

in sedimentation rate) which restart the succession and/or as the result of the local migration of the various coral populations.

SCANNING-ELECTRON-MICROSCOPE EXAMINATION OF SAND-GRAIN PARTICLES FROM AN ICE CORE FROM CAMP CENTURY, NORTHWEST GREENLAND

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Quartz and feldspar particles studied, using the scanning-electron microscope, from near the bottom of a 1,375 m ice core from Camp Century, Thule area, northwest Greenland, have surface textures and shapes that indicate delicate structure and yet show evidence of severe abrasion. The particles ranged in size from 200 μm to 30 μm . Delicate textures and sharp conchoidally fractured flakes co-exist with badly scarred and gouged grains. Puncture scar holes in clean conchoidal fragments show progressive gradation to particles in which only parts of the original clean fractured face remain. The ultimate products are glacially rounded fragments. Many of these rounded fragments have protruding surficial stalks. The tops of these stalks are smooth surfaces which are probably relics of previously existing surfaces of these rounded grains. The rounding began when the original grains were in a packed array; the stalks probably occupied the intergranular close-packed spaces.

USE OF MASS-BALANCE EQUATIONS TO EVALUATE MODELS OF MAGMA GENESIS

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Least-squares solution of mass-balance equations can help place constraints on source composition for magmas and can help to distinguish between partial melting and fractionation.

(1) magma (a) = magma (b) + En + Fs + Wo + Jd + Al_2O_3 + TiO_2 \pm SiO_2

(2) mantle (M) = magma (m) + En + Fs + Wo + Jd + Al_2O_3 + TiO_2 \pm SiO_2

Equation (1) tests for possible high-pressure relationships between pairs of lavas which appear from their chemistry to be closely related, but which cannot be related by fractionation at low pressure. The two distinguishable possibilities are fractionation or different degrees of partial melting of a common source. The fractionation hypothesis requires the bulk composition $\Sigma(\text{En} + \text{Fs} + \text{Wo} + \text{Jd} + \text{Al}_2\text{O}_3 \pm \text{SiO}_2)$ to be a possible high-pressure pyroxene \pm olivine \pm garnet. In contrast, partial melting may be indicated when concentrations of Jd, Al_2O_3 , and/or TiO_2 exceed values found in high-pressure near-liquidus pyroxenes.

Equation (2) tests the compatibility of an assumed source composition (M) with a particular lava (m), assuming that melting results in a residual phase assemblage consisting of olivine, pyroxene, and/or garnet. The degree of melting must be fixed by an incompatible element (e.g., K, P, Ce, Zr) whose amount is assumed in M and measured in m. Solutions using an appropriate mantle composition will have small residuals, and $\Sigma \text{En} + \text{Fs} + \text{Wo} + \text{Jd} + \text{Al}_2\text{O}_3 \pm \text{SiO}_2$ will be a reasonable high-pressure pyroxene \pm garnet composition. By changing (m), equation (2) also tests whether any two magmas are compatible with the same source. One such test shows that Hawaiian tholeiite is compatible with a peridotite source, but ocean-ridge tholeiite is not and requires more pyroxene and/or garnet in the source rock.

MOLYBDENITE MINERALIZATION AT THE HALL PROPERTY, NYE COUNTY, NEVADA
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At the Hall Property, a stock of Cretaceous quartz monzonite porphyry (69 m.y.) has intruded Permian(?) tuffaceous sediments. The stock is crudely cylindrical in shape, approximately 2400 feet in diameter, and plunges to the southeast at 50 degrees. Along the margins of the stock, and cutting locally into the surrounding country rock, is a zone ranging from 200 to 1000 feet across in which quartz-sulfide veins comprise greater than 30 percent of the rock volume. Less intense quartz-sulfide veining continues outward from the stock up to 3000 feet. Sulfides associated with the veining are zoned concentrically, with relatively abundant molybdenite found in a ring-shaped band a few hundred feet wide along the outer margin of the zone of intense quartz veining. Molybdenite gives way to chalcopyrite farther from the stock; sphalerite and minor galena appear at the fringes of mineralization.

SOURCES OF SHOALING IN CHARLESTON HARBOR-FOURIER GRAIN SHAPE ANALYSIS AS A NATURAL TRACER

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Siltation of Charleston Harbor, South Carolina, is a severe economic problem requiring major expenditures for dredging as well as proposals for drastic modifications of the sediment carrying capacities of rivers discharging into the harbor. Previous studies agree on the hydrodynamic responses to diversion of the Santee Rivers' 15,000 cfs flow into Charleston Harbor. However, no consensus exists concerning the source of sediment influx i.e. whether or not the source of shoaling material is from the Cooper River or the proximal continental shelf. Also, previous investigations have not discussed the role of channel deepening in the estuarine dynamics of Charleston Harbor.

The sources of sediment influx into Charleston Harbor and the relative contributions of each source have been determined with Fourier Series grain shape analysis. Results of the shape analysis on the sand fraction indicate a significant sediment influx from the proximal continental shelf. Shape analysis of the silt fraction reveals that its source is primarily from the Cooper River. The major cause of shoaling in the lower harbor channels is sand accumulation derived from a seaward source. Silt and sand accumulations derived from the Cooper River generally are deposited in the Cooper River channels and in the shallow and unchanneled areas of the harbor. These results indicate that the deepening of the harbor channels has played a major role in the shoaling of Charleston Harbor as well as the increased freshwater flow from the Santee River diversion.

HIGH RATES OF VERTICAL CRUSTAL DISPLACEMENT, VENTURA BASIN, CALIFORNIA

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The Neogene section of the central Ventura basin is age-calibrated by fission-track zircon dates of ash beds of 6.8 and 1.2 m.y., recognition of the Olduvai and Jaramillo magnetic events in the Saticoy oil field, and dating of coastal California marine terraces by the open-system uranium-series and amino-acid racemization methods. This

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