THE UPPER MANTLE BENEATH THE SOUTHWESTERN UNITED STATES.

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Systematic field study of tens of thousands of xenoliths from 15 major Quaternary volcanic fields of the Southwestern United States and neighboring Mexico, completed by detail structural and chemical study of hundreds of selected samples, show mappable patterns in the distribution of textures, petrological and chemical parameters and related physical mantle conditions. The upper mantle appears laterally homogeneous over large regions which correspond to major tectonic provinces, but composition and physical properties vary with depth within such cells, the latter being limited by sharp boundaries of deep extension. Common ultramafic cumulates are genetically related to the overlain metamorphic mantle. Xenoliths from older volcanics indicate petrologic variability throughout time and the following recent (<30 m.yr.) evolution and present state of the upper mantle can be inferred:

- Colorado Plateau and Sierra Nevada (Moho at 45-48 km):formerly infracratonic-type depleted mantle, chemically and texturally modified some 20 m.yr. ago through impregnation by tholeiitic liquids;
- Central Nevada (Moho at $\leq$ 16 km): Cr-rich peridotites with large (5-10 cm) poikiloblastic olivines ($\sigma \sim 20$ bars) typical of a late stage of continental rifting, indicate a zone of present mantle upwelling and crust thinning;
- Basin-and-Range (excluding Nevada; Moho at $\sim$ 32 km): fine-grained homogeneous lherzolites passing down to coarse (8-10 mm) harzburgites with websteritic banding (diffusion?); 60-to-70 km-deep peridotite-xenolith-bearing neo-websteritic batholiths imply a residual coarser highly-depleted (melting) deeper facies;
- Baja California: homogeneous lherzolites; this province escaped the late (10 m.yr.?) differenciation processes illustrated by the last two provinces. Sheared facies ($\sigma \sim 800$ bars) would be related to reactivation of major lithospheric fault/shear zones immediately prior to the eruption it probably triggered.

General petrogenetic and rheological models derived yield new constraints for the tectonic history of the Southwestern United States.