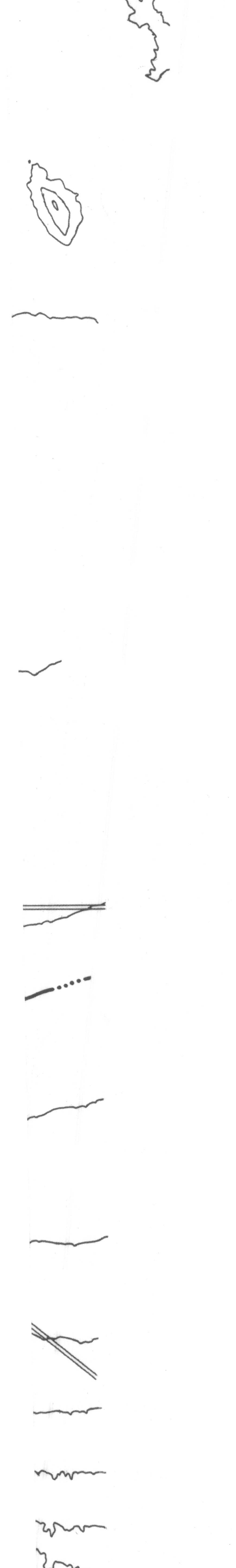
OPEN-FILE REPORT
80-1064



DISCUSSION

This map is one of three in the U.S. Geological Survey open-files that emphasize the nature and distribution of late Quaternary deposits in the Antelope Valley and the adjacent canyons of the Transverse Ranges and Tehachapi Mountains in south-central California. The area covered by the set of three maps encompasses about 4200 square kilometers of northern Los Angeles County and parts of San Bernardino and Kern Counties, excluding Angeles National Forest and parts of Edwards Air Force Base. Topography in the area ranges from rugged semiarid mountains and steep canyons to broad valleys and arid desert flatlands; elevations range from about 300 meters in valley lowlands to more than 1,800 meters on mountain peaks. About 150,000 people live in the area, with most of the population in the cities and towns of Lancaster, Palmdale, Rosamond, Quartz Hill, Littlerock, Saugus, and Newhall.

The map is designed to serve two purposes. Valley and canyon deposits of Quaternary age are those that most affect and are most affected by land-use decisions, and so this map should be useful to planners and engineers as an aid in assessing areas subject to severe ground motion during earthquakes, flash floods, foundation and drainage problems, and other geologic hazards. The distribution, age, and pattern of faulting and folding of the deposits also provides earth scientists with an overview of the nature of sediment deposition and deformation in part of one of the more tectonically active regions of the world.

Late Quaternary alluvial, colluvial, lacustrine, and eolian deposits are differentiated on the map. These materials have accumulated in the valleys and canyons of the area in response to uplift and erosion of the Transverse Ranges and Tehachapi Mountains and to subsidence of the closed basin of the Antelope Valley during the last half-million years or so. All the late Quaternary map units are unconsolidated, they have similar, primarily granitic, clast lithologies, and each retains some or all of its original depositional surfaces. These characteristics distinguish the deposits from older Quaternary and pre-Quaternary formations of diverse lithology which are weakly to firmly consolidated and deformed and which preserve none of their original depositional surfaces.

Alluvial deposits of seven major episodes of deposition are the most widely exposed late Quaternary materials in the area. Correlative colluvium with generally similar textural characteristics and alluvium whose texture has been modified by the addition of windblown sand are shown on the map with distinguishing patterns. Materials deposited during the high stands of shallow lakes, alluvium that has been modified by the addition of large amounts of calcium carbonate around the lake shorelines, and dunes of uniform sand that migrate during dry lake periods occur in the valley lowlands.

