[cut off]MATION OF ANISOTROPIC ROCKS

№ 139532

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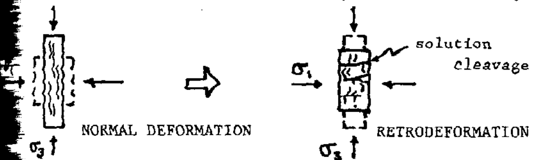
[cut off]ormation" is deformation with shortening in the σ_3 principal [cut off]rection, with less rapid shortening or even lengthening in the [cut off]on. Such behavior is possible in principle in materials which [cut off] with volume loss and which possess a mechanism for easy [cut off] in the σ_3 direction but no equivalent mechanism for short- [cut off] the σ_1 direction. Retrodeformation is driven by an interaction [cut off] the anisotropy of the material and the stress field, but not by [cut off]ential stress σ_1-σ_3. The rule that the applied stress field [cut off] work on the material leads to the need for volume-loss and [cut off] (in plane straining) that $|\dot{e}_3| > \sigma|\dot{e}_1|$, where $\dot{e}_3$ and $\dot{e}_1$ are the [cut off] shortening and lengthening in the σ_3 and σ_1 directions and σ is [cut off] of σ_1 to σ_3. It is suggested that retrodeformation may some- [cut off] during stress decay following normal deformation, introducing [cut off]ration of structures without any change in the principal stress [cut off] as sketched below. Normal deformation establishes the neces- [cut off]nical anisotropy (via a foliation at a high angle to σ_1, or a [cut off] subparallel to σ_1). Retrodeformation sets in below a criti- [cut off]ential stress as the latter decays, and may continue in the [cut off] the differential stress vanishes. During retrodeformation, [cut off] of shear straining on any given non-principal plane is opposite [cut off] of the applied shear stress acting across the same plane.



[cut off]NTAL EVIDENCE FOR PRODUCTION OF K_2O- [cut off]ENT WITHOUT SiO_2-ENRICHMENT BY [cut off]AL CRYSTALLIZATION OF DRY BASALTIC MAGMA AT 10-15 KB

№ 129895

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[cut off]ved potassic rocks are generally assumed to have formed from potas- [cut off] basalts. Experimental studies at 10-15 kb on *hy*-normative basalts [cut off]ate K_2O contents show that this assumption is not necessarily war- [cut off] cases. Crystallization of plagioclase+pyroxene±olivine±iron titanium [cut off] anhydrous basaltic liquids enrichs the residual liquid in K_2O but the [cut off] of the liquid may rise, may remain constant, or may fall with con- [cut off]llization. Changes in SiO_2 content depend on $P_{crystallization}$ and [cut off] and Mg/Fe of parental liquids.

[cut off]ges crystallizing from *hy*-normative basaltic melts at low P are dom- [cut off]ivine and plagioclase with augite and iron oxide. Low-Ca pyroxene [cut off]rom more silicic melts. Residual liquids are strongly enriched in [cut off] to parental liquids. The primary phase field of olivine contracts [cut off] anhydrous systems. At P>≈6 kb, the thermal divide, plagioclase- [cut off]Ca pyroxene, prevents evolution of basalts to silicic compositions. [cut off]ds evolve to L(ol, pl, aug, low-Ca px) and undergo little enrichment [cut off]s P rises, compositions of multiply saturated liquids are more for- [cut off] their SiO_2 contents are lower at higher P. K_2O is enriched in the [cut off] cases. Experiments on natural compositions show that similar phase [cut off] applicable. Residual liquids formed from anhydrous basaltic liquids [cut off] are enriched in K_2O but show little variation in SiO_2. Such frac- [cut off]ds may be terminated by eruption to low-P environments, by in- [cut off] content of residual liquid, or by crystallization of K-rich phases. [cut off]asalts may be formed by fractional crystallization of tholeiitic bas- [cut off] water contents at moderate P. Required depths of fractionation [cut off] the depth of the Moho in typical continental areas (≈35 km). [cut off]ss may be more common on continents than in oceans where likely [cut off]tionation are shallower.

[cut off] CARBON ISOTOPIC SHIFTS BETWEEN ALTERED AND [cut off]MESTONE IN THE PERIPHERIES OF THE SANTA [cut off]NG DISTRICT, CHIHUAHUA, MEXICO.

