Letters

The annular solar eclipse of 2003 May 31

From Mr Andrew Sinclair

The annular eclipse on 2003 May 31 will pass briefly over the north of Scotland. The details are rather difficult to work out from the standard diagrams published in almanacs, as the annular phase of the eclipse starts at sunrise in Scotland. It is hoped that the four plots in the figure will help to clarify the situation. In the darker shaded area the Sun has not yet risen. For the purpose of these plots and the data in the table, sunrise is taken as the instant when the Sun's lower limb is on the horizon, allowing for refraction. Thus the whole of the disk will just be visible. (The conventional definition of sunrise has the Sun's upper limb on the horizon, so that none of the disk is visible.) At the instant specified in each plot the annular phase of the eclipse will be visible within the lighter shaded area. The bold curve in the 4th plot is the envelope of the successive areas of visibility, so from anywhere above this curve the annular eclipse will be visible at some time.

The table gives local circumstances for a few locations in Scotland. The altitude is given for the centre of the Sun, and in all cases it is very low in the sky. The direction of the rising Sun will be very close to NE, and so locations on the east or north coast would seem to be most favourable. The quantities 'upper gap' and 'lower gap' are the gaps in minutes of arc between the limbs of the Moon and the Sun. For all locations in Scotland the upper gap will be fairly small. In order to see the eclipse with the Moon's disk centred in the Sun's disk it would be necessary to travel to Iceland.

The partial phase of the eclipse will still be in progress at sunrise in all parts of the UK. The tip of Cornwall will see the least of the eclipse, where sunrise will be at 04:25 UT, and the partial phase of the eclipse will end at 04:33. An animation of this eclipse can be seen at **http://members.aol.com/atsinclair/animate.htm**

Andrew T. Sinclair

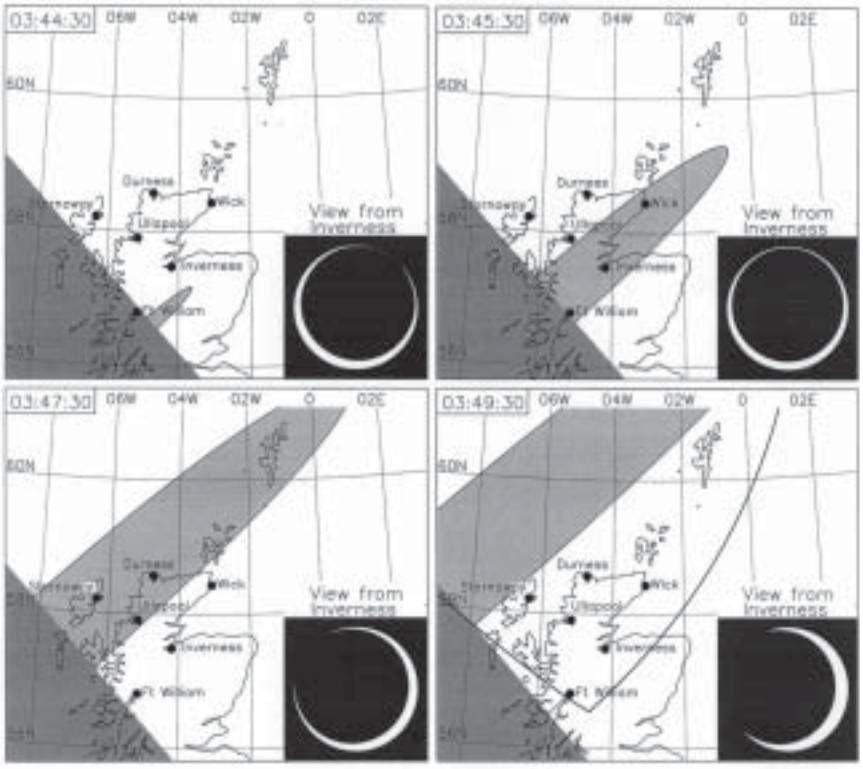
4 Gough Way, Cambridge CB3 9LN
[ATSinclair@aol.com]

(For more details on this eclipse, readers are referred to the paper by Peter Macdonald on p. 29 of the 2002 February Journal. – Ed.)

Local circumstances of the annular eclipse, 2003 May 31

All times are given in UT; add one hour for British Summer Time

Location	*Sunrise* h m s	*Maximum eclipse* h m s	*Dur. of annularity* sec.	*Alt. of Sun* °	*Upper gap* arcmin.	*Lower gap* arcmin.
Ft William	03:45:32	03:45:16	56	0.23	0.03	1.94
Inverness	03:37:01	03:45:32	68	0.98	0.05	1.91
Wick	03:25:26	03:46:05	81	2.01	0.07	1.88
Ullapool	03:37:50	03:46:40	114	0.99	0.15	1.82
Durness	03:31:03	03:47:16	126	1.60	0.18	1.77
Stornoway	03:40:26	03:47:48	142	0.86	0.24	1.72



Light pollution in France

From the Director of the Variable Star Section

I read with interest the letter by Bob Mizon in the *Journal* for August 2002 about light pollution on the Costa Brava. I had the good fortune to attend the Association Francaise des Observateurs d' Etoiles Variables (AFOEV) meeting on Variable Stars in the old town of Bourbon Lancy in Burgundy in August of this year, and looked forward to some nice clear dark skies.

