

Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center

Please send comments and suggestions to SWPC.Webmaster@noaa.gov

### 1999 Verification Statistics for Daily M flare, X flare, and Proton Event Probability Forecasts

Forecast Type: Likelihood (probability) of the occurrence of an M flare, X flare, or Proton Event

Note: Mpred1 = M flare PREDiction day 1  
Mpred2 = M flare PREDiction day 2  
Mevents = Observed number of M flares,  
etc.

Missing data: NA

Total Records: Total number of daily forecast/observation records used to generate statistics  
365

Event Days: Total number of days in the sample on which at least one (M, X, Proton event) occurred

| Mevents | Xevents | Pevents |
|---------|---------|---------|
| 101     | 4       | 0       |

Mean observation

| Mevents | Xevents | Pevents |
|---------|---------|---------|
| 0.28    | 0.011   | 0       |

Mean, Median, and Standard Deviation of all forecasts

|        | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| mean   | 0.35   | 0.34   | 0.33   | 0.065  | 0.063  | 0.061  | 0.048  | 0.047  | 0.046  |
| median | 0.30   | 0.30   | 0.30   | 0.050  | 0.050  | 0.050  | 0.010  | 0.010  | 0.010  |
| sd     | 0.24   | 0.24   | 0.24   | 0.075  | 0.075  | 0.075  | 0.055  | 0.057  | 0.058  |

Mean, Median and Standard Deviation of forecast given the non-occurrence ( $f|x=0$ ) of an event

|        | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| mean   | 0.29   | 0.29   | 0.28   | 0.064  | 0.063  | 0.061  | 0.048  | 0.047  | 0.046  |
| median | 0.25   | 0.20   | 0.20   | 0.050  | 0.050  | 0.050  | 0.010  | 0.010  | 0.010  |
| sd     | 0.22   | 0.22   | 0.21   | 0.074  | 0.075  | 0.075  | 0.055  | 0.057  | 0.058  |

Mean, Median and Standard Deviation of forecast given the occurrence ( $f|x=1$ ) of an event

|        | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| mean   | 0.50   | 0.47   | 0.45   | 0.18   | 0.087  | 0.087  | NA     | NA     | NA     |
| median | 0.50   | 0.50   | 0.50   | 0.12   | 0.075  | 0.075  | NA     | NA     | NA     |
| sd     | 0.24   | 0.25   | 0.26   | 0.16   | 0.048  | 0.048  | NA     | NA     | NA     |

Discrimination: The difference between [Mean (f|x=1)] and [Mean (f|x=0)]

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.215  | 0.177  | 0.170  | 0.111  | 0.025  | 0.027  | NA     | NA     | NA     |

Linear correlation (r) between forecasts and observations

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.397  | 0.331  | 0.319  | 0.154  | 0.035  | 0.037  | NA     | NA     | NA     |

Mean Error, Mean Absolute Error, Mean Square Error, and Root Mean Square Errors of forecasts.

|      | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| ME   | 0.070  | 0.36   | 0.19   | 0.054  | 0.072  | 0.018  | 0.048  | 0.047  | 0.005  |
| MAE  | 0.061  | 0.36   | 0.42   | 0.052  | 0.070  | 0.130  | 0.047  | 0.046  | 0.073  |
| MSE  | 0.053  | 0.18   | 0.44   | 0.050  | 0.017  | 0.136  | 0.046  | 0.005  | 0.073  |
| RMSE | 0.345  | 0.19   | 0.44   | 0.072  | 0.019  | 0.136  | 0.048  | 0.005  | 0.074  |

Forecast skill with respect to observed climatology (same as prediction efficiency)

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.114  | 0.052  | 0.044  | -0.563 | -0.712 | -0.692 | -Inf   | -Inf   | -Inf   |