Assessment of CO₂ Storage Capacity for Basalt Caprock - Sandstone Reservoir System in the northern East China Sea

Moohée Kang (karl@kigam.re.kr), Jin Ho Kim, Kyong-O Kim, Soon Cheong, Young Jae Shinn
Korea Institute of Geoscience and Mineral Resources (KIGAM), Daejeon, South Korea

ABSTRACT

Estimation of carbon dioxide (CO₂) storage capacities in the northern East China Sea (ECS), which is one of the largest marginal seas in the world and divided into several deep sedimentary basins and basement highs, has been performed in basin scale using CO₂ storage efficiency. However, detailed studies on traps, caprocks and reservoirs, those are essential for the selection of CO₂ geological storage sites, are insufficient. We have identified a stratigraphic trap for potential CO₂ storage where sandstone reservoir is overlaid by basalt caprock on tectonically stable Cretaceous basement high of the northern ECS through analysis of 2D multichannel seismic and well data. The basalt formation forming anticlinal structure is located at about 1,000 m depth from the seafloor and distributes over about 84.9 km². Below the basalt formation, a high porous sandstone reservoir which is suitable for the efficient storage of CO₂ is developed with 60 ~ 100 m in thickness. 3D geological storage of CO₂ is developed with ~680 km² in area. The estimated geologic CO₂ storage capacity, that is derived from well-log evaluation. The estimated geologic CO₂ storage capacity for the potential sandstone reservoir covered by the basalt caprock ranges from 59.4 to 248.3 Mt of CO₂. 3D geological storage sites, are insufficient. We have identified a CO₂ storage capacity for the potential sandstone reservoir covered by the basalt caprock ranges from 59.4 to 248.3 Mt of CO₂. New seismic data reveals that basalt covers large area (~680 km²) in the northeastern part of East China Sea. Through the analysis of 2D seismic and exploration well data, we identified a CO₂ storage potential stratigraphic trap where sandstone reservoir overlaid by basalt in the northern part of ECS. Basalt formations are expected to be utilized either as sealing caprocks or as permanent sequestration reservoirs by mineralization for CO₂ geological storage in this region.

INTERPRETATION SEISMIC & WELL DATA

Figure 3. Seismic reflection profile showing major unconformities and megasequences of the northern East China Sea. See Figure 2 for location.

REGIONAL GEOLOGY & STATIGRAPHY

Figure 1. Structural and tectonic elements of the northern East China Sea (Zhou et al., 1989; Pigott et al., 2013)

3D GEOLOGICAL MODEL & STORAGE CAPACITY ESTIMATION

Figure 6. Well log analysis of PZ-1(gamma ray, density, Vp, total porosity (caprock)

CONCLUSION

• Through the analysis of 2D seismic and exploration well data, we identified a CO₂ storage potential stratigraphic trap where sandstone reservoir overlaid by basalt in the northeastern part of ECS. Basalt formations are expected to be utilized either as sealing caprocks or as permanent sequestration reservoirs by mineralization for CO₂ storage in this region.