It comes hard having to criticize a book coming from the rickety old typewriter of Britain's favourite astronomer, and maybe the blame for the book's many faults lies more with the publisher. Let's hope that the 13th Edition will sort out the mess. — David Stickland.


This atlas is the third (and final?) one in the series of atlases of Arcturus brought out by Hinkle and his colleagues. It complements the infrared one published in 1995, made with a Fourier-transform spectrometer at the Kitt Peak 4-m telescope and covering the wavelength region 0.9–5.3 μm, and the visible-region one published in 2000, made with an echelle spectrograph plus CCD at the Kitt Peak coude-feed system and covering the region λλ 3727–9300 Å. The new one extends the coverage far into the ultraviolet, to λ 1150 Å. The space-ultraviolet spectra, from the short-wavelength limit up to λ 3140 Å, were taken with a high-resolution spectrograph on the Space Telescope — and very beautiful spectra they are, too. The section from λ 3140 to λ 3800 Å was observed with the same Kitt Peak spectrograph as was used for the visible atlas, save that below λ 3310 Å an ordinary low-order grating was used in place of the echelle system, and the resolution was substantially lower at a claimed 45 000 against well over 100 000 elsewhere.

Like its predecessors in the series, the atlas is presented as an ordinary-sized book; the spectrum is plotted in 247 panels each about 8 inches long, 'landscape' on successive pages, each panel covering 10 Å of the spectrum (15 Å below λ 1700 Å, where there is relatively little to see). The panels are 3 inches high, but there is no means of specifying the height of the continuum because no such thing exists in the relevant region: at the short-wavelength end the spectrum consists of emission lines, some of which grossly overflow the panels (they are plotted again with the scale of ordinates reduced by a factor of 30), while at the long-wavelength end the high points in the plotted spectrum occupy much of the height of the panels. Each page carries not only the Arcturus panel but also a similar panel showing a solar-type spectrum of the same region. It says something for the Space Telescope that no solar spectra of quality comparable with that of the Arcturus atlas could be found, so the authors of the atlas felt obliged to fall back upon a spectrum of α Centauri A that was also taken by the Space Telescope. Above λ 3140 Å the Kurucz et al. solar-flux atlas is plotted.

It is only in the region above about λ 3000 Å that there is a family resemblance between the Arcturus and solar-type spectra. Late-type stellar spectra are of an emission-line character far down in the ultraviolet, and the wavelength region in which they change to absorption varies from star to star. It is easy to see in a general way that the changeover wavelength will be longer the cooler the star, because it occurs where the Planck law for the black-body curve indicates that the continuum intensity is down nearly to nothing in its shortward fall-off. Thus, in the early part of the atlas under review, both spectra are emission-line spectra, although for reasons that are not germane to this review they are astonishingly different from one another. Then, weak continuous spectra begin to appear, and first α Cen at about λ 1700 Å and then Arcturus at about λ 2100 Å start to show absorption lines, although emission is not overwhelmed for several
hundred Ångströms more — indeed there is strong emission not only in the Mg II lines near \( \lambda 2800 \) Å but in the familiar \( H \) and \( K \) lines more than 1000 Å still further longward.

As the author of an Arcturus spectral atlas\(^4\) published nearly 40 years ago, I (the reviewer) naturally have a keen interest to see how the new work agrees with my own, whose principal shortcoming is that it was produced (from photographic spectra) before the age when everything had to be digital. The two works overlap only in the relatively small region \( \lambda \lambda 3600-3800 \) Å. Additionally, however, in collaboration with Dr. R. E. M. Griffin, I published a supplementary atlas\(^5\), admittedly at lower resolution and compressed onto one page of the *ApJ Supplements*, of a region further into the ultraviolet. It covered the \( \lambda \lambda 3200-3600 \) Å region of the Arcturus spectrum, with the evident (if undeclared) purpose of pulling the rug out from under an atlas\(^6\) prepared for an overlapping region from spectra taken from a balloon and consisting in that region largely of scattered light.

There is no overlap between the reviewer’s work and that majority of the new atlas that was made from the *Space Telescope*, which as far as can be assessed is absolutely excellent: one has to welcome it as *si generis* and apparently beyond compare even with solar spectra, and it will obviously constitute a mine of interesting data for a long time to come. The early panels (derived from spectra taken with a conventional low-order grating) of the ground-based part of the atlas appear to be of very similar resolution and quality to the piece published\(^5\) long ago in the *ApJS*, and as far as can easily be told they agree well photometrically too. The new work is printed at a much larger scale, but its principal advantage is supposed to be that it is available digitally, although no digital record accompanied the volume under review. In fact, unless there is some oversight in this review, nowhere is there any suggestion that any digital version is actually available. Indeed, right opposite the Preface there is a draconian prohibition telling us that the work is copyright and that “No part of the material ... may be reproduced or utilized [reviewer’s emphasis] in any form or by any means ... without written permission from the Astronomical Society of the Pacific.” So what good is that?

The overlap between the new atlas and the reviewer’s old one\(^4\) occurs where the new one is based on ground-based échelle spectra; again, the two appear very comparable with one another in all respects. The cores of certain strong lines appear to be a little deeper in the new work. That was noticed and illustrated in the preceding atlas\(^2\) of the visible region, which refers with apparent approval to Peterson *et al.*\(^7\) having stated that “there is apparently a problem with the intensity scale in the Griffin atlas”. That is not actually what Peterson *et al.* said (they referred to scattered light rather than the intensity scale), but at the risk of appearing over-sensitive on the issue and abusing the editorial hospitality of this review I would like to say that I do not believe that photometric errors other than random ones of order 1% have ever been demonstrated in my atlas\(^4\). It is, however, certainly true that deep lines are portrayed there as somewhat less deep than they really are, owing to effects of the instrumental profile of the spectrograph used. That profile was carefully investigated and illustrated in the atlas itself, and its effects were equally carefully investigated and published in detail\(^8\) the following year. It is very possible that modern gratings have superior instrumental profiles, and/or that some of their bad effects are removed in the normal course of the digital manipulation of the observational data, notably in the subtraction of the “large