

## *Preface to the fourth edition*

*Practical Astronomy with your Calculator or Spreadsheet* has been written for those who wish to calculate the positions and visual aspects of the major heavenly bodies and important phenomena such as eclipses, either for practical purposes or simply because they enjoy making predictions. We present recipes for making calculations, where we have cut a path through the complexities and difficult concepts of rigorous mathematics, taking account only of those factors that are essential to each calculation and ignoring corrections for this and that, necessary only for very precise predictions of astronomical phenomena. Our simple methods, suitable for use with a pocket calculator, are usually sufficient for all but the most exacting amateur astronomer, but they should not be used for navigational purposes. For example, the times of sunrise and sunset can be determined to within 1 minute and the position of the Moon to within one fifth of a degree. But new to this fourth edition are spreadsheets which offer much higher precision (see below).

The second edition included much more material in response to letters and requests from readers of the first edition. Many errors were also corrected. The third edition continued the same process, adding four new sections on generalised coordinate transformations, nutation, aberration and selenographic coordinates, improving the sunrise/set and moonrise/set calculations so that they worked properly everywhere in the world, including a rigorous method of calculating precession, taking account of the J2000 astronomical system where appropriate, and correcting mistakes or clarifying obscurities wherever they were found in the second edition.

The fourth edition has also been updated considerably; however the major change is that we have included, for the first time, a spreadsheet for nearly every calculation. Each spreadsheet illustrates the calculation, making it easier to get the right answer. But we have also written a library of powerful functions which can carry out many of the calculations for you with much higher precision, so those people who wish to use their computers can do so and obtain the benefits of greater accuracy. For example, use the simple recipes and your calculator to find the times of moonrise and moonset to within a precision of 10 minutes or so, or use the spreadsheet functions to obtain the results correct to within 1 minute. You will need to visit our website (see page 209) to download the spreadsheets to your computer; the library of functions will come automatically with the spreadsheets.

We are most grateful to those kind people who have taken the trouble to write in with their suggestions, criticisms and corrections, in particular to Mr E. R. Wood, who kindly scanned the manuscript of the third edition for errors, Mr S. Hatch, Mr S. J. Garvey, who supplied the nomogram for the solution of Kepler's equation, and Mr Anthony Ehrlich of Pittsburgh, Pennsylvania, who developed a rudimentary scheme for calculating the circumstances of sunrise/set and moonrise/set into one that actually worked

(superseded in this edition). We would also like to thank and acknowledge those authors whose books we have read and whose ideas we have cribbed, mentioning particularly Jean Meeus (*Astronomical Formulae for Calculators*) and W. Schroeder (*Practical Astronomy*). We have made extensive use of *The Explanatory Supplement to the Astronomical Ephemeris* and the *American Ephemeris and Nautical Almanac*, as well as the *Astronomical Almanac* and its predecessors.

Our thanks are also due to Dr Anthony Winter, who suggested writing the first edition of the book, to Mrs Dunn who typed it, to Dr Guy Pooley who read the manuscript and made many helpful suggestions, and to Dr Simon Mitton for taking so much trouble over the production of the book. Thanks for particular help with the fourth edition go to William Lancaster, Sehar Tahir and our editor Vince Higgs.

We hope you have as much fun with these recipes and spreadsheets as we have had! Please let us know when you find an error. You can contact us via the book's website (see page 209).