I have seen maps of European light pollution in the past and noted that most of France, away from the large towns and other heavily developed areas, was relatively dark – and notably darker than most of the UK. Consider my disappointment then, when I found the area of Bourbon Lancy to be proliferated with dome lights of varying shapes and sizes. Very attractive they were when viewed during the day, but a complete disaster at night. Not only could one see little of the night sky, but due to the glare from such lights, little could be seen of one's surroundings.

Perhaps if France were as heavily populated as the UK the level of night time lighting would be intolerable. It certainly seems that as far as lighting is concerned, France is a long way behind the UK in designing and using the correct type of luminaire.

Roger Pickard

28 Appletons, Hadlow, Kent TN11 0DT.
[rdp@star.ukc.ac.uk]

Radar reflection from Mercury

From Dr Darren Beard

I am writing concerning the letter in the October 2002 *Journal* (page 245) entitled 'Radar reflection from Mercury'. This obtains roughly the correct answer, but only because two major errors nearly cancel each other.

Section a) is correct. Section b) obtains the wrong angular size for Mercury at inferior conjunction. Taking the radius of Mercury as 2439km (from the BAA *Handbook*) and the Earth–Mercury distance as 0.613AU, yields a radius of 2.66×10^{-5} rad, not 2.42×10^{-5} rad as given. This is only a minor error.

Section c) neglects to square the radii in the equation. The equation should be

$$500\ [(2.66 \times 10^{-5})^2 / (6.1 \times 10^{-4})^2] = 0.951\ \text{kW}.$$

The letter obtains 0.787 kW.

Two major errors occur in section d). First, in the calculation of the flux received by Earth, the Earth–Mercury distance is taken as 1.496×10^{11}m. This is 1AU. If Mercury is at inferior conjunction, then the correct distance should be 0.613AU for an average value. The flux density at Earth should be

$$951 / [2\pi\ (0.613 \times 1.496 \times 10^{11})^2] = 1.80 \times 10^{-20}\ \text{Wm}^{-2}$$

This is a factor of more than 3.2 larger than that given in the letter. However, when calculating the energy received by the Goldstone telescope, the letter uses 70m, i.e. the diameter, as the radius in the equation instead of 35m. This gives a collecting area 4 times larger than should have been used, which fortuitously almost exactly cancels the factor of 3.2 error in calculating the flux. The correct equation should be

$$\pi \times 35^2 = 3848\text{m}^2$$

This yields a received power of 6.9×10^{-17}W. This is only 80% of the value given in the letter.

Clearly the thrust of the letter, that the received power is very small, is valid. The mathematics, however, leaves a little to be desired.

Darren Beard

18 Cumberland Avenue, Chandlers Ford, Eastleigh, Hants. SO53 2JX

Rivenhall Observatory

From Mr James Abbott

After rather more years than originally planned, Rivenhall Observatory (near Witham, Essex) is finally complete and I would like to thank the BAA for the award of a Ridley Grant which helped with the costs of construction. The Grant was given on the basis that the facility could be visited by children from the local primary school and an invitation to the school has recently been sent.

The main instrument is a 300mm Orion f4 Newtonian. The observatory has a fully rotating 3m dome constructed of fibreglass over a marine plywood skin. The opening (see photo) comprises 2 elements: a hinged drop down shutter and a sliding shutter. Because of the height, planning permission was needed and the final colour was at the discretion of the local authority.

The dome rotates on industrial castor wheels guided on a metal track, which was one of the few items that had to be made separately. The DIY approach certainly saved on overall costs, but the downside has been the time taken – the foundations were laid in 1995!

The observatory is at first floor level on top of a square block built building. To minimise vibration, the telescope is mounted on a pier which passes through a hole in the observatory floor and then directly into the ground. The lower part of the pier consists of concrete piping filled with concrete. The ground floor is used as storage, and for security, access is only via the adjacent building.

The overall design gives an elevated position for the telescope with good views over the surrounding countryside down to near the horizon. Although the sky suffers some light pollution typical of Essex, with glows from local towns, the nearest streetlights are about 1km away and the near neighbours have been very understanding when approached about minimising use of exterior lighting.

James Abbott

Rivenhall Observatory, Park Road, Rivenhall, Essex CMS 3PR