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THE GEOLOGY OF SAND DUNES FOUND ON SAN NICOLAS ISLAND, CALIFORNIA

A detailed stratigraphic and sedimentologic analysis reveals three generations of sand dunes on San Nicolas Island, California. The oldest deposit is a red-brown, compositionally supermature, texturally mature, poorly consolidated sandstone averaging 91% detrital and 1% carbonate grains that covers channels in an underlying formation. The next youngest deposit occurs near the west-end of the island and is a gray, compositionally submature, texturally mature to submature, poorly consolidated, cross-bedded sand exhibiting a mean of 63% detrital and 34% carbonate grains. The youngest and most extensive dune sheet blankets most of the island and includes active and recently active dunes that are mostly tan, compositionally submature, texturally mature to submature, and comprising a mean of 65% detrital and 35% carbonate grains. The two most recent generations of dunes exhibit leeward, windward, cliff-top, and vegetated dune accumulations, as well as those related to aerodynamic fluctuations. These dune features are caused by northwesterly winds and are influenced by the island's topography, small size, and archeological content. Primary dune directions, composition, and grain rounding suggest that sediment from presently submerged wave-cut platforms northwest of the island were the sand source for the two oldest dune deposits. Shallow submerged, coarse-grained, calcareous, unconsolidated sediment adjacent to and northwest of San Nicolas is probably the source for the youngest dune deposits. The two oldest generations of dunes on San Nicolas Island developed when sediment sources were exposed during Holocene sea level lows, whereas the youngest generations of dunes most likely originated during recent times.