Jeremy Cook

The Hatfield SCT Lunar Atlas

Photographic Atlas for Meade, Celestron and Other SCT Telescopes

With 216 Figures

Springer

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Jeremy Cook 1933–2003

The *Hatfield Lunar Atlas* has been widely used ever since it was first published. There has long been a need for a new edition, oriented to make it convenient for modern telescopes, and the obvious person to carry out this task was Jeremy Cook. Sadly, it was to be his last contribution to science.

He never worked as a professional astronomer, but he made his name as a skilled observer and became an acknowledged expert in all matters connected with the Moon. He was appointed Director of the Lunar Section of the British Astronomical Association and proved to be an exceptionally capable administrator, always ready to help others with the benefit of his experience. Jeremy was universally liked and admired, and his sudden and totally unexpected death came as an appalling shock to his many friends – and I am proud to have been counted as one of these. His marriage to Marie was long and ideally happy. She is herself a very capable lunar observer, and their son, Dr. Tony Cook, is an internationally known astronomer.

Jeremy Cook is much missed – but he is certainly not forgotten.

Sir Patrick Moore ***CBE FRS***

Jeremy Cook (centre) with Commander Henry Hatfield, on the occasion of the presentation of copies of *The Hatfield Photographic Lunar Atlas*, outside Commander Hatfield's solar observatory.

Publisher's Preface

Jeremy was only a fortnight from delivering me the manuscript for this book when he died suddenly, just before Christmas 2003. He will be greatly missed. Jeremy was one of those people who always seemed to arrive in my office grin first. Unfailingly good-humoured, he was meticulous in preparing his work and was also one of that small band of authors who really cared about deadlines. We were both very enthusiastic about this project, and I'm devastated that Jeremy won't see the finished book.

The genesis of the idea was slightly unusual.

I am personally not very familiar with the Moon, and using *The Hatfield Photographic Lunar Atlas* to locate a particular crater proved next to impossible with my Meade LX-200 because of the mental gymnastics needed to visualise a map with South at the top and East on the left, as North at the top and East on the left – a mirror image. In the end I was reduced to going indoors, scanning the relevant page of the atlas, flipping it, printing it and running back out to the telescope.

At almost exactly the same time, in a field near Heidelberg in Germany, Hubertus Riedesel – one of Springer's international editorial directors and a keen amateur astronomer – was having exactly the same problem looking at the Moon with *his* LX-200. We discovered the coincidence the next morning.

Jeremy was the obvious person to approach to solve our problem, and so *The Hatfield SCT Lunar Atlas* was born.

My thanks to Tony Cook for rescuing the work from Jeremy's hard drive and to Mrs. Marie Cook for permission to use it.

John Watson
Hampshire, England
October 2004

Introduction

When the first version of this Atlas was first published, men were within a year of setting foot on the Moon, and the exciting buildup to this event stimulated a great upsurge in lunar observations by professionals and amateurs alike. The original author of this atlas, Henry Hatfield, put to good use the many photographs he took of the lunar surface at this time with his homebuilt 30 cm (12-inch) Newtonian telescope. He realised how useful it would be for an amateur observer to have by his side an easy-to-use Atlas of the Moon to assist in locating and identifying the many features which could be seen through a telescope of similar size—and so the *Amateur Astronomer's Photographic Lunar Atlas* came into being.

Thirty years later, the opportunity arose for the Atlas to be updated, not in the quality of the photographs (which remain excellent) but with the subsequent changes in lunar nomenclature, the change from Imperial to SI units of measurement and the change from Classical to IAU east-west directions. In recognition of the original author, the revised publication was named *The Hatfield Photographic Lunar Atlas*. It retained the original image orientation of lunar South at the top but with East now designated to be on the left and West on the right.

With the increasing use of commercially-made telescopes having a more compact light path than the Newtonian, a further edition of this lunar atlas has become desirable because most of these compact telescopes have their usual viewing position at right angles to the telescope's optical axis, which results in an image reversal. This change in direction of the optical path has the effect, for northern hemisphere observers, of providing a lunar image in the eyepiece that has North at the top and South at the bottom, but with Mare Crisium on the left and Aristarchus on the right—contrary to the accepted IAU convention.

