analyze two projections of the time surface: one to a constant shot plane and one to a constant receiver plane. For each fixed shot or receiver, there is a distribution of time picks. Comparisons with real data distributions show a good match to theory as the time surface is manipulated. The study of these projections enables us to derive criteria for estimating the accuracy, precision, and consistency of any solution to the statics problem for the simple model of a linear refractor and high frequency statics. In this case the specific criteria are: (1) the expected value of each distribution is constant along each axis, (2) the variance of each distribution is zero along both shot and receiver axes, and (3) the shot and receiver statics are equal.

In addition, several basic types of anomalies can be recognized by their effects upon the first-arrival time surface. These basic types are: (1) geometric variation in the refractor, (2) velocity variation in the weathering, and (3) velocity variations in the subweathering. The combination of these three is a complete description of the general weathering statics problem.

The effects of these anomalies may be studied via the shot and receiver projections. Type (1) can lead to a blurring of the first-arrival time distribution. Type (2) can lead to a lens shape within the first-arrival projections. The lens is formed by a splitting of the left-hand and right-hand shots. Since the lens is composed of both time-rise and time-fall segments, it will be split under certain circumstances. Type (3) can appear as a change in the trend of the projections and a discrepancy between shot and receiver statics.

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Provenance and Depositional Mode of Upper Cretaceous Chatsworth Formation Conglomerates, Simi Hills, California

Conglomerates of the Upper Cretaceous Chatsworth Formation occur as lenses of concentrated clasts in channels and as clasts dispersed at the base of thick, coarse-grained, graded sandstone beds. The matrix of the conglomerates consists of grains ranging from silt to granule size (4 mm) and comprises between 20 and 78% of any one conglomerate unit. The matrix composition ranges from 30 to 80% quartz, 25 to 60% feldspar, and 5 to 20% lithic fragments, with accessory biotite up to 5%. The conglomerate clast population is composed principally of clasts in the pebble size range. Five distinct rock types are recognized within the conglomerate clast population: blue-black argillite, 4 to 20%; felsic volcanites, 4 to 28%; felsic plutonites, 16 to 24%; arkosic sandstones and siltstone, 0 to 12%; and a group of genetically related quartz-rich clasts, 17 to 46%. The quartz-rich clasts include sandstones and siltstones with continuous textural gradation from well-preserved sandstone through partially recrystallized sandstone with sutured grains, into metamorphosed, foliated quartz sandstone and quartz schist types. In addition, a conglomerate unit may contain between 0 and 14% authigenic rip-up clasts.

The Chatsworth Formation, as a whole, is recognized to be a deep-sea fan complex upon which the primary depositional agent for sand was turbidity currents. Lenses of concentrated pebble conglomerates originated as debris flow, whereas beds of dispersed pebble clasts are of turbidity current origin. Paleocurrent data and the conglomerate clast composition for the Chatsworth Formation indicate that its detritus was derived from a source terrane to the south of the Simi Hills.

The Santa Monica Mountains basement complex contains a large mass of argillite and felsic plutonite, but contains no felsic volcanite or quartz-rich suite of rocks. The basement in the northern Peninsular Ranges includes representatives of the principal rock types recognized in the clasts of the Chatsworth Formation conglomerates and, therefore, it is the best possible choice for the provenance. Extensive Franciscan terrane also lies south of the Chatsworth conglomerates, but no Franciscan detritus is recognized in the Chatsworth Formation.

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Cal Canal Field, San Joaquin Basin, California

Cal Canal is the northernmost of the 26 Miocene Stevens sandstone fields in the southern San Joaquin basin. Since discovery in 1977, at initial rates of 6,000 mcf gas/day plus 2,697 bbl of 41° condensate, the field has been fully developed and 17 wells are producing at sharply declining rates.

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Upper Cambrian Stratigraphic Cycles, Southwestern Great Basin

One megacycle and numerous minicycles are recorded in the stratigraphic interval comprising the Dunderberg Shale and overlying Halfpint Member of the Upper Cambrian Nopah Formation in southeastern California and southern Nevada. The retrogradational leg of the megacycle is expressed by the succession: Bonanza King Formation (peritidal carbonate strata), Dunderberg Shale (outer ramp to peritidal shales and interbedded carbonates), and lower Halfpint (subtidal carbonates). The progradational leg is developed within the Halfpint, above the shale-carbonate boundary, as peritidal cryptalgal boundstone overlying subtidal shelf micrites and pelmicrites. Biostratigraphic data suggest this cycle is the result of regional transgression-regression. The Dunderberg-Halfpint contact, representing the boundary between shale and carbonate half-cycles within an apparent grand cycle, does not reflect a major shift in depositional environments, but rather the availability of terrigenous mud and the delicate nature of the carbonate "factory." The main environmental shift occurred during later deposition of the Halfpint carbonate lithosome when a peritidal algal thrombolite complex prograded seaward (see figure).

Coarsening-upward, meter-thick minicycles are abundant in peritidal and shallow subtidal facies in the Spring Mountains and Goodsprings, Nevada district and less common in more distal, deeper, outer ramp facies west of the Spring Mountains. Shallow-marine minicycles are expressed as micrite or shale, and occasionally cryptalgal boundstone, overlain by bioclastic packstone and grainstone as well as intraclastic beds. Deeper subtidal minicycles are expressed as bioclastic wackestone overlying shale or micrite. The minicycles are the products of fair weather-storm cyclicity on the open, deep to shallow subtidal ramp, as well as tidal influences within a peritidal algal-bank complex; as such they do not represent shallowing phases and shifting environments, but rather fluctuating conditions within their respective environmental settings.

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Electro-Magnetic Oil Exploration Research Using Commensurate Frequency Phase Difference Technology