(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:

\[
\text{Probability(whole disk)} = 1 - (1 - p_1) \times (1 - p_2) \times \ldots \times (1 - p_n)
\]

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:

\[
\text{Probability(M-flare whole disk)} = 1 - (1 - 0.75)(1 - 0.25)(1 - 0.10)
\]
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.