



Numerical approaches to the evaluation of foreland basin in an active convergence boundary for CO₂ sequestration

Sinda He

Taiwan (wolf010006@gmail.com)

Greenhouse gas control has become one of the most critical environmental issues since last two decades. Since then, underground geological storage has been recognized as an important technique for CO₂ mitigation. The geological reservoirs can trap CO₂ by a number of mechanisms, including stratigraphic and structural trapping, hydrodynamic trapping and geochemical trapping. However, the detailed evaluation on capacity of reservoir formation, sealing caprock and stability of geological environment should be carefully made when consider a potential site as CO₂ reservoir. IPCC suggested that potential sites located in active plate margin must be carefully evaluated on an individual basis. However, Cenozoic foreland basin is one of the most dominant tectonic units in the west Pacific margin, including the study area (Taiwan), and is naturally characterized by many preferred features for geological CO₂ storage. Accordingly, in this study, foreland basin will be assessed in both aspects of a conceptual framework and an individual local case with a full-scale numerical model.

The foreland basin along Taiwan Orogeny can be subdivided into two basins (Taihsi Basin and Tainan Basin) by Peikang High region. Taihsi Basin is a preferred potential storage due to considerable thickness of sandstone in the range of injection depth. Accordingly, a detailed geological profile across the Taihsi Basin has been established with magnetotelluric and seismic reflection surveys in a preliminary study, which were used for evaluating the Taihsi Basin and estimating the amount of CO₂ sequestration under various geological scenarios in this study. The results demonstrate that the north part of Taihsi Basin were less faulted and folded and is the most favor potential site. The injected CO₂ naturally migrates toward the Taiwan Strait due to the gentle dipping; and, CO₂ will finally reach the forebulge of the basin in about twenty thousand years. In addition, the reservoir formation is truncated by a thick clay formation in front of the forebulge. The CO₂ can be eventually trapped in the wedge sealed by the clay formation.