and an oceanic geotherm. The temperature uncertainties are now based on the estimated error in our σ data. Implied in the results in Figures 5 and 6 is the requirement that the σ of the earth's mantle at these depths is controlled by olivine. Olivine with a composition near Fo 90 is believed to undergo a phase change to spinel, perhaps via an intermediate phase, at a depth near 380 km, the transformation being likely to be complete by about 450 km [*Fujisawa,* 1968; *Ringwood and Major,* 1970; *Ringwood,* 1972]. Other assumptions in the calculations are that there is no further change in conduction mechanism in olivine above 1660°C and that the pressure effect at higher temperatures is similar to that observed below 1440°C. Furthermore, the temperatures calculated from the present data are correct only if the oxygen fugacity in the mantle is near the values indicated at the top of Figure 3. Comparison of Figures 5 and 6 indicates clearly that although the uncertainty in σ due to the maximum possible pressure effect is large, it is at most only 25% of the total uncertainty due to lack of resolution of σ with depth for the earth at depths to 400 km. Thus improvements must be made in the resolution of the σ-depth data in order to improve the temperature profiles shown in Figures 5 and 6. It would also be helpful to be able to set realistic limits on the oxygen fugacity in the mantle.

Figure 3 demonstrates that the oxygen fugacity in the experimental atmosphere affects the electrical conductivity of olivine. Other structure-sensitive properties (i.e., elastic constants, creep properties, diffusion, optical absorption, thermal diffusivity) may also be affected at high temperatures by the atmosphere in which they are measured. We suggest therefore that more care be exercised in specifying the experimental conditions at which these properties are determined.

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