Magmatism and the Causes of Continental Break-up

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Magmatism and the Causes of Continental Break-up

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Preface

The association between lithospheric extension, continental break-up, mantle plumes and massive bursts of igneous activity is well recognized, but their causal relationship remains controversial. According to active mantle hypotheses, rifting is initiated by doming above a mantle plume. Alternative hypotheses consider magmatism as a passive response to lithospheric stretching and rifting with the chance unroofing of a plume only enhancing lithospheric failure and producing abnormally large volumes of basaltic magmatism. Some models combine aspects of both active and passive hypotheses and it is the arrival of a new plume beneath lithosphere already under tension that causes it to split and form a new ocean. The active and passive hypotheses highlight important differences in the relative timing of rifting, magmatism and uplift. Consequently, this debate should be resolved and the main aim of this volume is to integrate relevant tectonic, geochemical and geophysical data which will lead to a better understanding of the causal relationships between magmatism and continental break-up.

The first section of the volume is concerned mainly with models of magma generation and break-up processes. Critical to the debate is the origin of the large continental flood basalt provinces and the difficult task of interpreting geochemical signatures. The remaining sections present examples from the geological record. They provide essential feedback to the models and it is clear that some may need to be modified. The debate is, however, by no means over and many of the problems discussed in this volume will be the focus of continuing research for some time.

In conclusion the many people who contributed to the production of this volume, including the staff of the Geological Society Publishing House are gratefully acknowledged. We are very grateful to the referees for their careful reviews and for responding quickly to our requirements, and to contributors for making an effort to meet our deadlines. Staff of the British Antarctic Survey, in particular Gill McDonnell, gave much help and time to make the conference on which this volume is based a success and they are warmly thanked. Financial support received from The Royal Society, Shell UK Exploration and Production, Amerada Hess Ltd, Esso Exploration and Production UK Ltd, Intera ECL Petroleum Technologies and ARK Geophysics Ltd underpinned the success of the meeting by enabling keynote speakers to be invited.

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