

Video Grazing Occultations

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Grazing occultations are always visible at the projections onto the surface of the Earth of the lines tangent to the lunar limb that are created by the motion of the Moon relative to the star being occulted.

Most information about the lunar profile continues to be provided by visual observers using simple equipment. Everyone is to be encouraged to join expeditions to observe grazes, because the accuracy of the observed profile is proportional to the number of stations. The use of grazes improves knowledge of the lunar profile (needed for the analysis of solar eclipse timings), data about close binaries, and galactic rotation from stellar reference-frame determination. Contact timings made near the edges of a solar eclipse track, for example, enable the diameter of the Sun to be derived relative to the lunar diameter, the latter being determined from occultations.

Using video equipment, it is possible to record such an event with an accuracy of ± 0.04 s (single frame resolution) and at the bright limb, whereas a visual observer will have problems recovering the star at a bright reappearance, and moreover will only attain ± 0.1 s time-resolution. Observing with a 20-cm telescope and a “standard” – commercial – colour video-camera, it is possible to record stars down to magnitude 8.

Four grazes recorded on video were shown:

- 1: α Librae, 1985 May 4. This graze was used to observe at both limits to determine an accurate polar diameter of the Moon.
- 2: δ Cancri, 1981 May 10. The first multiple event ever recorded on video (by A. Fiala), while 18 other stations observed visually. Misses occurred at the 2 northernmost stations, but multiple events at nearly all of the others. This event was important for determining the lunar profile as the latitude libration was similar to that found at solar eclipses.
- 3: σ Scorpii, 1986 March 30. This event demonstrated the possibility of resolving double stars with separations as small as 0.01 arcsec.
- 4: α Scorpii, 1986 July 18. Observed entirely on the bright limb and one of the best-observed events to date, with about 170 timings from 20 stations for 6 separate teams in California, and 15 stations near Miami, Florida. Five tapes of the graze were obtained. Steve Edberg, observing near San Diego, recorded 8 contacts. Dark-limb grazes are even better, when relatively long dimmings, partial blinks, and

faint flashes, caused by the large angular diameter of Antares, 0.04 arcsec, are most apparent. The only stars occulted by the Moon with larger angular diameters are the Mira variable R Leonis (0.067 arcsec) and the Sun. Events involving Antares' greenish fifth-magnitude companion can be seen during dark-limb southern-limit grazes at night.