceeding from the testing and verification at the known wells into an exploration-reconnaissance mode employing seismic data only, the AVO analysis indicates at least two untested anomalies, one of which is of significant size. These anomalies are the leads for new exploration in the Eden Yuturi field.