

CCMC community scoreboards

<https://ccmc.gsfc.nasa.gov/challenges/>



Flare Scoreboard
Upload your Flare Predictions for Full Disk and/or Active Regions.

Leads: **Trinity College Dublin** (S. Murray), **ROB** (J. Andries)



SEP Scoreboard
Under development
Help us plan and design.

Leads: **BIRA-IASB** (M. Dierckxsens, N. Crosby), **GSFC** (I. Richardson), **UK Met Office** (M. Marsh)



CME Scoreboard
Submit your CME arrivable time predictions and compare with others.

Leads: **CCMC** (L. Mays), **UK Met Office**



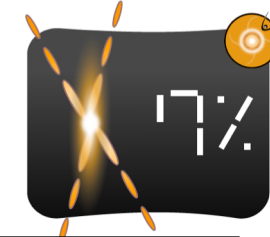
IMF Bz Scoreboard

Leads: **GSFC** (N. Savani), **PredSci** (P. Riley), **CCMC** (L. Mays)

- Scoreboards collect forecast before event is observed
- Allow a consistent **real-time** comparison of various operational and research forecasts. Complementary to non-real time model assessments.

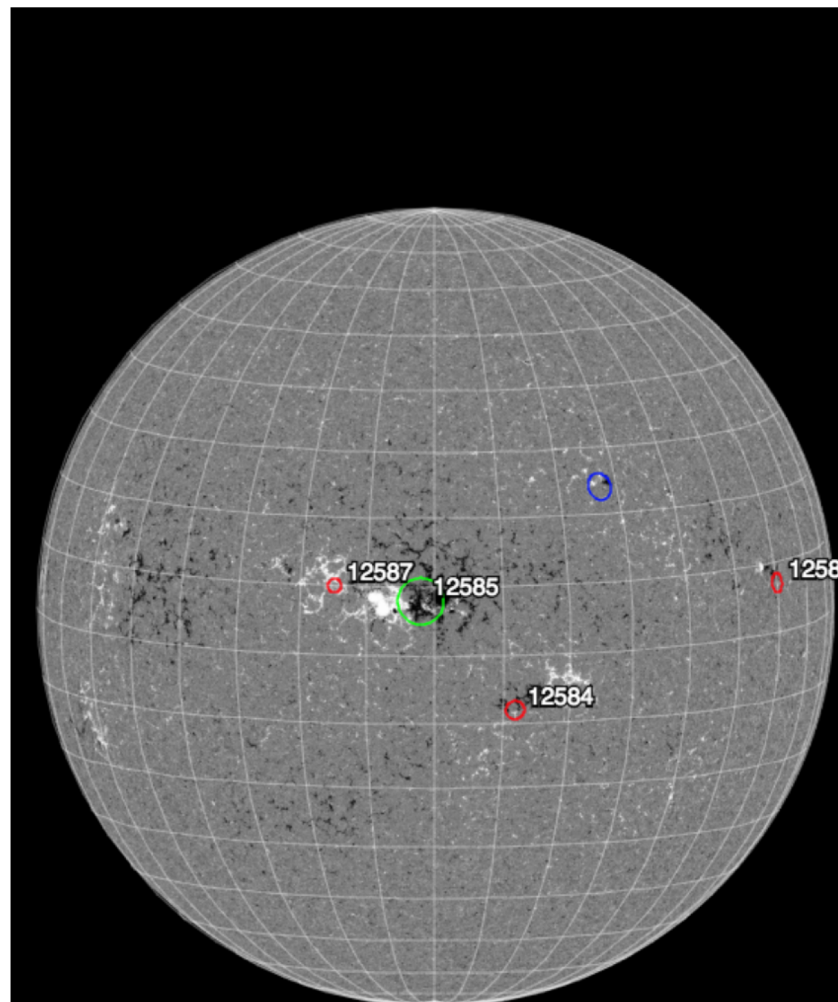


Flare Scoreboard & Working Team



<https://ccmc.gsfc.nasa.gov/challenges/flare.php>

- Allows a consistent real-time comparison of various operational and research flare forecasts.
- Automated system; model developers can routinely upload their predictions to an anonymous ftp
- Forecast data is parsed and stored in a database which accessible to anyone via an API
- This project is led by Sophie Murray (TCD) and the planning group includes expert scientists as well as operational space weather prediction centers.
- Collaborating with ISEE/PSTEP "BenchMarks for Operational Flare Forecasts Workshop" study



