ABSTRACTS

Preliminary analysis has revealed several new and surprising results: (1) Limb occultations observed during the eclipse showed the 200 μm limb to be more than 2° above the 30 μm limb. (2) The solar center-to-limb intensity profile was determined at all four wavelengths. (3) Several plage regions were mapped. At the longer wavelengths these showed a sharp increase in brightness relative to the quiet sun. In addition, the sun and moon were mapped, the latter at several phases, to permit an absolute measurement of the solar flux at all four wavelengths using the moon as a photometric standard. More detailed results are presented in other papers at this meeting.

38.06 A Comprehensive Study of the Sun in the Submillimeter Continuum, E. E. BECKLIN, J. T. JEFFERIES, C. LINDESD, F. Q. ORRALL, Univ. of Hawaii; I. GATLEY, UKIRT, and M. WERNER, NASA Ames. - We present results of solar observations in the far infrared and submillimeter continuum made during eight flights of the 0.9 m NASA-Ames Kuiper Airborne Observatory (KAO) in July 1981. The program culminated in the observation of the total solar eclipse of 1981 July 31. The sun was observed simultaneously in well defined bands at 30, 50, 100, and 200 μm with an angular resolution of 2′ using a system described by Gatley (1977, Ap.J. 216, 277). The earth’s atmosphere is opaque to the entire spectrum between 30 and 300 μm. Consequently, high altitude observations are required in this band. These recent KAO results constitute the most extensive and detailed solar observations made in this range of the solar spectrum. The 30-300 μm continuum is of special importance since radiation in this band emanates primarily from the low chromosphere where nonradiative heating of the solar atmosphere becomes important.

38.07 Submillimeter Observations of the Extreme Solar Limb Obtained in the Total Eclipse of 1981 July 31, C. LINDESD, E. E. BECKLIN, J. T. JEFFERIES, F. Q. ORRALL, Univ. of Hawaii, I. GATLEY, UKIRT, and M. WERNER, NASA Ames. - We observed the occultation of the solar limb simultaneously at 30, 50, 100, and 200 μm at both second and third contacts at the total eclipse of 1981 July 31 using the 0.9 meter telescope of the Kuiper Airborne Observatory. The solar crescent near and at totality was scanned using two-beam differential photometry. The angular resolution along the solar crescent was 2′. The two beams were swept repeatedly across the solar crescent at 0.5 Hz giving a sampling interval of 0.75s. At second contact, the 50, 100 and 200 μm limbs were found to be above the 30 μm limb by 073, 175, and 275 respectively. The results obtained at third contact are slightly greater than these values. The absolute extension of the submillimeter limb above the visible limb will be determined from simultaneous data available from a white light video monitor.

Existing plane parallel models of the solar atmosphere cannot account for these observations. If the large limb extensions attributed to chromospheric spicules (cf. Beckman et al. Nature, 254, 39, 1975; Horne et al., Ap.J., 244, 340, 1981), the spicules must be optically thick at 200 μm in contrast to the predictions of current models. The results show further that spicules become optically thin by 30 μm.

Preliminary analysis shows no evidence for sudden brightening at the extreme limb at any of the four wavelengths.