SKYLAB: A PROGRESS REPORT

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(Presented by G. Newkirk)

Abstract. The Skylab Apollo Telescope Mount contains six principal instruments spanning the X-ray to visible wavelength range. These experiments include an externally occulted white light coronagraph from the High Altitude Observatory which observes the outer solar corona from 1.5 to 6.0 radii from Sun center, in broadband (3500–7000 Å) white light with approximately 10″ spatial resolution. An X-ray spectrographic telescope of the American Science and Engineering, Inc. employs six filters and an objective grating to observe a 48′ field of view in the wavelength range 3.5–6.0 Å, with approximately 3″ spatial resolution. A scanning ultraviolet polychromator, spectroheliometer of the Harvard College Observatory is capable of observing 1.2 Å spectral resolution from 300–1350 Å with a 7 detector array. The field of view of the instrument is determined by its operational mode and ranges from 5′ × 5′ to 5″ × 5″. An X-ray telescope from the Marshall Space Flight Center employs five metal filters to observe the 5–33 Å spectral region with 2.5″ spatial resolution over the 40′ field of view. The Naval Research Laboratory has supplied two instruments: the first, an XUV spectroheliograph, covers wavelength regions 150–335 Å and 321–625 Å, with somewhat better than 5″ spatial resolution and a spectral resolution of 0.13 Å (for a 10″ feature). The second instrument, a slit spectrograph, covers the spectral range 970–3940 Å in two bands, 970–1970 and 1940–3940, and has 0.5 and 0.1 Å spectral resolution respectively, with a 2″ × 60″ slit. Additionally, these principal experiments are supported by two Hα telescopes and a broadband (150–600 Å) ultraviolet monitor for astronaut use. All experiments except that of the Harvard College Observatory (which utilizes photoelectric detectors) employ film to be recovered and installed during astronaut extravehicular activity. Operating in concert in a joint observing program designed to obtain observations of certain solar phenomena, the experiments have now completed more than two months of manned operation and, in the case of the AS&E, HCO and HAO instruments, approximately two additional months of unmanned operations. Representative preliminary results are outlined from several of the experiments below.

DISCUSSION

Pneuman: One thing that perplexes me about these apparent changes in the white light corona is that, if we observe the corona in the green line, one has to look for a long time to see any changes at all. Of course, that bubble you showed was a real transient, but couldn't some of those other rather subtle changes be also due to perspective effects?

* The National Center for Atmospheric Research is sponsored by the National Science Foundation.

Gordon Newkirk, Jr. (ed.), Coronal Disturbances, 489–490.

Newkirk: The hour-by-hour changes in the fine scale ray structure appear to be quite common. At present we do not know what fraction of these changes are produced by the turning on and off of fine jets of coronal plasma, by the influence of waves, or by perspective changes.

Schmidt: In Asilomar you put forward the conjecture that one might see the current sheets in the streamers only for a short time, from the right viewing angle. In one of the early frames of the movie there was a thin radial feature. Could this be such a feature?

Newkirk: I think that feature was an artifact but other features whose appearance and disappearance are due to perspective changes have been seen.

Schmidt: Which magnetograms were used to identify the X-ray bright points with bipolar magnetic features?

Newkirk: I don't know.

Kiepenheuer: Are the knots moving with the same velocity as the expanding blob?

Newkirk: The knots are probably Hα emitting blobs and appear to be moving slower.

Vrabec: Would the bright points in the low corona correspond to the emerging flux regions described by Martin.

Martin: The lifetime, size, distribution on the disk, and approximate number (50–100 day^{-1}) of X-ray bright points agrees very well with our observations of ephemeral regions. I think they are probably the same solar features.

Smith: With the wide bandwidth of the coronagraph, will it be possible to determine the densities in transients?

Newkirk: We cannot directly distinguish Thompson scattering and line emission in say Hα but concomitant Skylab and ground observations and the observed polarization should allow these components to be separated to determine densities, masses, etc.