An increasing number of discoveries with high CO₂ content offshore Brazil highlight a new exploration risk for the pre-salt play. New seismic data is fundamental to understanding deep geological features to address this risk. CGG’s Nebula-C data set provides images down to 20 km in depth and shows ultra-deep crustal features in high definition. Mapping the Moho and deep-seated faults is essential to understanding possible paths of mantelic CO₂ migration to pre-salt reservoirs. A de-risking study was performed using Nebula-C to map where the deep-seated faults connect Moho and the reservoir, and where the lower crust is not offset by faulting, allowing prospect identification with lower risk of CO₂ contamination.

Nebula-C seismic section displaying a hyper-extended crust dissected by deep detachment faults extending from the pre-salt sequence down to the mantle. In the region surrounding the upper tip portion of the detachment fault, a high CO₂ content was reported in the pre-salt wells.
CGG’s latest imaging technology delivers unprecedented detail of the deep structure in the pre-salt rift basin to support the identification of mantle CO2 migration pathways, allowing operators to de-risk pre-salt exploration.

**CONCLUSION**

With the recent examples of CO2-charged reservoirs being encountered by pre-salt wells in the Santos Basin, the ability to de-risk the presence of CO2 before becoming crucial. By applying the latest subsurface imaging technologies to newly available long-offset and multi-offset data, the Nebula-C 3D dataset can provide clear images of the entire crust and Moho. This has made it possible to map crustal faults and identify faulting style below each prospect and assess the risk of CO2 contamination. Specifically, we have been able to identify regions of intense faulting with a corresponding rise in CO2 in the Santos Basin, which is key to de-risking pre-salt strata with a lower risk of CO2. This same methodology has been applied in other areas of the Brazilian pre-salt to promote future exploration with confidence.

In many cases, one does not need expensive kit to do real science and penetrate the physics of things.”

Guy Wheater – CGG Earth Technologies