
Contents

**Part I Lunar Domes Morphometry, Geophysical Modelling
and Formation Processes**

1	Volcanism on the Earth and the Moon: Morphometry and Eruption Conditions	3
1.1	Volcanic Processes and Formation of Volcanic Edifices on the Earth and the Moon	3
1.2	Physical Parameters of Dome Formation	6
1.3	Lunar Pyroclastic Deposits	6
1.4	Lunar Cones	8
1.5	Vents of Effusive Lunar Domes	9
1.6	Localization of Lunar Domes	10
1.6.1	Domes in the Maria	10
1.6.2	Domes Inside Craters	10
1.6.3	Domes in Highland Regions	10
1.6.4	Domes Bisected by Rilles	15
1.6.5	Domes with Non-volcanic Hills and Linear Rilles on their Surface	18
1.6.6	Domes with Concentric Craters on their Summit	18
1.6.7	Aligned Lunar Domes, Formation along Crustal Fractures	20
1.6.8	Lunar Intrusive Domes	21
2	Lunar Domes: Morphometric and Rheologic Properties	23
2.1	Observing Lunar Domes	23
2.2	Images Rendered Based on Topographic Data	24
2.3	Image-Based Photogrammetric Measurements	25
2.4	Determination of Morphometric Properties	27
2.4.1	Shadow Length Measurements	27
2.4.2	Photoclinometry and Shape from Shading	29
2.4.3	A Combined DEM Construction Approach	33
2.5	Modelling of Rheologic Properties	34
2.6	Monogenetic and Non-Monogenetic Lunar Effusive Domes	36

2.7	Classification Schemes Based on Qualitative Morphologic Features	36
2.7.1	The Classification Scheme by Westfall (1964)	36
2.7.2	The Classification Scheme by Head and Gifford (1980)	38
2.8	Conclusion	38
3	Determination of Spectral Properties	39
3.1	Spectral Ratios	39
3.2	Diagnostic Spectral Parameters	41
3.3	Petrographic Maps	44
4	Modelling of Lunar Effusive and Intrusive Domes	49
4.1	Modelling of Feeder Dike Dimensions	49
4.2	Time Scales Relevant During Dome Formation	52
4.3	Laccolith Modelling of Putative Intrusive Domes	54
4.3.1	Arguments Against and In Favour of an Intrusive Origin	54
4.3.2	Laccolith Modelling	55
4.3.3	Comparison with Terrestrial Laccoliths	56
5	Lunar Domes Classification Scheme	59
5.1	Classification Based on Principal Component Analysis	60
5.2	Non-monogenetic Lunar Effusive Domes	63
5.3	Classes of Lunar Intrusive Domes	63
5.4	Conclusion	65
Part II Guide to Observing Lunar Domes on the Moon		
6	Effusive Bisected Lunar Domes	69
6.1	The Birt Domes	69
6.2	The Domes near the Crater Menelaus	72
6.3	The Bisected Dome near Gassendi	77
7	Effusive Lunar Domes	79
7.1	Effusive Lunar Domes Located from Selenographic Longitude 0° to 90° East	79
7.1.1	Mare Tranquillitatis	79
7.1.2	Mare Vaporum and Hyginus	89
7.1.3	Autolycus	90
7.1.4	Meton	91
7.1.5	Rupes Altai and Piccolomini	95
7.1.6	Fracastorius	96
7.1.7	Mare Fecunditatis	97
7.1.8	Vendelinus	98
7.1.9	Mare Crisium and Yerkes	100
7.1.10	Petavius	101
7.1.11	Mare Undarum	103

7.2	Effusive Lunar Domes Located from Selenographic Longitude	
	0° to 90° West	105
7.2.1	Palus Putredinis	105
7.2.2	Mare Frigoris and Region Around Archytas	107
7.2.3	Dome Suite near Hortensius and Domes and Swells Between Milichius and Tobias Mayer, Mare Nubium and Aristarchus	108
7.2.4	Capuanus and Palus Epidemiarum	116
7.2.5	Region Around C. Herschel in Mare Imbrium and Sinus Iridum . . .	118
7.2.6	The Doppelmayer Region	120
7.2.7	Region Around Mee	124
7.2.8	Gruithuisen Region	125
7.2.9	Mons Hansten	127
7.2.10	Marius Hills	127
7.2.11	Mons Rümker	131
8	Candidate Lunar Intrusive Domes	135
9	Conclusion	145
	Appendix A: Lunar dome images	149
	Appendix B: Further Resources	157
	References	163
	Index	171

Lunar Domes

Properties and Formation Processes

Lena, R.; Wöhler, C.; Phillips, J.; Chiocchetta, M.T.

2013, XIII, 174 p., Hardcover

ISBN: 978-88-470-2636-0