

98	B. Compactional flow	289
99	C. Convective flow	289
100	References	290
101	8 Allochthonous sediments	291
102	Introduction: the classification of sedimentary rocks	291
103	Allochthonous sediments classified	291
104	Metasediments	292
105	Sedimentary facies and oil source rocks	292
106	Clay minerals	292
107	Organic sediments	293
108	Sandstones	293
109	Nomenclature and classification of sandstones	293
110	Sandstones described	294
111	Preface	295
112	Acknowledgements	295
113	Geological generators	295
114	Sedimentary facies	295
115	Introduction	296
116	1 Introduction	296
I.	Introduction and historical review	1
II.	Sedimentology and the earth sciences	3
III.	Applied sedimentology	5
IV.	References	15

2 Sedimentary Structures

117	Introduction	297
118	1 Introduction	297
I.	Introduction	297
II.	Sedimentary structures	297
III.	Classification of sedimentary structures	297
IV.	Processes	297
V.	Applications	297
VI.	Conclusions	297
119	3 Particles, Pores and Permeability	298
120	Introduction	298
121	1 Introduction	298
I.	Physical properties of particles	298
II.	Porosity and permeability	31
III.	References	35
122	4 Transportation and Sedimentation	36
123	Introduction	36
124	Aqueous processes	36
125	A. Sedimentation from traction currents	36
126	B. Eolian sedimentation from wind-driven currents	36
127	C. Sedimentation from low-density currents	36
128	D. Gravity flows	36
129	E. Fluvio-deltaic processes	36
130	F. Fluvio-deltaic processes	36
131	G. Fluvio-deltaic processes	36
132	H. Fluvio-deltaic processes	36
133	I. Fluvio-deltaic processes	36
134	J. Fluvio-deltaic processes	36
135	K. Fluvio-deltaic processes	36
136	L. Fluvio-deltaic processes	36
137	M. Fluvio-deltaic processes	36
138	N. Fluvio-deltaic processes	36
139	O. Fluvio-deltaic processes	36
140	P. Fluvio-deltaic processes	36
141	Q. Fluvio-deltaic processes	36
142	R. Fluvio-deltaic processes	36
143	S. Fluvio-deltaic processes	36
144	T. Fluvio-deltaic processes	36
145	U. Fluvio-deltaic processes	36
146	V. Fluvio-deltaic processes	36
147	W. Fluvio-deltaic processes	36
148	X. Fluvio-deltaic processes	36
149	Y. Fluvio-deltaic processes	36
150	Z. Fluvio-deltaic processes	36
151	5 The Surface Environment	37
152	Introduction	37
153	A. Wind and water	37
154	B. Gravity and ice	37
155	C. Sedimentation and glaciogenesis	37
156	D. Glaciation	37
157	E. Wind erosion	37
158	F. Wind deposition	37
159	G. Wind transport	37
160	H. Wind abrasion	37
161	I. Wind deflation	37
162	J. Wind saltation	37
163	K. Wind suspension	37
164	L. Wind deposition	37
165	M. Wind deflation	37
166	N. Wind saltation	37
167	O. Wind suspension	37
168	P. Wind deflation	37
169	Q. Wind saltation	37
170	R. Wind suspension	37
171	6 The Non-terrestrial Environment	38
172	Introduction	38
173	A. Planetary atmospheres	38
174	B. Planetary surfaces	38
175	C. Planetary interiors	38
176	D. Planetary environments	38
177	E. Planetary evolution	38
178	F. Planetary life	38
179	G. Planetary death	38
180	H. Planetary destruction	38
181	I. Planetary rebirth	38
182	J. Planetary recycling	38
183	K. Planetary regeneration	38
184	L. Planetary reworking	38
185	M. Planetary reprocessing	38
186	N. Planetary reworking	38
187	O. Planetary recycling	38
188	P. Planetary regeneration	38
189	Q. Planetary reworking	38
190	R. Planetary recycling	38
191	S. Planetary regeneration	38
192	T. Planetary reworking	38
193	U. Planetary recycling	38
194	V. Planetary regeneration	38
195	W. Planetary reworking	38
196	X. Planetary recycling	38
197	Y. Planetary regeneration	38
198	Z. Planetary reworking	38
199	7 The Non-terrestrial Environment	39
200	Introduction	39
201	A. Planetary atmospheres	39
202	B. Planetary surfaces	39
203	C. Planetary interiors	39
204	D. Planetary environments	39
205	E. Planetary evolution	39
206	F. Planetary life	39
207	G. Planetary death	39
208	H. Planetary destruction	39
209	I. Planetary rebirth	39
210	J. Planetary recycling	39
211	K. Planetary regeneration	39
212	L. Planetary reworking	39
213	M. Planetary reprocessing	39
214	N. Planetary reworking	39
215	O. Planetary recycling	39
216	P. Planetary regeneration	39
217	Q. Planetary reworking	39
218	R. Planetary recycling	39
219	S. Planetary regeneration	39
220	T. Planetary reworking	39
221	U. Planetary recycling	39
222	V. Planetary regeneration	39
223	W. Planetary reworking	39
224	X. Planetary recycling	39
225	Y. Planetary regeneration	39
226	Z. Planetary reworking	39
227	8 Allochthonous sediments	40
228	Introduction: the classification of sedimentary rocks	40
229	Allochthonous sediments classified	40
230	Metasediments	40
231	Sedimentary facies and oil source rocks	40
232	Clay minerals	40
233	Organic sediments	40
234	Sandstones	40
235	Nomenclature and classification of sandstones	40
236	Sandstones described	40
237	Preface	40
238	Acknowledgements	40
239	Geological generators	40
240	Sedimentary facies	40
241	Introduction	40
242	1 Introduction	40
I.	Introduction and historical review	40
II.	Sedimentology and the earth sciences	40
III.	Applied sedimentology	40
IV.	References	40

