

Thermochemical convection with plates: Linking tectonics to the geochemical evolution of the Earth's mantle.

by  
John Paul Brandenburg

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Dissertation Committee:  
Associate Professor Peter E. van Keken, Chair  
Professor Larry A. Haskin  
Associate Professor Jerome H. Burn  
Professor Charles B. Jost

# Thermochemical Convection With Plates Linking Tectonics To The Geochemical Evolution Of The Earth S Mantle

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**Summary :** Free thermochemical convection with plates linking tectonics to the geochemical evolution of the earth s mantle pdf download - variations in trace element isotope ratios of oceanic basalts may be used to calculate time-integrated constraints on the vigor and mixing efficiency of convection in the earth s mantle since the majority of quantitative measurements of mantle convection are geologically instantaneous this type of extended metric is crucial in this dissertation the isotopic evolution of the mantle is examined in dynamic models of thermochemical convection discrete tracers are used for the dual purpose of prescribing chemical buoyancy and calculating isotope geochemistry published chemical-geodynamic calculations are reproduced and systematically extended to more realistic convective vigor revealing complex behavior and a high sensitivity to small changes in dynamic parameters an improved dynamically consistent treatment for multiple stiff plates in cylindrical geometry is presented and the extraction of basaltic oceanic crust at mid-ocean ridges is explicitly linked to divergent plate boundaries the evolution of the u-th-pb-he k-ar rb-sr sm-nd and re-os systems are tracked pooling of dense oceanic crust at the base of the mantle and variable rates of continental crust extraction are found to be essential to explain observed variations in isotope ratios compatible behavior during partial melting can explain noble gas observations but is limited by degassing constraints and sampling considerations a quantitative model for the production rate of mid-ocean ridge basalt is described but is presently limited by uncertainties in the underlying thermodynamic model

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