NGDC SOLAR DATA SERVICES

23 February 2007

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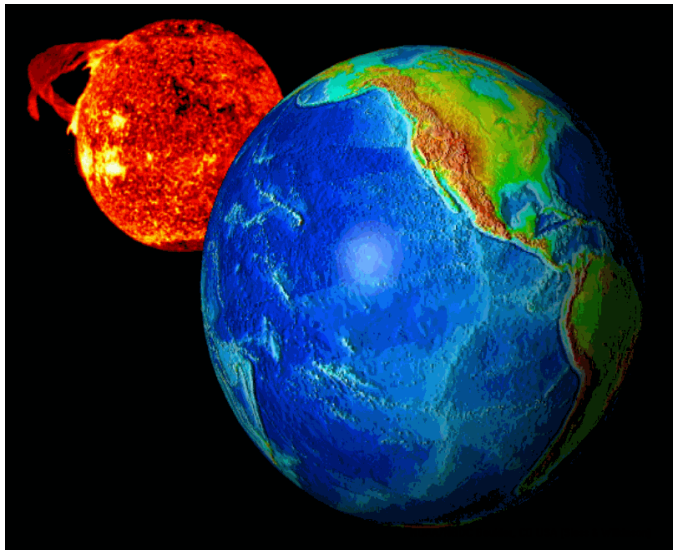
National Geophysical Data Center
Boulder, Colorado

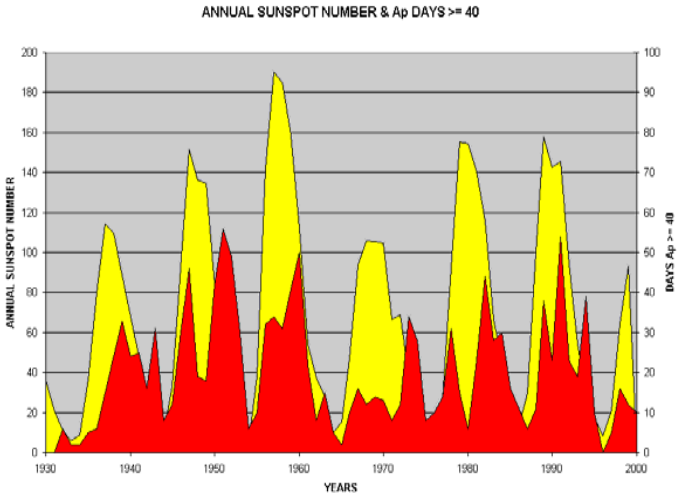
OUR VISION

To be the world's leading provider of geophysical and environmental data, information and products

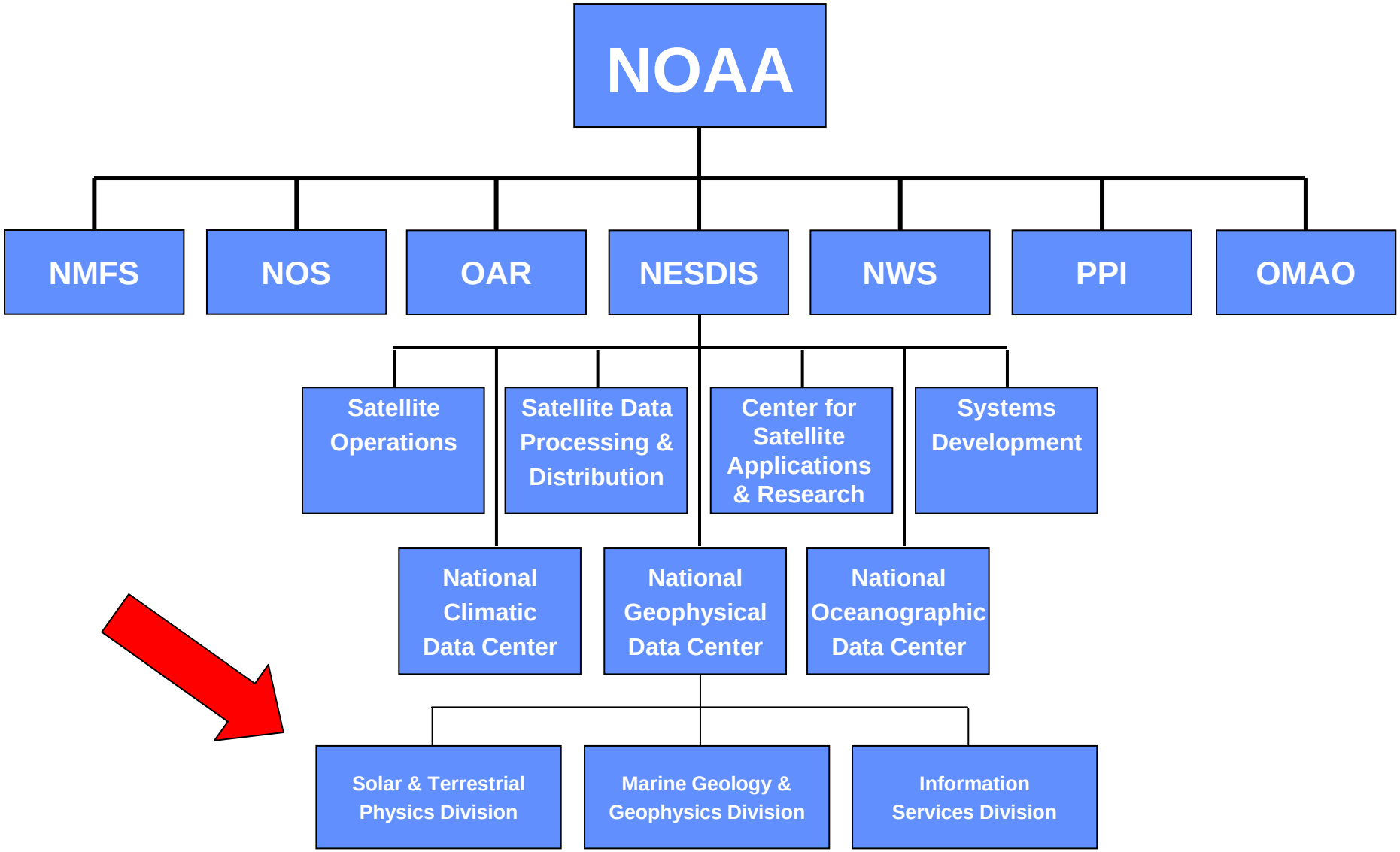
OUR MISSION

To provide long-term scientific data stewardship for the Nation's geophysical data, ensuring quality, integrity and accessibility





NOAA Organizational Chart
National Oceanic & Atmospheric Admin.



