

Observing the Moon

The Modern Astronomer's Guide, Second Edition

Written by an experienced and well-known lunar observer, this is a hands-on primer for the aspiring observer of the Moon. Whether you are a novice or are already experienced in practical astronomy, you will find plenty in this book to help you raise your game to the next level and beyond. In this thoroughly updated Second Edition, the author provides extensive practical advice and sophisticated background knowledge of the Moon and of lunar observation. It incorporates the latest developments in lunar imaging techniques, including digital photography, CCD imaging, and webcam observing, and essential advice on collimating all common types of telescope.

Learn what scientists have discovered about our Moon, and what mysteries remain still to be solved. Find out how you can take part in the efforts to solve these mysteries, as well as enjoying the Moon's spectacular magnificence for yourself!

GERALD NORTH graduated in physics and astronomy. A former teacher and college lecturer, he was also a Guest Observer of the Royal Greenwich Observatory. He is now a freelance astronomer and author. He is a long-term member of the British Astronomical Association, and has served in several posts in their Lunar Section. His other observing guides include the acclaimed *Advanced Amateur Astronomy* (Second Edition, Cambridge University Press, 1997) and *Observing Variable Stars, Novae and Supernovae* (with Nick James, Cambridge University Press, 2004).

“... the friendly and chatty style of *Observing the Moon* continues in this second edition ... Chapters have had major modifications to reflect the changes in the past seven years and cover subjects such as camera attachments to the telescope, modern CCD cameras, camcorders and webcams, image processing techniques and online web resources. This book is a good friendly way to introduce amateurs to lunar observing and has some excellent examples of observations by well known observers to illustrate what can be done.”

Tony Cook, *Journal of the British Astronomical Association*

“North has managed to convey his enthusiasm while making this book accessible to those with no prior knowledge of the topic ... There are a great deal of modifications to those chapters dealing with technologies and techniques that have been updated since the first edition ... North's friendly and informative writing style assists the reader in learning about the techniques of lunar observation. This is an excellent reference tool for first-time astronomers and experts alike ... the perfect companion for a budding amateur astronomer.”

Martin Vickers, *EOS*

“Gerald North, an accomplished lunar scholar is the author, or co-author, of a number of texts on advanced amateur astronomy and observing techniques ... This book is well produced and is a very useful, practical reference guide for the lunar observer, whether beginner or advanced. This delightful volume should inspire a new generation to the study of the Moon, Earth's long term companion in space.”

John McFarland, *Contemporary Physics*

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Gerald North

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SECOND EDITION

GERALD NORTH BSc



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PREFACE

PREFACE TO THE FIRST EDITION

Interest in the Moon periodically ebbs and flows, like the tides it causes in our oceans. The years leading up to the *Apollo* manned landings marked a particularly high tide. Since then there has been a very deep low tide – but the tide is turning once again. Recently we have had the *Clementine* and *Lunar Prospector* probes and professional studies of the Moon are on the increase. It is not unreasonable to expect that within the next two or three decades people will once again be walking on the eerie lunar surface. When it does happen we will be back to stay this time.

We already know a great deal about our Moon but many mysteries remain. A few of these mysteries might be solved by the modern-day backyard observer. Nonetheless, there are many other motives for the amateur devoting time and energy to study the Moon, or any of the other celestial bodies, through his/her telescope, aside from any wish to do cutting-edge science. I will not waste space listing the other possible motives here. All that really matters is that you, the reader of this book, have an interest in the Moon which you wish to explore. If so, then this is the book for you!

I intend this book to be a 'primer', a guide for the interested amateur astronomer who is yet to become a lunar specialist. Of course I have provided details about practical matters, such as equipment and techniques, but I have also included a limited amount of the history of the study of the Moon and, particularly, of lunar science. Without the science (and to a less important extent, the history) the subject would be sterile and any practical work beyond simple sight-seeing would be pointless.

To 'shoehorn' everything I needed to say into the book-length available has not been easy. The facts of commercial life apply to books as to any other commodity. This book is highly illustrated and was expensive to produce because of this. To keep the cost to you from becoming astronomical in every sense of the word, I have had to keep its length to within very tight limits set by the publisher. Consequently, time and time again I have had to refer you, the reader, to other publications to expand on points that I had not room enough to adequately cover in this book.

x PREFACE

However, that shortcoming is also a strength. As I said, this book is a 'primer'. It is certainly not intended to be the definitive history of lunar studies, nor of our scientific understanding of the Moon. I can't really say that it is the last word on practical techniques and equipment for the practising amateur astronomer, either. What I can claim for this book is that it contains enough working knowledge to give any tyro lunar observer a flying start. Beyond that, this book is intended to be a 'springboard' to further studies and practical work. Please do follow up the references I give. Go beyond that and seek further ones on your own. Your knowledge of the Moon and how it has been studied will expand beyond any limits set by the finite size of any one single-volume work.

I hope you like this book and find it interesting. Much more importantly, I hope that you discover for yourself the thrills of examining the Moon's mountains, craters and other surface structures through your telescope's eyepiece. Aside from the awesome spectacle of the views, you will find real fascination in understanding how the Moon got to be as it is.

Gerald North
Bexhill on Sea

PREFACE TO THE SECOND EDITION

The new level of interest in the Moon that I noted in the Preface to the First Edition has been maintained in the years since. Meanwhile much has changed in the arena of practical amateur astronomy. New equipment and techniques have allowed amateurs to make significant advances in the quality of their work and some of the older ways of doing things have fallen by the wayside. The First Edition of this book proved to be popular and it was reprinted a number of times. However things have changed so much since that First Edition was first published it is now time for this new one. Consequently I have re-written much of this book to reflect the amateur astronomer's world of the early twenty-first century. I hope you enjoy reading it – and I hope that you will obtain whatever telescopic equipment you can and turn it to the Moon. Things certainly have moved on in practical astronomy but the Moon remains as beautiful, as thrilling, and as mysterious as ever.

Gerald North
Norfolk

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In addition, Mr John Hill had, for the First Edition, gone to considerable trouble to furnish me with materials and it is very sad for me now to have to record his death along with my thanks. For this edition I have also been given a tremendous amount of help by my many friends of the Breckland Astronomical Society, especially John Gionis, Michael Butcher and Malcolm Dent. In particular Michael Butcher has spent many hours building a photographic-based key map (Figure 7.1), that replaces my hand-drawn version in the First Edition.

Finally I must not forget to thank Dr Simon Mitton and his staff at Cambridge University Press for all their hard work in making the First Edition the success it was. Now I have to thank Vince Higgs along with his staff at the Press again for their sterling work on this Second Edition.

Gerald North
Norfolk

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