

SPATIALLY RESOLVED OBSERVATIONS OF SOLAR ACTIVE REGIONS
IN SOFT X-RAYS AND CENTIMETRIC WAVELENGTHS

By

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Soft X-ray images of solar active regions obtained by the S-054 experiment on Skylab have been compared with simultaneous interferometric observations at 2.8 cm. The radio data consist of one-dimensional scans with a spatial resolution of 16 arcseconds in the East-West direction. The resolution, although lower than the X-ray telescope resolution, is high enough for a detailed comparison.

We have found that there is a general correspondence in position and size between X-ray and radio sources, but relevant differences are also present. In particular, very bright, narrow components at 2.8 cm appear coaligned with regions of very weak X-ray emission. These strong radio components appear to be localized directly above sunspot umbrae.

Models of active regions are investigated both for the atmosphere directly over the sunspot umbra and for regions above the adjacent plage. The presence of the magnetic field is taken into account and its effects on the energy dissipation and on propagation of radio waves are discussed. A model of the upper transition region and corona is proposed which accounts for the emission in both spectral ranges and appears consistent with recent ultraviolet observations of active regions and sunspots.