WDC – Solar-Terrestrial Physics
Solar & Terrestrial Physics Division

Solar & Terrestrial Physics Division
Dr. William Denig

Earth Observation Group
Dr. Chris Elvidge

Earth Geophysics Group
Vacant

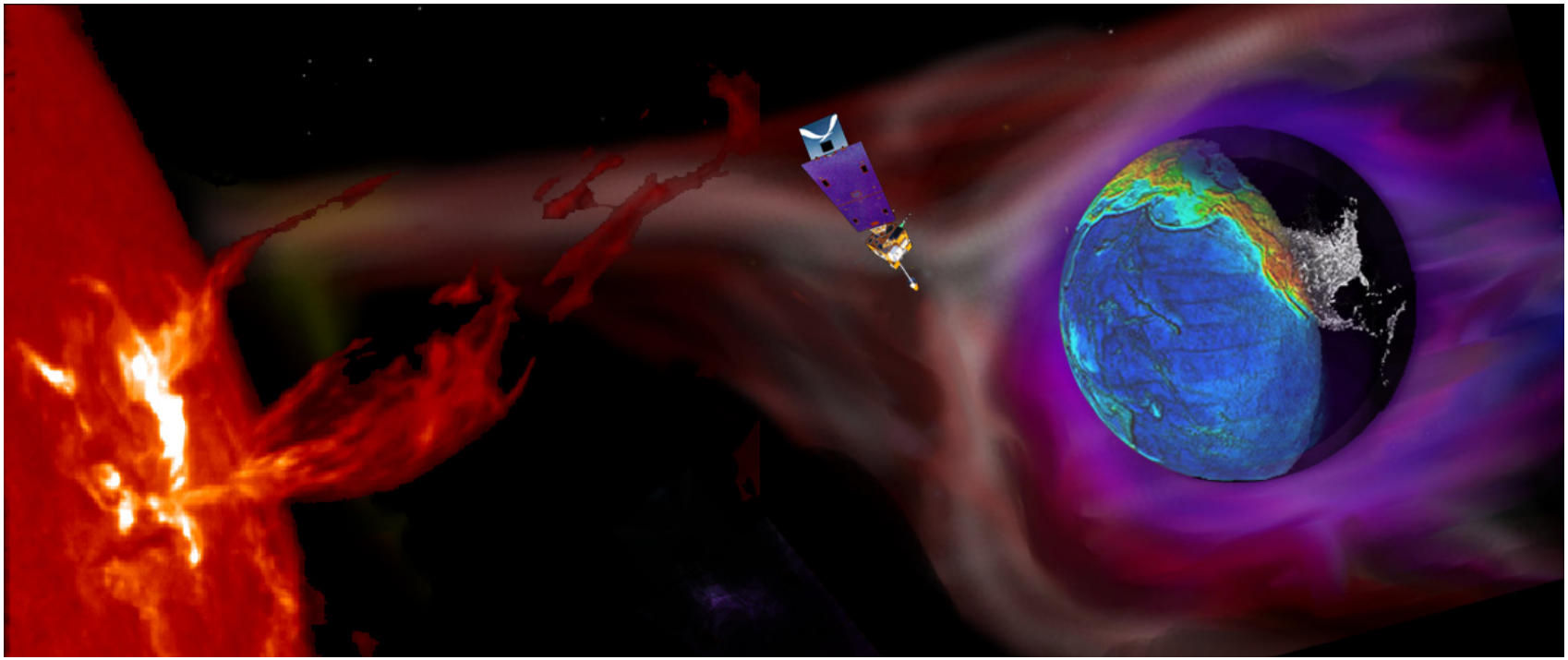
Space Environment Group
Dr. Eric Kihn

World Data Center
Solid Earth Geophysics
Susan McLean

World Data Center
Solar-Terrestrial Physics
Dr. William Denig

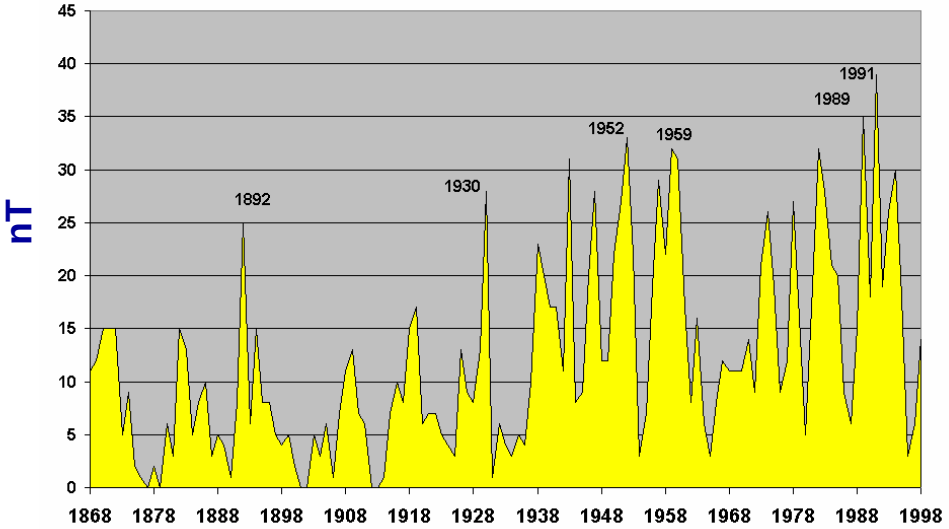
WDC – Solar-Terrestrial Physics
Space Weather

Space Weather Data record the environment that extends from the Sun to the surface of the Earth. Short and long term variations in that environment can effect satellite operations, communications, transportation and manned spaceflight.

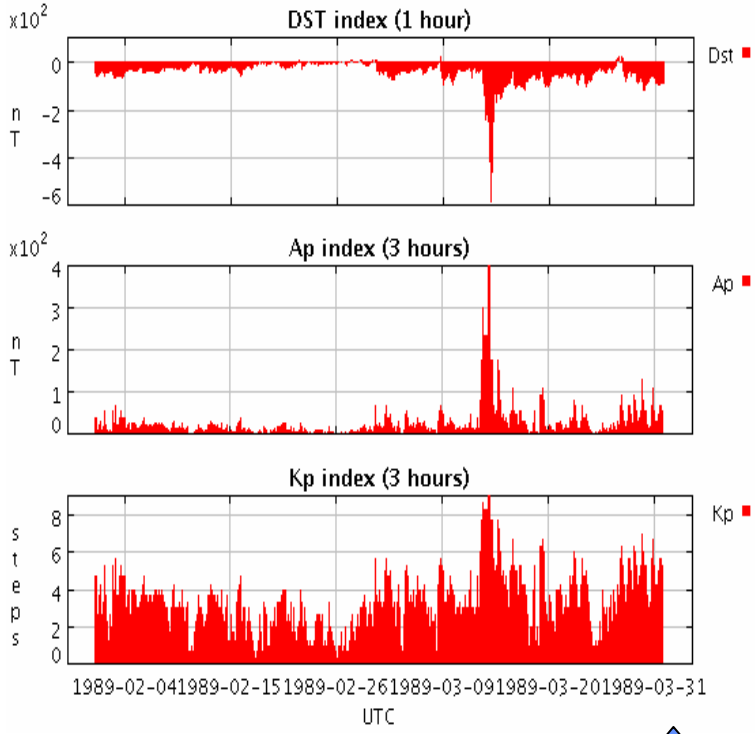


WDC – Solar-Terrestrial Physics
Geomagnetic Data Services

Geomagnetic Data: A worldwide network of magnetic observatories routinely provide one-minute recordings of the Earth's magnetic field. NGDC also maintains data that describe the long term geomagnetic variations.



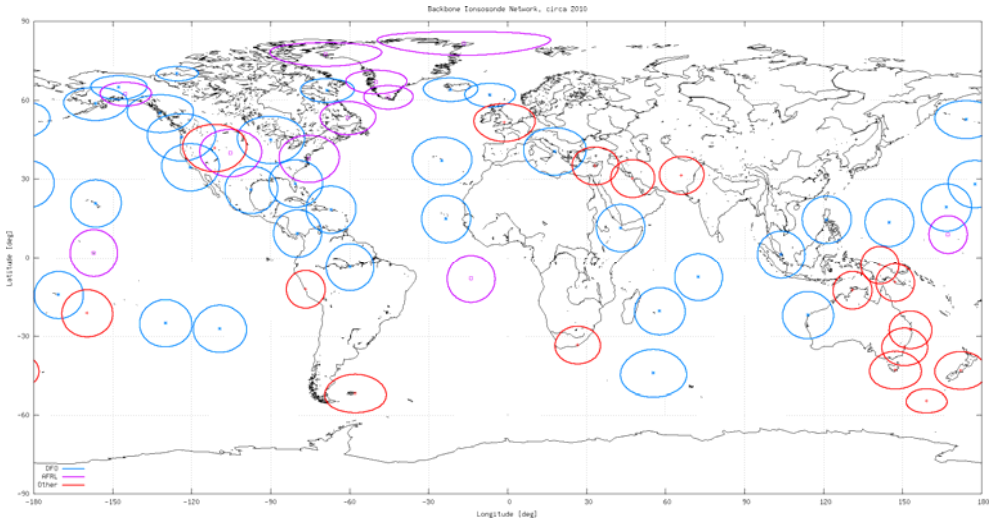
AA* Maximum 1869 - 1998



The March 13, 1989 Great Geomagnetic Storm was responsible for major disruptions in the North American power distribution system. Similar disruptions in Europe were experienced during the October 2003 geomagnetic storms.

WDC – Solar-Terrestrial Physics
Ionospheric Data Services

Ionospheric Data: Ionospheric parameters provided by an international network of observatories facilitate telecommunications, navigation and positioning using GPS systems.

