photon fluxes could be determined. From this sample we have extracted data for all the statistically significant maxima (1564 in number).

One of the questions which our study addresses is whether individual maxima share the spectral properties of the flares in which they are embedded. In particular, we have looked for signatures of hardening and softening within the temporal maxima. In many cases, we have found that the peaks do not share the overall spectral character of their parent flare: Type B (soft-hard-soft) flares may have peaks which show type C (soft-hard-hard) character within them. Further, we have found that the individual flare maxima tend to have rates of hardening or softening that are very different from the corresponding rates seen in the parent flares considered as a whole. Since Type C flares tend to be gradual and of long duration, we have looked for a correlation between peak duration and changes in the rate of hardening from the beginning to the end of each peak. There appears to be no such correlation.

Our results seem to show that the temporal fine structure in flares does not mimic the overall temporal structure. This may mean that the fine and coarse temporal structures are governed by different physics. We shall discuss these and other related results in detail.

41.06
Interacting Confined-Eruptive Flare Sites within a Magnetic Active Region Complex
G. A. Gary (MSFC), G. Poletto (Arcetri), M. E. Machado (UIAH)

We have investigated the extensive magnetic structures that interlink within an active region complex using the data obtained by the Hard X-ray Imaging Spectrometer (IXIS) and magnetic field morphology using Kitt Peak National Observatory (KPN) and Marshall Space Flight Center (MSFC) magnetograms. The main study is an analysis of the topology and structure of the large scale features observed by IXIS between separated active regions. The temporal correlation of X-ray activity at various sites within the active region complex implies a physical link and interaction between these sites. The specific effect of expanding magnetic fields in confined-eruptive flare sites is investigated as a mechanism to explain the reported observations. The semi-continuous reconnection near the photosphere with an associated evolving magnetic field may be the effect which induces energy released at remote sites; this effect is seen as a possible source of soft X-ray variability and simultaneity between the regions. We propose that the cause of the onset of the flares and subflares are exogenous, whereas the energy of the flares are endogenous. What determines the magnetic topology for the overlapping, large interconnected loops systems, as well as the evolution of these systems, is presented for active regions AR 2530 and AR 2522 for 1980 June 23-26.

41.07
Variation of Hard X-Ray Flare Characteristics Observed by ISEE-MICE during Solar Cycle 21
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The hard X-ray spectrometer on the International Cometary Explorer (ICE - formerly known as ISEE-3) spacecraft consisted of a NaI (TI) scintillator, 22 cm² in area and surrounded by a plastic anticoincidence shield. The instrument measured photon spectra in 12 channels with a nominal energy range of 26 keV to 3.2 MeV. The exact X-ray energy range could be varied by command. Typically, the time resolution was 0.5 - 4.0 seconds depending on the energy channel, with a complete spectrum being read out every 4 seconds. Of the solar flares observed by the hard X-ray spectrometer during the period August 1978 - December 1986, we found approximately 7000 solar flares for which power law photon spectra covering at least two energy channels could be fit to both the observed peak counting rates and the total photon counts. The effective sensitivity of this data base is approximately 1.6 photons/cm²/sec for photons with energy > 30 keV. This data base was used to determine the number of hard X-ray flares observed per day above various thresholds of photon energy. The observed occurrence frequencies were corrected for data gaps and binned by month. In addition to the occurrence frequency of hard X-ray flares, variation of average spectral parameters during the solar cycle was also examined. The slope of the size distribution of hard X-ray flares is found to vary substantially during the solar cycle with pronounced changes especially during the 155-day recurrence periods. The size distribution tends to be significantly flatter in the maximum phase of the 155-day periods than in the minimum phase. This is consistent with results found in a study of SMM-HXRBS results by Bai (1992). A comparison of the long term variations of the hard X-ray flares with other related solar activity parameters, such as Hα flares and soft X-ray flares, will be presented. Implications of these results with regard to the mechanisms of the solar cycle variation will be discussed.

41.08
The X10 Flare of 1991 June 9: White Light, H-alpha, Magnetic Fields, and Electric Currents

We present observations by several instruments of the white-light flare (WLF) of 1991 June 9 01:34 UT. A white-light image from the National Astronomical Observatory of Japan indicates the location of the WLF within the active region (NOAA 6659). Stokes polarimetry from Moen Solar Observatory (University of Hawaii) yields a vector magnetogram and a map of the vertical electric currents. Also from Moen comes Hα imaging spectroscopy, which is an indicator of such specific chromospheric processes as nonthermal electron precipitation, high coronal pressure, and mass motion. Both Moen instruments provide continuum images, allowing coregistration of the various datasets. The white-light emission arises from an extended area including both sunspot umbra and penumbra. The active region magnetic field is strongly nonpotential and has numerous vertical electric current channels. The WLF is situated in an area of relatively low current density at the edge of the strongest current in the active region, and the nearby magnetic neutral line is highly sheared. The WLF site shows electron precipitation, but only in its penumbral portion; stronger magnetic mirroring in the umbra may inhibit precipitation there. Also, the precipitation is not especially strong (relative to that observed elsewhere in this flare), suggesting that the electron-beam model for WLFs is not appropriate in this case. Also, the lack of strong redshifts argues against a dynamical energy transport model.

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42.01
First Results from 5-Element Observations with the OVRO Solar Array
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We report the first synthesis imaging results using the 5 antennas of the newly expanded solar array at Owens Valley Radio Observatory. The observations were made on 1991 Oct 24 and give the spatial and spectral structure of the complex active region NOAA 6891 as well as the spatial, spectral, and temporal structure of three flares that occurred during our observations. We show aperture synthesis maps of the active region from 1.2 to 7 GHz, with spatial resolution from 60" to 9" over the same range, and plot brightness temperature spectra for various points in the maps to show the region of dominance of free-free emission versus the region of dominance of gyrosresonance emission. From the free-free dominated spectra we can deduce the coronal column density and temperature as a function of position over the active region. Where the source...