

Part of an outline map of the Moon: such a map is very useful for learning the positions of the major features. coronal holes (pages 78–79), but as yet no more precise correlation has been established between the darkness of lunar eclipses and the conditions in the outer layers of the solar atmosphere.

Observation of lunar eclipses, then, offers some insights into processes involving all three bodies – Sun, Moon and Earth – although not necessarily simultaneously.

One effect which has yet to be mentioned, and which is present to a variable degree at every eclipse, is that the Earth's shadow is larger than would be expected on purely geometrical grounds. The umbral shadow is always enlarged and flattened to a considerably greater extent than can be accounted for by the polar flattening of the Earth. Various reasons for this have been suggested, but none of them are fully accepted, although it does seem that the height and opacity of the atmospheric layers play a considerable part. Further observations which will help to establish the correct mechanism

are quite easy to make, as they only involve the accurate timing of events. These may either be the four instants at which the limbs of the Moon enter and leave the umbra, or the times when individual features are crossed by the edge of the umbra. From the known positions of the Moon and of features upon it, the exact extent of the umbral shadow may then be established. Small telescopes and binoculars are quite sufficient for this work, which is easy to undertake.

The overall visibility and colour of the eclipse can be easily estimated and recorded using the naked eye alone, although specialized photometers have been constructed to record the brightness of the whole Moon by comparing it with stars of known magnitude. Such experiments are unusual however, and it is more normal for observers to estimate the visibility of certain specific features by the use of various coloured filters. Some observers use photoelectric photometers for the same purpose,