○ NOAA Active Regions
○ Other Active Regions

N08E02 Region Flare Predictions (24 hour)			
ASAP_1	C : 58%	M : 18%	X : 3%
BoM_flare1		M+ : 5%	X : 1%
NOAA_1	C : 50%	M : 10%	X : 1%
AMOS_v1	C+ : 61%	M+ : 16%	X : 2%
Averages	C : 54%	M : 14%	
	C+ : 61%	M+ : 10%	X : 2%

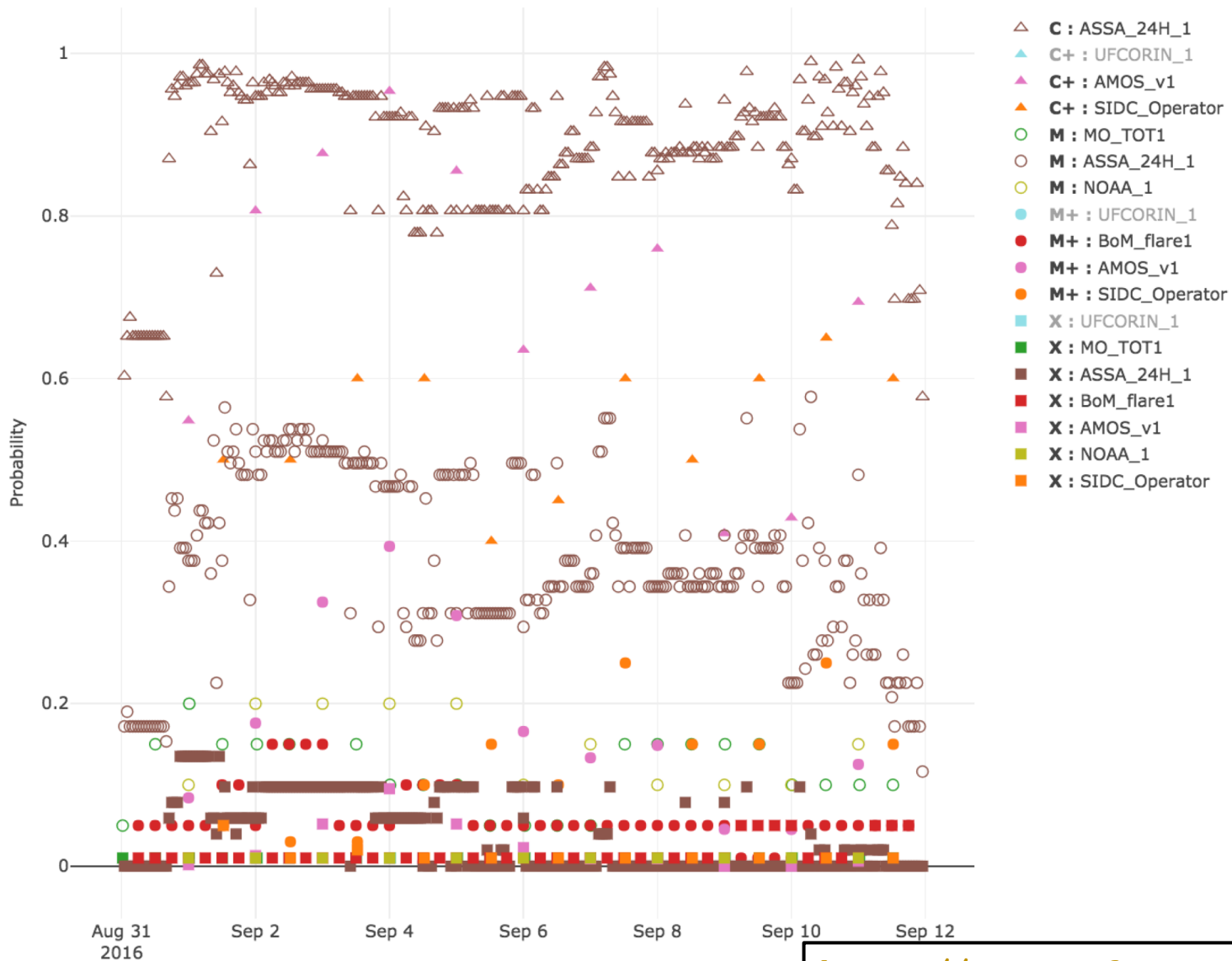
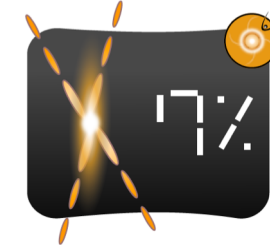
Region Location Details	
ASAP_1	
ASAP_1 AR#:	2 (N08E02, 2016-09-06 00:00:00.0)
BoM_flare1	
NOAA AR#:	12585 (N08E02), R: 2.35, Beta
NOAA_1	
NOAA AR#:	12585 (N08E02), R: 2.35, Beta
AMOS_v1	
NOAA AR#:	12585 (N08E02), R: 2.35, Beta
AMOS_v1 AR#:	0 (N08E02, 2016-09-06 00:00:00.0)

