

CMEs

The following CME parameters came from the CDAW database

(https://cdaw.gsfc.nasa.gov/CME_list/catalog_description.htm):

cme_time

- date and time of first appearance in the LASCO/C2 field of view

cme_angle

- central position angle (degrees)

cme_width

- sky-plane apparent width (degrees)

cme_speed

- linear speed (km/s) obtained by fitting a straight line (aka linear or first-order polynomial fit) to the height-time measurements

initial_2nd_order

- initial quadratic speed (km/s) obtained by fitting a parabola (aka quadratic or second-order polynomial fit) to the height-time measurements and evaluating the speed at the time of final (last possible) height measurement

final_2nd_order

- final quadratic speed (km/s) obtained by fitting a parabola (aka quadratic or second-order polynomial fit) to the height-time measurements and evaluating the speed at the time of final (last possible) height measurement

20r_2nd_order

- speed (km/s) obtained as in 2nd order calculations but evaluated when the CME is at a height of 20 solar radii

cme_acceleration

- acceleration of the CME (km^2/s) can be positive, negative or close to zero meaning CMEs speed up, move with constant speed or slow down within the LASCO FOV

cme_mass

- mass of the CME (grams), estimation of which involves a number of assumptions, so the values given should be taken as representative.

cme_kinetic_energy

- kinetic energy of the CME (erg) obtained from the linear speed and the representative mass.

cme_mpa

- position angle (degrees) at which the height-time measurements are made

cme_remarks

- remarks regarding the number of data points and other limitations

cme_quality

- quality remarks separated from general remarks

cme_halo

- halo flag

- if width > 270deg then flagged 'IV'
- if 180 < width < 270 the 'III'
- if 120 < width < 180 then 'II'
- if < 120 then 'I'

The linear speed (cme_speed), width (cme_width), CPA (cme_angle), and acceleration (cme_acceleration) are regarded as the basic attributes of a CME.

Flares

The flare parameters are one of the SWPC

(<ftp://ftp.swpc.noaa.gov/pub/indices/events/README>), LMSAL, or RHESSI event lists.

Definitions below taken from SWPC:

flare_window_start

- start time of search window obtained from CME event

flare_window_end

- end time of search window obtained from CME event

flare_type

- what catalogue the event came from (SWPC, LMSAL, or RHESSI)

flare_start_time

- The UTC Time (Coordinate Universal Time, same as UT) of the beginning of the event as reported by the observing site.

flare_peak_time

- The UTC Time (Coordinate Universal Time, same as UT) of the maximum of the event as reported by the observing site.

flare_end_time

- The UTC Time (Coordinate Universal Time, same as UT) of the end of the event as reported by the observing site.

flare_string_latlon

- Location is in degrees latitude, north or south, and degrees longitude, east or west, from central meridian. The location is the spherical, heliographic coordinates of the solar region, as a distance in degrees from a line extending from the solar equator (heliographic latitude), and distance in degrees from a line extending from the north solar rotational pole to the south solar rotational pole through the center of the solar disk, as viewed from Earth (central meridian) in H-alpha.

flare_hg_latitude

- latitude (degrees), if negative direction is solar South and if positive North

flare_hg_longitude

- longitude (degrees), if negative direction is solar East and if positive Solar

flare_hcx_position

- equivalent arcsecond position on solar disk along x direction

flare_hcy_position

- equivalent arcsecond position on solar disk along y direction

flare_goes_class

- GOES flare X-ray Class, taken from peak flux in the 0.1 to 0.8 nm range (Wm^{-02})

flare_active_region_no

- The SWPC-assigned solar region number.

SEPs

To be continued...

Sunspots

The following are from the SWPC Solar Region Summaries

(ftp://[ftp.swpc.noaa.gov/pub/forecasts/SRS/README](ftp://ftp.swpc.noaa.gov/pub/forecasts/SRS/README)):

srs_observation_time

- Date and time the summary was issued (generally always 00:30UTC)

srs_active_region_no

- An active region number assigned to a sunspot group during its disk passage.

srs_string_latlon

- Sunspot group location, in heliographic degrees latitude and degrees east or west from central meridian, rotated to 2400 UTC.

srs_hg_latitude

- latitude (degrees), if negative direction is solar South and if positive North

srs_hg_longitude

- longitude (degrees), if negative direction is solar East and if positive Solar

srs_lon_extent

- Longitudinal extent of the group in heliographic degrees.

srs_carrington_lon

- Carrington longitude of the group.

srs_no_spots

- Total number of visible sunspots in the group.

srs_mcintosh

- Modified Zurich classification of the group.

srs_area

- Total corrected area of the group in millionths of the solar hemisphere.

srs_hale

- Magnetic classification of the group.

Active Regions

These were obtained by running the SMART algorithm

(https://github.com/drsophiemurray/smart_python):

smart_observation_time

- time of observation (yyyymmdd_HHMM)

smart_limb_event

- limb flag
 - if longitude > 80degrees its 'IV'
 - if 70 < longitude < 80 then 'III'
 - if 60 < longitude < 70 then 'II'
 - if longitude < 60 then 'I'

smart_string_latlon

- Centre of SMART mask in SRS string format

smart_hg_latitude

- latitude (degrees), if negative direction is solar South and if positive North

smart_hg_longitude

- longitude (degrees), if negative direction is solar East and if positive Solar

smart_hcx_position

- equivalent arcsecond position on solar disk along x direction

smart_hcy_position

- equivalent arcsecond position on solar disk along y direction

smart_total_area

- total area of detection (millionths of a solar hemisphere)

smart_negative_area

- area of negative magnetic field part of detection (millionths of a solar hemisphere)

smart_positive_area

- area of positive magnetic field part of detection (millionths of a solar hemisphere)

smart_total_flux

- total magnetic flux of detection (maxwell)

smart_negative_flux

- magnetic flux of negative magnetic field part of detection (maxwell)

smart_positive_flux

- magnetic flux of positive magnetic field part of detection (maxwell)

smart_flux_fraction

- flux fraction of detection, i.e. (posflx - negflx) / totflx

smart_b_min

- total negative magnetic field strength of detection (gauss)

smart_b_max

- total positive magnetic field strength of detection (gauss)

smart_b_mean

- mean magnetic field strength of detection (gauss)

smart_bipole_separation

- bipole separation of detection (megameters)

smart_psl_length

- polarity inversion line length of detection (megameters)

smart_r_value

- r value (maxwell)

smart_wlsg

- gradient-weighted integral length of PIL (gauss)