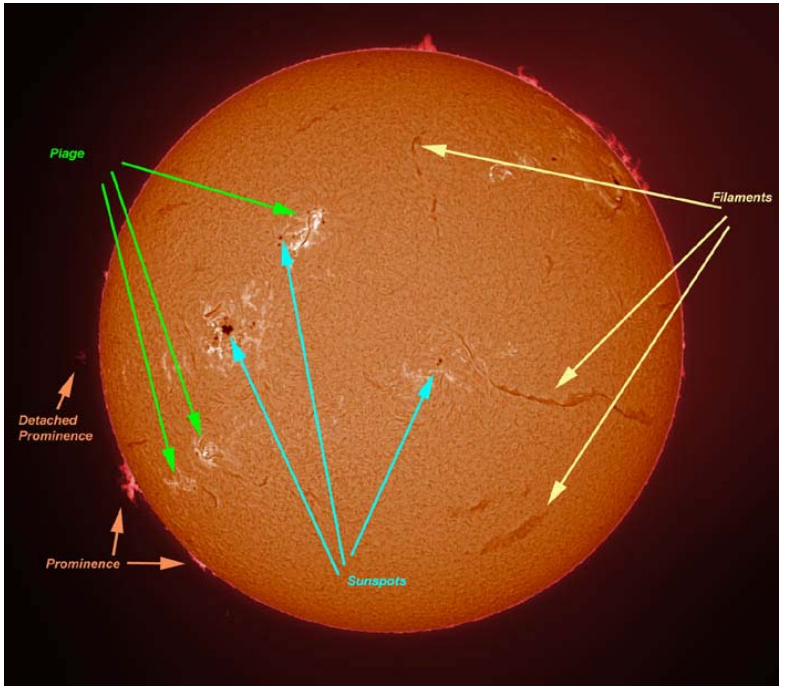


Global Ionosonde Network

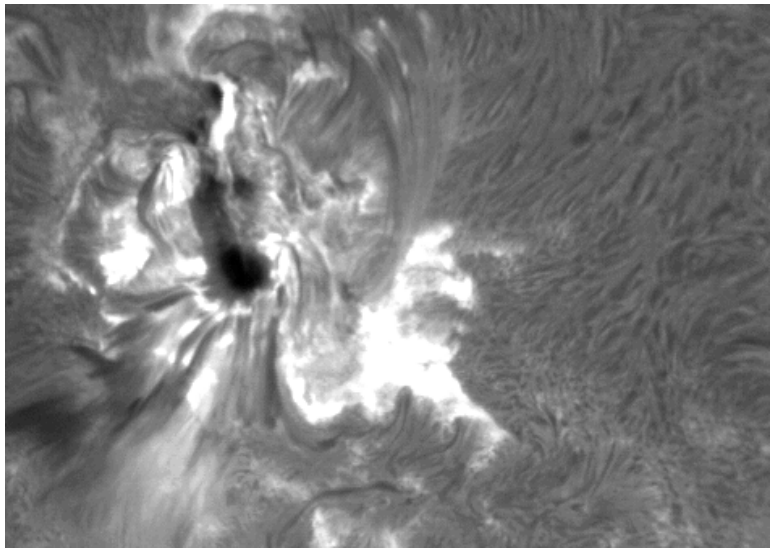
Ionosonde Antenna Construction
Wallops Island, VA (Oct '06)

WDC – Solar-Terrestrial Physics
Solar Data Services

Solar Data: WDC maintains long-term archives of solar irradiance, solar variability, solar indices, solar events, solar imagery and galactic cosmic rays. Solar-Geophysical Data (SGD) has been published continuously since 1955.



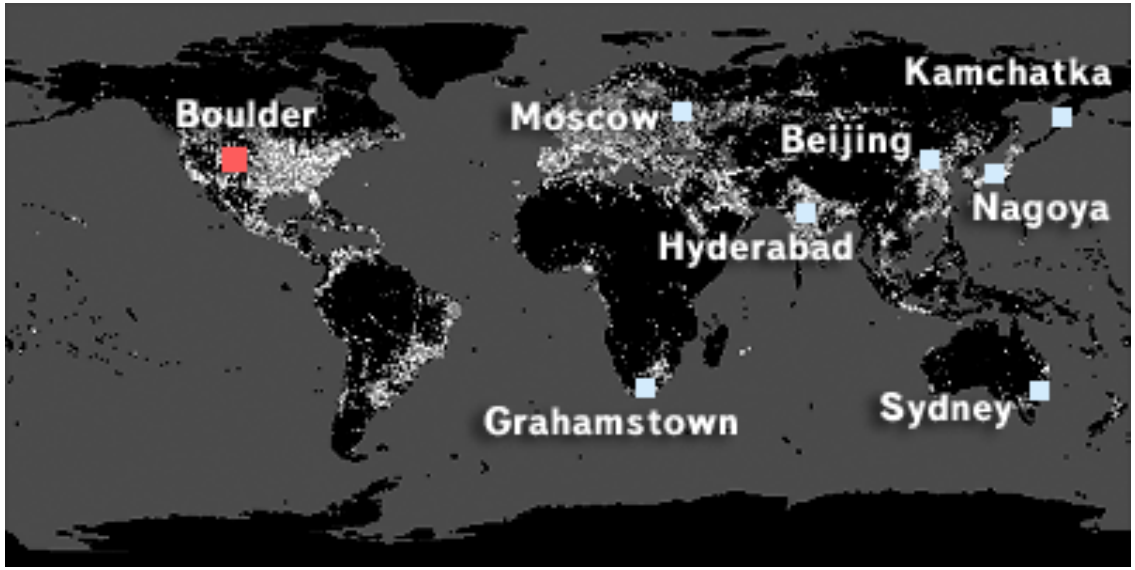
Solar Tutorial



Plage

High-resolution imagery of solar plage
- Plages are bright cloud-like features found around sunspots that represent regions of higher temperature and density within the chromosphere.

WDC – Solar-Terrestrial Physics
Access Tools



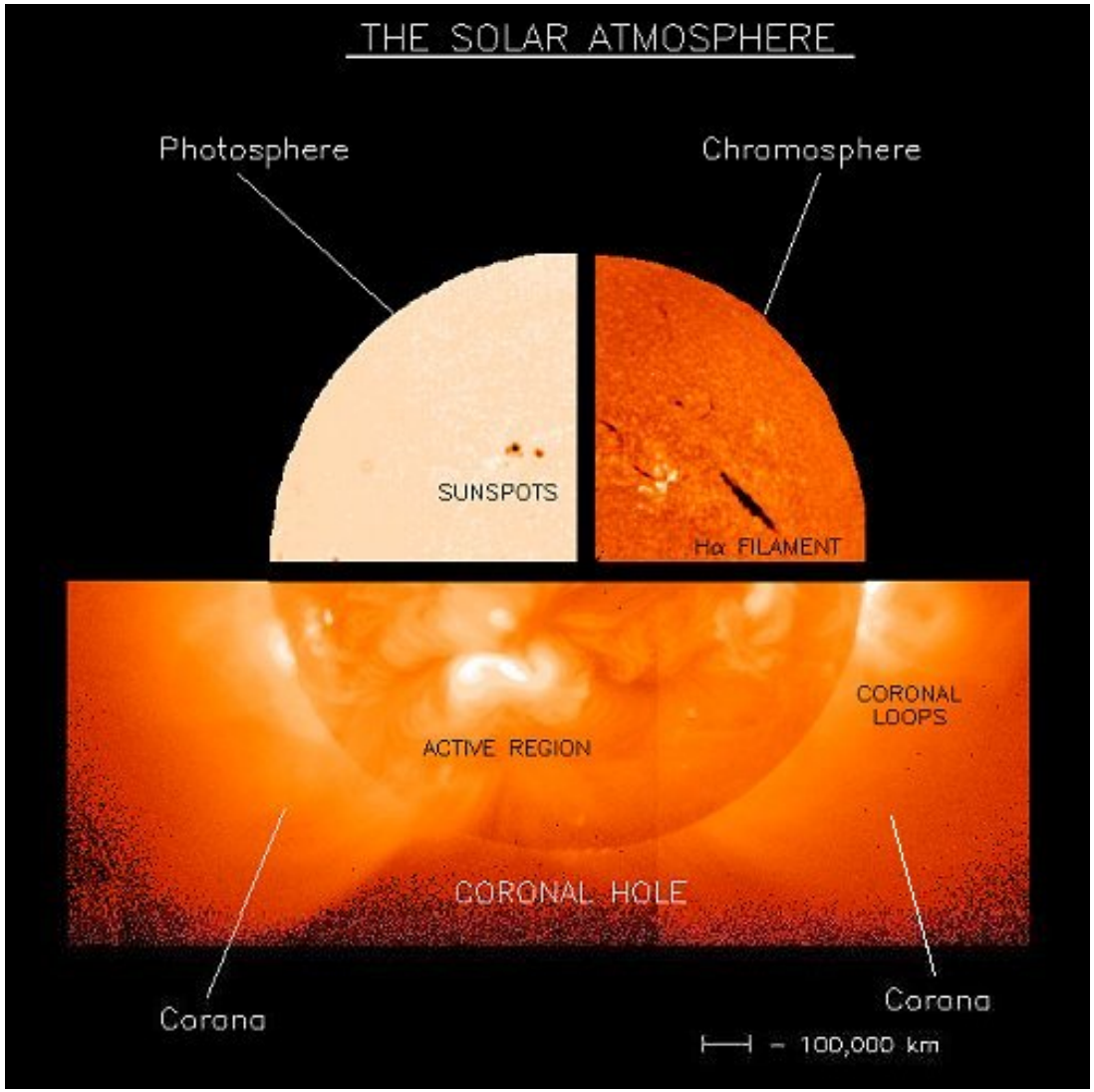
Multiple datasets / Multiple views

Space Physics Interactive Data Resource (SPIDR)

Distributed net-work of synchronous databases and 100% Java middle-ware servers accessed via the World Wide Web. SPIDR allows a solar-terrestrial physicist to intelligently access and manage historical space data for integration with environmental models and space weather forecasts.

http://spidr.ngdc.noaa.gov/spidr/index.jsp

SOLAR TUTORIAL
Surface Layers of the Sun



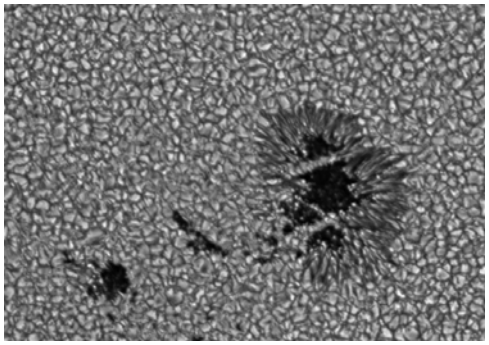
Surface Layers of the Sun

Photosphere – Visible (gas) surface of the Sun. The temperature of the photosphere is ~5,700 °K. Typically imaged in white light. Features include sunspots, faculae, granules and supergranules.

