Astronomers Gull and Daniell have developed efficient noise-reduction techniques to enhance radio galaxy displays. They used the information theory notion of entropy with a chi-square constraint. In these conditions, the criterion derivatives provide separate equations to estimate each processed sample at a very fast computation rate. The chi-square constraint serves as a global constraint and ensures the continuity of the process over a given area and yields a confidence level for the results. The full confidence situation corresponds to the standard stack, whereas the zero confidence level corresponds to a flat distribution (trace). By slightly decreasing the confidence level from 100% confidence, meaningful noise reduction is achieved.

This technique is applicable to the noise reduction of seismic data. At each time sample of a deconvolved gather, the mean and the standard deviation are associated within the chi-square constraint to generate a new stack estimator. Such a process may be effective in sharpening velocity analyses. This is shown on both synthetic and real data. This nonlinear constraint method can be advantageously compared with more classical semblance or coherency technique with respect to computer time and the number of selected parameters is minimum.

Bryan and Skilling tried a new statistic in order to obtain a better distribution of noise residuals. The proposed solution consists of constraining the standardized and ordered residual components of the chi-square to fit a theoretical normal distribution. In fact, the solution can be made more general according to the noise distribution, inferred experimentally from the data.

Attempts have been made to apply this technique to the same seismic data sets. The Gull and Daniell technique provided a first estimate, which served as a starting point for the second technique. Convergence was obtained after a few iterations and improvement of the solution with respect to a normal distribution was checked through a chi-square goodness-of-fit procedure.

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Geology and Slope Stability of Point Delgata, California

Two bedrock complexes crop out at Point Delgata in northern California: a Franciscan melange complex composed of sedimentary rocks, pillow basalts, and glaucophane schist; and the Franciscan coastal belt complex composed mainly of interbedded shales and sandstones. Two Quaternary formations largely cover these bedrock complexes.

The major geologic structure is the northwest-trending San Andreas fault, which cuts Point Delgata and forms the contact between the two Franciscan bedrock complexes. This active fault has extensively deformed the Quaternary deposits. The Franciscan coastal complex has numerous folds with axes subparallel to the trace of the fault.

Over 50 recent slope failures have occurred within the mapped area. Rotational slumps and debris flows within soil horizons are most common. The predominantly sandy soils of the area were found to have an average angle of internal friction of 31.4°, and cohesion strength of 7.0 kg/m^2.

Under static condition, slopes greater than 40° are basically unstable, but, during a major earthquake, condition slopes greater than 20° would likely be unstable.

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Sedimentology of Upper Cretaceous Submarine Fan Strata, San Miguel Island, California, and Comparison to Selected Mainland Localities

Upper Cretaceous sandstone, mudstone, and conglomerate are exposed in an eastward-dipping homoclinal sequence at the western end of San Miguel Island. These strata were deposited in the inner, middle, and middle-fringe regions of a submarine fan during the Campanian and Maestrichtian Stages. Outer fan and basin-plain sedimentary rocks are absent, whereas thick sections of mudstone-dominated strata deposited in fan-fringe areas abound. The great thickness of the middle-fan fringe facies suggests that these rocks were deposited in an elongate basin, the long axis of which was oriented normal to the direction of sediment transport.

The middle-fan fringe strata on San Miguel Island are characterized by rhythmically interbedded mudstone, siltstone, and sandstone commonly found in thickening-upward sequences. The mid-fan strata are distinguished from outer fan and basin-plain deposits by the facies occurrence along strike from mid-fan channelized sequences, by paleocurrent indicators which trend subnormal to channel orientations, and by large- and small-scale slumping subnormal to channels.

The conglomerate clast suite on San Miguel Island is dominated by durable, but brittle, black dacites and plutonic rocks. Some black dacite clasts were shattered during transport to produce black sand grains that have given the sandstones a salt and pepper appearance.

Upper Cretaceous submarine fan strata in San Diego County contain a much smaller percentage of black dacite clasts than on San Miguel Island, but both are overlain by the same Eocene submarine fan strata dominated by Poway rhyolite clasts. This relationship suggests that these rocks were deposited as two separate, but closely adjacent, submarine fans which received coarse clastic detritus from similar and overlapping volcano-plutonic source terranes.

The Upper Cretaceous strata on San Miguel Island have been referred to the Jalama Formation as established on the mainland. However, the clast suites of the Jalama conglomerates in Santa Barbara County are dominated by metamorphic rocks which indicate a source terrane very different and separate from the volcano-plutonic dominated highlands that supplied detritus to the San Miguel Island and San Diego fans. Thus, the name Jalama Formation should not be used on San Miguel Island.

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Sedimentology of a Middle Tertiary Paludal Deposit, Northern San Joaquin Valley, California

The middle Tertiary Valley Springs Formation is characterized over much of its surface and subsurface extent in the northern San Joaquin Valley by yellowish- to greenish-gray claystone with crude wavy bedding and common clay-lined partings, fractures, and tubules. Common glass shards and pumice grains in this lithofacies have led previous workers to interpret it as altered vitric tuff or welded tuff, but the presence of unaltered glass in the claystone and in the interbedded vitric tuff argues against such a simple genesis.

