



The mid-ocean ridge system is the site of creation of the oceanic crust and lithosphere that cover more than two-thirds of the Earth. Nearly three-quarters of Earth's total heat flux occurs through oceanic crust, much of it through hydrothermal circulation at mid-ocean ridges. How does this hydrothermal activity transfer heat from Earth's lithosphere to its hydrosphere? How do hydrothermal vents, their heat and chemical fluxes, vary in time and space? How are these variations related to the geology of the underlying crust/lithosphere?

This volume features multidisciplinary studies on such questions from geophysical, petrological, geochemical, seafloor observational, experimental and theoretical perspectives, including:

- Processes of heat transfer from Earth's mantle via mid-ocean ridges to the oceans
- Global variations in hydrothermal vents and heat flux
- Morphology, rheology, internal structure, and geology of the oceanic lithosphere and their controls on hydrothermal circulation
- Physical and chemical reaction processes in hydrothermal circulation systems
- Direct observations and measurements of hydrothermal vents from submersibles

Scientists and students working in marine geochemistry, marine geology and geophysics, tectonophysics, volcanology, geochemistry and petrology, as well as multidisciplinary scientists with an interest in mid-ocean ridges and hydrothermal systems will find this work an important resource in our evolving view of the Earth.

[www.agu.org](http://www.agu.org)



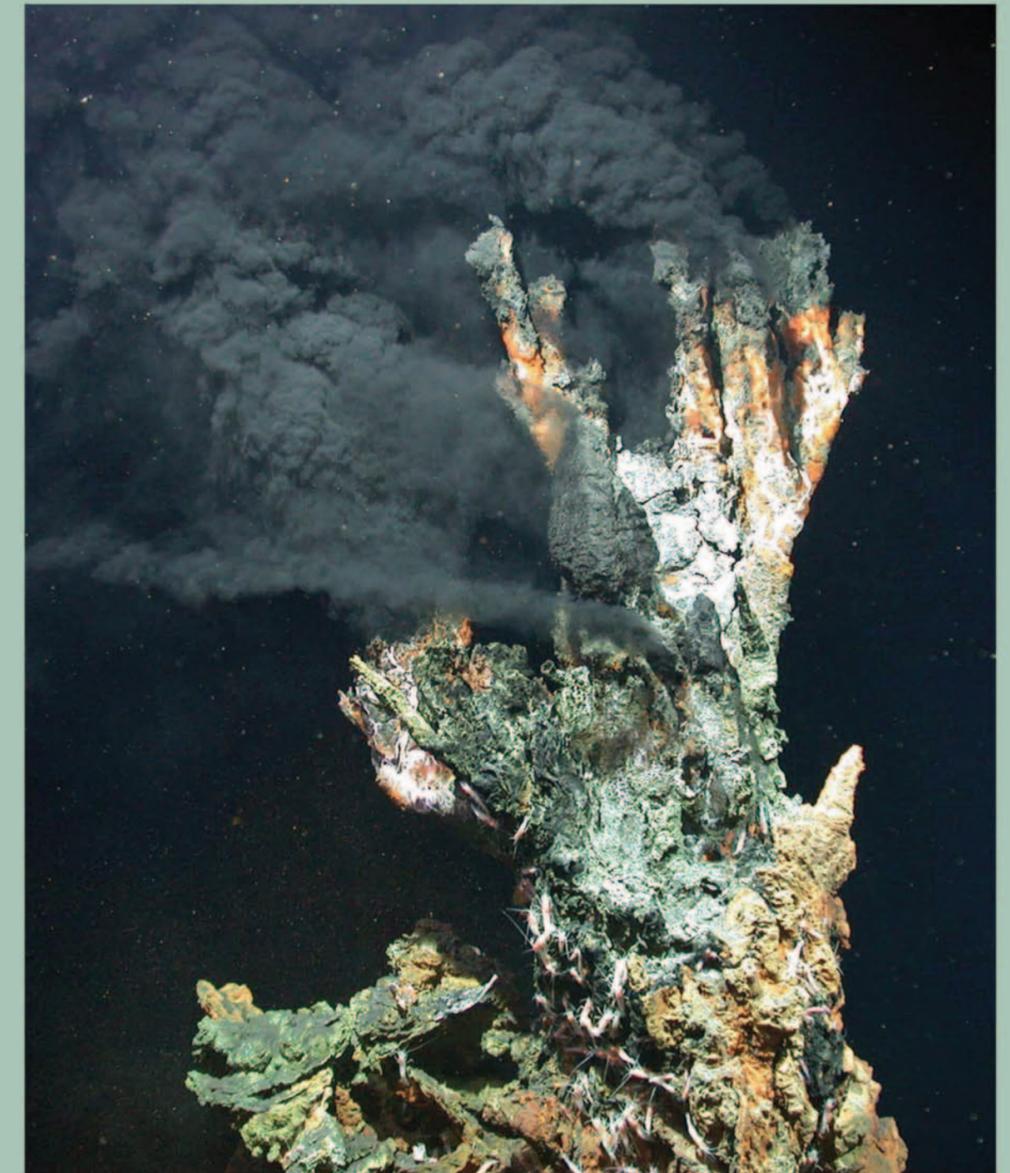
Geophysical  
Monograph  
148

MID-OCEAN RIDGES  
Hydrothermal Interactions  
between the Lithosphere and Oceans