Full Disk Predictions (24 hour)			
UFCORIN_1	C+ : 43%	M+ : 0%	X : 0%
MO_TOT1		M : 5%	X : 1%
ASSA_24H_1	C : 81%	M : 29%	X : 6%
BoM_flare1		M+ : 5%	X : 1%
AMOS_v1	C+ : 64%	M+ : 17%	X : 2%
NOAA_1		M : 10%	X : 1%
Averages	C : 81%	M : 15%	
	C+ : 53%	M+ : 7%	X : 2%



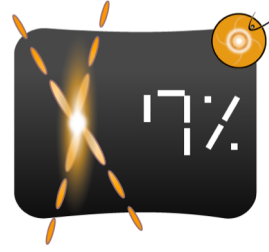
Flare Scoreboard: Probability Timeseries

Full Disk 24 Hour Predictions

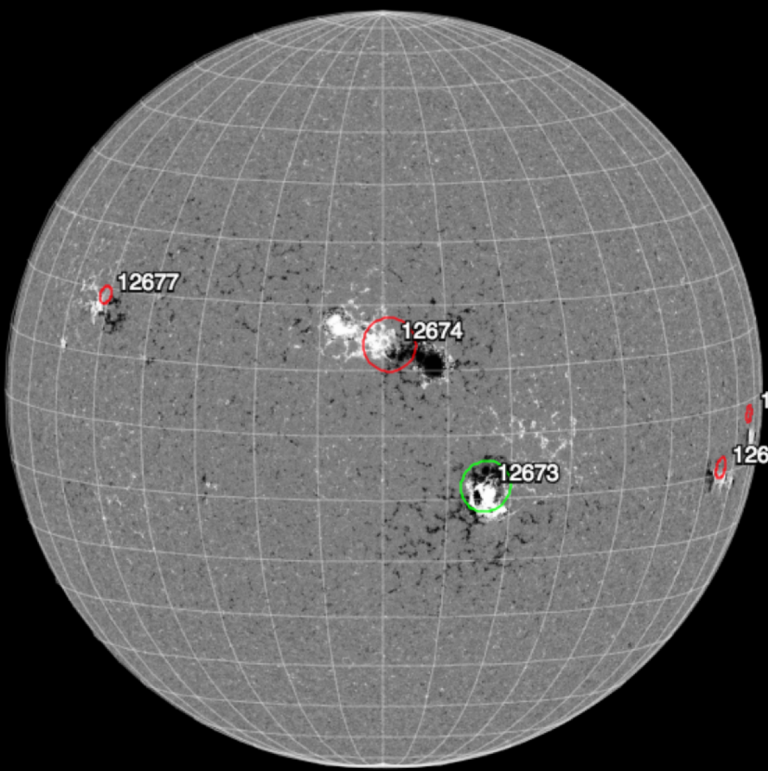


<https://ccmc.gsfc.nasa.gov/challenges/flare.php>

Flare Scoreboard: Sep 2017



Solar Flare Scoreboard



S08W16 Region Flare Predictions (24 hour)

NOAA_1	C : 95%	M : 60%	X : 20%
AMOS_v1	C+ : 94%	M+ : 48%	X : 10%
Averages			
	C : 95%	M : 60%	
	C+ : 94%	M+ : 48%	X : 15%