Analysis of the mineralogy, chemistry, fabric, and organic content of a 26 ft (8 m) thick section at Wallace, Calaveras

County, has revealed a complex history. The presence of abundant freshwater microfossils (megaspores, chrysomonad cysts, diatoms, sponge spicules), together with only limited evidence of authigenesis, indicates that most of the claystone originated as detrital clay deposited in shallow ponds or marshes. Weathered horizons, at least one of which may represent a remnant of a fossil soil, and other evidence of surficial processes, such as root tubes (and roots) and nearly ubiquitous illuvial-clay coatings in pores, indicate that the ponds dried up periodically.

The dominant claystone lithofacies of the Valley Springs Formation, together with interbedded fine-grained sandstone (channel deposits?) and tuff, can be interpreted as the deposits of a poorly drained coastal plain that was occasionally blanketed by ash deposits and that extended westward from the present Sierra Nevada foothills to at least the present Coast Ranges foothills.

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Reaction Kinetics of Laboratory-Simulated Kerogen Maturation

Application of time and temperature evaluations to maturation and hydrocarbon formation requires knowledge of the chemical kinetics of the maturation process. Lopatin and others have used first-order kinetics, assuming linear dependence of maturation on time for a given temperature and have derived a rate constant whose temperature dependence is governed by the Arrhenius equation. This model may be inadequate as maturation data used in such first-order kinetic equations have generally yielded Arrhenius factor activation energies which vary widely with temperature.

We report here a detailed kinetic analysis of the laboratory-simulated maturation of several distinct kerogens having different source organic compositions and utilizing data for the production of CO_2, CH_4, and higher hydrocarbon gases as a function of time and temperature. In all cases, the dependence of maturation on time departs from linearity. Empirically a dependence on $t^{1/2}$ gives the best fit to the data, indicating possible product inhibition of the maturation process. We develop a simple chain reaction model incorporating this feature for both short and long reaction times. The model yields an effective rate constant which should obey the Arrhenius equation and consistently gives temperature-independent composite activation energies of the same approximate magnitude as is implied by Lopatin's model. The nature of the mineral substrate present with the kerogen influences the rate of maturation, both directly by catalytic action in some cases and indirectly by adsorption of product.

Our results suggest a marked difference in kerogen maturation kinetics between closed and open systems, which must be considered in interpreting and comparing laboratory simulations and which may be of considerable significance for hydrocarbon genesis in the field. This may be reflected in a dependence of the kinetics on lithology and porosity of the source or rock unit.

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New Age Determinations in Franciscan Limestone Blocks, Northern California

This paper documents age assignments for two widely separated and isolated northern California Franciscan "formation" limestone pods that have not previously been reported in published literature. These assignments, the first definite early Eocene fauna thus far recognized, and the most northeasterly occurrence of a Late Cretaceous Cenomanian stage fauna, were made by examining planktonic Foraminifera in thin sections.

In northern California, the Franciscan is divided into three broad northwest-trending belts: an eastern metamorphic belt, a central melange belt, and a western and youngest coastal belt. The occurrences of *Rotalipora appenninica, R. cushmani, Praeglobotruncana stephani,* and *P. stephani* var. *turbinata* in a limestone pod in the melange belt, about 10 mi (16 km) east of Covelo, indicate a Late Cretaceous (Cenomanian) age. Other limestone blocks in the same area contain Late Jurassic (Tithonian) megafossils.

In the coastal belt, a limestone pod from an abandoned quicksilver mine about 6 mi (10 km) north of Branscomb includes *Globorotalia subbotinae = G. rex, G. aragonensis, G. caucasica?* and *G. pseudotopilensis,* indicative of an early Eocene age.

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Sandstone Diagenesis as Function of Depositional Environment and Plate Tectonic Setting—Comparison Between Jurassic Sandstones from North Sea Basin and Some Oligocene Sandstones from Coast Ranges of California

Jurassic sandstones from the North Sea and Oligocene sandstones from the Coast Ranges of California are characterized by very different diagenetic mineral composition, which can be explained by differences in source rocks, sedimentary facies, climate, and ultimately in terms of plate-tectonic setting. The Jurassic sandstones from the North Sea were deposited in a rifted basin and were mostly derived from uplifted Precambrian terrane. A high content of diagenetic kaolinite in these sandstones can be attributed to meteoric water flushing through fluvial and deltaic sediments, causing the breakdown of feldspar and mica and the formation of kaolinite. Montmorillonite and zeolites are rare as authigenic minerals in these sandstones. In California, the rapid subsidence of the basins in this subduction regime caused marine sandstone facies to predominate. These sandstones contain smaller amounts of kaolinite, probably because they did not experience any strong flushing by meteoric water after deposition. In addition, a drier climate in this region explains why fluvial sandstones such as the Sespe Formation show less evidence of meteoric water diagenesis than the Jurassic North Sea sandstones. Basin subsidence and marine transgression after the deposition of the Sespe Formation also limited the time these sandstones were exposed to meteoric water and thereby the formation of kaolinite. A higher content of mafic clastic minerals and chert, which formed unstable mineral assemblages in the California sandstones, favored extensive growth of diagenetic montmorillonite.

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Weathering Statics Problem and First-Arrival Time Surfaces

Where organized by shot and receiver coordinates, the collection of picks of the first arrivals forms a jagged surface. It is thus crucial that the properties of the time surface of first arrivals be studied for various situations. It is particularly useful to