

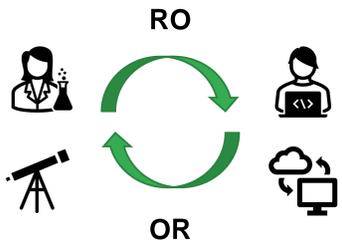
Bridging Operations to Research with the SIDC Solar Weather Event List

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SIDC Solar Weather Event List

List of solar weather events including:

- Sunspot Groups
 - Flares
 - Flare/Proton event forecast
 - Coronal holes & high-speed stream forecast
- Updated **daily** by the forecaster on duty



Connection between different types of features and events is stored

➤ **Event chains**

Information/history of each feature

➤ **Identify returning features in successive solar rotations**

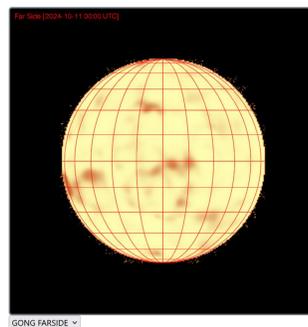
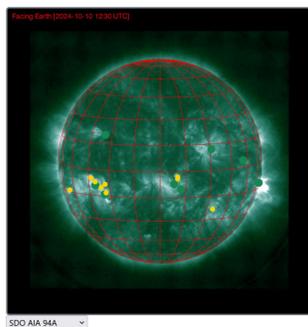
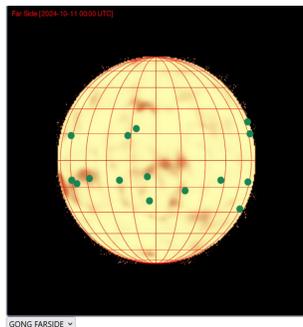
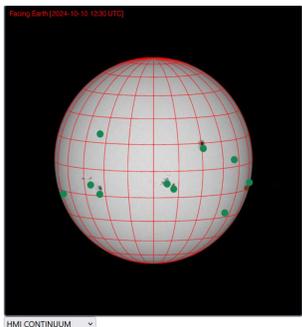
SIDC Sunspot Groups (SGs)

Existing lists/data

- NOAA Active Regions (ARs)
- Ground based observations

New data:

- SIDC USET solar observations (Brussels)
- Evaluate size, classification etc.



SIDC Flares

Flare assignment to an existing *SIDC Sunspot Group (SG)*

- Suggested association (automated) based on location, peak time or NOAA association (if available)
- Automated suggestion for Solardemon flares
- Can also treat off-disk/unassociated flares

Flare/Proton event forecasting

- Pre-filled suggestions for C,M, X flares (based on McIntosh class for each SG)
- Forecast for the next 3 days
- Full-disk flaring probabilities calculated automatically
- Categorical forecast for Proton Events

SIDC Flare/Proton Forecasts - Frontsided Sunspot Groups

SIDC #	Today (2024-10-10)		
SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Eki/growing	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Dki/stable		
C+ [%]	M+ [%]	X [%]	P [%]
99	65	10	10
99	65	10	10
99	65	10	10

Today (2024-10-10)	1 day back (2024-10-09)
Proton Forecast Category: 2024-10-10: Proton event in progress (>10 MeV)	Proton Forecast Category: 2024-10-09: Proton event in progress (>10 MeV)
2024-10-11: Proton event in progress (>10 MeV)	2024-10-10: Proton event in progress (>10 MeV)
2024-10-12: Warning condition (activity levels expected to increase, but no numeric forecast given)	2024-10-11: Warning condition (activity levels expected to increase, but no numeric forecast given)

SIDC Coronal Holes

Existing lists/data

- NOAA Coronal Hole (synoptic map)

New data:

- SIDC Coronal Hole (evaluated by the forecaster on duty)

Evaluate position, polarity and forecast high-speed stream impact

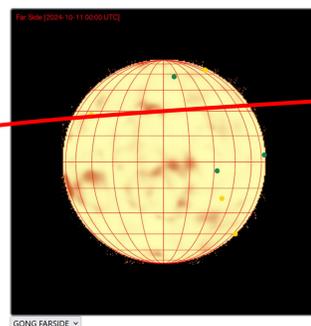
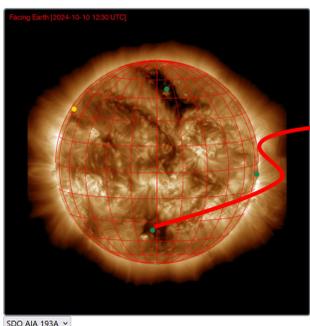
SIDC Coronal holes

Coronal Hole	First Time [UTC]	Last Time [UTC]
0053	2024-08-24 12:30	2024-10-12 00:00
0067	2024-10-04 12:30	2024-10-15 00:00
0060	2024-09-09 12:30	2024-10-16 00:00

