(Twice) Daily Synoptic Drawing Tips

Description:

The drawing is a composite ***analysis*** of solar features and a ***24-hour forecast*** of flare (C, M, X) and energetic proton event probabilities for individual active regions and the whole-disk. It is produced twice daily, scanned, posted to the SWPC web page, FTP site, and services page. It is archived by the Solar and Terrestrial Physics division of NCEI.

Features and Annotations:

- Neutral Lines (dashed lines)
- Sunspots (solid)
- Active Region Numbers (4-digits)
- Active Region Flare Probabilities (C-prob/M-prob/X-prob/Proton-prob)
- Plage (shaded red)
- Coronal Holes (solid line with inward-facing tic marks; dashed line with inward facing tics if uncertain)
- Coronal Hole Numbers (0-99), Polarity (+/-), and ISES certainty of the existence of the coronal hole from 1 = uncertain to 4 = Good.
- Filaments (solid lines, cross-hatched, often along the neutral line)

Manually Calculating Probabilities:

Recall the formula for flare probabilities for a given class of flares (e.g. M-class) from Appendix C of the Recipe for the Space Wx Discussion:

Probability(whole disk) = 1 - (1 - p_1) x (1 – p_2) x ... x (1 – p_n) where p=probability for a particular region, out to n-regions.

Example:

Three regions, with M-flare probabilities as follows:

p_1 = 0.75 (also known as 75%)

p_2 = 0.25 (also known as 25%)

p_3 = 0.10 (also known as 10%)

Then the whole disk probability for M-flares is:

Probability(M-flare whole disk) = 1 – (1 – 0.75)x(1 – 0.25)x(1 – 0.10)

= 1 – 0.25 x 0.75 x 0.90

= 1 – 0.169

= 0.831 (also known as 83%)

What the Products-Solar-Analysis-Probability Forecast gives you:

- For the Model Whole Disk Forecast
    - **Minimum** is the probability associated with the active region that has the highest probability for a given flare class.
    - **Maximum** is equivalent to the manual calculation described above, including all the regions with only 1% probability.
- So the whole disk forecast, in general, should be no lower than the minimum value and no higher than the maximum value indicated by the Model Forecast.

Considerations:

- If you need to nudge the whole-disk probabilities up or down, modify the probabilities associated with the individual regions, based on their expected evolution, so the whole-disk forecast remains consistent.
- Adjustments can also be made to account for new regions rotating on, and old regions rotating off the visible disk.