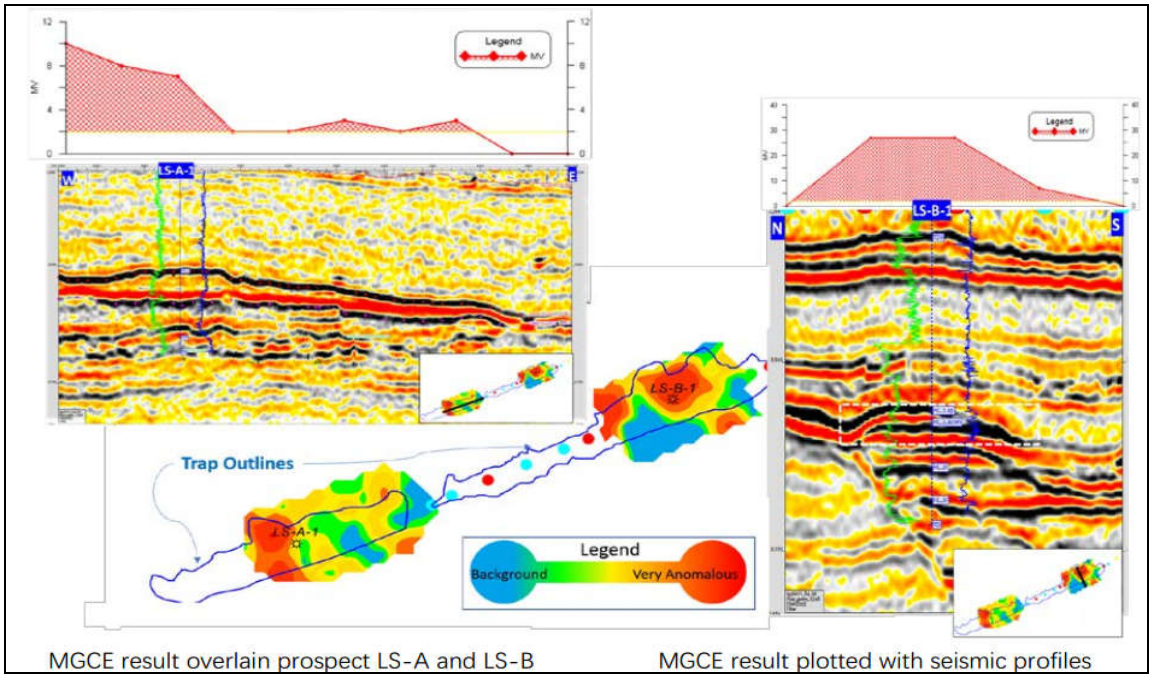
CASE STUDY : *DE-risking DW Prospect Charge* *using Microbial-Geochemical Exploration (MGCE)*

Background: The combination of high drilling costs and low success rates in deep water presents both technical and commercial challenges. While many techniques are employed to help mitigating risk, microbial analysis of sea floor sediments can confirm hydrocarbon charge prior to drilling operations. Including geomicrobial and geochemical analysis (MGCE) into integrated geological and geophysical workflows can significantly reduce prospect charge risk.

Case History, @WD 1400m: Located in the central part of the Qiongdongnan Basin of the South China Sea, exploration efforts have resulted in both success and failures. While a gas reservoir discovered in Block LS-A demonstrated the presence of a petroleum system, several other valid traps were dry. With a leads and prospects portfolio derived from high quality 3D seismic, a reliable method for de-risking charge and ranking was required.



MGCE result overlain prospect LS-A and LS-B MGCE result plotted with seismic profiles

The figure above shows the location of two parts of the MGCE survey (A & B blocks). Data was collected over a known hydrocarbon occurrence LS-A-1 (not tested) in the A block and an undrilled prospect in B block. While the survey design did not provide full coverage over the entire trap extent, the results show very good correlation with the existing discovery well LS-A-1 with very high anomalies measured over the area related to a high point of a basin floor turbidite sheet. The highly anomalous feature identified over the LS-B prospect suggested a high probability of success. The LS-B-2 well was drilled in 2014 discovering a high dry gas flow of over 50 MMscfd.

Conclusions:

1. While high resolution 3D seismic often provides excellent trap definition, determination of the reservoir fluid contents using seismic attributes alone, can be inconclusive and ambiguous.
2. Integrating MGCE data into geological and geophysical workflows provides an effective method of addressing risk of charge for multiple prospect ranking in deepwater exploration.
3. MGCE surveys are particularly beneficial in areas where drilling is very expensive and minimizing risk is imperative. In many cases, proving charge can improve the probability of success before drilling by a factor of two.

Recommendation:

With over 11 years industry experience of applying surface Geo-microbial and Geochemical exploration technologies integrated with Geology & Geophysics, AE&E is confident that it can successfully support frontier or reconnaissance exploration efforts in deep water continental margins, as well play to prospect maturation.

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