

# Contents

<i>Preface</i> .....	xi
<i>Foreword</i> .....	xiii
<b>1. Introduction</b> .....	1
R. B. Morrison	

## TOPICAL CHAPTERS

<b>2. Quaternary paleoclimates</b> .....	13
T. L. Smiley, R. A. Bryson, J. E. King, G. J. Kukla, and G. I. Smith	
<i>Introduction</i> .....	13
T. L. Smiley	
<i>Modeling past climates</i> .....	15
R. A. Bryson	
<i>Early and middle Quaternary vegetation</i> .....	19
J. E. King	
<i>Pleistocene stratigraphy of deep-sea sediments and loess</i> .....	26
G. J. Kukla	
<i>Continental paleoclimatic records and their significance</i> .....	35
G. I. Smith	
<b>3. Dating methods applicable to the Quaternary</b> .....	45
J. N. Rosholt, S. M. Colman, M. Stuiver, P. E. Damon, C. W. Naeser, N. D. Naeser, B. J. Szabo, D. R. Muhs, J. C. Liddicoat, S. L. Forman, M. N. Machette, and K. L. Pierce	
<i>Summary of Quaternary dating methods</i> .....	45
S. M. Colman and K. L. Pierce	
<i>Radiocarbon dating</i> .....	46
M. Stuiver	

<i>K-Ar dating of Quaternary volcanic rocks</i> .....	49
P. E. Damon	
<i>Fission-track dating</i> .....	53
C. W. Naeser and N. D. Naeser	
<i>Conventional uranium-series and uranium-trend dating</i> .....	55
B. J. Szabo and J. N. Rosholt	
<i>Paleomagnetic dating</i> .....	60
J. C. Liddicoat	
<i>Thermoluminescence dating</i> .....	61
S. L. Forman and M. N. Machette	
<i>Amino acid geochronology of fossil mollusks</i> .....	65
D. R. Muhs	
<b>4. <i>Quaternary volcanism in the western conterminous United States</i></b> .....	<b>75</b>
R. G. Luedke and R. L. Smith	
<b>5. <i>Quaternary tephrochronology</i></b> .....	<b>93</b>
A. M. Sarna-Wojcicki and J. O. Davis	
<b>6. <i>Tephrochronologic correlation of upper Neogene sediments along the Pacific margin, conterminous United States</i></b> .....	<b>117</b>
A. M. Sarna-Wojcicki, K. R. Lajoie, C. E. Meyer, D. P. Adam, and H. J. Rieck	

## REGIONAL CHAPTERS

<b>7. <i>Quaternary geology of the Pacific margin</i></b> .....	<b>141</b>
W. R. Dupré, R. B. Morrison, H. E. Clifton, K. R. Lajoie, D. J. Ponti, C. L. Powell II, S. A. Mathieson, A. M. Sarna-Wojcicki, E. L. Leithold, W. R. Lettis, P. F. McDowell, T. K. Rockwell, J. R. Unruh, and R. S. Yeats	
<i>Introduction</i> .....	141
W. R. Dupré and H. E. Clifton	
<i>Quaternary coastal and shallow-marine facies sequences, Northern California and the Pacific Northwest</i> .....	143
H. E. Clifton and E. L. Leithold	
<i>Quaternary stratigraphy and geomorphic surfaces of the Willamette Valley, Oregon</i> .....	156
P. F. McDowell	
<i>Quaternary geology of the Great Valley, California</i> .....	164
W. R. Lettis and J. R. Unruh	
<i>Quaternary geology of the Southern California Coast Ranges</i> .....	176
W. R. Dupré	
<i>Quaternary geology of the Ventura and Los Angeles basins, California</i> .....	185
R. S. Yeats and T. K. Rockwell	