Evaluation Time [UTC]	Location	Crossing central meridian
2024-09-09 12:30	N38E53	False
2024-09-10 00:00	N38E47	False
2024-09-11 00:00	N38E34	False
2024-09-12 00:00	N38E22	False
2024-09-13 00:00	N38E00	True
2024-09-14 00:00	N38W12	False
2024-09-15 12:30	N36W38	False
2024-09-16 00:00	N36W45	False
2024-09-17 00:00	N36W57	False
2024-09-18 00:00	N36W69	False
2024-09-19 00:00	N36W81	False
2024-10-07 00:00	N36E50	False
2024-10-08 00:00	N36E38	False
2024-10-09 07:50	N36E19	False
2024-10-10 00:00	N36E10	True
2024-10-11 00:00	N36W03	False
2024-10-12 00:00	N36W15	False
2024-10-13 00:00	N36W27	False
2024-10-14 00:00	N36W39	False
2024-10-15 00:00	N36W51	False

SIDC Coronal Hole 60 for 2024-10-10:

Internal Tag Name	SIDC Coronal Hole Number	Evaluation Time
SIDC_CoronalHole_Evaluation_2024	60	2024-10-31T14:57:08Z
Time for Location Evaluation	Longitude of center [Stonyhurst, -180 deg to 180 deg]	Latitude of center [Stonyhurst, -90 deg to 90 deg]
2024-10-10T00:00:00Z	-10	-36
Extent	Crossing Central Meridian?	Polarity
Mid-Latitude	Yes	Positive
Patchy?	Decayed	
No	No	



Forecast for High Speed Stream issued at 2024-10-10T09:35:46:		
Target: Earth	Arrival time: 2024-10-13T12:00:00	Time uncertainty: 24 hours
Impact speed: 500 km/s	Speed uncertainty: 100 km/s	Probability of arrival: 55%
Forecast for Geomagnetic Impact issued at 2024-10-10T09:35:46:		
Target: Earth	Arrival time: 2024-10-13T18:00:00	Time uncertainty: 24 hours
KBel: 5	Kindex Uncertainty: 1	Probability of occurrence: 50%

Example of event chain: The geomagnetic storm on 10/10/2024

SIDC Sunspot Groups - Frontside

Pending	SIDC #	Today (2024-10-10)	1 day back (2024-10-09)
	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Eki/growing	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Dki/stable	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Dki/decreasing
	NOAA 3848	NOAA 3848	
	USET 2		

SIDC SG 217

History (part)

SIDC Flares - Frontsided Sunspot Groups

Pending	SIDC #	Today (2024-10-10)	1 day back (2024-10-09)
	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Eki/growing	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Dki/stable	SIDC 217 (NOAA 3784/3814/3848/3878) beta-gamma-delta Dki/decreasing
	SIDC 2255 X1.8 [01:56] UTC		
	NOAA X1.8 [01:56] UTC		

SIDC Flare 2255

Associated flares (part)

Evaluation Time [UTC]	Location	Growth	McIntosh	Magnetic
2024-08-08 08:10	S15E78		Hax	NA
2024-08-09 14:30	S15E66	Growing	Hkx	NA
2024-08-10 00:30	S15E61	Decreasing	Cko	Beta
2024-08-11 00:30	S15E48	Stable	Cki	Beta-Delta
...
2024-10-03 00:30	S14E70	Growing	Dhc	Beta-Delta
2024-10-04 00:30	S13E56	Growing	Dkc	Beta-Gamma
2024-10-05 00:30	S13E42	Growing	Dkc	Beta-Gamma-Delta
2024-10-06 00:30	S13E28	Growing	Dkc	Beta-Delta
2024-10-07 00:30	S13E14	Stable	Dki	Beta-Delta
2024-10-08 00:30	S13E01	Stable	Dki	Beta-Gamma-Delta
2024-10-09 00:30	S12W11	Decreasing	Dki	Beta-Gamma-Delta
2024-10-10 00:30	S12W25	Stable	Dki	Beta-Gamma-Delta
2024-10-11 00:30	S13W39	Stable	Dki	Beta-Gamma-Delta
2024-10-12 00:30	S13W53	Stable	Dko	Beta-Gamma
2024-10-14 00:30	S13W79	Stable	Dhi	Beta-Gamma
2024-10-13 00:30	S14W67	Decreasing	Dko	Beta-Gamma
2024-10-28 09:00	S16E70	Growing	Dki	Beta
2024-10-27 10:50	S15E79	Growing	Cao	Alpha
2024-10-29 00:30	S18E61		Eki	Beta-Gamma-Delta
2024-10-30 00:30	S16E51	Growing	Eki	Beta-Gamma-Delta
2024-10-31 00:30	S16E37	Growing	Eki	Beta-Gamma-Delta

Flare	Start Time [UTC]	Peak Time [UTC]	End Time [UTC]	GOES X-ray class	Location
2255	2024-10-09 01:25	2024-10-09 01:56	2024-10-09 02:43	X1.8	S12W12
2277	2024-10-11 22:44	2024-10-11 23:20	2024-10-11 23:34	C9.7	S12W49
2278	2024-10-12 03:25	2024-10-12 03:31	2024-10-12 03:35	C5.3	S13W55