№ 143101

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[cut off] oxidized mineralization at Santa Eulalia is discontinuously [cut off] by zones of argentiferous manganese-oxide mineralization [cut off]mestone. This mineralization consists of fracture fillings [cut off]nular disseminations of fine-grained manganese-oxides with [cut off] associated sulfides and sulfosalts. Oxygen and carbon [cut off] elemental analyses of AMOM and adjacent unmineralized [cut off] show significant differences and abrupt transitions that [cut off]h a visually sharp contact between the two zones. Regional [cut off]arbon isotope values for unaltered limestone are 21.8 and - [cut off]elative to SMOW and PDB respectively), while values in the [cut off]OM are 16.2 and -3.9 respectively. These values rise to [cut off] on the altered side of the AMOM/limestone contact, with [cut off].7 and -1.8 on the unaltered side. Unmineralized limestone [cut off]in AMOM have values comparable to those along the unaltered [cut off] limestone 100m from mineralization shows near-regional [cut off]nificant amounts of Ag, Pb, Zn, Cu, Cd, Mn, Fe, and Ba are [cut off]M, but drop abruptly to background values at the transition [cut off] limestone.

These oxygen and carbon isotope shifts are identical to those seen around massive sulfide mineralization below the level of oxidation, which indicates that the shifts around AMOM are also a hypogene effect, presumably caused by wall rock penetration of hydrothermal fluids. This evidence, coupled with the anomalous metal content, and the spatial distribution relative to orebodies, indicates that AMOM formed at the extreme fringes of the hydrothermal system, from depleted equivalents of the district ore-forming fluids. This strongly reinforces the validity of using AMOM as an exploration guide.

REE GEOCHEMISTRY OF CONTINENTAL RIFT LAVAS OF THE SALTON TROUGH, CALIFORNIA AND MEXICO

№ 138421

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The Salton Trough is the northern, landward expression of active crustal spreading within the Gulf of California, recording the interaction between East Pacific Rise magmas and rifted continental crust. This study describes the REE compositions of subsurface lavas recovered in wells drilled in the Cerro Prieto and Salton Sea Geothermal Fields, including the 10,564 ft. research well (State 2-14) of the Salton Sea Scientific Drilling Project (SSSDP). In addition, the REE compositions of surface lavas and xenoliths from the Quaternary volcanoes of the Salton Trough are described.

The REE geochemistry of rhyodacite/dacite volcanoes and granitic xenoliths suggests derivation by remelting of pre-existing granitic crust. The subsurface basalts and andesites of the Salton Trough are products of primary melts similar to those which produced East Pacific Rise basalts, except that the continental lavas are LREE-enriched. The majority of the mantle-derived rocks are most likely underplated at the base of the rifted crust, supplying the heat necessary to melt the pre-existing granitic rocks and producing the felsic volcanoes. These processes may produce the previously reported bimodal distribution of igneous rocks in the Salton Trough. High level intrusions of basaltic material occur as sills at the 9,450' depth in the State 2-14 well of the SSSDP, however, rifting in the Salton Trough has not yet evolved to the point where basaltic lavas will erupt at the surface.

GLOBAL CHANGE AND GLOBAL ICE

№ 144146

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Ice, as snow, glaciers, sea ice, and ground ice, is an important component of the Earth's environment and its climate machine. Changes in the ice cover affect the environment, feed back to climate, and influence Earth's rotation. Global warming due to the "greenhouse effect" will cause ice wastage leading to a global rise in sea level that will be serious but not catastrophic in the next century. Ice fluctuations dominate the paleoclimate record of the last 2 million years, and ice sheets store the most complete, high time-resolution data on environmental change during the last 100,000 years. Thus ice and global change are inextricably linked.

A RECONSTRUCTION OF SOUTHERN ALASKA AT 75 Ma

№ 137199

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Our reconstruction of southern Alaska to 75 Ma is based on quantitative restoration of the major strike-slip faults of interior Alaska and the northern Canadian Cordillera. Displacements were determined through slip-history analyses of published and new data correlating offset tectonostratigraphic elements. The principal strike-slip fault systems and their proposed 75 Ma offsets include: Tintina (150 km RL), Kaltag (130 km RL), Iditarod/Nixon-Fork (60 km RL), Denali/Farewell (38 km RL), and Castle Mountain (35 km RL). Paleomagnetic data from volcanic rocks require up to 40±15° of CCW rotation of blocks between faults in western Alaska. Four end-member reconstructions were developed to explore the implications of different magnitudes of fault slip and block rotation. The preferred solution balances the effects of rotation and strike-slip motion to conserve slip where structural elements change strike in central and southern Alaska. Displacement vectors were summed around closed loops in this region to estimate the magnitude and sense of slip on secondary structures and to check the internal consistency of our reconstruction. The offset data imply low slip rates (1-5 mm/yr) for the major strike-slip faults. These rates are inconsistent with transform motions inferred from plate kinematic analyses and paleomagnetic data from sedimentary rocks. Most of the displacement between North America and the Kula plate must have been taken up on coastal structures of southern Alaska, such as the Border Ranges fault. The reconstruction implies that the southern Alaska continental margin was largely in place and gently curved at 75 Ma.