Region Location Details

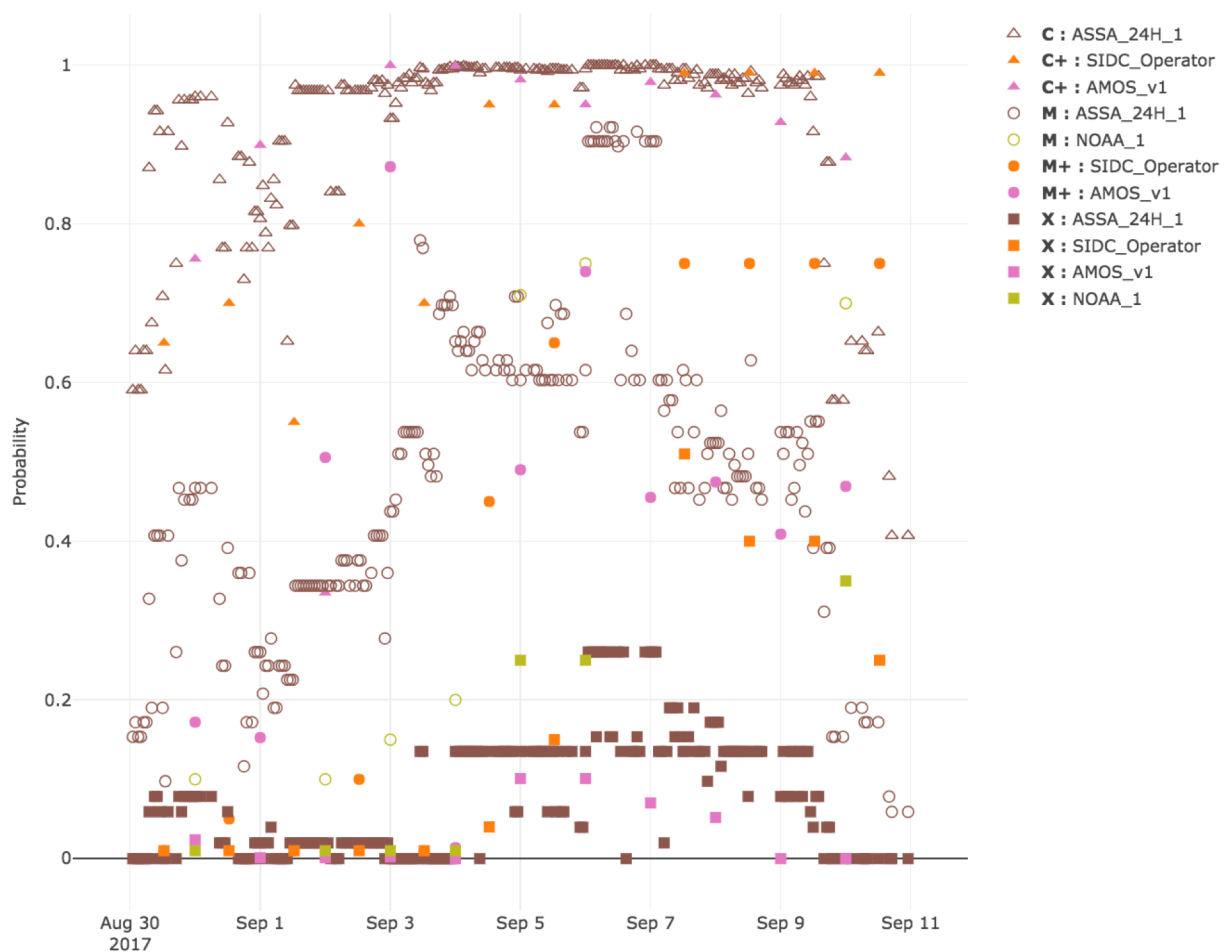
NOAA_1
NOAA AR#: 12673 (S08W16), R: 2.99, Beta-Gamma-

AMOS_v1
NOAA AR#: 12673 (S08W16), R: 2.99, Beta-Gamma-
AMOS_v1 AR#: 0 (S08W16, 2017-09-05 00:00:00.0)

Full Disk Predictions (24 hour)

ASSA_24H_1	C : 99%	M : 60%	X : 14%
AMOS_v1	C+ : 98%	M+ : 49%	X : 10%
NOAA_1		M : 71%	X : 25%
Averages			
	C : 99%	M : 66%	
	C+ : 98%	M+ : 49%	X : 16%