Part I Rock to Sediment

2 Weathering and the Sedimentary Cycle

I.	Introduction	298
II.	The sedimentary cycle	298
III.	Weathering	298
A.	Biological weathering and soil formation	298
B.	Physical weathering	298
C.	Chemical weathering	298
D.	Economic significance and conclusion	298
IV.	References	298

3 Particles, Pores and Permeability

I.	Physical properties of particles	36
A.	Surface texture of particles	36
B.	Particle shape, sphericity and roundness	36
C.	Particle size	36
II.	Porosity and permeability	36
A.	Introduction	36
B.	Pore morphology	36
C.	The origin of primary porosity	36
III.	References	36

Part II Sediment Sedimented

4 Transportation and Sedimentation

I.	Introduction	79
II.	Aqueous processes	84
A.	Sedimentation from traction currents	84

X CONTENTS

B.	Sedimentation from high-density turbidity currents	89
C.	Sedimentation from low-density turbidity currents	95
III.	Eolian processes	96
A.	Eolian sedimentation from traction carpets	97
B.	Eolian sedimentation from suspension	102
IV.	Glacial processes	102
V.	Gravitational processes	104
A.	Debris flow	107
B.	Grain flow	108
C.	Fluidized flows	108
VI.	References	110

5 Sedimentary Structures

I.	Introduction	115
II.	Biogenic sedimentary structures	116
III.	Primary inorganic sedimentary structures	120
A.	Introduction	120
B.	Pre-depositional (interbed) structures	122
C.	Syndepositional (intrabed) structures	124
D.	Post-depositional sedimentary structures	139
E.	Miscellaneous structures	143
IV.	Palaeocurrent analysis	147
A.	Collection of palaeocurrent data	147
B.	Presentation of palaeocurrent data	149
C.	Interpretation of palaeocurrent data	151
V.	References	154

6 Environments and Facies

I.	Sedimentary environments	159
A.	Environments defined	159
B.	Environments of erosion, equilibrium and deposition	160
C.	Environments classified	161
II.	Sedimentary facies	165
III.	Sedimentary models	167
A.	The model concept	167
B.	Some models described	168
IV.	Sedimentary models, increments and cycles	246
A.	Walther's law	247
B.	Genetic increments of sedimentation	247
C.	Sequences and cycles	248
V.	References	250

