Introduction

We conducted study on carbonate reservoirs and saline aquifer, namely the Lower Cibulakan eqv Baturaja Formation located at North West Java Basin, Indonesia (Fig 1). This study purposes to get Storage Capacity, Containment and Injectivity for Carbon Storage Complex. The Lower Cibulakan Formation carbonate, which is of Early Miocene age, is characterized by deposits influenced by marine environments, with the predominant marine influence marked by the presence of limestone (Fig 2). The Lower Cibulakan Formation has vuggy and mouldic porosity types controlled by karstification processes. The rock in the core exhibits a chalky nature with rubble appearances in some parts, and there are indications of collapsed breccia in a karst cross-section (Fig 3).

Method

The methods employed for facies and diagenesis analysis of the Lower Cibulakan carbonate reservoir involved biostratigraphic analysis and sedimentological analysis (petrography, SEM, and XRD). Reservoir quality determination of the Lower Cibulakan Formation was carried out by identifying well logs, production flow tests, or analyses of core samples. Reservoir property calculations involved analyses of clay content, porosity, secondary porosity, and water saturation. For the Lower Cibulakan Formation carbonate, analysis of secondary porosity, referred to as the secondary porosity index (SPI), was conducted, which is the difference between density porosity and sonic porosity (Fig 4). The lower Cibulakan Formation in term of reservoir divide by depleted hidrokarbon layer and Saline Aquifer layer We make Static model and calculate storage capacity of depleted hidrokarbon layer and saline aquifer layer.

Geophysical analysis support karst feature finding and furthermore reveal high density fracture associated with fault (Fig 5). We perfom Fault Seal Analysis and Fault Reactivation analysis to constrain maximum limit of injection pressure and plume movement. We conducted Top Seal Analysis to estimate maximum allowable and CO_2 Column Height in case penetrate into Caprock Formation which is Cisubuh Formation. We simulate several pressure injection simulations on both reservoirs and obtained different values for fracture gradient, pore pressure, maximum allowable pressure, and storage efficiency.

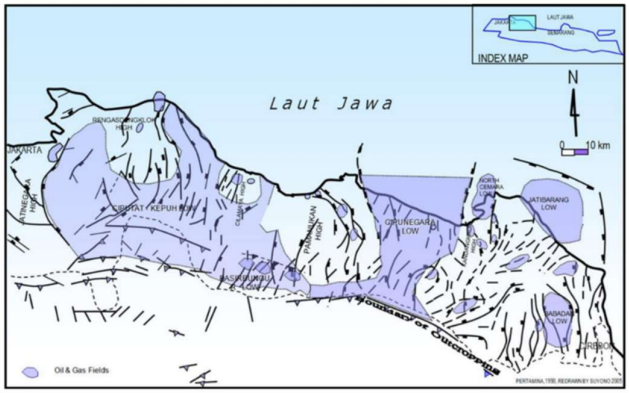

Figure 1 . Tectonic Configuration of North West Java Basin, Indonesia

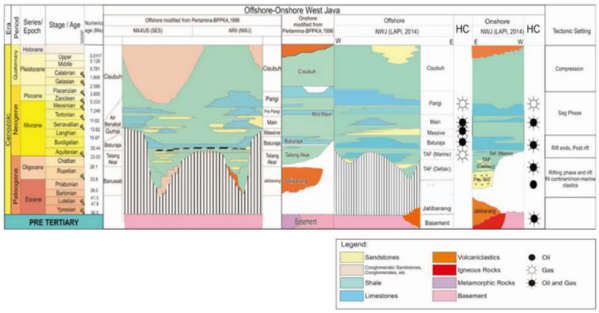

Figure 2 . Stratigraphic Corelation of North West Java Basin, Indonesia

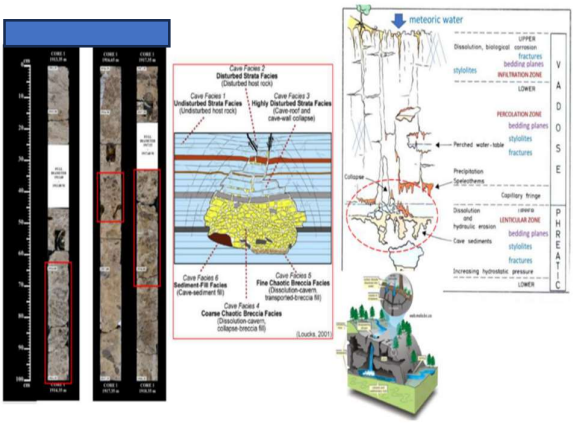

Figure 3. Collapse Breccia Features from Core

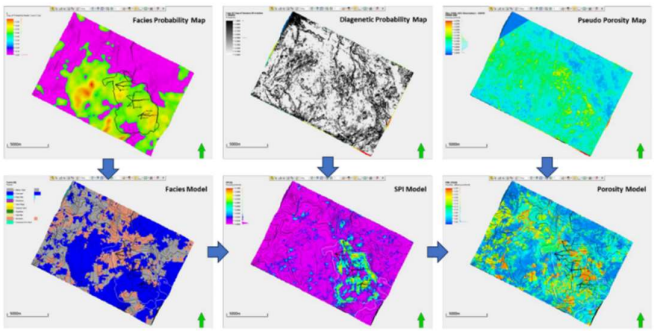

Figure 4. Porosity and Diagenetic Map

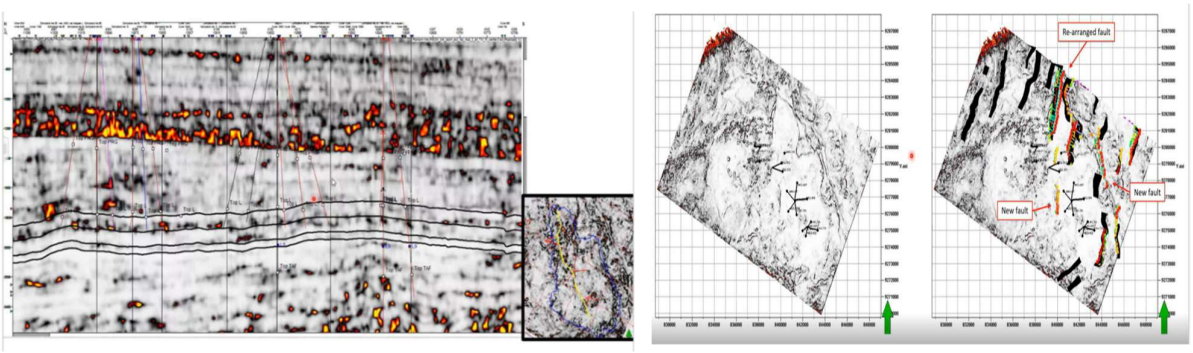

Figure 5. Geophysical analysis show karst feature and fault identification

Conclusions

Our Finding of karst feature that exist in depleted reservoir and saline aquifer raise question of vertical and horizontal permeability. Our Plume model with different scenario suggest early plume breakthrough. Our result at Caprock integrity, Top Seal, Fault Seal Analysis and Fault Reactivation suggest to limit injection pressure below fracture gradient 0.75 psi/ft and maximum BHP at Injector 2800 psi. Despite we doesn't perform geochemical analysis but solubility trapping, residual trapping and immiscible pressure from this carbonate saline aquifer will contain the CO2 safely.

References

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