Chromosphere – Hotter, less dense outer thin layer. Thickness is ~2000 km. The temperature of the chromosphere is 6,000-to ~50,000 °K. Spectrally imaged in H-alpha (656.3 nm, Ca-II K (393.4 nm), He I (108.3 nm) and He II (304Å). Features include the chromospheric network, filaments, plage, prominances and spicules.

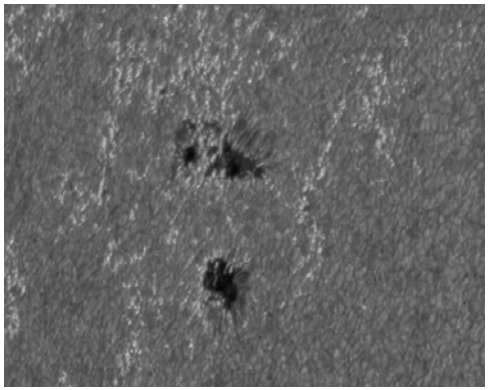
Corona – Faint, outer-most layer. Imaged in radiowaves, X-rays and spectral lines of H-alpha, Ca-II K, Fe XIV (530.3 nm) and Fe X (637.4 nm). Features include helmet streamers, polar plumes, coronal loops, coronal holes, CMEs and solar flares.

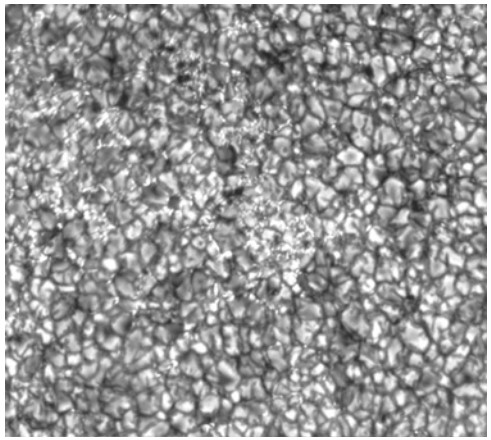
SOLAR TUTORIAL
Photosphere - Features



Sunspots – Dark regions due to cooler surface temperatures. Strong magnetic fields restrict the vertical convective flow resulting in cooler temperatures.

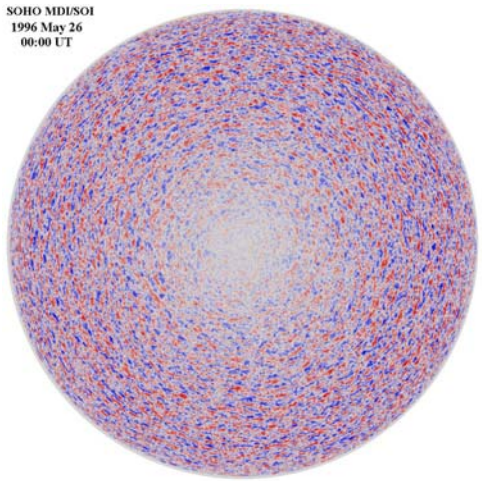
Faculae – Bright areas associated with strong magnetic fields. Bright areas within convection cell view deeper into the hot solar interior.





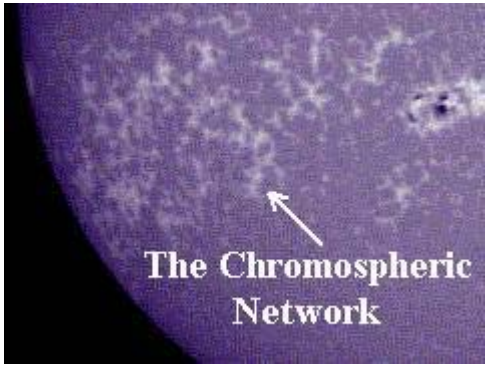
Granules – Small (~1,000 km) cellular features at the tops of solar convection cells

Super Granules – Larger (~35,000 km) versions of granules. Doppler-shifted imagery shows regions of motion towards (blue) and away (red) from the viewer.

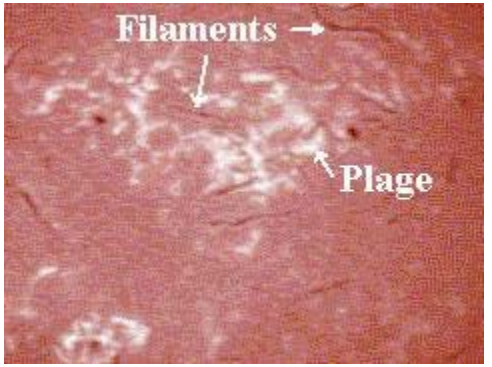


Ni I (~676.8 nm)

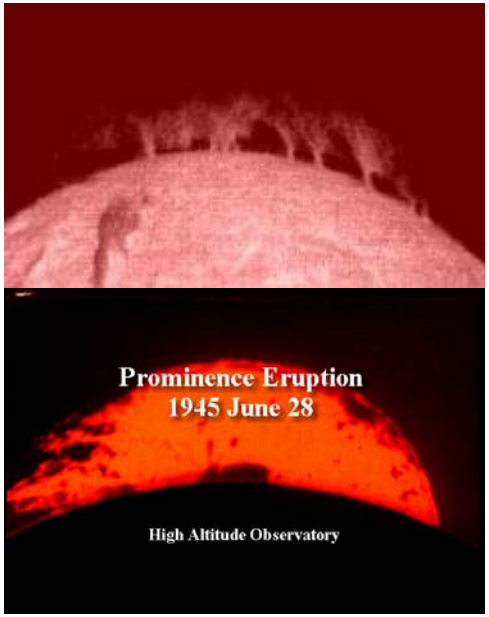
SOLAR TUTORIAL
Chromosphere - Features



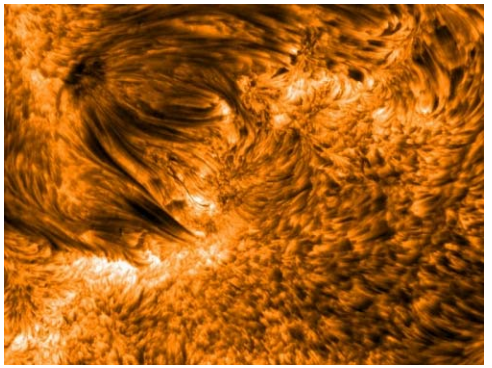
Chromospheric Network – Web-like features outlining supergranule cells containing magnetic field bundles.



Filaments & Plague – Filaments are denser, cooler clouds of magnetically suspended material suspended. Plague are bright patches around sunspots having concentrated magnetic fields.

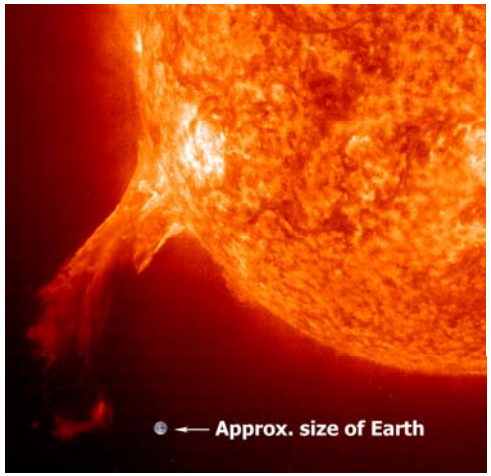


Prominences – Dense clouds of magnetically suspended material – prominences are edge viewed filaments.

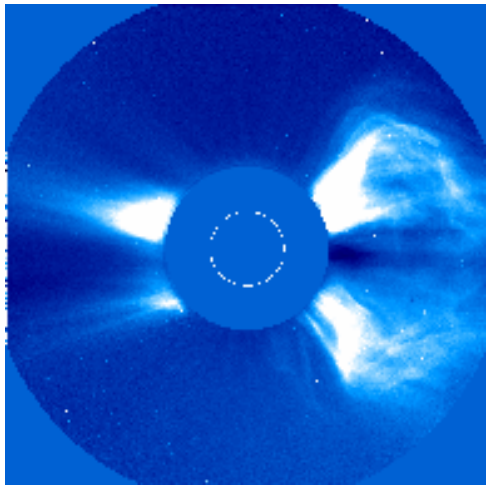


Spicules – Small, jet-like eruptions from the chromospheric surface. Produced by interior sound waves producing surface shocks that eject material. Feeds the solar wind.

SOLAR TUTORIAL
Corona – Features



Solar Flares – A flare is defined as a sudden, rapid, and intense variation in brightness. A solar flare occurs when magnetic energy that has built up in the solar atmosphere is suddenly released. Radiation is emitted across virtually the entire electromagnetic spectrum, from radio waves at the long wavelength end, through optical emission to x-rays and gamma rays at the short wavelength end.



