Observations of the solar filigree in the magnesium b lines and of solar magnetic fields in the magnesium b2 line provide strong evidence for the concentration of solar magnetic fields in the subgranular structures called filigree.

A3 A New Component of Solar Magnetism - The Inner Network Fields. W. C. LIVINGSTON and J. HARVEY, Kitt Peak National Obs. - Low resolution slow scan magnetograms have in the past indicated that even inside the photospheric network cell magnetic flux is detectable everywhere. Recent 512-channel magnetograms obtained with the McMath Telescope in 1974 were interpreted to resolve these fields interior to the network into discrete elements. Some very preliminary characteristics for the inner network fields are: 1. Polarisities are mixed and evidently independent of the surrounding dominate-field, or network, polarity. Many elements seem bipolar but the flux seldom balances. 2. Flux elements as small as 51014 maxwells are detected (implying a size of 50 km if B = 2000 G). 3. Lifetime is not yet defined but little or no change is seen in 5 days and field patterns separated by 20 arc seconds appear unrelated. 4. In some cases the inner-network fields show a radial movement - 0.5 km/s toward the presumed cell boundaries.

A4 Interpreting XUV Spectroheliograms in Terms of Coronal Magnetic Field Structures. N. R. SHEELEY, JR., J. D. BOHLIN, G. E. BRUECKNER, J. D. PURCELL, V. E. SCHERRER, and R. TOUSEY, U. S. Naval Research Laboratory. It has become generally accepted that X-ray and XUV images of the sun can be used to map coronal magnetic fields. This paper compares Skylab/NRL XUV spectroheliograms with KPNO magnetograms in an attempt to examine the apparent relation between the coronal emission flux and the projected coronal magnetic fields in more detail than has been possible heretofore.

A5 Temperature and Density Measurements of Coronal Loops. R.C. CHASE, L. GOLUB, A.KREI1EGER, J.K. SILK, ASSL, G.S. VAiana, M. ZOIME, E.CFPA, and A.P. TIMOTHY, NASA HQ - X-ray photographs obtained by the AS & E S-054 telescope experiment on Skylab show numerous coronal loop structures with one or both footpoints in an active region. A selection of these loops representing a wide range of X-ray brightness were chosen for analysis. Temperature, density, length, and width measurements of the loops are presented. Transverse and longitudinal variations in X-ray intensity are studied. This work was supported by NASA under contracts NASB-27758 and NASB-31017.

A6 Emerging Flux Regions Observed by S-056. J.A. VORPAHL, The Aerospace Corporation, Los Angeles, Ca. This paper discusses coronal magnetic field characteristics resulting from new photospheric flux, as suggested by recent X-ray observations made by the S-056 Mariner II Aerospace experiment. The instrument is an x-ray telescope which produces high-resolution images of the sun in the soft X-ray region between 0.6 and 0.8 A. Some spectral information is obtained through the use of thin, full filters. It is not known exactly how well the observed X-ray structures correlate with the coronal magnetic field. It can be said, however, that the data are highly structured, rather than indicating a uniform atmosphere in hydrostatic equilibrium. The shape and location of the emerging structures strongly suggest a magnetic influence. For example, x-ray bright features are frequently linear, bridge the local neutral line, and often take the form of arcs or clusters of arches which suggest the magnetic field of a bipolar region. We show the data in an x-ray structures associated with photospheric field growth and decay in several regions, indicating that near active region no.x on September 1-4, 1973. Analysis yields the following conclusions regarding soft x-rays and changing photospheric fields: 1) the emergence of new flux in the photosphere is followed within a few hours by significant changes in the x-ray radiation; the latter consist of one or more low amplitude bright line features positioned across the neutral line and enclosed by an envelope of higher, fainter loops at lower temperatures; 2) when the photospheric field decreases or polarities separate, the corresponding x-ray structures become diffuse and lose their sharp definition within hours after the photospheric change; and 3) although linear X-ray features connect active regions with the polarities in the surrounding photosphere, these X-ray striations are never as bright as the associated with new, concentrated bipolar fields.

A7 The Pressure Balance and Currents in Active Region Loop Structures. P.V. FOURCAL, Center for Astrophysics, Harvard Univ. and Smithsonian Astrophysical Obs. - Observations with the Harvard spectrometer on ATIC show that most active region EUV loops are visible with high contact points at temperatures between 105 K and 106 K. It is shown that the loops are easily visible in transition region lines principally because they contain a core of cool material at temperatures extending down to chromospheric values. The material in most of these structures seems to be within a factor two of gas pressure balance with an active region corona of 2 x 106 K, although occasional loops show pressure excesses as high as a factor six. Systematic deviations of some loops from calculated potential fields imply current densities along field lines that are large compared to the current densities across field lines required to balance the radial pressure gradients calculated in the same structures. Thus the primary current generator in most loops would seem to be a twisting rather than a dilation of the lines of force.

B1 Observations of Weak Solar Magnetic Fields with the Lockheed Diode Array Magnetograph. R. C. SMITHSON, Lockheed Solar Observatory. - The Lockheed Diode Array Magnetograph has been used to map weak magnetic fields with extremely high sensitivity in quiet regions of the sun. These magnetograms show large areas.