AI Enhanced Reservoir Evaluation -Supporting the Goal of Net Zero Via Carbon Capture and Storage

Luis Gomez, Ryan Williams

Geoteric

Abstract

Carbon capture and storage (CCS) has become a hot topic in recent years and is seen as a possible mitigation to the world's climate/carbon crisis. Storage of CO_2 in subsurface aquifers or abandoned hydrocarbon fields is not a new concept, around the world several sites have been suggested. The Endurance structure in the UK Southern North Sea has been proposed as one of these suitable storage sites. This anticlinal feature with minimal faulting and overlaying shales forms a substantial trap and seal pairing for the Bunter Sandstone aquifer/ reservoir. This understanding was gathered through traditional interpretation methods. In our presentation we will discuss how AI based seismic interpretation was used to evaluate the structural integrity of the Endurance area. AI fault analysis can be beneficial in an interpretation environment as it has unlimited stamina, so it will interpret each inline and crossline with the same vigour and rigour as it did the last. This high level of consistency is difficult to achieve manually as an interpreter's opinion of a fault/structure/ surface may change from day to day, and time to focus on a project may vary due to competing priorities. Use of traditional attributes for structural analysis has been commonplace and can be optimised to some degree for the structures in question. However, with AI based technology a further data specific fine-tuning can be applied to the network, making the results even more directly relevant to the study. Experience shows that AI fault identification is considerably quicker than manual interpretation allowing an interpreter to spend their time more efficiently. Our AI technology confirmed the presence of the limited number of faults identified by manual interpretation, however, it further highlighted previously unseen faults. These faults may have minimal offset when they reach the top reservoir interval, however, they may play a role in the structure's potential for CCS, whether it be sealing potential or fluid transmissibility to successfully fill the closing structure. Certainly they should be identified and evaluated. Even though this study was undertaken on non-optimized vintage seismic volume, AI technology has been able to reveal information about the structure's fault patterns in more detail than ever before. This can be crucial for any CCS project for defining risks associated to trap fill and trap seal.