

Contents

Presentation of Field “History of Science”	xi
Jean-Claude DUPONT	
Introduction	xiii
Pierre SAVATON	
Chapter 1. What Earth Sciences Existed in Greco-Roman Antiquity?	1
Frédéric LE BLAY	
1.1. Defining the field: Aristotelian meteorology	2
1.2. The movements of the Earth.	6
1.3. Probing the bowels of the Earth: networks and cavities.	14
1.4. The subterranean fire hypothesis	18
1.5. The Earth and its materials.	21
1.6. Toward a history of the Earth: floods and variations in sea level	26
1.7. Conclusion	31
1.8. References	32

Chapter 2. Studying and Knowing the Earth in the Middle Ages	37
Joëlle DUCOS and Fleur VIGNERON	
2.1. The Earth and stones: knowledge scattered across multiple fields	37
2.1.1. The three currents of medieval reflection	38
2.1.2. The uses of stones.	39
2.1.3. Stones as materials	41
2.2. Sources and authors of the medieval west	42
2.2.1. Sources	42
2.2.2. Forms and genres of writings on the Earth	44
2.2.3. Notable authors	45
2.3. Medieval debates on the Earth.	49
2.3.1. The formation and evolution of the Earth.	49
2.3.2. The interior of the Earth	53
2.3.3. The surface of the Earth	57
2.4. Conclusion	63
2.5. References	64
2.5.1. Edited sources	64
2.5.2. Encyclopedias	64
2.5.3. General histories of geology	66
2.5.4. Studies	67
Chapter 3. Geology from the Renaissance to the Enlightenment.	73
Gaston GODARD	
3.1. The origin of fossils and stones	74
3.1.1. Figured stones	74
3.1.2. The quarrel of the “giants”	81
3.1.3. Fossil woods	85
3.1.4. Stones, crystals and petrification	88
3.2. From an immutable Earth to a dynamic Earth	92
3.2.1. Freaks of nature, flood inundation or invasion by the sea?	92
3.2.2. Volcanoes	93
3.2.3. Theories of the Earth	97
3.3. Conclusion	100
3.4. References	101

Chapter 4. Crystallography: 17th–19th Centuries	109
Bernard MAITTE	
4.1. The first studies	109
4.1.1. Kepler in a lineage	109
4.1.2. From Galileo to Steno	110
4.1.3. Bartholin and the double refraction of calcite	112
4.2. 17th century: the intervention of physicists; Huygens contradicted by Newton	113
4.2.1. Double refraction and the structure of crystals: Huygens	113
4.2.2. Newton’s stinging refutation	115
4.3. 18th century: from the crystals of the natural sciences to mathematics.	116
4.3.1. Sensualists	116
4.3.2. Romé de l’Isle and the law of constancy of angles	118
4.3.3. The first works of René-Just Haüy	121
4.3.4. Crystal classifications in 1784	121
4.4. René-Just Haüy’s study.	124
4.4.1. From the Essai (1784) to the Exposition abrégée (1792): rejection of the possibility of a crystallographic classification	124
4.4.2. From the courses of year III to the Traité de minéralogie of 1801: crystallography and chemistry, bases of classification	127
4.4.3. The evolution of Haüy’s thought up to the Traité de cristallographie: a purely geometric classification.	130
4.4.4. The remaining problems	131
4.4.5. The “polarization” of light.	133
4.5. The early 19th century: the roles of physicists and philosophies of nature	135
4.5.1. Crystals and the wave theory of light	135
4.5.2. Crystals in Naturphilosophie: symmetry axes, classes and lattice types	139
4.5.3. The irreverent continuators of Haüy: Delafosse, Bravais and crystal lattices	141
4.6. Space groups and Curie’s principle.	144
4.6.1. The enumeration of space groups	144
4.6.2. The physical properties of crystals and Curie’s principle	147
4.7. Mineralogy at the end of the century and its development prospects	148
4.8. References	152
4.8.1. Primary sources	152
4.8.2. Secondary sources	155

Chapter 5. Geology and Visual Discourse: The Birth of the Geological Map	157
Pierre SAVATON	
5.1. Statistics and inventories plotted on maps	159
5.1.1. Soil maps and maps of fossil mines	159
5.1.2. Mineralogical geography	162
5.2. Physical geography	166
5.3. Geognosy and geognostic maps	168
5.4. Geological maps	176
5.4.1. Lithostratigraphic and geological maps	176
5.4.2. Biostratigraphic and geological maps	178
5.5. From map to map: geological cartography in 19th-century France	183
5.6. Conclusion	186
5.7. References	186
5.7.1. Edited sources	186
5.7.2. Studies	188
Chapter 6. Birth and Development of Stratigraphy	191
Philippe GRANDCHAMP	
6.1. The birth certificate of stratigraphy	191
6.2. The impasse of Wernerian lithostratigraphy	193
6.3. The emergence of paleontological stratigraphy	195
6.3.1. Beginnings	196
6.3.2. Cuvier, Brongniart and Smith	196
6.3.3. The decisive step	200
6.4. An alternative path: purely geometric stratigraphy	205
6.5. The invention of a key concept: the stratigraphic stage	211
6.6. Toward the international stratigraphic scale	214
6.7. Conclusion	218
6.8. References	222
Chapter 7. History of Mobilist Ideas: Wegener's Model	227
Philippe Le VIGOUROUX	
7.1. The Earth globe: a fixist conception under tension	228
7.1.1. The American conception: permanentism	228
7.1.2. The European conception: contractionism	231
7.1.3. A renewal of ideas	236

7.2. The invention of mobilism	238
7.2.1. Alfred Wegener, a scientific background	238
7.2.2. Continental drift according to Wegener	240
7.2.3. Two aspects of the theory	243
7.2.4. Other earlier drifts	257
7.3. The reception of Wegener’s theory	263
7.3.1. A limited and mixed international reception	264
7.3.2. Reception in France.	267
7.4. Conclusion	270
7.5. References	274
List of Authors	281
Index of Terms	283
Index of Names	287