# NRAP Task 6: Geologic Model of the Sacramento Basin

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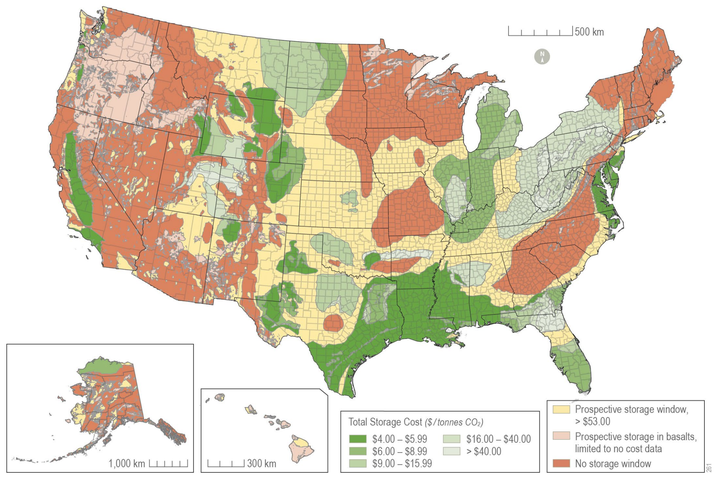
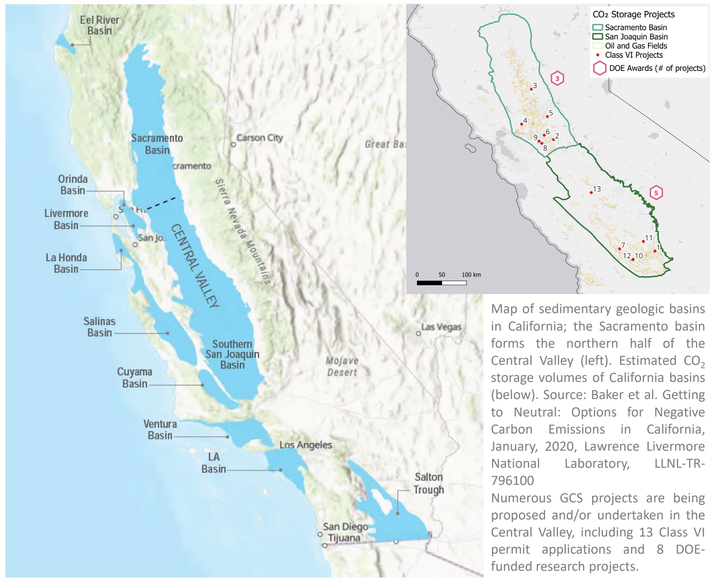
## California's Central Valley is the most promising and one of the few options for sedimentary GCS in the western US

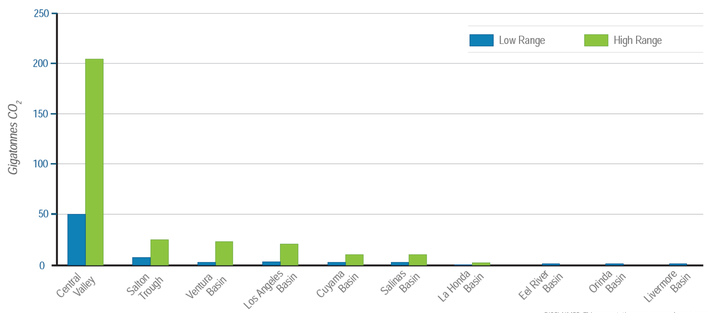



Source: Pett-Ridge et al. Roads to Removal: Options for Carbon Dioxide Removal in the United States, December 2023, Lawrence Livermore National Laboratory, LLNL-TR-852901.

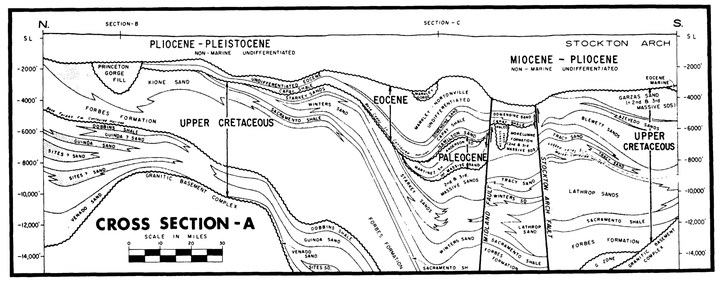



Map of sedimentary geologic basins in California; the Sacramento basin forms the northern half of the Central Valley (left). Estimated $CO_2$ storage volumes of California basins (below). Source: Baker et al. Getting to Neutral: Options for Negative Carbon Emissions in California, January, 2020, Lawrence Livermore National Laboratory, LLNL-TR-796100

