I conclude that diffusion creep can reasonably be expected to be a significant flow process in the mantle. In fact, the most probable values of E^*, V^*, D_0, and R lead to a predicted effective viscosity, for depths to 1500 km and for all except the lowest of the various proposed temperature distributions, which is about equal to that deduced from the observed uplift of unloaded sections of the earth's crust. Diffusion creep is a consequence of the thermally activated mobility of atoms in crystals and so occurs quite generally in polycrystalline materials. It is not dependent on the presence of any type of specialized structure (e.g., particular dislocation arrays or obstacles to dislocation motion), and the mechanism is established by both theory and experiment beyond any reasonable doubt. In contrast, the calculations of viscosity in the earth by *Cook* [1963] are based on a model whose applicability to close-packed crystalline structures is not established, and they lead to activation energies that are much too low by any reasonable physical standards.

The occurrence of diffusion creep fixes a definite minimum for the resistance of a material to creep deformation. For the effective viscosity of an appreciable part of the mantle to be greater than 10^{25} poises, the amount required for the current figure of the earth to have been retained from an earlier equilibrium shape [*MacDonald*, 1963], either E^* and V^* would have to be unreasonably large or the temperatures at depths below 1000 km would have to be as low as those proposed by Gutenberg.

The occurrence of diffusion creep in the mantle does not rule out creep deformation at a more rapid rate due to motion of dislocations. Such deformation is expected, for example, in regions of orogenic and earthquake activity. However, the occurrence of diffusion creep at significant rates indicates that the assumption of Newtonian viscosity usually made in calculations of large-scale flow processes in the mantle is a reasonable one.

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