Clearly, identification of lunar features at the telescope is made very much more difficult when the actual image is reversed left-right relative to an IAU-correct comparison map or photograph. This new Lunar Atlas, *The Hatfield SCT Lunar Atlas*, has therefore been constructed specifically for users of such telescopes in that the maps and photographs now appear in the same orientation as that seen through a right-angle eyepiece, that is North at the top, South at the bottom, East on the left and West on the right. This is ideal for almost all commercially made Schmidt-Cassegrain or Maksutov telescopes. It should be noted, however, that viewing a lunar image from the rear of such a telescope along its optical axis—that is, without a right-angle diagonal at the eypiece—still produces a conventional IAU orientation.

Authority—Nomenclature

Feature names have, where appropriate, been altered to those listed in the NASA Reference Publication 1097 *NASA Catalogue of Lunar Nomenclature* by Leif E. Andersson and Ewen A. Whitaker (1982), and include more recent amendments particularly whereby some lettered craters have acquired proper names. However, a few features which are not contained in the NASA Catalogue have been allowed to retain their earlier names for historical reasons. These names are shown enclosed by brackets on the Maps in this book and identified in the Index of Named Formations by an asterisk.

The Maps—Overlaps—Scale—Map Grids

Since this Atlas is aimed primarily at visual observers with catadioptric telescopes (whose view of the lunar surface through the right-angle eyepiece will usually be one in which North is at the top, South at the bottom, East on the left and West on the right) all of the maps and main plates are printed in this orientation. We of course realise that the appearance of the maps and plates will be unfamiliar to other lunar observers because of this reversal!

The Atlas is divided into sixteen sections, each of which is made up of a map and two photographic plates. Each map is based primarily on the large facing plate. The Index of Named Formations includes many cross-references to help in locating the most appropriate map. Feature heights are given in metres (m) and distances in kilometres (km).

No attempt has been made to adhere rigidly to the boundaries of the various numbered sections in the Keys to Maps and Plates: indeed in some cases the boundaries of the plates have purposely been allowed to encroach into neighbouring sections. The Key Plate is intended to guide the reader into the right area: the Index of Named Formations lists every map on which a particular feature will be found. The "scale" of each map, and of the main plates which accompany it, has been adjusted so that the Moon's diameter is nominally 64 centimetres (any variation in this diameter is stated in the relevant

caption). Despite this, the true scale (the relationship between the diameter of a crater on the Moon and its diameter in this Atlas) of each map and plate varies from place to place; furthermore the north-south scale may well vary in a different way from the east-west scale. This is part of the very nature of the orthographic projection, in which the observer views a globe from a great distance. In order to give the reader some idea of the true scale from place to place, the diameters of five craters have been noted beneath each map. As the scale varies from plate to plate, so the size and shape of the various photographic images will also vary. The grids on the various maps are intended to be used only for reference purposes. They bear no relationship to lunar latitude and longitude or to any of the cartographic grids which are in use at the present time. If a formation appears on more than one map, then its grid references on each map will almost certainly vary. An unnamed and unlettered formation on any map may be identified with certainty by quoting the map number and grid reference, e.g., Map 3 Square a4, and then making a small tracing of the square concerned, showing the formation.

The Libration Keys

Beneath each main plate there is a small key, which shows the numbered area in which the plate lies and the Moon's optical libration when the photograph was taken. The Moon does not present exactly the same face to the Earth all the time, but rocks gently back and forth in all directions, so that at one time or another an observer on the Earth will see about 60% of its surface. Referring to these libration keys, the reader should imagine that the Moon has rotated in the direction of the arrow by the amount indicated. Thus in Plate la the movement is 7.3° in a direction a little east of north, and therefore an area just west of the South Pole has been exposed, which could not be seen if the Moon were in its mean position. If the blacked-in "square" on these keys lies in the same semicircle as the libration arrow, then the direction of the libration is fairly favourable for the area depicted on the plate; if the arrow passes through the square concerned, then the direction is very favourable; an unfavourable libration will exist if the square concerned lies beyond the head of the libration arrow. The amount of libration can vary between nothing and a maximum of about 10°. Libration of 7° or 8° is considered to be good in most cases. The Moon's physical libration and diurnal libration have been ignored since their combined effect would not alter the aspect of the various photographs appreciably.

Conventional IAU Plates

The small plates show the same section of the Moon as the corresponding main plate, but with the IAU-correct orientation: that is, South at the top, North at the bottom, East on the left and West on the right. Once a feature has been located in the eyepiece and identified using the large plates and maps, it is relatively easy to find it on the small plates. This is intended to help users of modern commercial telescopes become familiar with the location of features on convential Moon maps.