<i>Emergent marine strandlines and associated sediments, coastal California; A record of Quaternary sea-level fluctuations, vertical tectonic movements, climatic changes, and coastal processes</i> .....	190
K. R. Lajoie, D. J. Ponti, C. L. Powell II, S. A. Mathieson, and A. M. Sarna-Wojcicki	
<b>8. Quaternary geology of the Columbia Plateau</b> .....	215
V. R. Baker, B. N. Bjornstad, A. J. Busacca, K. R. Fecht, E. P. Kiver, U. L. Moody, J. G. Rigby, D. F. Stradling, A. M. Tallman	
<i>Introduction</i> .....	215
V. R. Baker	
<i>Loess deposits and soils of the Palouse and vicinity</i> .....	216
A. J. Busacca	
<i>Quaternary stratigraphy of the Pasco Basin, South-Central Washington</i> .....	228
B. N. Bjornstad, K. R. Fecht, and A. M. Tallman	
<i>Late Quaternary stratigraphy of the channeled scabland and adjacent areas</i> .....	238
E. P. Kiver, U. L. Moody, J. G. Rigby, and D. F. Stradling	
<b>9. Quaternary geology and structural history of the Snake River Plain, Idaho and Oregon</b> .....	251
H. E. Malde	
<b>10. Quaternary stratigraphic, hydrologic, and climatic history of the Great Basin, with emphasis on Lakes Lahontan, Bonneville, and Tecopa</b> .....	283
R. B. Morrison	
<b>11. Quaternary geology of the Basin and Range Province in California</b> .....	321
J. C. Dohrenwend, W. B. Bull, L. D. McFadden, G. I. Smith, R.S.U. Smith, and S. G. Wells	
<i>Introduction</i> .....	321
J. C. Dohrenwend and W. B. Bull	
<i>Tectonic activity and Quaternary landscape evolution</i> .....	323
W. B. Bull	
<i>Surficial geology and geomorphology of the Mojave Desert</i> .....	325
J. C. Dohrenwend, W. B. Bull, L. D. McFadden, S. G. Wells, and R.S.U. Smith	
<i>Quaternary geology and tectonics of the Salton Trough</i> .....	334
J. C. Dohrenwend and R.S.U. Smith	
<i>Surficial geology and geomorphology of the Southwest Great Basin</i> .....	337
J. C. Dohrenwend	
<i>Stratigraphy and chronology of Quaternary-age lacustrine deposits</i> .....	339
G. I. Smith	

<b>12. Quaternary geology of the southern Basin and Range province</b> .....	353
R. B. Morrison	
<b>13. Quaternary geology of the Colorado Plateau</b> .....	373
P. C. Patton, N. Biggar, C. D. Condit, M. L. Gillam, D. W. Love, M. N. Machette, L. Mayer, R. B. Morrison, J. N. Rosholt	
<i>Introduction</i> .....	373
P. C. Patton and R. B. Morrison	
<i>Quaternary volcanic fields of the Colorado Plateau</i> .....	378
C. D. Condit and R. B. Morrison	
<i>Quaternary tectonics and erosion along the western margin of the Colorado Plateau</i> .....	379
L. Mayer and C. D. Condit	
<i>Landslides on the Colorado Plateau</i> .....	382
P. C. Patton	
<i>Uinta Basin section</i> .....	382
R. B. Morrison	
<i>Canyonlands and High Plateaus sections</i> .....	383
N. Biggar and P. C. Patton	
<i>Navajo and Acoma-Zuni sections</i> .....	391
D. W. Love and M. L. Gillam	
<i>Quaternary geology of the Grand Canyon</i> .....	397
M. N. Machette and J. N. Rosholt	
<b>14. Quaternary history of some southern and central Rocky Mountain basins</b> .....	407
M. C. Reheis, R. C. Palmquist, S. S. Agard, C. Jaworowski, B. Mears, Jr., R. F. Madole, A. R. Nelson, and G. D. Osborn	
<i>Bighorn basin</i> .....	409
M. C. Reheis, R. C. Palmquist, and S. S. Agard	
<i>Green Mountain-Sweetwater River area</i> .....	417
C. Jaworowski	
<i>Laramie basin</i> .....	418
B. Mears, Jr.	
<i>Yampa River basin</i> .....	427
R. F. Madole	
<i>Northwestern Uinta basin</i> .....	432
A. R. Nelson and G. D. Osborn	
<b>15. Quaternary geology of the Northern Great Plains</b> .....	441
W. J. Wayne, J. S. Aber, S. S. Agard, R. N. Bergantino, J. P. Bluemle, D. A. Coates, M. E. Cooley, R. F. Madole, J. E. Martin, B. Mears, Jr., R. B. Morrison, and W. M. Sutherland	

<i>Introduction</i> .....	441
W. J. Wayne, R. B. Morrison, and R. F. Madole	
<i>The Unglaci­ated Missouri Plateau and Black Hills</i> .....	445
<i>Yellowstone and Musselshell drainage basins, Montana</i> .....	
R. N. Bergantino	
<i>Powder River basin</i> .....	
B. Mears, Jr., S. S. Agard, and W. M. Sutherland	
<i>The unglaci­ated Missouri Plateau in the Dakotas</i> .....	448
J. P. Bluemle and J. E. Martin	
<i>Black Hills</i> .....	449
J. E. Martin	
<i>The High Plains in Wyoming</i> .....	450
B. Mears, Jr.	
<i>The Cheyenne Tableland</i> .....	453
M. E. Cooley	
<i>Colorado Piedmont section</i> .....	456
R. F. Madole	
<i>High Plains and Plains Border sections in Nebraska, Kansas,</i> <i>and Oklahoma</i> .....	462
W. J. Wayne and J. S. Aber	
<i>Paleoclimates in the Northern Great Plains</i> .....	469
W. J. Wayne	
<b>16. Quaternary geology of the Southern Great Plains and an adjacent segment of the Rolling Plains</b> .....	<b>477</b>
T. C. Gustavson, R. W. Baumgardner, Jr., S. C. Caran, V. T. Holliday, H. H. Mehnert, J. M. O'Neill, and C. C. Reeves, Jr.	
<i>Introduction</i> .....	477
T. C. Gustavson	
<i>Quaternary stratigraphy and soils of the Southern High Plains</i> .....	479
V. T. Holliday and T. C. Gustavson	
<i>Origin and stratigraphy of alkaline lake basins, Southern High Plains</i> .....	484
C. C. Reeves, Jr.	
<i>Late Cenozoic volcanism, uplift, and erosion in the Ocate volcanic field, north-central New Mexico</i> .....	486
J. M. O'Neill and H. H. Mehnert	
<i>Quaternary geology of the Texas Rolling Plains</i> .....	492
S. C. Caran and R. W. Baumgardner, Jr.	
<b>17. Quaternary geology of the Osage Plains and Interior Highlands</b> .....	<b>503</b>
R. F. Madole, C. R. Ferring, M. J. Guccione, S. A. Hall, W. C. Johnson, and C. J. Sorenson	
<i>Osage Plains</i> .....	503
R. F. Madole, C. R. Ferring, S. A. Hall, W. C. Johnson, C. J. Sorenson	

