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26.08
A Study of Solar Flares using the 154 Day Period
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We have investigated the properties of flares using the reported period of 154 days. The periodic flaring probability is distinctly non-sinusoidal and can be most simply represented by a square-wave with a 10% duty cycle. Comparison of the number of flares within this 10% interval to those outside has been made for different flare emissions at several intensity levels. It is found that the amplitude of the periodic modulation increases with flare size. Only active regions with a complex and compact magnetic field configuration exhibit a periodic modulation similar to that of the larger flares. These observations can be interpreted as evidence indicating the existence of two types of frequency distributions. We find that both periodic and non-periodic flare events are present, with the observed periodic size dependence caused by a change in the ratio of the two types within the interval of enhanced flare occurrence. The phenomenon shows no dependence on Carrington longitude.

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26.09
On the 152-day Periodicity of Solar Flare Occurrence
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Recently Rieger et al. (1983) discovered from SMM GRS observations that the flare occurrence rate shows a 154-day periodicity. Kiplinger et al. (1984) analyzed HESS observations of 1980-1984 to find a periodicity at a comparable period of 138 days. Bogart and Bai (1985) have analyzed observations of solar flare microwaves for the period 1968 through 1983, and have found that this periodicity is not a transient phenomenon, and the best estimate of the period is 151.8±1.0 days. In order to determine whether this periodicity is a global or local phenomenon, and whether this periodicity is due to interaction of active zones rotating at different rates, I have analyzed the coordinates of energetic solar flares observed with HESS during 1968 through 1985. I have found that this periodicity is a global phenomenon and is not due to interaction of active zones rotating at different rates.

26.10
Coronal Loop Interaction in the Post-Flare Phase
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High resolution coronagraph observations of three post-flare loop systems recorded in Fe XIV (5303Å) and Fe X (630 Å) have revealed enhanced emission at the projected intersection of some loops. At their maximum, the brightness of such enhancements in green-line emission has been measured to be up to five times greater than the brightness of the legs at places where two loops overlap. Emission from the blue line has a lifetime of approximately 10 minutes. The loop systems are typically very faint in red-line emission, but enhancement at the point of intersection can still be observed, with a lag relative to the green-line enhancement of approximately 5 minutes. The energy represented in one enhancement has been calculated to be 7×10^28 ergs, based on the assumption that the origin of the enhancement is due to the coalescence instability. The electron density has been derived from the observed cooling time from maximum green-line emission to maximum red-line emission and found to be, Ne = 10^12 cm^-3.

26.11
An Electrical Circuit Model for Two-Ribbon Flares
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Two-ribbon flares are always initiated by the eruption of a filament and the view is widely held that the eruption is the physical cause of the observed flare phenomena. We have approximated the filament as a line current and constructed the magnetic field configuration resulting from the filament current, the chromospheric return current, and, a distant background field, approximated as a dipole field. We have solved the magnetic and energy equation for the filament numerically and thus calculated the evolution of the whole magnetic field configuration.

It consists of two distinct stages by

1. A slow current build-up and hence energy storage in the corona, during which the height of the filament slowly increases and the magnetic field basically evolves through a series of magnetostatic equilibria.
2. The loss of force-equilibrium of the filament, which results in a fast eruption and the emergence of a current sheet below the filament. The strong induced electric field in this sheet causes electron acceleration and plasma heating.

The second stage is the actual flare and most of the observed flare phenomena result from the acceleration and heating in the current sheet, while the eruption of the filament leads to the interplanetary blast wave.

This global circuit description of the filament evolution is the first comprehensive model that includes both the preflare energy build-up and the energy conversion during the actual two-ribbon flare.

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26.12
Solar Flares and The Intense Geomagnetic Storm of Feb. 1986
H. A. Garcia (Space Environment Laboratory/NOAA)

On 6 February, 1986 a sudden (magnetic) storm commenced (SSC) was recorded about 1312 UT by the College Alaska Magnetic Observatory. On the following day the first of a series of major magnetic disturbances arrived with such intense normal magnetogram records were unreadable. After a brief recovery on 8 February another very intense magnetic storm produced a maximum H (horizontal field component) variation of 8100 nT which was the largest ever recorded at that station. The storm was the largest since 1960, and the 3rd largest since 1932.

Major magnetic disturbances are attributable to solar activity such as flares, low latitude coronal holes, or large flaring filaments, either occurring individually or in some combination. There is no known single kind of solar event that unambiguously produces a geomagnetic storm (although a southward interplanetary magnetic field seems to be a necessary condition) irrespective of the magnitude of the event. However, in the case of the February geomagnetic storms it is clear that the x-ray flares preceding these storms, emanating from one active region (5711), appear to have been the primary cause. What is unexplained in the