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## Physical and Lithological Characteristics of Potential Caprocks Considered for CO<sub>2</sub> Geological Storage in Offshore Basins, South China

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CO<sub>2</sub> capture and storage techniques (CCS), along with improvements in energy efficiency and a wider use of renewable resources, can present a key instrument for help mitigate climate change caused by anthropogenic emissions of CO<sub>2</sub> and other greenhouse gases. Deep saline aquifers offer the largest storage potential of the geological CO<sub>2</sub> storage options and are widely distributed throughout earth, which requires detailed assessments of each potential storage site's geologic environment, especially properties of the storage seal(s) that may affect permanence of CO<sub>2</sub> storage. The objective of this study was to review relevant basin-scaled physical and lithologic characteristics of caprock formations considered for saline reservoir CO<sub>2</sub> sequestration in sedimentary basins offshore South China, to present characteristics that could be relevant to CO<sub>2</sub> storage, and to identify common features that may impact long-term CO<sub>2</sub> storage. Regions investigated in this study included Pearl River Mouth Basin (PRMB), Beibuwan Basin (BBWB), Qingdongnan Basin (QDNB) and Yinggehai Basin (YGHB). Potential seals within those four basins were examined in detail for their physical, lithological, depositional and structural features. Results showed that the marine mudstones serve as regional seal strata, including upper Zhujiang and lower

Hanjiang formations in PRMB, Yinggehai and Meishan formations in QDNB and YGHB, and the continental mudstones also serve as seal rocks in BBWB, such as Liushagang, Weizhou Formations. Review of the caprock properties revealed that they were generally thick and exhibited low permeability and high displacement pressure. There is substantial spatial variability in the composition, facies, thickness, and fluid transport properties of the seal formations within the basins. Each basin has unique regional features that could be relevant to CO<sub>2</sub> storage, such as the presence of mud diapers, fault traps and over pressure. In certain sags within those basins, some of the seal rock strata also serve as source rock of hydrocarbon generated. The potential effects of exploration or production operations on the performance of the caprock formations used for potential CO<sub>2</sub> storage need to be further investigated. The regional characteristics identified in this study could help guide modeling, laboratory, and field studies needed to assess safety and stability of CO<sub>2</sub> storage within the examined basins.

**Key words:** CO<sub>2</sub> geological storage, physics, seal integrity, caprock geology, offshore basin, South China

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