

Contents

Foreword.....	v
Introduction.....	xi
Part I The Moon and Meteoroids	
Chapter 1 Widespread Evidence	3
A Brief History of Impacts in the Early Solar System	3
The Impact that Built the Moon	6
A Brief Look at Some Other Significant Impacts	8
Are Impacts Still Happening Today?	15
Chapter 2 Lunar Impact Features	17
Maria vs. Highland Craters	17
Young vs. Old Craters	18
Appearance vs. Size.....	21
How to Recognize Different Types of Features.....	24
Chapter 3 Remarkable Collisions	27
Historic Impacts of Interest.....	27
The AD 1178 Lunar Impact Event.....	28
The Taurid Complex Objects.....	29
The “Lunar Flare” Event of 1953	30
Chapter 4 Possible Impact Phenomena (PIPs)	35
Probable Appearance and Classification of PIPs	35
1955–2008: Additional Events	43
A catalog of Coordinated and/or Shower-Related Events as Documented by ALPO and IOTA	48
The Perseid Meteor Shower: 12–14 August 2002	59
Chapter 5 Beyond the Moon	71
Target Jupiter: The Shoemaker-Levy 9 Multiple Impact Event... ..	72
Crater Types and Morphologies Throughout the Solar System... ..	74
Other Historic and Probable Impact Sightings on Other Worlds	92
Conclusions	95

Part II An Observer's Guide to Lunar Meteor Impacts, Past and Present

Chapter 6 Guide to Observing Impact Features on the Moon	99
Maria vs. Highland Cratering	101
Young vs. Old Craters	102
Appearance vs. Size	104
How to Recognized Different Types of Features.	106
A "Top 100" List of significant Impact Structures to Observe . . .	109
A Link to Astronomical League Observing Clubs Related to the Moon	110
Chapter 7 Impacts Today	111
Lunar Transient Phenomena and Lunar Meteoroid Impacts . . .	111
Some Possible Causes of LTP.	112
Narrowing Down the Causes of LTP to Three: Electrostatic Levitation, Tidal/Thermal Stresses, and Meteoroid Impacts . . .	114
Chapter 8 Lunar Impact Observation Programs	121
Past Campaigns	121
Current Programs	122
Space Missions that Impacted/Will Impact the Moon.	123
Mission Statement of the ALPO Lunar Meteoritic Impact Search Program: A Vision of Lunar Impact Research	125
Chapter 9 Observing Impacts as They Happen (with Contributions by Many Members of the International Occultation Timing Association)	127
Geometric Considerations and Preparations Needed for Making Observations	128
Techniques for Visual Observations	129
Techniques for Video Observations	130
Twelve Examples of Observer Equipment Setup and Use.	133
Some Examples of Products and Resources	142
Putting it All Together: A Lunar Meteor Observing Plan	150
Conclusion	152
Chapter 10 Finding Collisions.	153
Automated Impact Detection Software	153
The Use of Registax for Automated Lunar Meteor Detection. . .	154
Increasing the Probability of Detection with LunarScan	158
Chapter 11 Spurious Flash or True Impact Event?	165
How to Identify True Lunar Meteoritic Impact Events	165
GLR Dark Test	165
Validation of Lunar Flashes: A Network of Observers for Simultaneous Patrols	168
Identification of the Flash Profiles	171
Single Observer Validation of Lunar Meteor Impacts	175
Conclusion	178

Chapter 12 Professional and Amateur Collaboration	181
Introduction: Pro-Am Collaborations	181
Examples of Professional Research in Lunar Meteor Impacts . . .	182
Advances in Amateur Lunar Meteor Observations	189
Appendix A References	197
Appendix B Glossary	199
Appendix C Impact Candidates Observed by ALPO/LMIS Likely to be Cosmic Ray Hits or Other Spurious Phenomena	209
Introduction	209
1999: Lunar Geminid Impact Candidates	209
May 2000: Lunar Eta Aquarid Impact Candidates	210
The Leonid Meteor Storms of 2001	211
The Perseid Meteor Shower: 12–14 August 2002	211
Appendix D A Simple Method for Timing Videotaped Occultations (and Lunar Meteor Impact Flashes)	215
Introduction	215
System Requirements	215
System Setup	215
Timing the Occultation	217
Conclusion	219
Appendix E Equipment Checklist and Vendors	221
Appendix F Details of Shortwave Time Signals for Astronomical Timings . .	225
Appendix G Stellar Resources for Comparison and Calibration	229
Finding Limiting Magnitudes for Visual and Video Camera Observation	229
Standard Stars for Extinction Correction and Flux Calibration	231
Appendix H Impact Plots	233
Index	237

<http://www.springer.com/978-1-4419-0323-5>

Lunar Meteoroid Impacts and How to Observe Them

Cudnik, B.

2009, XVI, 240 p. 152 illus., Softcover

ISBN: 978-1-4419-0323-5