Contents

Cover Photo Caption ................................................................. vii

Preface ........................................................................................... ix

Richard P. Tollo, Mervin J. Bartholomew, James P. Hibbard, and Paul M. Karabinos

Acknowledgments ............................................................................. xi

Introduction to the Appalachian Region
1. The Appalachian orogen: A brief summary ........................................ 1

Robert D. Hatcher Jr.

Overview of the Precambrian Orogen
2. Review of the Proterozoic evolution of the Grenville Province, its Adirondack outlier, and the Mesoproterozoic inliers of the Appalachians ................................................................. 21

James M. McLelland, Bruce W. Selleck, and M.E. Bickford

Overview of the Paleozoic Orogen
3. Comparative analysis of the geological evolution of the northern and southern Appalachian orogen: Late Ordovician–Permian .......................................................... 51

James P. Hibbard, Cees R. van Staal, and Douglas W. Rankin

Northern Section
4. The Laurentian margin of northeastern North America ......................... 71

John S. Allen, William A. Thomas, and Denis Lavoie

5. Magmatism in the Vermont Appalachians ............................................ 91

Raymond A. Coish

6. Orogenic curvature in the northern Taconic allochthon and its relation to footwall geometry ............................................................ 111

Jean M. Crespi, H. Ray Underwood, and Yu-Chang Chan

7. The Rivière-des-Plante ultramafic Complex, southern Québec: Stratigraphy, structure, and implications for the Chain Lakes massif ....................................................... 123

Stéphane De Souza and Alain Tremblay

8. The tectono-thermal evolution of the Waterbury dome, western Connecticut, based on U-Pb and ⁴⁰Ar/³⁹Ar ages ......................................................... 141

Craig Dietsch, Michael J. Kunk, John Aleinikoff, and John F. Sutter
9. Evidence for an orogen-parallel, normal-sense shear zone around the Chester dome, Vermont: A possible template for gneiss dome formation in the New England Appalachians, USA .......................................................... 183
Paul Karabinos, Elizabeth S. Mygatt, Sean M. Cook, and Matthew Student

10. The tectono-stratigraphic framework and evolution of southwestern Maine and southeastern New Hampshire .......................................................... 205
Arthur M. Hussey II, Wallace A. Bothner, and John Aleinikoff

11. High-precision U-Pb zircon dates for Ediacaran granitoid rocks in SE New England: Revised magmatic chronology and correlation with other Avalonian terranes .................. 231
M.D. Thompson, J. Ramezani, S.M. Barr, and O.D. Hermes

12. Lessons from the foreland basin: Northern Appalachian basin perspectives on the Acadian orogeny .......................................................... 251
Charles A. Ver Straeten

13. Geochemistry and origin of Neoproterozoic ironstone deposits in the New Jersey Highlands and implications for the eastern Laurentian rifted margin in the north-central Appalachians, USA .......................................................... 283

14. Tectonic, magmatic, and metamorphic history of the New Jersey Highlands: New insights from SHRIMP U-Pb geochronology .......................................................... 307
Richard A. Volkert, John N. Aleinikoff, and C. Mark Fanning

15. Lithochemistry of the Lower Paleozoic Goldenville and Halifax groups, southwestern Nova Scotia, Canada: Implications for stratigraphy, provenance, and tectonic setting of the Meguma terrane .......................................................... 347
Chris E. White and Sandra M. Barr

16. Middle Cambrian to Ordovician arc-backarc development on the leading edge of Ganderia, Newfoundland Appalachians .......................................................... 367
A. Zagorevski, C.R. van Staal, N. Rogers, V.J. McNicoll, and J. Pollock

Southern Section

17. Stratigraphy and geochemistry of the Catoctin volcanics: Implications for mantle evolution during the breakup of Rodinia .......................................................... 397
Robert L. Badger, Kyle T. Ashley, and Brian L. Cousens

18. Orphans of the far-traveled Pulaski thrust sheet: Exotic detached duplexes and their implications for original fold-and-thrust geometry .......................................................... 417
Mervin J. Bartholomew and Sharon E. Lewis

19. The Alleghanian deformational sequence at the foreland junction of the Central and Southern Appalachians .......................................................... 431
Mervin J. Bartholomew and Amy E. Whitaker

20. A model for Iapetan rifting of Laurentia based on Neoproterozoic dikes and related rocks .......................................................... 455
William C. Burton and Scott Southworth
| Contents |
|------------------|------------------|------------------|
| 21. Temporal and spatial changes in deformation conditions during the formation of the Central Appalachian fold-and-thrust belt: Evidence from joints, vein mineral paragenesis, and fluid inclusions | 477 | Mark A. Evans |
| 22. Crustal fluid evolution during deformation, uplift, and exhumation of the southeastern Piedmont of the Southern Appalachians: Late Paleozoic through Mesozoic rifting | 553 | Mark A. Evans and Mervin J. Bartholomew |
| 25. Ordovician volcanic-arc terrane in the Central Appalachian Piedmont of Maryland and Virginia: SHRIMP U-Pb geochronology, field relations, and tectonic significance | 621 | J. Wright Horton Jr., John N. Aleinikoff, Avery Ala Drake Jr., and C. Mark Fanning |
| 27. Three tectonothermal pulses recorded in eclogite and amphibolite of the Eastern Blue Ridge, Southern Appalachians | 701 | Brent V. Miller, Kevin G. Stewart, and Donna L. Whitney |
| 29. Depositional and tectonic setting of the Neoproterozoic-early Paleozoic rocks of the Virgilina sequence and Albemarle Group, North Carolina | 739 | Jeffrey C. Pollock, James P. Hibbard, and Paul J. Sylvester |
| 30. S and Z buckle folds as shear-sense indicators in the ductile realm: Field examples from the Grenville Province of Ontario and the Appalachians of South Carolina | 773 | Walfried M. Schwerdtner, Sheng J. Lu, and Daniel Landa |
33. Thermomagmatic evolution of Mesoproterozoic crust in the Blue Ridge of SW Virginia and NW North Carolina: Evidence from U-Pb geochronology and zircon geothermometry
Richard P. Tollo, John N. Aleinikoff, Joseph L. Wooden, Frank K. Mazdab, Scott Southworth, and C. Mark Fanning

34. Interactions between the southern Appalachian–Ouachita orogenic belt and basement faults in the orogenic footwall and foreland
William A. Thomas

35. Heterogeneous wrench-dominated transpression in the deep crust recorded by the Burnsville fault and related structures, Blue Ridge, North Carolina: Implications for the Acadian orogeny in the Southern Appalachians
Cheryl Waters-Tormey and Kevin Stewart

36. Southern Appalachian Laurentian margin initial drift-facies sequences: Implications for margin evolution
James F. Tull, David T. Allison, Stephen E. Whiting, and Nick L. John