

## **Application of a New Three-Dimensional Model of the San Joaquin Basin to Hydrocarbon Resource Assessment and Petroleum Systems Modeling**

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**Allegra Hosford Scheirer**, U.S. Geological Survey, 345 Middlefield Road, MS 989, Menlo Park, CA 94025, phone: 6503294134, [allegra@usgs.gov](mailto:allegra@usgs.gov) and **Donald L. Gautier**, U.S. Geological Survey, 345 Middlefield Road, MS 969, Menlo Park, CA 94025.

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We present a new 3-D model of the San Joaquin Basin (SJB) that is constructed from subsurface data spanning the entire basin. The basin is bounded on the east by the Sierran magmatic arc complex and on the west by the Central Coast Ranges and the San Andreas Fault. The Tehachapi Mountains and the Stanislaus county line bound the basin on the south and north, respectively. This model is being compiled in support of a USGS assessment of future additions to reserves of oil and gas in the SJB. The 3-D map volume spans 325 x 145 km, oriented along the basin axis, and extends to ~18 km depth. Data sources include horizon picks from more than 3,200 prospect and production wells; regional depth grids and fault maps provided by Oxy Resources, California; and detailed surficial geologic maps. Mapped surfaces range in age from the crystalline basement to the present-day topography. The horizon tops and fault surfaces are compiled into a consistent 3-D model using EarthVision software.

The 3-D model provides a critical stratigraphic synthesis for the USGS estimation of undiscovered hydrocarbon accumulations in the basin. Confirmed plays in the SJB are constructed both in the traditional map-view as well as in depth. Stratigraphic surfaces define the "ceilings" and "floors" of the plays. These play volumes are queried, sliced, and rotated in real-time to reveal internal structure; they are populated with prospect wells to highlight exploration intensity; and they are plotted with other 3-D play volumes to visualize relationships among exploration targets. The 3-D model is particularly useful for furthering our understanding of the deep-gas play on the west side of the SJB, which has been explored only in the past few years and is penetrated by <70 wells. The model also serves as input to PetroMod software to make predictions of hydrocarbon generation, migration, and accumulation processes in the SJB.

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