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G. SCATTERING SOURCES IN THE DEEP MANTLE AND P'P' AND PKP PRECURSOR WAVES

Precursors to PKP and PKKP phase are in general interpreted as ordinary core waves, and the corresponding physical explanation requires one or more layers in the fluid outer core. However, in the recent two years very careful analysis of array recorded precursor waves has resulted in slowness and azimuth values which are incompatible with the standard velocity models of the earth's core. For example, azimuth deviations up to ± 50 deg are observed, while slowness values may vary from 1.0-4.5 sec/deg. Alternatively, the precursors may be interpreted in terms of scattering sources in the deep mantle, an explanation forwarded both by Cleary and Haddon (1972) and by Doornbos and Vlaar (1973). Moreover, Haddon (1973) has developed a wave-scattering theory which is an important tool in verifying the above scattering hypothesis.

Work is now in progress at NORSAR aimed at a detailed mapping of the 'scattering' properties of core precursor waves, both in time and space. The preliminary results obtained compare favorably to those based on theoretical calculations for scattering structures of the Chernov (1960) type in the deep mantle. To get a better check on the scattering models used, the theoretical calculations have to match the analysis results of precursor waves associated with different types of core phases.

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