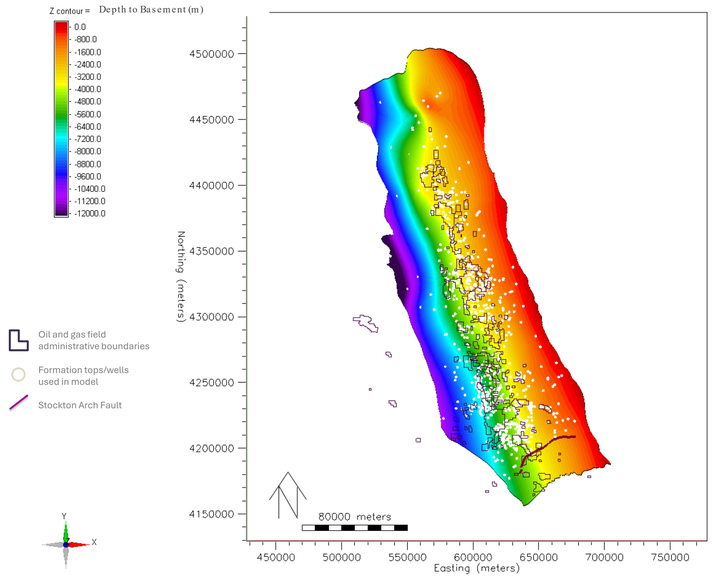
Numerous GCS projects are being proposed and/or undertaken in the Central Valley, including 13 Class VI permit applications and 8 DOE-funded research projects.




## The Sacramento Basin has two prospective depositional systems: Kione/Forbes/Pre-Forbes & Mokelumne/Starkey/Winters




N-S Generalized Cross Section of the Sacramento Basin. Source: Morrison, R.R., Brown, W.R., Edmonson, W.F., Thomson, J.N., and Young, R.J., 1971, Potential of Sacramento Valley gas province, California, in Cram, I.H., ed., Future petroleum provinces of the United States their geology and potential: American Association of Petroleum Geologists Memoir 15, p. 329-338.




Map showing the extent of the Sacramento Basin static geologic model; contours are drawn on the top of the basement. The southern geologic (as opposed to geographic) boundary of the basin is generally considered to be the Stockton Arch Fault. Basin boundary from the United States Geological Survey National Assessment of Oil and Gas Project (2006). Oil and gas field administrative boundaries and location of the Stockton Arch Fault from the California Department of Conservation.

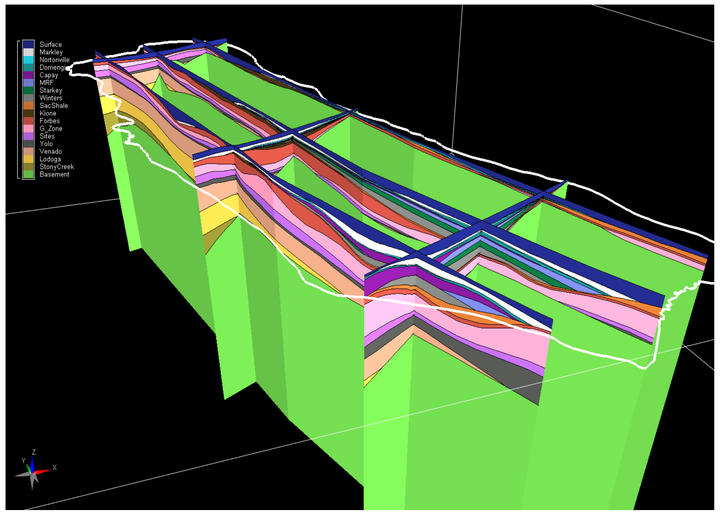
Building on the work of Orme & Graham[1], the model was constructed using more than 6,400 formation tops picked from publicly available well logs and well files available from the California Department of Geologic Energy Management. Simplifications were made to this first iteration of the model including the exclusion of faults and merging formations that are not part of the storage complex.

[1]Orme, D. A., & Graham, S. A. (2018). Four-dimensional model of Cretaceous depositional geometry and sediment flux in the northern Great Valley forearc, California.

FUTURE WORK:

- Refine the structural model to include major faults and stratigraphic changes across faults
- Incorporate facies to better represent reservoir compartmentalization and refine property model

## Full-basin model will be used to help assess and manage risks of rapid scale-up of geologic carbon storage




Property models were created for porosity, permeability, temperature, and salinity, but available data are very sparse.