# SOLAR PROGRAM AT MANILA OBSERVATORY

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The sun is the most important object in the sky for man. The sun which appears to be the model of constancy is in fact quite variable. Storms rage on the sun's surface and influence the earth. To detect these events the Manila Observatory maintains a dawn to dusk surveillance of the sun daily. Direct observations are made with various optical and radio instruments. Indirect detectors of solar activity measure directly ionospheric and geomagnetic effects.

White light observations are made with two 4-inch refractors, one in Baguio City and the other in Quezon City. These make possible sunspot studies of various kinds. The sun in Hydrogen H$\alpha$ is monitored with a 10-inch refractor fitted with a Lyot filter. This is used for flare patrol and for prominence studies. The beam is split into four outputs: (a) to the eyepiece for detailed visual viewing, (b) to the 35-mm camera for taking pictures at the desired rate, (c) to the photocell of a sun-follower for optimizing the tracking, and (d) to the TV camera so that the sun may be viewed on a TV screen at a convenient place or places. Each 35-mm frame contains a filtergram of the sun, a density step wedge for calibration, the face of a 24-hour clock with a seconds hand, and whatever has been written on a data slate. For prominence photography at the solar limb, any one of a set of occulting cones may be used.

To view the sun at other optical wavelengths the spectroheliograph is used. In general the wavelengths of interest are the Hydrogen H$\alpha$ and Calcium K lines, but other wavelengths are easily obtained. A pair of 16-inch coelostat mirrors directs sunlight to the 12-inch objectives mirror of an off-axis Gregorian system with a choice of either 8-inch or 3-inch secondary mirror. All optics are of fused quartz. The 6-by-8-inch diffraction grating contains 15,000 lines to the inch.

The daily work consists of obtaining sunspot numbers, measuring sunspot areas and locations and classifying them according to the Zurich scheme. Calcium plages are measured with respect to area and position, and so too with H$\alpha$ flares. The start, peak and end times of flares are determined. Descriptions are given of prominences, filaments, facular areas, flares and sunspot formations. All this information is coded and tabulated. During flare activity more frequent filtergrams, spectroheliogram and sunspot photographs are taken.

The radio sun is monitored at six single-frequencies, 8800, 4995, 2695, 1415, 606 and 245 MHz and with a swept-frequency interferometer radiometer in the 24-48 MHz band. Daily solar flux values are measured at about meridian transit. Because the coverage is continuous, solar bursts are recorded and immediately measured. Recorders are run at high, medium and low gains. This insures that the extremes of great and small bursts are detected. Some great bursts show an increase of 10,000 X within minutes. The time evolution characteristics of radio flares are classified according to Covington's scheme while the spectra of radio bursts are classified according to Castelli's scheme.

Indirect detectors of solar activity measures such ionospheric and geomagnetic effects as the following: Shortwave Fadeout (SWF), Sudden Enhancement of Atmospherics (SEA), Sudden Cosmic Noise Absorption (SCNA), Sudden Phase Anomaly (SPA), geomagnetic storm sudden commencement (SSC) and magnetic crochet (sfe). Each effect is associated