Title : CO_2 Storage Capacity Estimation of Sandstone Reservoir Unit D, Suphan Buri Basin Using Seismic and Petrophysical Data

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ABSTRACT

To mitigate the environmental impact of carbon dioxide (CO_2) emissions, geological carbon storage is increasingly recognized as an essential step toward achieving Net Zero goals. The Suphan Buri Basin is a promising site due to numerous existing development wells, offering an opportunity to transition current infrastructure into a Net Zero-emission project by capturing and storing on-site emissions. This study estimates the practical CO_2 storage capacity of a Unit D sandstone reservoir, an inter-rift Middle to Late Miocene formation deposited in fan delta, fluvial, and lacustrine environments. To determine if this reservoir meets ideal geological conditions with a depth of 1,000–2,500 meters, a net thickness over 20 meters, porosity over 10%, and permeability over 200 mD, a systematic workflow integrating well logs and 3D seismic data was employed. Petrophysical analysis of four wells calculated effective porosity, irreducible water saturation, permeability, reservoir thickness, and the net-to-gross ratio. A well-to-seismic tie then matched the well data to a 100 km^2 3D seismic volume. During seismic interpretation, a specific sandstone horizon was mapped, and a Root Mean Square (RMS) amplitude attribute was extracted along this surface to determine the precise area of the sandstone bodies. To calculate the rock's bulk volume, this area was multiplied by the net reservoir thickness derived from the net-to-gross ratio. Using a volumetric equation, the calculated CO_2 storage capacity of the Unit D reservoir is estimated to be 3.66 - 30.12 x 10^9 kg. However, sedimentary supply was deposited from both the north and south directions, resulting in the sandstone in the central area being thinner than the minimum reservoir thickness requirement, making it unsuitable for storage. Consequently, the thicker sandstone sequences at the northern and southern margins have a significantly higher potential for future fluid injections. Ultimately, this study provides a reliable workflow to guide future carbon storage assessments.

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