Part III Sediment to Rock

7 The Subsurface Environment

I.	Subsurface temperatures	267
II.	Subsurface pressures	270
III.	Subsurface fluids	272
A.	The non-hydrocarbon gases	272
B.	Petroleum fluids	273
C.	Subsurface waters	275
IV.	Fluid flow in sedimentary basins	280
A.	Meteoric flow	280

V.	B. Compactional flow	280
	C. Convective flow	280
V.	References	282

8 Allochthonous Sediments

I.	Introduction: the classification of sedimentary rocks	284
II.	Allochthonous sediments classified	286
III.	Mudrocks	288
	A. Sapropelites, oil shales and oil source rocks	289
	B. Orthoclaystones and clay minerals	291
IV.	Pyroclastic sediments	299
V.	Sandstones	300
	A. Nomenclature and classification of sandstones	300
	B. Sandstones described	305
	C. Diagenesis and porosity evolution of sandstones	309
VI.	The rudaceous rocks	327
	A. Conglomerates	327
	B. Sedimentary breccias	330
VII.	References	332

9 Autochthonous Sediments

I.	Introduction	337
II.	Carbonates	338
	A. Introduction	338
	B. The carbonate minerals	340
	C. The physical components of carbonate rocks	341
	D. Nomenclature and classification	347
	E. Diagenesis and porosity evolution of carbonates	349
	F. Dolomite	362
III.	Coal	365
	A. Introduction	365
	B. Coal petrography	366
	C. Environments of coal deposition	369
IV.	Sedimentary iron ores	371
	A. Oolitic iron ores	372
	B. Pre-Cambrian banded ironstone formations	372
V.	Phosphates	373
VI.	Evaporites	378
	A. Introduction	378
	B. Evaporites: gross geologic characteristics	378
	C. Carbonate-anhydrite cycles	383
	D. Halite-potash evaporite successions	391
	E. Economic significance of evaporites	393
VII.	Cherts	394
VIII.	References	396

10 Sedimentary Basins

I.	Environments, base levels and tectonism	403
II.	Sedimentary basins	405
	A. Concepts and classifications	405
	B. Crustal sag basins	413
	C. Arc-related basins	420
	D. Divergent plate boundary basins	424