# MID-OCEAN RIDGES

## Hydrothermal Interactions between the Lithosphere and Oceans



Christopher R. German, Jian Lin, and Lindsay M. Parson, *Editors*

# CONTENTS

---

## **Preface**

*Christopher R. German, Jian Lin, and Lindsay M. Parson*.....vii

## **The Thermal Structure of the Oceanic Crust, Ridge-Spreading and Hydrothermal Circulation: How Well Do We Understand Their Inter-Connections?**

*Christopher R. German and Jian Lin* .....1

## **Geophysical Constraints Upon the Thermal Regime of the Ocean Crust**

*Martin C. Sinha and Rob L. Evans*.....19

## **The Rheology and Morphology of Oceanic Lithosphere and Mid-Ocean Ridges**

*R. C. Searle and J. Escartín*.....63

## **Modeling the Thermal State of the Oceanic Crust**

*Yongshun John Chen*.....95

## **Some Hard Rock Constraints on the Supply of Heat to Mid-Ocean Ridges**

*Mathilde Cannat, Joe Cann, and John MacLennan*.....111

## **Effects of Hydrothermal Cooling and Magma Injection on Mid-Ocean Ridge Temperature Structure, Deformation, and Axial Morphology**

*Mark D. Behn, Jian Lin, and Maria T. Zuber* .....151

## **Experimental Constraints on Thermal Cracking of Peridotite at Oceanic Spreading Centers**

*Brian deMartin, Greg Hirth, and Brian Evans* .....167

## **Submarine Lava Flow Emplacement at the East Pacific Rise 9° 50'N: Implications for Uppermost Ocean Crust Stratigraphy and Hydrothermal Fluid Circulation**

*Daniel Fornari, Maurice Tivey, Hans Schouten, Michael Perfit, Dana Yoerger, Al Bradley, Margo Edwards, Rachel Haymon, Daniel Scheirer, Karen Von Damm, Timothy Shank, and Adam Soule*.....187

## **Hydrothermal Processes at Mid-Ocean Ridges: Results From Scale Analysis and Single-Pass Models**

*Robert P. Lowell and Leonid N. Germanovich* .....219

## **On the Global Distribution of Hydrothermal Vent Fields**

*Edward T. Baker and Christopher R. German* .....245

## **Ultramafic-Hosted Hydrothermal Systems at Mid-Ocean Ridges: Chemical and Physical Controls on pH, Redox and Carbon Reduction Reactions**

*W. E. Seyfried, Jr., D. I. Foustoukos and D. E. Allen* .....267

## **Evolution of the Hydrothermal System at East Pacific Rise 9°50'N: Geochemical Evidence for Changes in the Upper Oceanic Crust**

*Karen L. Von Damm* .....285

## **Vigorous Venting and Biology at Pito Seamount, Easter Microplate**

*D. F. Naar, R. Hekinian, M. Segonzac, J. Francheteau, and the Pito Dive Team* .....305

# Mid-Ocean Ridges: Hydrothermal Interactions between the Lithosphere and Oceans

<https://www.agu.org>



<p><b>O</b> - Order (<i>Places title(s) in your bookbag. You can change selections at any time before finally submitting your order.</i>)</p>		
<p><b>N</b> - Do Not Order (<i>Removes title(s) from your bookbag</i>)</p>		
<b>O</b>	<b>N</b>	<b>Description</b>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p><b>Mid-Ocean Ridges: Hydrothermal Interactions between the Lithosphere and Oceans</b>  <i>Christopher R. German, Jian Lin, and Lindsay M. Parson, Editors</i></p> <p>The mid-ocean ridge system is the site of creation of the oceanic crust and lithosphere that cover more than two-thirds of the Earth. Nearly three-quarters of Earth's total heat flux occurs through oceanic crust, much of it through hydrothermal circulation at mid-ocean ridges. How does this hydrothermal activity transfer heat from Earth's lithosphere to its hydrosphere? How do hydrothermal vents, their heat and chemical fluxes, vary in time and space? How are these variations related to the geology of the underlying crust/lithosphere? This volume features multidisciplinary studies on such questions from geophysical, petrological, geochemical, seafloor observational, experimental and theoretical perspectives, including:</p> <ul style="list-style-type: none"> <li>· Processes of heat transfer from Earth's mantle, via mid-ocean ridges, to the oceans</li> <li>· Global variations in hydrothermal vents and heat flux</li> <li>· Morphology, rheology, internal structure, and geology of the oceanic lithosphere and their controls on hydrothermal circulation</li> <li>· Physical and chemical reaction processes in hydrothermal circulation systems</li> <li>· Direct observations and measurements of hydrothermal vents from submersibles</li> </ul> <p>Scientists and students working in marine geochemistry, marine geology and geophysics, tectonophysics, volcanology, geochemistry and petrology, as well as multidisciplinary scientists with an interest in mid-ocean ridges and hydrothermal systems will find this work an important resource in our evolving view of the</p>

Earth.

*Geophysical Monograph Series, Volume 148, 311 pages, hardbound, 2004, ISBN 0-87590-413-0, AGU Code GM1484130*

***Special Pre-Publication Member Price: \$45.50 (through 1 November 2004).***

**AGU Member Price - \$ 45.50**

---

**Select a topic to browse:**

Geophysical Monograph Series (118 items) 

- Show (& Search) titles only for selected topic  
 Show (& Search) all information for selected topic

Search the selected topic for keywords:

The search matches any keyword.

Enclose a book title (or partial title) in quotation marks (e.g., "A Book Title").

Clear the keyword box to view all titles in the selected topic.

---

[Follow this link](#) if your membership status is incorrect.

The prices shown are for **AGU Members**.

- 
- Review book selections  
 Purchase selected books

Bookbag #05852

