

Introductory Remarks

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Introductory remarks

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In the last few years we have acquired a rather detailed knowledge of the development of the main ocean basins. Large parts of the Earth's surface behave and move as rigid plates, or rather as rigid spherical caps. These plates are created on the axes of the ridges and destroyed at the trenches. This new picture is primarily kinematic, though from its first origins in the work of Dietz & Hess it was realized that it has petrogenic implications.

We have great plates of igneous rock often several thousand kilometres across and 50, or maybe 100 km thick; each is being formed along one or more of its edges over periods of 50 to 100 Ma. Where does this great volume of rock come from? Clearly it must be derived from the upper mantle, and a study of its chemistry and mineralogy can tell us something of the possible composition of the mantle and of processes in it. This is the main theme of this discussion. With the introduction of the electron-probe and of activation analysis the methods of studying the composition of rocks have improved so greatly that we can now obtain a great number of analyses covering not merely the main constituents but a large number of trace elements, of which the rare earths are particularly informative. The methods of experimental petrology are also of great importance in the interpretation of petrogenic processes on the ridge axis. In recent years the most important silicate systems have been studied not only dry and at atmospheric pressure, but at high pressures in the presence of water. This is a step of the first importance in a realistic experimental study of processes that may occur beneath the mid-ocean ridges.

The discussion therefore represents a coming together of three diverse ways of studying the rocks of the oceans: plate tectonics, chemical analysis and experimental petrology. The subject is central to an understanding of the history of the Earth but it is only very recently that we have learnt enough to understand what we need to know. Five years ago such a discussion would have been of only limited usefulness.

It is remarkable that almost all the papers deal with the creation of oceanic rocks and none with their destruction. Perhaps in a few years we can meet again to discuss the final fate of the lithospheric plates and their relation to the volcanoes and fold mountains bordering the continents.

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