Full Disk 24 Hour Predictions

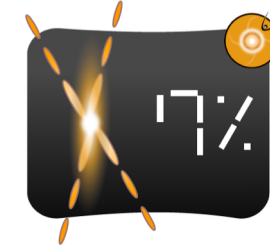


Start time (and issue time) of 24-hour prediction window

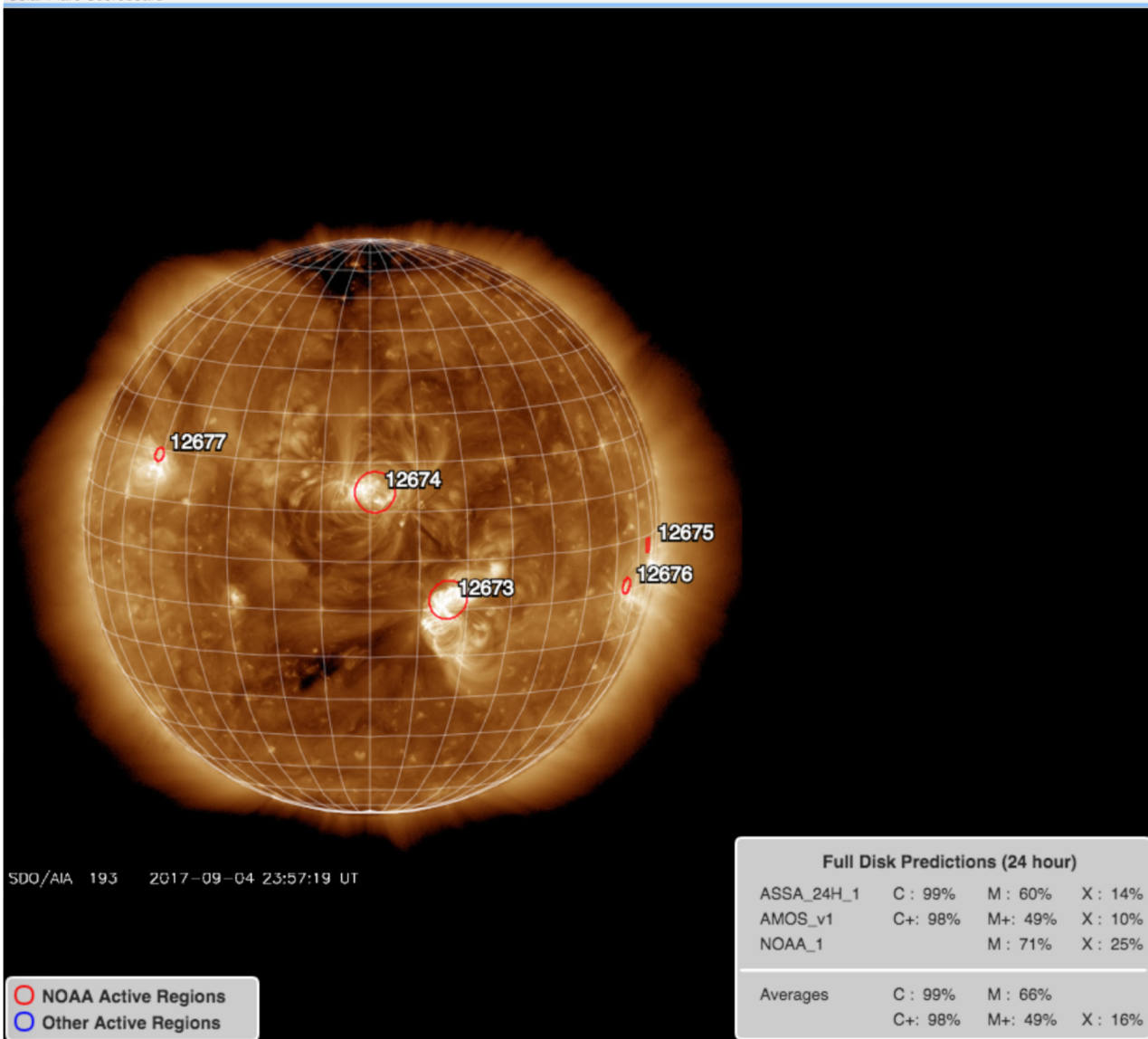
NOAA Active Regions
 Other Active Regions



