

# Identification and Characterization of Oil Types in the San Joaquin Basin, California

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Analyses of 120 oil samples were used to characterize and map the distribution of oil types in the San Joaquin Basin, California. Geochemical parameters most useful for oil-oil correlation are stable carbon isotope ratios and biomarker ratios that include pristane, phytane, steranes, and terpanes. A subset of 82 oils not significantly affected by biodegradation or severe thermal maturity was selected for chemometric analysis, including hierarchical cluster analysis and principal component analysis. The results show that there are at least four oil types, which are designated as MM, ET, EK, and CM, after the most likely source rocks — the middle and upper Miocene part of the Monterey Formation, the upper Eocene Tumey Formation, the middle Eocene part of the Kreyenhagen Formation, and the Upper Cretaceous to Paleocene Moreno Formation, respectively. Different MM oil subtypes may originate from various members of the Monterey Formation and lower Miocene part of the Temblor Formation. Some of the MM oils reflect the increased contribution of terrigenous organic matter to the marine basin near the Miocene paleoshoreline.

Maps showing the distribution of oil types provide the basis for petroleum system maps that incorporate the geologic framework, source rock distribution and burial history, and migration pathways. These petroleum system maps are used for U.S. Geological Survey resource assessments of the San Joaquin Basin.