



Figure 9. Global sedimentary basins and thicknesses. Map shows onshore basins and practically accessible offshore basins. Regions with high volumes of sedimentary basin are correlated to higher CO₂ storage capacities

4.5. Discussion

We estimate practically accessible global geologic storage capacity for carbon dioxide as approximately 8,000 Gt when extrapolating from Szulczewski's assumptions and up to 55,000 Gt following the assumptions adopted by the USGS. Our lower estimate, restricting storage capacity to account for unacceptable pressure increases and inaccessible offshore storage, indicates sufficient capacity to store over two centuries of all current global carbon dioxide emissions. These estimates are based on current technology, but it may be possible for storage capacity to increase over time due to technological change that allows greater utilization of the sedimentary formation volume.

Though certain regions are endowed with particularly favorable geology for storage, each of the economic regions defined by the EPPA model have approximately 100 Gt or more of accessible storage capacity in our lower estimate, excepting Korea and Japan. Our analysis, however, does not account for the possibility that storage capacity may be unevenly distributed within a given region, which is of particular importance for geographically disjointed regions. Finally, we find the exclusion of storage sites in deep water, far offshore, or in the Arctic or Antarctic, results in a major reduction in estimated offshore storage capacity, decreasing our estimate by about 70 percent.

A potential weakness of our analysis is our extrapolation of a capacity coefficient based only on U.S. data. Extrapolating from a single region's geology was unavoidable due to the lack of detailed storage assessments from different regions using a common methodology. As a check on the validity of our extrapolation, we also estimated storage capacity for the North Sea, as the UKSAP and NPD have studied the local geology and potential for carbon dioxide storage in this area extensively using similar methods [7,8]. We selected the North Sea as a check on the validity of our extrapolation because of the availability of quality data for the area; however, the existence of data for these regions may indicate a selection bias in that only regions with favorable geology have been characterized. The methodologies employed by the UKSAP and NPD are more similar to the USGS assessment than the Szulczewski study, but both the UKSAP and NPD also include pressure limitations where oil and gas exploration data indicates the formation is closed. Due to its location and shallow water depth, our practicality constraints do not reduce North Sea storage capacity.

Though the appropriateness of our assumptions weaken when applied to smaller regions, our estimates for the North Sea are consistent with the estimates from the UKSAP and the NPD. Our lower and upper estimates bracket the combined UKSAP and NPD estimate for the British and Norwegian sections of the North Sea (Figure 10).