Coronal Mass Ejections – Coronal mass ejections (or CMEs) are huge bubbles of gas threaded with magnetic field lines that are ejected from the Sun over the course of several hours. Although the Sun's corona has been observed during total eclipses of the Sun for thousands of years, the existence of coronal mass ejections was unrealized until the space age. With ground based coronagraphs only the innermost corona is visible above the brightness of the sky. From space the corona is visible out to large distances from the Sun and can be viewed continuously.

SOLAR DATA SERVICES
Taxonomy

Solar Indices

- Total Solar Irradiance
- Solar Ultraviolet Emissions
- Solar Radio Flux
- Total Magnetic Field
- Sunspots
  - ✓Sunspot numbers
  - ✓PSI
- Solar Frares
  - ✓H-alpha index
  - ✓CFI
- Plages Regions
- Green-line Coronal Daily Index

Solar Imagery

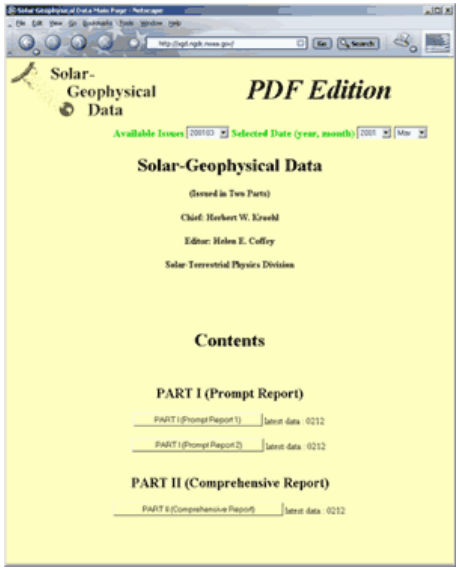
- Photosphere
  - ✓Visible Light
  - ✓Sunspot drawings
- Chromosphere
  - ✓Calcium-K
  - ✓Hydrogen alpha
  - ✓Infrared
  - ✓Magnetograms
- Corona
  - ✓Radioheliograph
  - ✓X-rays
  - ✓Coronagraphs

Solar Features*

- Solar Flares
  - ✓H-alpha
  - ✓X-rays
  - ✓Solar Radio Burst
- Prominences/Filaments
  - ✓Listings
  - ✓Cartes synomtique
  - ✓Filament disappearances
- Plague Regions
- Faculae & Sunspot Areas
- Sunspot Regions

Tables

SOLAR DATA SERVICES
Solar-Geophysical Data (SGD)



BACKGROUND

Full Title: Solar-Geophysical Data (SGD): A Publication Containing Historical Data About the Sun and Its Effects on the Earth - Part 1

Description: SGD is a comprehensive compilation of many different kinds of observational data on the sun's activity and its effects on the Earth.

Source: Various sources

DATA SETS

- Solar Geophysical Data – 1955-present
  http://www.ngdc.noaa.gov/stp/SOLAR/sgdintro.html

Dynamic Link in Presentation Mode

STATUS

Media: Available in hardcopy & electronic formats (after 2000)

Dates: 1955 – present

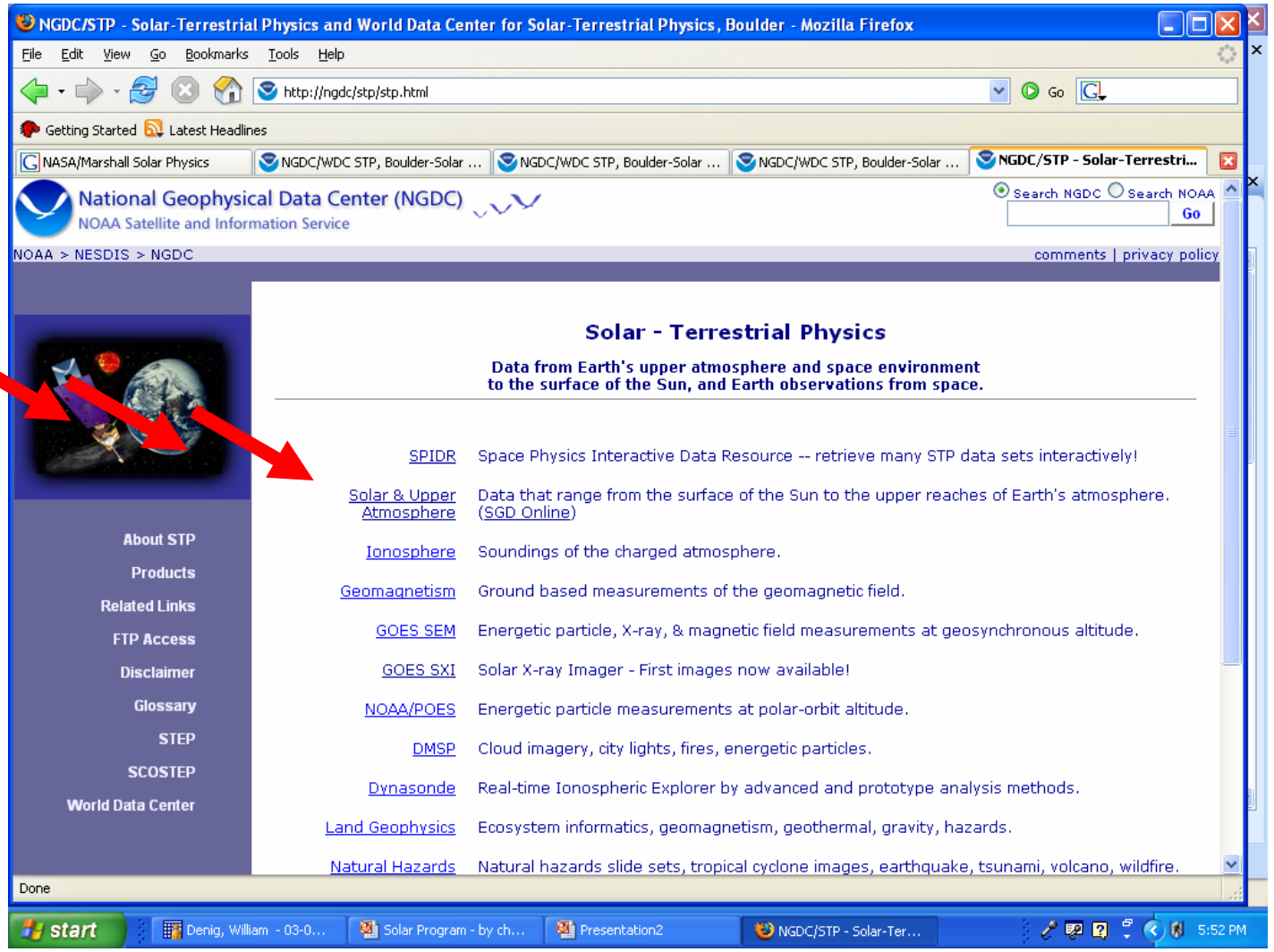
Dataset Included in Monthly SGD

SOLAR DATA SERVICES

Web Access – if you prefer

http://ngdc/ngdc.html

SOLAR DATA SERVICES
Web Access



http://ngdc/stp/stp.html

SOLAR DATA SERVICES
Web Access

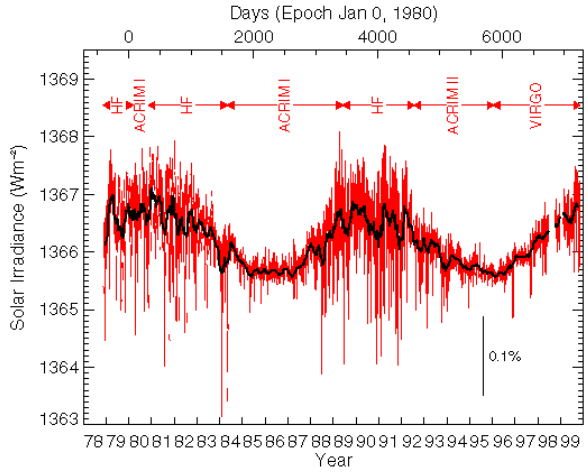
http://ngdc/stp/SOLAR/solar.html

SOLAR DATA SERVICES
Taxonomy

Solar Indices

- Total Solar Irradiance
- Solar Ultraviolet Emissions
- Solar Radio Flux
- Total Magnetic Field
- Sunspots
  - ✓Sunspot numbers
  - ✓PSI
- Solar Frares
  - ✓H-alpha index
  - ✓CFI
- Plages Regions
- Green-line Coronal Daily Index

SOLAR DATA SERVICES
Solar Indices – Total Solar Irradiance



Solar Irradiance (1978 – 2000)

BACKGROUND

Title: Solar Irradiance

Description: Tabular listings of total solar irradiance (& some spectral data). The average solar flux is ~1366 W/m^2.

Source: Satellite instruments (1978-2003), High-altitude aircraft (1969) and ground-based solar observatories (1902-1954).

