expected flare rate for each of the next 7 days, which can be then used to provide numerical guidance to the forecaster.

Possible errors in the daily-averaged region classifications may be caused by the rapid evolution of the region or the difficulty in properly classifying the region at the field site. This is addressed by extracting the number of times that each of the classifications was reported from each observing site for the same region and day. This gives a quantitative measure of which classifications tend to be neighbors in the evolutionary sequence or have neighboring classification properties. The results of this neighborliness study will be used to address whether additional improvements in utility of the derived evolutionary statistics would be expected if some of the classes were merged or eliminated.

22.18

Studying Solar Flares at a Small College Observatory
G. D. Toot and J. C. Krueger (Alfred U.)

22.19

What Do Stellar Flares Tell Us About Solar White Light Flares?
G. H. Fisher (U. Hawaii), S. L. Hawley (OCIW)

We have studied the evolution of the flare continuum occurring in the giant ($E_{rad} \geq 3 \times 10^{34}$ erg) flare of 1985 April 12 on the star AD Leo. We find that the continuum spectrum is fit extremely well by a black body with a temperature ranging from 8400–9500K. Detailed spectra show that the continuum rises into the blue with little evidence of a Balmer jump. The energy flux radiated from a black body with the above temperature range is $\geq 10^{11}$ erg cm$^{-2}$ s$^{-1}$.

Standard models for energy release during the impulsive phase of solar flares can predict similarly large energy fluxes using observed hard X-ray count rates and flare areas. It is nearly impossible, however, to get this much energy down to the photosphere (which is the only place there is enough continuum opacity to form a black body) by transporting particles; nearly all of the nonthermal electron flux is stopped in the upper chromosphere. This is the basic enigma of white light flares; the stellar analogue is the question of what powers the continuum in stellar flares.

Two clues are that (1) theoretical models suggest that virtually all the energy deposited in the chromosphere by e.g. nonthermal electrons is converted into “metal” losses, and (2) the observed UV spectra in the AD Leo flare show a forest of intense UV lines and band heads in the 1500–3000Å range. We therefore suggest that white light emission in both solar and stellar flares is formed by reprocessing the “metal” losses into the photosphere, which must heat up until its effective temperature is large enough to re-radiate the energy deposited by the UV lines. One can then relate the black body temperature to the deposited flux of particles: $\sigma T^4_B = 1/2 E_{flux} + 4 T^4_p$, where $E_{flux}$ is the flare energy flux deposited in the chromosphere and $T_p$ is the preflare photospheric temperature. This work was supported by NASA grant NAGW-864 and NSF grant ATM-88-22366.

22.20

On the Direction of the Currents at Magnetic Neutral Points
J.M. Fontenla (CSPAR/UAH), J.M. Davis (NASA/MSFC)

We consider the direction of the currents which would flow across the neutral points between independent impacting magnetic structures. These currents would result from the dynamic behavior of the sources of the magnetic field structures.

In simplified cases we show that vertically flowing currents distort the field horizontally without raising the plasma, i.e., without increasing the plasma gravitational potential energy. The stressed configurations can produce the magnetic field shear often observed in active regions and filaments. We suggest that the stressed configurations can result in metastable situations which may lead to both flares and prominence eruptions. Observations which support our scenario are described.

Session 23: RISE Poster Session

23.01

TOTAL IRRADIANCE AND THE SOLAR CYCLE

H.S. Hudson (UCSD) and R.C. Willson (JPL)

The total solar irradiance, corrected for the direct effects of sunspots via PSI, varied by about 0.1 percent during 1978–1990, in a pattern resembling the solar cycle as seen for example in the sunspot number. This variation has previously been described as resulting from active-region faculae and the "active network." By smoothing the total-irradiance time series, we find that the data in the vicinity of 1980 do not match the general pattern, showing a significant excess over the level "predicted" by correlations against other solar-cycle parameters. The ACRIM and Nimbus-7 data agree closely in this interval. The existence of the excess in 1980 suggests the presence of an additional mechanism for solar luminosity variation on time scales comparable with a solar cycle.

23.02

Total Solar Irradiance Variations Compared with Ground-based Photometry at the SFD

G.A. Chapman, J.K. Laurence (SFD/CSUN), and H.S. Hudson (UCSD)

A large sunspot group crossed the central meridian of the solar disk on about 1 July 1988. This time period corresponded to the appearance of a significant dip in the solar irradiance as measured by the ACRIM/SMM experiment. On either side of this dip are peaks in the irradiance. Earlier fits to this time period have been refined by using the orbital mean values of the irradiance, linearly interpolated to the mean time of the CFDI (Cartesian Full Disk Telescope) observations made at the San Fernando Observatory. For a four week period, centered on 1 July 1988, we find a best fit to the ACRIM data using the photometric sunspot deficit, pixel by pixel measurement of the darkness of a sunspot, with the photometric facular index, based on the position of each facular pixel in a X-line filter having a contrast greater than 4.8% and limb darkening model by Chapman and Meyer (1983). The fit of these data to the interpolated ACRIM data has a multiple correlation coefficient 0.88 with 18 degrees of freedom. The quiet sun irradiance determined by this fit is 1365.8 W/m$^2$. The rms residual in this fit is 0.137 W/m$^2$, or about 0.1 ppm of the mean solar irradiance. Introducing UV or 10.7 cm data reduces the goodness of the fit.

This research has been partially supported by Grants ATM-88-217634 and AST-8615309 from the NSF, and NAGW-668 and NAG-5-1219 from NASA.