

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

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

2003 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 |
|---------|---------|---------|
| 79 | 17 | 24 |

Mean observation

| Mevents | Xevents | Pevents |
|---------|---------|---------|
| 0.22 | 0.047 | 0.066 |

Mean, Median, and Standard Deviation of all forecasts

| | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| mean | 0.30 | 0.29 | 0.28 | 0.065 | 0.061 | 0.056 | 0.064 | 0.051 | 0.042 |
| median | 0.25 | 0.25 | 0.25 | 0.050 | 0.050 | 0.050 | 0.010 | 0.010 | 0.010 |
| sd | 0.23 | 0.22 | 0.21 | 0.104 | 0.100 | 0.090 | 0.170 | 0.127 | 0.091 |

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 | 0.24 | 0.24 | 0.24 | 0.055 | 0.053 | 0.050 | 0.030 | 0.028 | 0.027 |
| median | 0.20 | 0.20 | 0.20 | 0.050 | 0.050 | 0.010 | 0.010 | 0.010 | 0.010 |
| sd | 0.18 | 0.18 | 0.18 | 0.079 | 0.083 | 0.077 | 0.046 | 0.047 | 0.040 |

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 | 0.45 | 0.41 | 0.28 | 0.21 | 0.18 | 0.55 | 0.38 | 0.26 |
| median | 0.50 | 0.40 | 0.35 | 0.25 | 0.15 | 0.10 | 0.50 | 0.25 | 0.20 |
| sd | 0.27 | 0.28 | 0.26 | 0.24 | 0.23 | 0.19 | 0.40 | 0.32 | 0.23 |

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

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.26 | 0.20 | 0.16 | 0.23 | 0.16 | 0.13 | 0.52 | 0.35 | 0.23 |

Linear correlation (r) between forecasts and observations

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.47 | 0.38 | 0.32 | 0.46 | 0.34 | 0.30 | 0.76 | 0.69 | 0.63 |

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 | 0.082 | 0.31 | 0.16 | 0.019 | 0.087 | 0.041 | -0.002 | 0.067 | 0.042 |
| MAE | 0.072 | 0.32 | 0.37 | 0.014 | 0.086 | 0.188 | -0.015 | 0.074 | 0.163 |
| MSE | 0.062 | 0.14 | 0.39 | 0.010 | 0.036 | 0.201 | -0.023 | 0.027 | 0.186 |
| RMSE | 0.297 | 0.15 | 0.40 | 0.086 | 0.040 | 0.203 | 0.058 | 0.035 | 0.204 |

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

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.179 | 0.091 | 0.037 | 0.203 | 0.095 | 0.078 | 0.569 | 0.439 | 0.321 |