DATA SETS

- Composite TSI - Frohlich & Lean – 1978-2003
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarirradiance.html#composite
- ACRIM Composite TSI - Willson *(Link)*
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarirradiance.html#acrim
- SORCE by G. Rottman (*Link*)
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarirradiance.html#sorce
- TSI - Other satellites – 1978-2003
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarirradiance.html#erbs
- Older data – 1902-1954, 1967
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarirradiance.html#arvesen

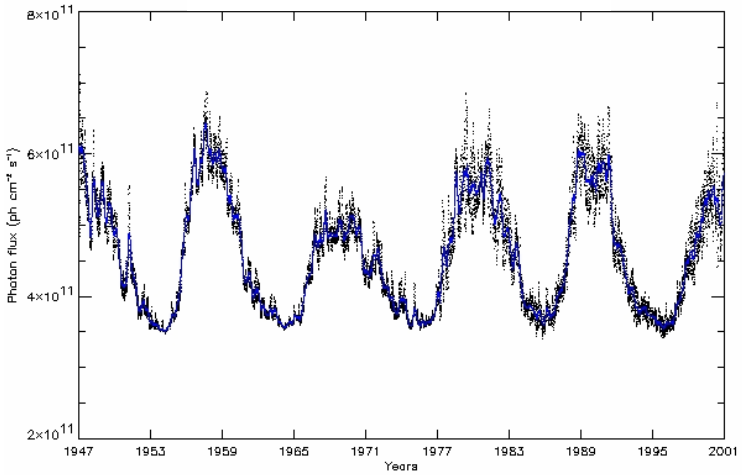
STATUS

Media: Available online

Dates: 1978-2003

Metadata Record: G00547

SOLAR DATA SERVICES
Solar Indices – Ultraviolet Emissions



5-cycle Composite – Lyman-alpha

BACKGROUND

Title: Solar Ultraviolet (UV) Emissions

Description: Solar UV measurements between 5 & 400 nm. Far UV irradiance can vary by 10% during the Sun's 27-day rotation, whereas bright 121.6 nm hydrogen Lyman-alpha emission can vary a factor of 2 during an 11-year solar cycle, dramatically affecting the energy input into the Earth's atmosphere.

Source: Satellites and high altitude aircraft

DATA SETS

- MgII Core-to-wing – Viereck - 1978-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolaruv.html#UV
- SORCE data – Rottman - 2003-present (*Link*)
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolaruv.html#sorce
- Older data – 1979-1997
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolaruv.html

- See also: SOLAR2000 Model – Tobiska
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolaruv.html#S2000

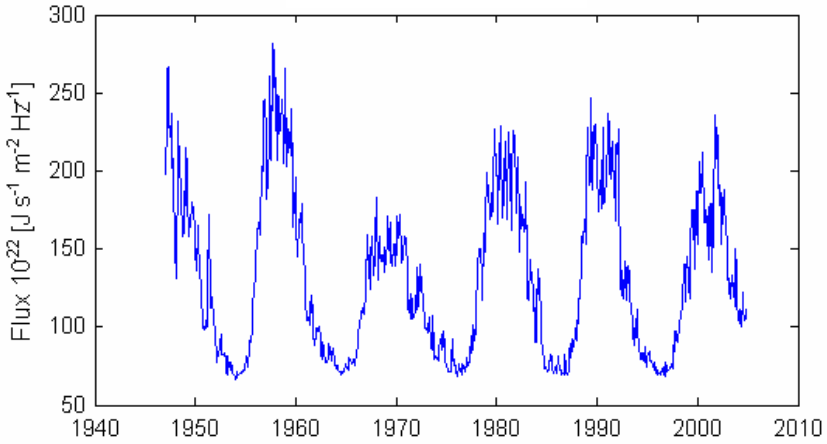
STATUS

Media: Available online

Dates: 1978 – present

Metadata Record: G00542

SOLAR DATA SERVICES
Solar Indices – Radiowaves



Solar F10.7 Flux (1947 – present)

BACKGROUND

Title – Solar Indices – Radiowaves

Description – Measurements of solar radio emissions at specific wavelengths between 1 cm & 1 m. Slowly varying or S-component at 10.7 cm attributed to A.E. Covington (Penticton solar radio flux values).

Source – Ground-based solar observatories (up to 55, primarily DMAO and USAF RSTN).

DATA SETS

- Solar Radio Flux – F10.7 & RSTN
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarradio.html#noonflux
- IAU QBSA daily solar radio noon flux values
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarradio.html#qbsa

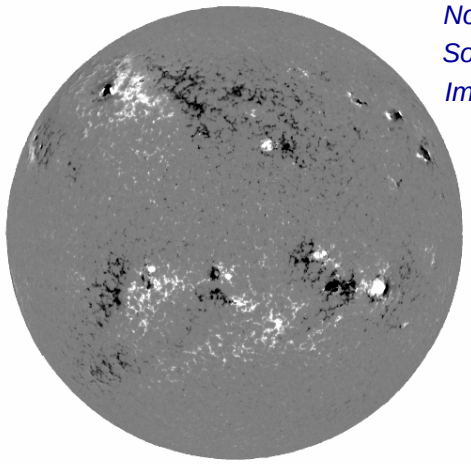
STATUS

Media: Available online

Dates: 1947 - present

Metadata Record: G00540

SOLAR DATA SERVICES
Solar Indices – Total Magnetic Field



North Polarity – White
South Polarity – Black
Image near solar max

Stanford Solar Magnetogram

BACKGROUND

Title: Solar Indices – Total Magnetic Field

Description: Tabular listings of the solar magnetic field summed over the solar disk. Referred to "sun as a star" measurements. References are provided for consideration of solar magnetic field reversals.

Source: Crimea Solar Observatory, Stanford Solar Observatory

DATA SETS

- Magnetic data - Crimea - 1968-1976
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunasastar.html
- Magnetic field - Stanford - 1975-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunasastar.html

Additional data:

Polar magnetic reversals – e-mail - 1948-1992
http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunasastar.html

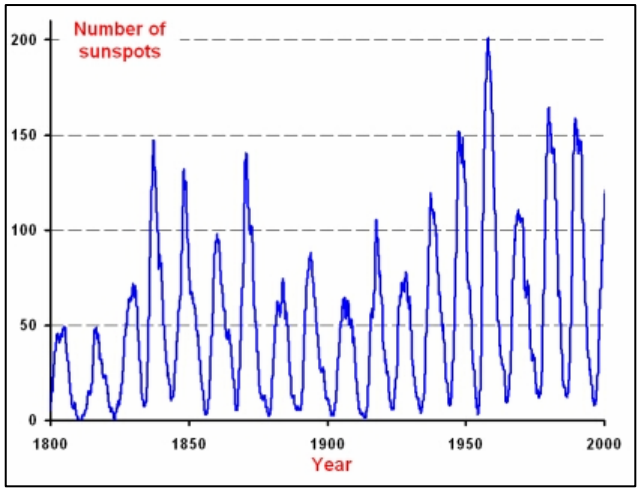
STATUS

Media: Available on-line

Dates: 1948 – present

Metadata Record: G10129
http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunasastar.html

SOLAR DATA SERVICES
Solar Indices - Sunspots



Sunspot Numbers (1800 – 2000)

BACKGROUND

Title: Solar Indices - Sunspots

Description: Various indices for monitoring sunspot numbers.

Source: Ground-based observations

DATA SETS

- Sunspot Numbers - 165 BC - present
  - ✓ International sunspot numbers – 1700-present
  - ✓ American sunspot numbers 1944-present
  - ✓ Ancient sunspot data 165 BC to 1684 AD
  - ✓ Group Sunspot Numbers – 1610-1995
- Photometric Sunspot Index – 1985-1998

STATUS

Media: Available on-line

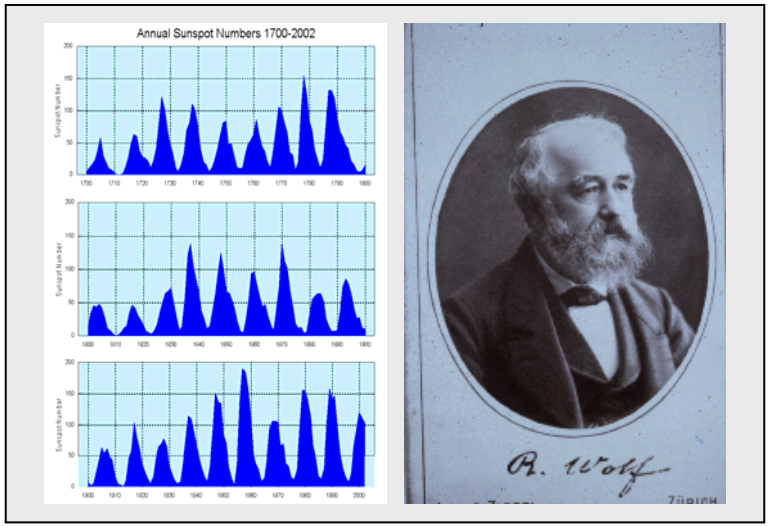
Dates: 165 BC – present

Metadata Record: G00532

Related Metadata: G01350 (slides)

SOLAR DATA SERVICES

Solar Indices – Sunspots – Sunspot Numbers



Sunspot Numbers (1700 – present)

BACKGROUND

Title: Solar Indices – Sunspots - Sunspot Numbers

Description: Index for the number of visible sunspots visible & number of cluster groups. Methodology attributed to J.R.Wolf (1816-1893). More sophisticated methods are currently used for solar monitoring.