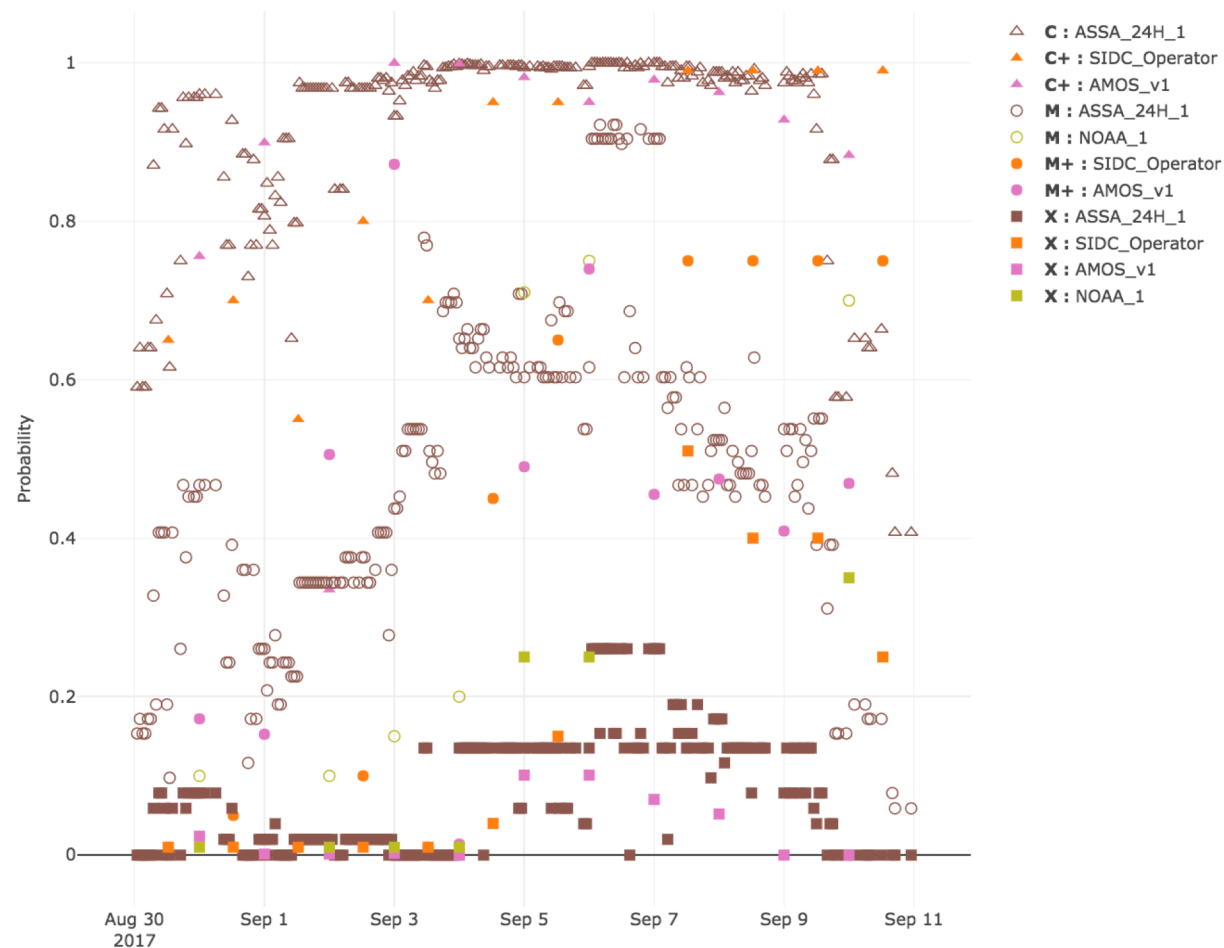
Flare Scoreboard: Sep 2017



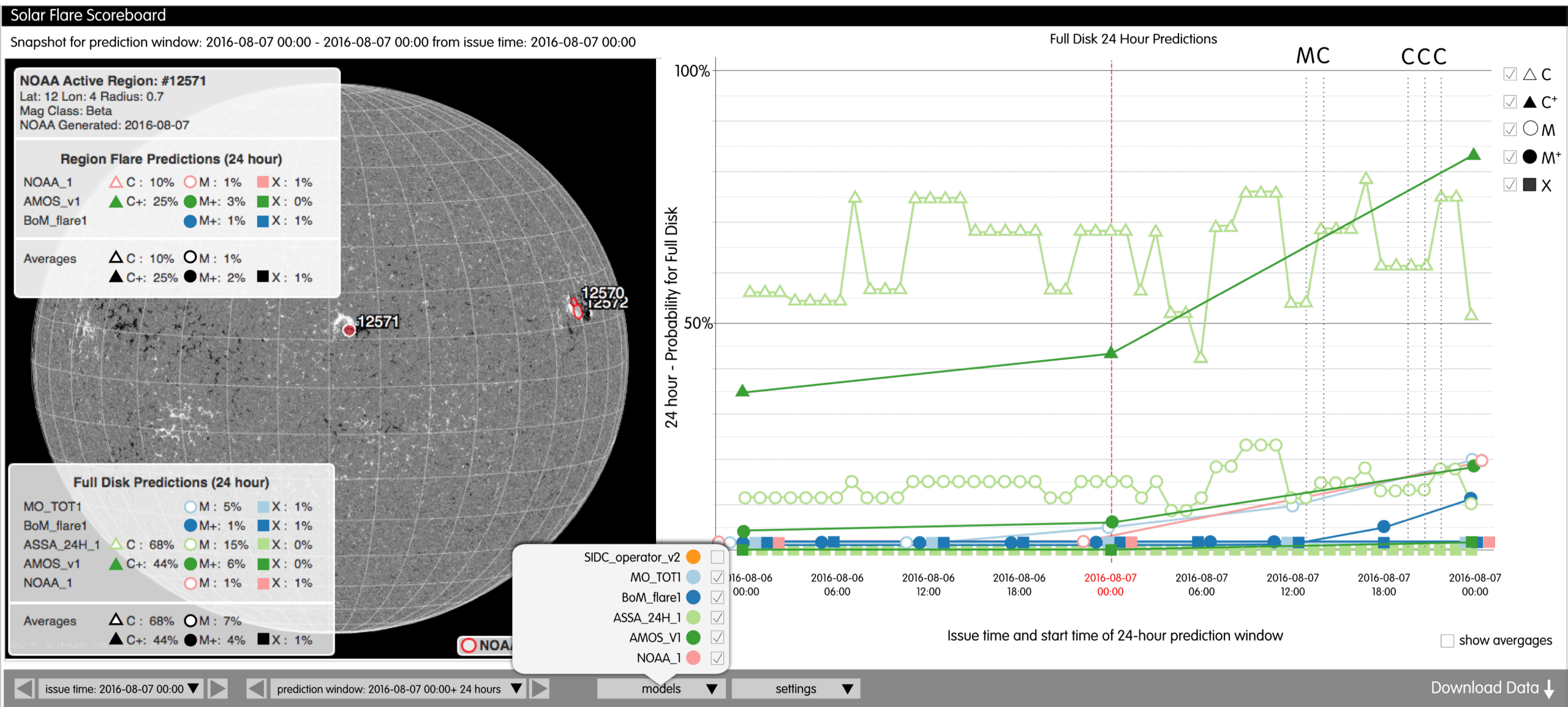
Solar Flare Scoreboard



Full Disk 24 Hour Predictions



Flare Scoreboard: original planning mockup





<https://iswa.ccmc.gsfc.nasa.gov/IswaSystemWebApp/flarescoreboard/hapi/catalog>

```
{
  "HAPI": "1.1",
  "catalog": [
    {
      "id": "SIDC_Operator_FULLDISK",
      "title": "SIDC human operator moderated",
      "type": "FULLDISK",
      "version": "2"
    },
    {
      "id": "SIDC_Operator_REGIONS",
      "title": "SIDC human operator moderated",
      "type": "REGIONS",
      "version": "2"
    },
    {
      "id": "MO_TOT1_FULLDISK",
      "title": "Met Office",
      "type": "FULLDISK",
      "version": "1"
    },
    {
      "id": "BoM_flare1_FULLDISK",
      "title": "Australian Bureau of Meteorology, Space Weather Services Flarecast automatic
forecast",
      "type": "FULLDISK",
      "version": "1"
    },
    ...
  ]
}
```

Solar Flare Scoreboard API - INFO



https://iswa.ccmc.gsfc.nasa.gov/IswaSystemWebApp/flarescoreboard/hapi/info?&id=NOAA_1_FULLDISK

```
{
  "HAPI-API": "1.1",
  "parameters": [
    {
      "fill": null,
      "length": 22,
      "name": "start_window",
      "type": "isotime",
      "units": "UTC"
    },
    {
      "fill": null,
      "length": 22,
      "name": "end_window",
      "type": "isotime",
      "units": "UTC"
    },
    {
      "fill": null,
      "length": 22,
      "name": "issue_time",
      "type": "isotime",
      "units": "UTC"
    }
  ],
}
```

```
{
  "fill": null,
  "name": "M",
  "type": "double",
  "units": "probability"
},
{
  "fill": null,
  "name": "X",
  "type": "double",
  "units": "probability"
}
],
"startDate": "2016-05-02T00:00:00.0",
"status": {
  "code": 1200,
  "message": "OK"
},
"stopDate": "2017-11-01T00:00:00.0"
}
```

Input Parameter:
id (required)

JSON returned:
startDate,
stopDate
parameters:
(start_window,
end_window,
M,C,X)

The Heliophysics Application Programmer's Interface (HAPI) data access specification is a RESTful API and streaming format specification for delivering digital time series data. The HAPI specification describes a minimum set of capabilities needed for a server to allow access to the time series data values within one or more data collections.