Further Information

The photographs are typical of those taken through a Newtonian telescope of 300 mm (12-inch) aperture. In the years since the Atlas was first published, spectacular advances have been made in lunar surface imaging by manned and unmanned spacecraft using photographic processes and CCD imaging in many optical wavebands. It is possible that water ice (or at least water molecules) may have been detected by the Clementine and Lunar Prospector spacecraft in the regions around the north and south poles, a hypothesis that would not have been considered seriously until comparatively recently.

The sophisticated equipment and platforms required to make such discoveries are currently well beyond the reach of amateur observers, but there is little doubt that some of these will become available in due course. However, in case anyone imagines that there is nothing new to discover on the lunar surface, do not forget that professional astronomers cannot observe the Moon in real time like an amateur observer, and spacecraft have a relatively short lifespan. Subtle changes have been observed to occur on the lunar surface, and prolonged study of these and other topographic features is an excellent way of learning the geology (or rather selenography) of our closest cosmic neighbour.

Users of this Atlas are strongly advised to join a local astronomical society or club, where they will obtain advice and assistance in pursuing their interest.

I would like to express my grateful thanks to the Council of the BAA (who own the original copyright) for allowing the use of the maps and photographs which form the basis of the present publication. I am also grateful for advice and assistance freely given by Ewen Whitaker and by the original author, Henry Hatfield.

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Piccadilly, London, England

Jeremy Cook
December 2003

Maps and Plates

Keys to Maps and Plates

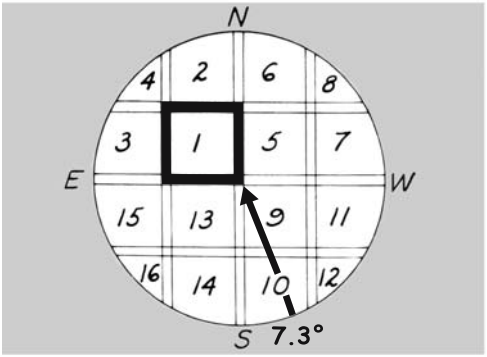
0240 UT 05.08.63

Map 1

Crater Diameters

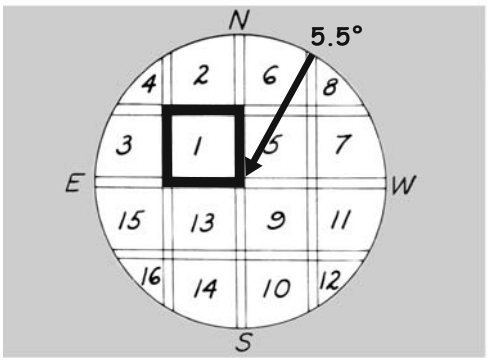
Archimedes	83	km (h7)
Posidonius	95	km (b7)
Manilius	39	km (e4)
Maskelyne	24	km (a1)
Bruce	7	km (g1)

This map has been prepared from Plate 1a. Plates 1b, 1c, and 1d show the same area under different lighting. Plate 1e shows larger scale photographs of the Triesnecker (g2) and Linné (e7) areas.



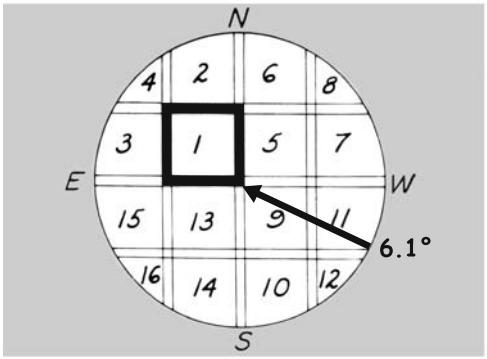
2046 UT 28.04.66. Moon's age 7.9 days. Diameter 64 cm. The Montes Appeninus (g5) rise to 4900 m in places.

Plate 1b



0215 UT 06.08.66. Moon's age 18.9 days. Diameter 64 cm. Note the ridges on the mare to the south west of Posidonius (b7), and the domes near Arago (c2). These are shown on a larger scale on Plate 3f.

Plate 1c



2137 UT 25.12.66. Moon's age 13.8 days (2 days before Full Moon). Diameter 64 cm. Compare this with Plate 1a, which shows almost the same area.