Source: Ground-based observations

DATA SETS

- International sunspot numbers – 1700-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunspotnumber.html#international
- American sunspot numbers 1944-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunspotnumber.html#american
- Ancient sunspot data 165 BC to 1684 AD
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunspotnumber.html#ancient
- Group Sunspot Numbers – 1610-1995
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunspotnumber.html#hoyt

STATUS

Media: Available on-line

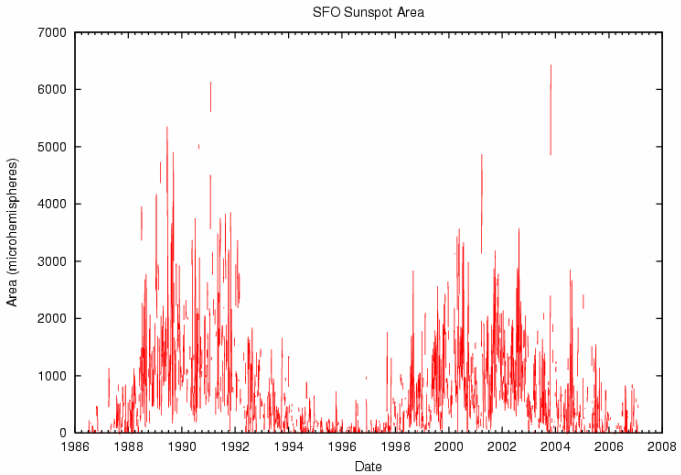
Dates: 165 BC – present

Metadata Record: G00532

Related Metadata: G01350 (slides)

SOLAR DATA SERVICES

Solar Indices - Sunspot Numbers - PSI



Sunspot Area (1988 - present)

BACKGROUND

Title: Solar Indices - Sunspots – Photometric Sunspot Index (PSI)

Description: The photometric sunspot index (*PSI*) was developed to study the effects of sunspots on solar irradiance. The PSI is calculated for each sunspot group and then summed over all groups present on the solar disk.

Source: San Fernando Observatory (SFO)

DATA SETS

- San Fernando Observatory (SFO) Photometric Observations - 1985-1998

  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsunspotphotometry.html

STATUS

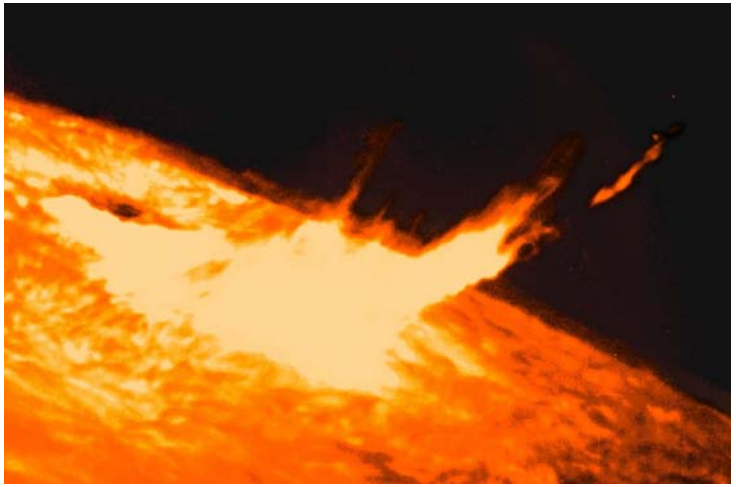
Media: Available on-line

Dates: 1985-1998

Metadata Record: *TBD*

Related Metadata:

SOLAR DATA SERVICES
Solar Indices – Flares



Solar Flare Image

BACKGROUND

Title: Solar Indices – Flares - H-alpha Flare Index

Description: Index of daily solar activity according to the methodology first introduced by Kleczek (1952). Daily sums are obtained for the northern and southern solar hemispheres

Source: Kandilli Observatory, Turkey

DATA SETS

- H-alpha Flare Index- Kandilli - 1976-present
- Comprehensive Flare Index - 1955-1980

STATUS

Media: available on-line

Dates: 1976 - present

Metadata Record: G01256

Related Matadata: G00580
G00537
G00118
G00746

MAIN ACCESS

http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#index

SOLAR DATA SERVICES

Solar Indices – Flares – H-alpha Flare Index

Kandilli Observatory

FLARE INDEX OF SOLAR ACTIVITY
FULL DISK

2003

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.11	1.48	0.55	2.31	8.81	0.74	0.68	0.00	0.00	3.33	7.21	0.00
2	0.13	1.16	1.44	2.34	2.49	6.27	6.60	9.95	0.00	4.88	30.47	0.21
3	5.17	0.00	0.00	3.52	0.46	0.58	3.70	3.28	0.17	1.12	15.79	0.00
4	4.42	0.56	0.00	10.54	1.68	0.11	9.70	0.19	0.07	0.24	12.09	0.26
5	2.44	0.57	0.73	3.03	0.92	0.74	1.81	0.80	0.00	0.90	0.41	0.11
6	0.79	6.86	0.00	0.57	0.12	5.97	2.43	0.00	0.00	0.00	0.00	0.00
7	5.49	1.85	0.35	0.00	0.43	0.92	0.36	0.75	1.69	1.85	0.00	0.00
8	10.05	0.00	1.19	0.31	0.00	12.75	3.63	0.10	0.00	0.00	0.00	0.00
9	9.12	0.42	0.82	0.91	0.00	12.32	8.74	0.13	0.00	0.43	0.00	0.00
10	0.83	0.00	0.45	13.17	0.16	35.85	0.63	0.91	0.53	0.00	0.20	0.00
11	5.87	1.21	2.11	0.00	0.00	23.15	0.07	0.00	0.00	0.00	1.55	0.00
12	2.08	5.43	0.64	0.00	0.00	16.02	0.62	1.76	0.09	0.00	0.00	0.00
13	2.43	0.96	2.42	0.27	0.00	3.71	1.35	3.02	1.36	0.00	0.00	0.00
14	0.17	1.16	0.00	0.61	0.00	0.85	0.75	2.08	0.82	0.00	0.00	0.09
15	0.69	0.09	2.32	0.00	0.00	0.79	0.00	1.52	1.06	0.17	0.86	0.00
16	6.85	0.00	6.77	0.00	0.27	0.53	1.32	0.59	1.02	0.18	1.23	0.00
17	0.15	0.00	4.95	0.14	0.15	2.08	7.53	0.93	0.81	0.00	9.55	0.55
18	0.50	1.57	45.54	0.00	0.57	1.55	2.97	0.84	0.81	3.10	16.67	1.23
19	1.28	6.61	19.48	0.15	2.56	0.00	2.09	6.72	0.21	9.37	6.67	2.21
20	0.77	2.13	1.35	0.63	0.91	0.82	5.33	0.00	0.56	9.87	22.94	0.68
21	2.53	6.74	0.86	2.96	0.00	0.87	6.20	0.00	0.00	4.00	1.16	0.84
22	1.83	1.10	0.00	1.39	5.72	0.29	4.46	0.33	0.21	10.34	0.45	1.71
23	8.15	0.00	0.00	5.37	0.48	0.27	2.38	0.35	0.37	7.95	0.92	2.74
24	4.87	2.17	0.00	3.45	1.33	2.01	0.00	1.12	2.89	10.05	0.32	1.80

BACKGROUND

Title: Solar Indices – Flares- H-alpha Flare Index

Description: Index of daily solar activity according to the methodology first introduced by Kleczek (1952). Daily sums are obtained for the northern and southern solar hemispheres

Source: Kandilli Observatory, Turkey

DATA SETS

- H-alpha Flare Index- Kandilli - 1976-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#index

STATUS

Media: available on-line

Dates: 1976 - present

Metadata Record: G01256

Related Matadata: G00580
G00537
G00118
G00746

SOLAR DATA SERVICES
Solar Features Tables – Flares - CFI

Most "Important" Flares – 1955-1980

Comprehensive Flare Index "Major" Flares -- Helen Dodson-Prince

Begin YYMMDD	ID#	HHMM UT	Lat	Long	H-a Imp	McMath Plage	Profile abcde	Index
780428	78057	1304-2232	22	-38	3B	15266	33435	18
680708	68057	1708-1815	13	-58	3B	9503	33335	17
580303	58018	1005-1411	-16	-60	3	4445	33334	16
580816	58077	0433-0831	-14	50	3+	4686	33334	16
590714	59065	0325-0901	17	-04	3+	5265	33334	16
601115	60097	0207-0427	25	35	3	5925	33433	16
610712	61022	1000-1300	-07	-23	3	6171	33334	16
610712	61022	1000-1300	-07	-23	3	6171	33334	16
660828	66042	1523-1700	22	-05	3B	8461	33334	16
670523	67051	1802-	29	-25	3B	8818	33334	16
670523	67051	-2200	29	-25	3B	8818	33334	16
720804	72078	0620-1000	14	-8	3B	11976	33334	16
570831	57068	1257-1455	25	02	3	4124	33333	15

Comprehensive Flare Index

BACKGROUND

Title: Solar Features Tables – Flares – Comprehensive Flare Index (CFI)

Description: An experimental index developed bu H.W. Dodson and E. R. Hedeman to categorize the "importance" of flares.