Solar Flare Scoreboard API – DATA (JSON)



```
https://iswa.ccmc.gsfc.nasa.gov/IswaSystemWebApp/flarescoreboard/hapi/data?
&id=NOAA_1_FULLDISK
&time.min=2017-10-25 00:00:00.0
&time.max=2017-10-31 00:00:00.0
&format=json
```

```
{
  "HAPI": "1.1",
  "data": [
    [
      "2017-10-25T00:00:00.0",
      "2017-10-26T00:00:00.0",
      "2017-10-22T22:00:00.0",
      0.1,
      0.01
    ],
    [
      "2017-10-25T00:00:00.0",
      "2017-10-26T00:00:00.0",
      "2017-10-24T22:00:00.0",
      0.01,
      0.01
    ],
    [
      "2017-10-26T00:00:00.0",
      "2017-10-27T00:00:00.0",
      "2017-10-24T22:00:00.0",
      0.01,
      0.01
    ],
    [
      "2017-10-27T00:00:00.0",
      "2017-10-28T00:00:00.0",
      "2017-10-24T22:00:00.0",
      0.01,
      0.01
    ],
    . . . ,
  ]
}
```

```
],
"format": "json",
"parameters": [
  {
    "fill": null,
    "length": 22,
    "name": "start_window",
    "type": "isotime",
    "units": "UTC"
  },
  {
    "fill": null,
    "length": 22,
    "name": "end_window",
    "type": "isotime",
    "units": "UTC"
  },
  {
    "fill": null,
    "length": 22,
    "name": "issue_time",
    "type": "isotime",
    "units": "UTC"
  },
  {
    "fill": null,
    "name": "M",
    "type": "double",
    "units": "probability"
  },
  . . .
]
```

Input Parameter:
id (required)
time.min (required)
time.max(required)
format(csv or json)
parameters (optional)

JSON returned:
Data + Info

Solar Flare Scoreboard API – DATA (CSV)



```
https://iswa.ccmc.gsfc.nasa.gov/IswaSystemWebApp/flarescoreboard/hapi/data?
&id=NOAA_1_FULLDISK
&time.min=2017-10-25 00:00:00.0
&time.max=2017-10-27 00:00:00.0
&format=csv
```

**CSV returned:
Data + Info**

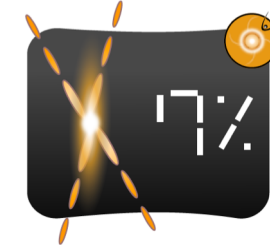
```
#{
# "HAPI": "1.1",
# "format": "csv",
# "parameters": [
# {
#   "fill": null,
#   "length": 22,
#   "name": "start_window",
#   "type": "isotime",
#   "units": "UTC"
# },
# {
#   "fill": null,
#   "length": 22,
#   "name": "end_window",
#   "type": "isotime",
#   "units": "UTC"
# },
# {
#   "fill": null,
#   "length": 22,
#   "name": "issue_time",
#   "type": "isotime",
#   "units": "UTC"
# },
# {
#   "fill": null,
#   "name": "M",
#   "type": "double",
#   "units": "probability"
# },
```

```
. . .
# {
#   "fill": null,
#   "name": "X",
#   "type": "double",
#   "units": "probability"
# }
# ],
# "startDate": "2016-05-02T00:00:00.0",
# "status": {
#   "code": 1200,
#   "message": "OK"
# },
# "stopDate": "2017-11-02T00:00:00.0"
#}
2017-10-25T00:00:00.0,2017-10-26T00:00:00.0,2017-10-22T22:00:00.0,0.01
2017-10-25T00:00:00.0,2017-10-26T00:00:00.0,2017-10-24T22:00:00.0,0.01
2017-10-26T00:00:00.0,2017-10-27T00:00:00.0,2017-10-24T22:00:00.0,0.01
2017-10-27T00:00:00.0,2017-10-28T00:00:00.0,2017-10-24T22:00:00.0,0.01
2017-10-26T00:00:00.0,2017-10-27T00:00:00.0,2017-10-25T22:00:00.0,0.01
2017-10-27T00:00:00.0,2017-10-28T00:00:00.0,2017-10-25T22:00:00.0,0.01
2017-10-28T00:00:00.0,2017-10-29T00:00:00.0,2017-10-25T22:00:00.0,0.01
2017-10-27T00:00:00.0,2017-10-28T00:00:00.0,2017-10-26T22:00:00.0,0.01
2017-10-28T00:00:00.0,2017-10-29T00:00:00.0,2017-10-26T22:00:00.0,0.01
```



Flare Scoreboard: Summary

<https://ccmc.gsfc.nasa.gov/challenges/flare.php>



Summary of flare scoreboard status

- Available since Fall 2016
- Probability time series plot now available
- API to download original files via iSWA
- Scoreboard specific API to download datastream (HAPI compliant)
- FTP server back online, more streams will be visible in real-time and old data backfilled

Future & Discussion

- Improve probability time series plot: your ideas?
- Adding new prediction methods/participants (e.g. from Flarecast, A-EFFORT)
- Create flare scoreboard mailing list for discussion
- Collaborate/support verification projects using the scoreboard