altered and represent diatreme-facies with considerable volatile autometasomatism. To the west in the Appalachian Plateau (E. Kentucky and S.W. Pennsylvania), fresh rock contains abundant peridotite xenoliths. Garnet lherzolites yield pressures equivalent to depths of 150 km and 160-170 km, respectively. Megacryst chemistry records near-isobaric fractionation over ~200°C (1350-1150°C). This is like the steep, inflected limbs of the Lesotho-type geotherms. Further into the Plateau, in New York State, megacrysts record a 100 km depth and 1100-1050°C. Spinel megacrysts and spinel peridotite xenoliths also represent a shallower origin. Eclogite xenoliths in the New York and Tennessee kimberlites indicate this to be a widespread component of the lower crust in the E. USA.

The occurrences in New York lie along a N-S joint pattern, that in S.W. Pennsylvania runs for 4-5 km along a NW-SE fault, transform to the prevailing structure (perhaps in a manner analogous to similar occurrences related to South-Atlantic rifting, e.g., Marsh, 1973). The ages of the southern occurrences are older than those in the North, reflecting progressive northerly rifting with time. All of the features discussed above can be explained by the prevailing tectonic regime for the Eastern United States during Early - Mid Mesozoic times.

G11

TEMPORAL AND SPATIAL PATTERNS OF ALKALI CONTINENTAL VOLCANISM: A TEST OF THE HOTSPOT CONCEPT

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The origin of kimberlite magma is investigated by compiling the known ages and locations of kimberlites, carbonatites, and other alkali continental intrusions. Because different proposed theories of origin make somewhat different predictions concerning eruption timing and location, these data help constrain speculation. The simplest model to test is the hotspot theory which predicts that the data must be self-consistent with plate motion over a set of mutually fixed magma sources. Other testable models include the reactivated fracture hypothesis which predicts linear patterns with uniform ages and the asthenospheric shear model which predicts craton-wide volcanism at times of rapid plate movement.

The post-Paleozoic igneous record of the Atlantic-bordering continents is found to be most consistent with the fixed hotspot concept. The same absolute plate motions which explain the majority of known seamount ages on the Atlantic ocean floor by fixed hotspots also explain most of the continental intrusions, including kimberlites. The reactivated fracture hypothesis is less satisfactory because many of the volcanic lineaments have demonstrable age progressions along their length. The shear melting model seems inconsistent with the great variety of ages observed within single cratons, although the data do suggest a relative peak of volcanic activity during the Cretaceous interval of rapid seafloor spreading.

G12

MINERALOGY AND COMPOSITION OF ABYSSAL AND ALPINE-TYPE PERIDOTITES

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Abyssal and alpine-type peridotites share the mineralogic and compositional features of the depleted residues of mantle melting and magma generation. Within the somewhat limited compositional spectrum of mantle peridotites, however, there are systematic differences between these different peridotite types which reflect melting in very different physical environments. Abyssal peridotite localities are characterized by very restricted mineral compositions and a relatively high abundance of modal diopside. It is apparent that melting of abyssal peridotites in general does not procede beyond the 4-phase field Ol-En-Di-Sp, and accordingly melt compositions are constrained by the four phase pseudo invarient point.

In contrast, alpine-type peridotites are frequently highly depleted compared to abyssal peridotites, and many have lower Di/En ratios. Frequently they have highly Mg, Al-poor, and Cr-rich mineral compositions lying entirely outside the range for abyssal peridotites. In addition, many alpine-type peridotites show very large local variations in degree of melting, often with large ranges of mineral compositions. It is evident that most alpine-type peridotites have melted well into the three phase field Ol-En-Sp under very different conditions than melting of abyssal peridotites.

These differences between abyssal and some alpine peridotites we attribute to hydrous remelting of abyssal peridotites in arc environments and their eventual emplacement there as ophiolite complexes. Thus many ophiolite complexes contain mantle peridotites ranging in composition from the abyssal mantle to the highly depleted residues of the generation of arc-magmas; possibly reflecting local variations in the availability of water during the last stages of melting.

G13

MAGMATIC AND TECTONIC EVENTS IN AN OCEANIC DIAPIR.

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The lherzolitic massif from Monte Maggiore, Northern Corsica, France (3x1.5 km) which belongs to an ophiolitic complex rests tectonically on a pile of thrust slabs. Structural, petrological and mineralogical studies have been engaged to determine the chronology of coupled magmatic and tectonic events during diapiric uprise of an oceanic mantle.

The oldest relict mantle, consists of layered and folded Cpx-rich peridotites evolving from Sp-free rocks to Sp-bearing ones. They have suffered limited or extensive partial fusion events, respectively initiated by pervasive injections of limited amounts of alkali-basaltic liquids or larger volumes of Ol-rich tholeiitic magma.

Circulation of alkali-rich liquids favoring the propagation of cracks have led to local enrichment of Al, Ti, Na, K, P and Zr as testified by the composition of the phases and the thermal disequilibrium. A mappable layered Pl-rich peridotite, towards the center of an ovoid lens of depleted peridotites (0.8-0.5 km) indicate fractionation of Ol-Sp-Opx-Cpx and Pl during magma ascent.

During progressive uprise of the mantle, Opx disappears as a liquidus phase in the least evolved