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2013 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 |
|---------|---------|---------|
| 63 | 10 | 21 |

Mean observation

| Mevents | Xevents | Pevents |
|---------|---------|---------|
| 0.17 | 0.027 | 0.058 |

Mean, Median, and Standard Deviation of all forecasts

| | Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| mean | 0.23 | 0.22 | 0.22 | 0.051 | 0.050 | 0.048 | 0.069 | 0.058 | 0.049 |
| median | 0.15 | 0.15 | 0.15 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| sd | 0.19 | 0.19 | 0.19 | 0.085 | 0.084 | 0.084 | 0.175 | 0.145 | 0.119 |

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 | 0.19 | 0.19 | 0.19 | 0.046 | 0.045 | 0.044 | 0.036 | 0.040 | 0.039 |
| median | 0.15 | 0.10 | 0.10 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| sd | 0.17 | 0.18 | 0.18 | 0.075 | 0.077 | 0.081 | 0.068 | 0.095 | 0.091 |

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 | 0.40 | 0.37 | 0.34 | 0.25 | 0.22 | 0.17 | 0.61 | 0.35 | 0.21 |
| median | 0.40 | 0.40 | 0.30 | 0.22 | 0.25 | 0.17 | 0.75 | 0.20 | 0.01 |
| sd | 0.19 | 0.20 | 0.20 | 0.15 | 0.13 | 0.11 | 0.40 | 0.36 | 0.30 |

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

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.21 | 0.18 | 0.16 | 0.20 | 0.18 | 0.13 | 0.57 | 0.31 | 0.17 |

Linear correlation (r) between forecasts and observations

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.41 | 0.35 | 0.31 | 0.39 | 0.34 | 0.25 | 0.76 | 0.49 | 0.33 |

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 | 0.057 | 0.27 | 0.14 | 0.024 | 0.065 | 0.027 | 0.011 | 0.076 | 0.05 |
| MAE | 0.050 | 0.27 | 0.35 | 0.022 | 0.066 | 0.153 | 0.001 | 0.082 | 0.15 |
| MSE | 0.043 | 0.12 | 0.36 | 0.020 | 0.024 | 0.158 | -0.009 | 0.023 | 0.20 |
| RMSE | 0.264 | 0.13 | 0.37 | 0.065 | 0.025 | 0.165 | 0.056 | 0.042 | 0.22 |

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

| Mpred1 | Mpred2 | Mpred3 | Xpred1 | Xpred2 | Xpred3 | Ppred1 | Ppred2 | Ppred3 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.134 | 0.080 | 0.043 | 0.120 | 0.070 | -0.023 | 0.577 | 0.230 | 0.073 |