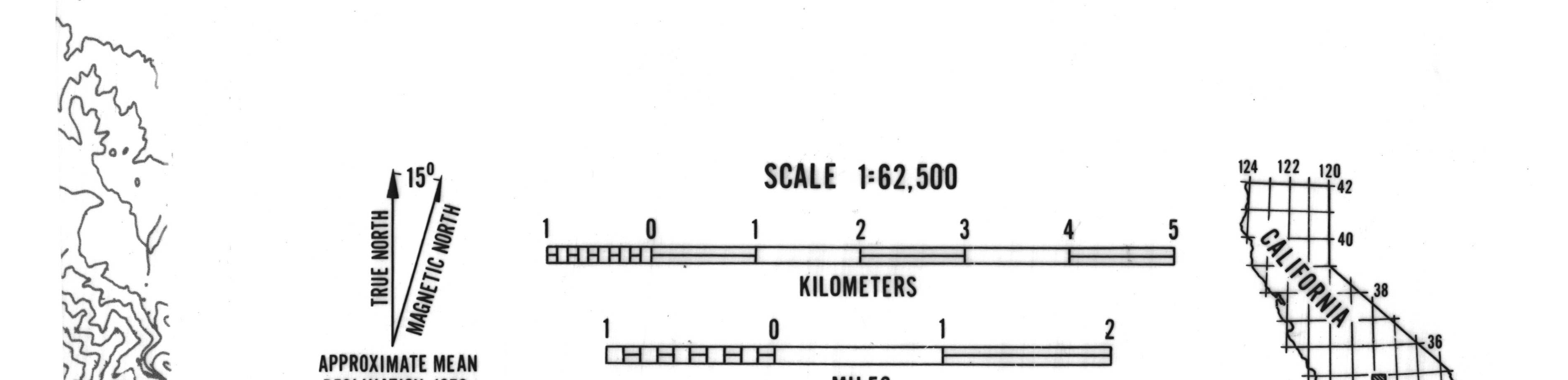
We determined the relative ages of the late Quaternary deposits and the distribution of textural facies in deposits by compilation of U.S. Soil Conservation Service soils maps, by interpretation of aerial photographs, and by study in the field. Preliminary maps were first produced by compiling soils maps of Woodruff and others (1970). Using their descriptions of the major soil series in the region, we were able to identify various ages of the materials based on the degree of soil profile development and were also able to obtain approximate grain size distributions in soil parent materials, because for deposits that still retain some of their original surfaces, the relative ages and textures of the soils directly reflect the relative ages and textures of the deposits upon which the soils formed. The compilation of soils mapping then served as a guide to field inspection of soil samples from channel edge exposures, road cuts, and thousands of shallow auger holes throughout the study area, and a sequence of soils and deposits of seven distinct ages was determined. Other criteria such as superposition of deposits, topographic position, and degree of fan surface dissection were also useful for relative dating of deposits, particularly in areas of high relief, structural complexity, and windblown sand veneers.

The grain size distributions of the geologic units differ significantly in some localities from the grain size interpreted from soils descriptions, and we therefore relied on field reconnaissance and the examination of several hundred collected and sieved samples to establish the locations of the facies. Wide variations in grain size over small distances in some of the materials make accurate delineation of facies impossible at map scale, and contacts between facies within units should be considered as only approximately located.

Radiometric ages of the late Quaternary units are unknown because datable material is very rare in deposits of the area, but we can estimate their ages based on stratigraphic position and comparision with dated deposits elsewhere. The Pleistocene Harold Formation, containing land mammal fossils of Rancholabrean age, directly underlies the oldest Q1 deposits in the southeastern part of the area (Noble, 1953; A. G. Barrows, oral communication, 1979). The age of the oldest Rancholabrean fossils is imprecisely determined, but estimates range from 450,000 to 600,000 years and the late Quaternary sequence of deposits on this map is thus probably no older than about 500,000 years. The ages of late Quaternary units within the alluvial sequence are estimated on the assumption that the deposits result from climatically controlled episodes of alluviation (Ponti, 1980; Ponti and others, 1980). The units are quite extensive and can be recognized along both the Transverse Ranges and Tehachapi mountain fronts in diverse tectonic settings and across the various microclimates of the Antelope Valley and adjacent highlands. They appear to have their origins as pulses of sediment produced during fluctuations of climate from glacial to interglacial times and can be tentatively correlated with climatically controlled deposits in other regions. Good correspondence occurs between the Antelope Valley units and the Riverbank and Modesto formations in the San Joaquin Valley. Q1, Q2, and Q3 deposits appear equivalent to the upper, middle and lower members of the Riverbank Formation, which have estimated ages from 450,000 to 130,000 years (Marchand and Allwardt, 1980). Units Q4, Q5, and Q6 appear equivalent to the Modesto Formation, which has an estimated age from 90,000 to 9,000 years (Marchand and Allwardt, 1980). Lacustrine deposits (Qpl) and calcium carbonate affected alluvium (Quca) result from deposition in and groundwater influences of a pluvial lakes which filled the Antelope Valley basin during the most recent (post-Q3) glacial periods. Unit Q7, present stream beds (Qs), and sand dunes (Qds) are in part historically modern and change each season with winter rainfall, summer flash floods, and springtime winds.

Contacts between pre-late Quaternary materials (bedrock units) are compiled and simplified from large- and intermediate-scale mapping by the U.S. Soil Conservation Service (Woodruff and others, 1970), and from Barrows (1977 and 1980), Barrows and others (1976), Beeby (1977), Dibblee (1967), Jahns and Muehlberger (1954), Kahle (1977), and Kahle and others (1975).
Geologic structures in the Antelope Valley are from unpublished mapping by D. B. Burke, those in the rift zone of the San Andreas fault are from recent studies by the California Division of Mines and Geology (Barrows, 1977 and 1980; Barrows and others, 1976; Beeby (1977); Kahle, 1977; Kahle and others, 1975), those in the Garlock fault zone are from Clark (1973), and those in the San Gabriel Mountains are from Jahns and Muehlberger (1954).

This map is designed as a regional appraisal of the distribution and properties of late Quaternary materials. It is accurate for its scale and purpose as an aid to earthquake hazard zonation, land-use planning, and regional tectonic analysis. However, it should be considered only as background information and not as a substitute for large-scale, site-specific studies where land-use and engineering decisions require more detailed geotechnical information.



This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.