Magnetic Field Evolution observed in conjunction with SMM, 19-26 June 1980. G.A. CHAPMAN, R.C. THORMAN, and J.K. LAWRENCE, SFO/CSU, Northbridge. A sequence of magnetograms and 5172Å filtergrams were obtained of several active regions from 19 June to 26 June 1980, inclusive. From a preliminary analysis of these data we have found several rapid changes in the morphology and magnetic flux in parts of these regions, most notably Hale no. 16931 (Boulder no. 2530). This region underwent rapid growth in flux between about 21 June to 24 June. A north-south oriented flare occurred at the location of this active region on 19 June 1952 UT but before any clear evidence was seen of the region's rapidly erupting magnetic field. A two-ribbon flare occurred in Hale no. 16918 (Boulder no. 2517) on 21 June 0048 UT. A portion of the flare extends to the southeast ending over the umbra of a large sunspot in Boulder no. 2519. The magnetograms show the penumbra of this spot to be less circularly symmetric during the two days before this flare, and more circularly symmetric on the day after the flare. This work has been supported, in part, by grant no. NGL3233 of the National Aeronautics and Space Administration.

HXIS: Instrument and observations, DULJEMAN, A., HXIS/SMM. - The Hard X-ray Imaging Spectrometer (HXIS) on board of the SMM satellite is capable of imaging hard X-rays (3.5 - 30 KeV) emitted during a solar flare. Its spatial resolution is 8" x 8". When operating in its high time resolution mode the instrument transmits one image every 1.5 s. The design of the instrument and its principal components will be shown together with some observational results.

Sunspots and the Solar Constant, A.D. MEYER and G.A. CHAPMAN, SFO/CSU, Northbridge. The Extreme Limb Photometer (ELP) has been used to measure the brightness deficit of the major sunspots occurring on the solar disk on a number of days in 1980 in support of the SMM/ACRIM experiment. We will present some of the data from 22-25 July 1980. We map the brightness excess or deficit of an active region by pointing the axis of rotation of the ELP away from disk center, and taking data in successive sets of scans such that each set is offset by one aperture length from each other. These data were obtained at A = 525nm with a bandpass of 70nm. Bolometric values, representing the regions contribution to a change in the solar constant are approximately 6% of the brightness changes, P(B), given here. In all cases we have assumed that the quiet sun is unchanged in brightness. The contribution of active region no. 2570 (Hale no. 16983) on 22 July 80 was -3.35 x 10^-10 to the apparent solar brightness, P(B). On 24 July active region no. 2577 (Hale no. 16992) contained a large sunspot at 813 W24. This spot made a contribution to P(B) of -1.20 x 10^-10. We also mapped the secular change in the contribution to P(B) due to active region no. 2571 (Hale no. 16985) on three successive days as the region approached the limb. The contribution of this region was -8.8 x 10^-10, -7.6 x 10^-10, and -6.0 x 10^-10 on 23, 24 and 25 July 80, respectively. Its positions on these three days were W34, W47, W60, respectively, at about 320. The corresponding values of r/R are 0.68, 0.80, and 0.90. Results of mapping all major regions, some at wave lengths from 0.42 to 1.0µm will be compared with ACRIM results in the near future. This research was supported principally by NASA grant NGR-53030.

The EUV Fine Structure of the Chromosphere-Corona Transition Zone Above a Sunspot, K. W. NICOLO, NRL, O. K. KERSTEN-MG, UNIV OF OSLO, J.-B. F. BARTOE, and G. E. BRUENNER, NRL - Ion emission line intensities between 1170 and 1700 Å allow one to determine the differential emission measure (DEM) and electron pressure (P_e) of the plasma in the solar transition zone (TZ). The Doppler shifts and line widths of these lines also give a measure of the non-thermal energy of the TZ plasma. All of these values for a sunspot are measured from data obtained with the NRL High Resolution Telescope and Spectrograph with 0.06 Å spectral and one arc-sec spatial resolution. Models of T_e versus mass column density are derived from the DEM and P_e values for 35 resolution elements in the sunspot umbra and penumbra. The umbra models connect smoothly with those determined for lower T_e from the Ca II and K lines (Kosner and Mattei). An estimate of the energy budget (to first order) as a function of T_e for a static plane parallel transition zone shows that an energy input is required to balance the radiative energy losses. The observed divergence of the enthalpy flux for the umbra downflows can balance the radiative losses for T_e between 30,000 and 200,000 K.

The resulting models also describe the observations that a large amount of TZ plasma with T_e between 200,000 and 10^6 K is present above sunspots, while the amount of