of hot plasma in the active regions corona with temperatures in excess of 6 million degrees. Characteristics of this hot plasma and its time variations seem to be different in active regions of different age. These hot plasma regions are sources of very weak, but clearly recognizable, X-ray emission above 3.5 keV. Long-lived X-ray brightenings, 10^4 times weaker than a flare, but lasting up to 10 hours occur predominantly along the M < 0 line, apparently low in the corona. After major flares, long-lived X-ray emission is also radiated from tops of arches extending high into the corona. Some other long-lived sources, far from M = 0 line, may be associated with newly emerging flux. Short-lived X-ray sources, ranging from subflare intensities to 10^3 times the flare flux, last for 2 to more than 30 minutes and are probably microflares. They seem to be most frequent in growing young active regions and appear often in areas of newly emerging flux.


Helios zonal zodiacal light photometers observe solar mass ejection transients in the interplanetary medium. Using Helios data we obtain low-resolution images of the 7 May 1979 mass ejection as it spreads outward from 15R<sub>☉</sub> to 0.3 AU. Because the Helios B spacecraft was positioned off the west limb of the sun as seen from earth, comparison of these data with the Solwind Coronagraph provide stereoscopic views of this ejection. Interplanetary scintillation observations of 3CX48 from earth show an increase in velocity consistent with the arrival of the ejection at 0.4 AU to the north of the sun 30 hours following the event. The IPS line-of-site velocity is the same as the outward speed determined from the bulk of the transient observed in white light from Helios.

23 JUNE 1983
THURSDAY MORNING
Session 6: Waves and Oscillations
0900-1000 (Georgian Room)

6.1 Low-frequency Oscillation Observations*
J. R. Kuhn, Princeton Univ. Medium resolution CCD-spectrograph observations have been obtained that are suitable for studying long spatial wavelength 5-min oscillations. We find evidence that at wavelengths of order one solar radius the oscillation field is not isotropic. It is also not well described by modes of uniform excitation. The velocity power density per spherical harmonic increases with decreasing k to 1.1 x 10<sup>-2</sup> cm<sup>2</sup> s<sup>-2</sup> per 3.5 x 10<sup>-<i>k</i></sup> Hz bandwidth at |<i>k</i> = 4|.

*This research was supported in part by the National Science Foundation.

6.2 Intermediate Degree Solar Oscillations, J. Harvey, KPNO, T. Duvall, NASA/GSFC. Observations of Doppler-shift oscillations of the full solar image averaged zonally and sectorially have been made at Kitt Peak since 1981. The resolution in spherical harmonic degree and angular order is about 3 and degrees from 1 to 200 are analyzed into power spectra of frequency versus degree. The power noise level is about 4 m<sup>2</sup> m<sup>-2</sup> Hz<sup>-1</sup> per degree and frequency resolution varies from 4 to 1 m<sup>-2</sup> Hz depending on the observation duration. The 5-minute p-mode oscillations are resolved into discrete ridges with radial orders from 1 to about 24. The frequencies of oscillations with degree less than 41 (which penetrate from just below the convention zone to the core) have been compared with predictions of Ulrich and Rhodes (Ap. J. 265, 551, 1983). We find a significant systematic discrepancy of the order of 10 micro-Hz that points to a problem in the model.

Low frequency g-modes are not well observed in our data because of noise at periods of a day and its harmonics. The average amplitude appears to be less than 1 cm s<sup>-1</sup> at low degrees.

6.3 Theoretical Eigenfrequencies for Low-Degree (p<sub>0</sub><sub>45</sub>) Solar Oscillations Having Periods Longer Than Nine Minutes, E.J. Rhodes, Jr., U. Bremen, Dept. of Astronomy, USC, and R.K. Ulrich, Dept. of Astronomy, UCLA. Recently several observational studies (Grec, Bosset, and Pomarantz, Nature, 288, 541, 1980; Claverie et al., Nature, 282, 591, 1979, and Nature, 293, 443, 1981; Scherrer et al., Solar Phys., 82, 93, 1983; and Woodward and Hudson, Solar Phys., 82, 67, 1983) have detected low-degree (p<sub>0</sub><sub>45</sub>) solar p-mode oscillations having periods less than nine minutes. In none of these studies, however, have longer-period p- or g-modes been unambiguously identified. As an aid to the analysis of the observational power spectra at shorter periods, we present here theoretical eigenfrequencies of p- and g-mode oscillations having degrees less than 4 and periods longer than nine minutes. We will next compare frequencies computed from the "standard" solar models of different groups and we will also present the corresponding frequencies from several different "non-standard" solar models.

6.4 High Frequency Waves in the Photosphere, S. L. Krall, AGU, Pamela A. Melroy, Wellesley College - We have measured phase shifts between line displacement fluctuations at various intensity levels in FeI 5576 and 6302 for frequencies up to 40 mHz. Waves with frequencies between 4.2 mHz and 10 mHz are propagating upwards with propagation velocities near the sound speed. The amplitude of the fluctuations corresponds to approximately 100 m/s. Although we measure power in the fluctuations above 10 mHz, the phase shifts drop to zero above 8 mHz. Earlier observations (Deubner, Solar Phys., 39, 31; and Schneider, Solar Phys., 47, 435) report that the phase shifts drop to zero above 8 mHz. This suggests that we have achieved higher resolution and better image stability than previous observations and that the high frequency cutoff in phase shifts results from atmospheric and instrumental seeing as...