III. Basin evolution, metallogeny and petroleum generation	429
IV. References	436
Subject Index	
8 Allochthonous Sediments	
A colour plate section appears between pages 404 and 405.	
882 A. Debris flow	B. Coagulative flow
882 B. Grain flow	C. Compaction
882 C. Fluidized flows	D. Solution
882 D. Windblown sand	E. Wind
882 E. Wind waves	F. Wind wave
882 F. Wind wave ripples	G. Wind wave ripples
882 G. Wind wave ripples	H. Wind wave ripples
882 H. Wind wave ripples	I. Wind wave ripples
882 I. Wind wave ripples	J. Wind wave ripples
882 J. Wind wave ripples	K. Wind wave ripples
882 K. Wind wave ripples	L. Wind wave ripples
882 L. Wind wave ripples	M. Wind wave ripples
882 M. Wind wave ripples	N. Wind wave ripples
882 N. Wind wave ripples	O. Wind wave ripples
882 O. Wind wave ripples	P. Wind wave ripples
882 P. Wind wave ripples	Q. Wind wave ripples
882 Q. Wind wave ripples	R. Wind wave ripples
882 R. Wind wave ripples	S. Wind wave ripples
882 S. Wind wave ripples	T. Wind wave ripples
882 T. Wind wave ripples	U. Wind wave ripples
882 U. Wind wave ripples	V. Wind wave ripples
882 V. Wind wave ripples	W. Wind wave ripples
882 W. Wind wave ripples	X. Wind wave ripples
882 X. Wind wave ripples	Y. Wind wave ripples
882 Y. Wind wave ripples	Z. Wind wave ripples
882 Z. Wind wave ripples	
5 Sedimentary Structures	
A. Nomenclature and classification of structures	
102 A. Introduction	B. Sedimentation
102 B. Biogenic sedimentary structures	C. Diagenesis and porosity evolution of sediments
102 C. Primary inorganic sedimentary structures	D. Depositional environments
102 D. Post-depositional sedimentary structures	E. Syndepositional structures
102 E. Miscellaneous structures	F. Syndepositional structures
102 F. Introduction	G. Syndepositional structures
102 G. Pre-depositional (interbed) structures	H. Syndepositional structures
102 H. Syndepositional (intrabed) structures	I. Syndepositional structures
102 I. Post-depositional sedimentary structures	J. Syndepositional structures
102 J. Miscellaneous structures	K. Syndepositional structures
102 K. References	L. Syndepositional structures
6 Environments	
A. Autocorrelative sedimentaries	
102 A. Collection of palaeocurrent data	B. Palaeocurrent analysis
102 B. Presentation of palaeocurrent data	C. Interpretation of palaeocurrent data
102 C. Interpretation of palaeocurrent data	D. Palaeocurrents and environments of carbonate rocks
102 D. References	E. Diagenesis and porosity evolution of carbonates
102 E. Sedimentary environments	F. Depositional environments
102 F. Environments defined	G. Environments of coastal deposition
102 G. Environments of erosion, equilibrium and deposition	H. Environments of coastal deposition
102 H. Environments classified	I. Environments of coastal deposition
102 I. Sedimentary facies	J. Environments of coastal deposition
102 J. Sedimentary models	K. Environments of coastal deposition
102 K. The model concept	L. Environments of coastal deposition
102 L. Some models described	M. Environments of coastal deposition
102 M. Sedimentary models, increments and cycles	N. Environments of coastal deposition
102 N. Walker's law	O. Environments of coastal deposition
102 O. General increments of sedimentation	P. Environments of coastal deposition
102 P. Sedimentary models	Q. Environments of coastal deposition
102 Q. Sedimentary models	R. Environments of coastal deposition
102 R. Sedimentary models	S. Environments of coastal deposition
102 S. Sedimentary models	T. Environments of coastal deposition
102 T. Sedimentary models	U. Environments of coastal deposition
102 U. Sedimentary models	V. Environments of coastal deposition
102 V. Sedimentary models	W. Environments of coastal deposition
102 W. Sedimentary models	X. Environments of coastal deposition
102 X. Sedimentary models	Y. Environments of coastal deposition
102 Y. Sedimentary models	Z. Environments of coastal deposition
102 Z. Sedimentary models	
Part III Sediment & Rock	
7 The Subsurface Environment	
10 Sedimentology - Basics	
A. Sedimentology - basics	
102 A. The subsurface environment	B. Facies
102 B. Petrology	C. Facies
102 C. Stratigraphy	D. Facies-facies associations
102 D. Facies-facies associations	E. Facies-facies associations
102 E. Facies-facies associations	F. Facies-facies associations
102 F. Facies-facies associations	G. Facies-facies associations
102 G. Facies-facies associations	H. Facies-facies associations
102 H. Facies-facies associations	I. Facies-facies associations
102 I. Facies-facies associations	J. Facies-facies associations
102 J. Facies-facies associations	K. Facies-facies associations
102 K. Facies-facies associations	L. Facies-facies associations
102 L. Facies-facies associations	M. Facies-facies associations
102 M. Facies-facies associations	N. Facies-facies associations
102 N. Facies-facies associations	O. Facies-facies associations
102 O. Facies-facies associations	P. Facies-facies associations
102 P. Facies-facies associations	Q. Facies-facies associations
102 Q. Facies-facies associations	R. Facies-facies associations
102 R. Facies-facies associations	S. Facies-facies associations
102 S. Facies-facies associations	T. Facies-facies associations
102 T. Facies-facies associations	U. Facies-facies associations
102 U. Facies-facies associations	V. Facies-facies associations
102 V. Facies-facies associations	W. Facies-facies associations
102 W. Facies-facies associations	X. Facies-facies associations
102 X. Facies-facies associations	Y. Facies-facies associations
102 Y. Facies-facies associations	Z. Facies-facies associations
102 Z. Facies-facies associations	