<i>Interior Highlands</i> .....	531
M. J. Guccione	
<b>18. Quaternary geology of the Lower Mississippi Valley</b> .....	<b>547</b>
W. J. Autin, S. F. Burns, B. J. Miller, R. T. Saucier, and J. I. Snead	
<i>Introduction</i> .....	547
W. J. Autin, R. T. Saucier, and J. I. Snead	
<i>Geomorphology, stratigraphy, and chronology</i> .....	550
R. T. Saucier	
<i>Pedology</i> .....	564
B. J. Miller	
<i>Tectonics</i> .....	573
W. J. Autin and S. F. Burns	
<i>Summary</i> .....	577
W. J. Autin, B. J. Miller, and J. I. Snead	
<b>19. Quaternary geology of the Gulf of Mexico Coastal Plain</b> .....	<b>583</b>
J. R. DuBar, T. E. Ewing, E. L. Lundelius, Jr., E. G. Otvos, and C. D. Winker	
<i>Introduction</i> .....	583
J. R. DuBar	
<i>Quaternary tectonic history of the Gulf of Mexico Coastal Plain</i> .....	584
T. E. Ewing	
<i>Northwestern Gulf Coastal Plain</i> .....	585
C. D. Winker	
<i>Northeastern Gulf Coast Quaternary</i> .....	588
E. G. Otvos	
<i>Florida Peninsula</i> .....	595
J. R. DuBar	
<i>Synopsis of vertebrate faunas of the Gulf Coastal Plain</i> .....	604
E. L. Lundelius, Jr.	
<b>20. Quaternary geology of the Appalachian Highlands and Interior Low Plateaus</b> .....	<b>611</b>
H. H. Mills and P. A. Delcourt	
<b>21. Quaternary geology of the Atlantic Coastal Plain</b> .....	<b>629</b>
D. J. Colquhoun, G. H. Johnson, P. C. Peebles, P. F. Huddlestun, and T. Scott	
<i>New Jersey</i> .....	635
G. H. Johnson and P. C. Peebles	
<i>Delmarva Peninsula</i> .....	635
G. H. Johnson and P. C. Peebles	

<i>Western shore of Maryland, Virginia, and North Carolina</i> .....	636
G. H. Johnson and P. C. Peebles	
<i>Cape Fear arch</i> .....	639
D. J. Colquhoun	
<i>Northeastern South Carolina</i> .....	640
D. J. Colquhoun	
<i>Central South Carolina</i> .....	640
D. J. Colquhoun	
<i>Georgia</i> .....	641
P. F. Huddlestun and D. J. Colquhoun	
<i>Florida</i> .....	646
Thomas Scott	
<b>Index</b> .....	651

**Plates**

(in accompanying slipcase)

- Plate 1. Correlation chart of widespread Pliocene and Quaternary (A), and middle Quaternary to Holocene (B), tephra layers within the Pacific margin of the western conterminous United States  
A. M. Sarna-Wojcicki
- Plate 2. Summary table of Quaternary dating methods  
S. M. Colman and K. L. Pierce
- Plate 3. Levels of alluvial deposits and basalt flows and their estimated ages along drainages of the Navajo and Acoma-Zuni sections of the Colorado Plateau  
D. W. Love and M. L. Gillam
- Plate 4. Terrace profiles and relative ages of alluvial surfaces and end moraines in the northwestern Uinta basin  
A. R. Nelson and G. D. Osborne
- Plate 5. Cenozoic stratigraphy, southern Great Plains and adjacent areas  
S. C. Caran
- Plate 6. Quaternary geology of the Lower Mississippi Valley  
R. T. Saucier and J. I. Snead
- Plate 7. Lower Mississippi Valley cross sections  
R. T. Saucier, W. J. Autin, E. B. Millet, D. J. McCraw
- Plate 8. Quaternary geology, northwestern Gulf Coast  
C. D. Winker