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GEOLOGICAL CONTROLS OF HYDROCARBON SEEPS IN SANTA MARIA BASIN, OFFSHORE CALIFORNIA

We believe that the offshore Santa Maria Basin contains the greatest known concentration of hydrocarbon seeps and related bottom features (gas vent craters, pockmarks and tar mounds) in the world. Controlled by active tectonism, these seeps and bottom features are both active (with water column anomalies-WCAs) and passive (without WCAs). Primary seep controls are the northwest-trending active faults of the Hosgri system, including the Purisima and Lompoc faults, and related growing anticlinal folds. We estimate that over 80% of the active seeps overlie the wedge-shaped tectonic block between the Hosgri and the western most Lompoc fault.

Additional controls include the extent and depth of the fractured Monterey Formation reservoir, the presence of shallower secondary reservoirs (e.g. sands of the Pliocene Sisquoc and Foxen Formations, and the Quaternary deposits), water depths over 250 m and seismicity. There are 13 oil and gas fields within our offshore study area that extends north of Point Conception to a point about 20 km north of Point Sal. Of these fields only two, the unnamed block 445 and the Bonito field are not overlain by active seeps. Both of these fields are in water depths of 200 m to over 400 m. Our data set includes geophysical trackline data from over 50 multi-sensor, shallow drilling hazard surveys, 73 exploratory well logs, cutting samples, cores and other data and other regional processed seismic records.