Each of these reactions has been studied in the laboratory and the relevant phase boundaries are shown in Fig. 11.

It will be noticed that the occurrence of lawsonite places an upper limit on the temperature of metamorphism at about 400°C. At low *P*s and *T*s a zeolite laumontite also restricts the lawsonite field. Further, we know that in complex chemical systems other phases tend to restrict this field even more so that a temperature limit of 300°C is likely to be nearer the truth. The subsequent reactions call for little comment, so burial along a gradient of about 10° km^{-1} to a depth of 30 km would explain the mineralogy. If these rocks are unique, so is the depth of burial and the low thermal gradient. It is also no surprise (cf. Fig. 8) that these rocks should be associated with eclogites; pressures are certainly high enough.

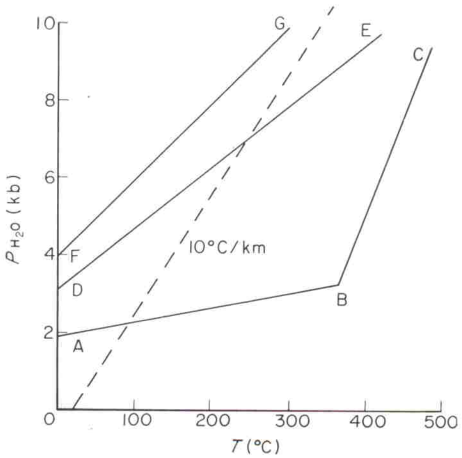

Fig. 11. Stability fields of minerals related to glaucophane schists. Lawsonite is only stable within the area bounded by A–B–C. Aragonite is stable above D–E. Jadeite with quartz is stable above F–G. A low geothermal gradient is shown.

Most other evidence points in the same direction. As already mentioned, the occurrence and preservation of aragonite indicates the same type of thermal gradient. Oxygen isotope fractionation gives temperatures of 250–300°C. The feldspars in these rocks show an extreme degree of order. There are still many unsolved problems and many aspects of the experimental data require confirmation, but one may doubt if refinement will greatly change the picture. It is now a problem for the geophysicist to explain the thermal regime.

If this type of metamorphism is related to descending convection currents in the upper mantle and to ocean-floor spreading, it is possible that remnants of it inside continental masses may point to the operation of ancient convective cells, as in the Ural Mountain belt. In this way we may be able to unravel many aspects of the thermo-mechanical history of the earth.

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