CAMBRIDGE

Cambridge University Press
0521640482 - Icy Worlds of the Solar System
Edited by Pat Dasch
Table of Contents
More information

Contents

List of contributors *page* viii
Preface xiii
Acknowledgements xiv

Introduction 1
JONATHAN I. LUNINE

1 The history and significance of ice on Earth 6
ROBERT BINDSCHADLER
The water planet 7
Early glaciations 8
Ice sheets, sea level, and climate 9
Ice sheet response 13
Snow and sea ice 15
Ice sheets and weather 17
Metamorphism of snow into ice 20
Climate tape recorder 21
Ice sheet facies 23
Ice sheet motion 24
Ice shelves 28
Ice landscaping 29
Meteorite catchers 30
Summary 32

2 Ice on Mercury and the Moon 33
BRYAN BUTLER
Mercury 33
The Moon 50
Future missions 58

3 How the Earth got its atmosphere 60
TOBIAS OWEN
How planets keep their atmospheres 60
Why small planets have different atmospheres 62

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521640482 - Icy Worlds of the Solar System
Edited by Pat Dasch
Table of Contents
More information

	Frigid worlds, atmospheric evolution, and cosmic time travel	63
	The sources of atmospheres: problems with meteorites	65
	The sources of atmospheres: icy planetesimals?	67
	Solar Composition Icy Planetesimals (SCIPs): a new type of icy planetesimal	69
	The sources of atmospheres: a rocky component?	72
	The importance of impact erosion	74
	Tests of the model	75
4	The frozen landscape of Mars	79
	MICHAEL T. MELLON	
	Mars: yesterday and today	79
	Polar deposits	81
	Seasons bring change	85
	Shapes in the polar landscape	86
	Deep in the ice cap	88
	The sky above	89
	The permafrost below	92
	Buried ice from the past	94
	Running water from frozen ground	95
	Moving ice	98
	At the limits of vision	99
	Impact craters in the permafrost?	101
	Climate change	103
	An elusive resource	105
	Hazards of living on ice	107
	Life?	108
	The future	109
5	The ice moons of Sol	110
	PAUL M. SCHENK	
	Moon madness	112
	Water! Water!	113
	Organic stews?	114
	Energy to spare	118
	Ice worlds – Oceanus Amokium?	121

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521640482 - Icy Worlds of the Solar System
Edited by Pat Dasch
Table of Contents
More information

Triton 132
It's a not-so small world after all 134

6 Triton, Pluto, and beyond 139
JOHN A. STANSBERRY
Pluto's story 141
Triton and the Trans-Neptunian objects (TNOs) 144
Triton and Pluto: twin siblings of a distant Sun 147
Geology recorded in water ice "rock" 147
Tidal evolution and giant impacts 150
Kuiper Belt objects: cousins to Triton and Pluto 152
Triton and Pluto today 152
Nitrogen, methane, and atmospheres 152
Ice transport and seasons 157
The fate of Pluto's atmosphere 162
Not yet explored 167

7 Comets: ices from the beginning of time 168
DALE P. CRUIKSHANK
What are comets? 170
The interstellar medium, and the death of stars 171
Comets are formed 172
The composition of comets 173
Special properties of water ice 177
What comets are made of 178
Comet dust 179
Where do comets come from? 182
Space missions to comets 188
Conclusion 189

Index 190

© Cambridge University Press www.cambridge.org