Source: Index only - Relies on data available elsewhere.

DATA SETS

- Comprehensive Flare Index - 1955-1980
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#cfi

Note: Information on this technique is contained in the UAGs 14, 52 and 80

STATUS

Media: available on-line

Dates: 1955 – 1980

Metadata Reference: G01256

Related Matadata:

SOLAR DATA SERVICES
Solar Indices – Plage Regions

YYYYMMDD	EMDX	VIORED	K2vK3	Delk1	Delk2	Delwb	K3
19940101							
19940102	0.0928168	1.26681	1.53432	0.612746	0.354189	1.56678	0.0685654
19940103	0.0927689	1.25785	1.55175	0.643614	0.360368	1.58311	0.0677033
19940104	0.0936810	1.26860	1.54444	0.629776	0.352570	1.57365	0.0685809
19940105							
19940106	0.0942151	1.26142	1.53035	0.654248	0.354304	1.58508	0.0697458
19940107	0.0931391	1.29092	1.53031	0.635520	0.360817	1.57979	0.0686768
19940108							
19940109							
19940110	0.0905773	1.28564	1.55594	0.600220	0.367286	1.56703	0.0650780
19940111							
19940112							
19940113							
19940114							
19940115							
19940116							
19940117							
19940118							
19940119							
19940120							

Sacramento Peak Ca index

BACKGROUND

Title: Solar Indices – Plage Regions

Description: Daily summary data from various solar observatories in Ca-II K (393.3 nm) showing the number of plage regions, total corrected plage area and Calcium plage index.

Source: Ground-based observatories including McMath, Hale, Big Bear, and Sacramento Peak

DATA SETS

- Indices – 1976-2002
  - ✓ Daily Summary Data from McMath/Hale/Big Bear 1942-1987 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#mcindex
  - ✓ Big Bear Ca K-line filtergrams - 1996-1997 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#bbindex
  - ✓ Sacramento Peak Ca index - 1976-2002 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#scindex

STATUS

Media: Available on-line

Dates: 1942 – 2002

Metadata Record: G10111

SOLAR DATA SERVICES

Solar Indices – Green-line Coronal Index

2004 CORONAL INDEX OF SOLAR ACTIVITY 2004
Slovac Academy Full Disk Emission (530.3nm) Units=10**16 W/sr

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6.29	5.90	6.70	6.93	6.26	6.18	5.25	4.19	5.48	10.82	7.88	6.92
2	6.35	6.33	6.83	6.48	6.55	5.79	4.84	4.09	6.68	10.72	7.71	6.48
3	6.17	6.44	6.99	6.86	6.89	5.68	4.49	4.66	6.62	10.50	7.55	6.50
4	6.11	6.45	7.02	7.09	5.99	5.57	4.37	5.13	6.11	10.10	7.70	6.56
5	6.14	6.48	7.00	7.33	6.42	5.35	4.27	4.51	6.76	9.50	7.55	6.55
6	5.67	6.74	7.09	7.18	6.53	5.01	4.86	4.91	6.60	9.29	7.33	6.74
7	5.57	6.93	7.03	7.00	5.91	5.30	4.89	4.80	6.97	9.05	7.32	6.78
8	6.06	7.05	6.89	6.42	5.76	5.19	5.25	5.77	7.50	7.55	7.22	6.62
9	5.67	7.08	6.67	6.11	5.59	5.02	5.72	6.05	7.10	7.29	7.11	6.67
10	6.32	7.08	6.53	6.00	5.28	4.85	5.71	6.43	6.95	7.07	7.19	6.21
11	7.13	7.07	6.37	5.88	5.33	4.25	6.06	5.91	7.39	6.94	6.60	5.75
12	7.43	6.92	7.02	5.82	4.99	3.69	6.54	6.27	6.11	6.72	6.34	5.91
13	7.83	6.98	7.25	5.82	5.36	4.42	6.82	6.45	7.17	6.36	6.31	5.91
14	8.22	7.11	7.42	5.74	5.30	4.39	6.94	7.02	7.34	5.70	6.10	5.73
15	8.41	7.49	7.54	6.04	5.38	4.40	7.18	6.59	7.33	5.48	6.13	5.44

CORONAL INDEX OF SOLAR ACTIVITY

BACKGROUND

Title: Solar Indices – Green-line Coronal Index

Description: Measures the total energy emitted by the sun's outermost atmospheric layer (the corona) at a wavelength of Fe XIX (530.3 nm).

Source: Lomnicky Peak (Slovakia)

DATA SETS

- Green (FeXIV 530.3 nm) Line Coronal Index of Solar Activity Lomnicky Peak 1939-present
  http://ngdc/stp/SOLAR/ftpsolarcorona.html#index

STATUS

Media: available on-line

Dates: 1939-present

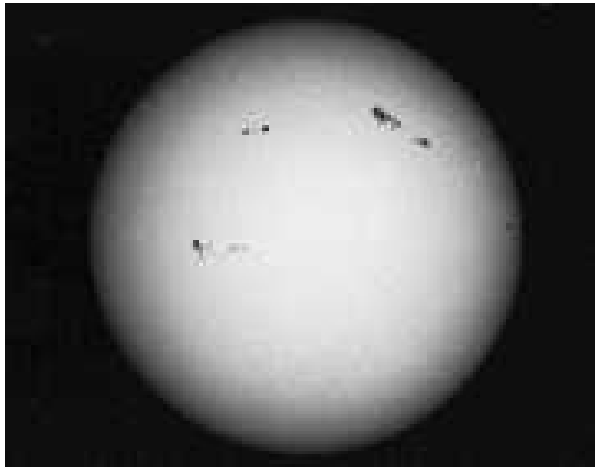
Metadata Record: TBD

SOLAR DATA SERVICES
Taxonomy

Solar Imagery

- Photosphere
  - ✓Visible Light
  - ✓Sunspot drawings
- Chromosphere
  - ✓Calcium-K
  - ✓Hydrogen alpha
  - ✓Infrared
  - ✓Magnetograms
- Corona
  - ✓Radioheliograph
  - ✓X-rays
  - ✓Coronagraphs

SOLAR DATA SERVICES
Solar Imagery - Photosphere



Photosphere White-light Imagery

BACKGROUND

Title: Solar Imagery – Photosphere

Description: White-light & filtered imagery and sketches of the sun showing the locations of sunspots.

Source: Various ground-based observatories- Photographs from Belgrade, Debrecen and Sac Peak (ISOON) and sketches from Haynald Observatory (Kalocsa, Hungary), Boulder and USAF SOON

DATA SETS

- Daily while-light images - 1957-present
  - ✓ Belgrade - imagery - 1957-1959
  - ✓ Debrecen Imagery - 1986-89 & 1993-96
  - ✓ USAF ISOON imagery - 2005-present
- Sunspot drawings - 1880-present
  - ✓ Kalocsa, drawings 1880, 1883-88 &1891-1919
  - ✓ Boulder 1966-1991
  - ✓ USAF SOON - 1999-present

MAIN ACCESS

http://ngdc/stp/SOLAR/ftpsolarimages.html#photos

STATUS

Media: Data available on-line

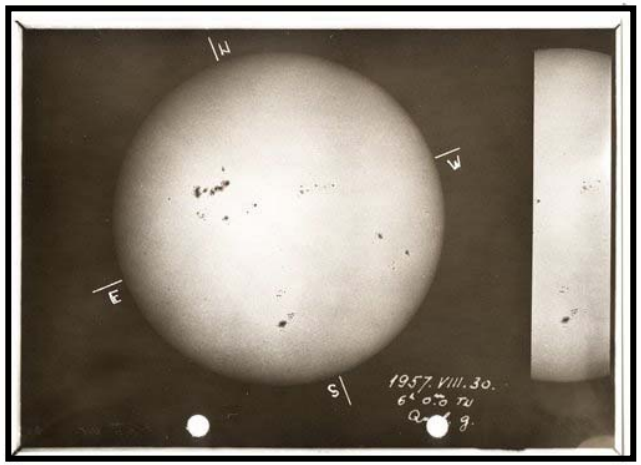
Dates: 1880-present

Metadata Record: gov.noaa.ngdc.G10109

SOLAR DATA SERVICES

Solar Images – Photosphere – Visible Light

30 August 1957



Belgrade Astronomical Observatory

BACKGROUND

Title: Solar Images – Phototsphere – Visible Light

Description: White-light and filtered images of the photosphere showing the locations of sunspots.

Source: Belgrade Astronomical Observatory, Debrecen Heliophysical Observatory; USAF Improved Solar Observing Optical Network (NSO/Sacramento Peak)

DATA SETS

- Belgrade White Light Images – 1957-1959
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/Beograd_WhiteLight_57to59/
- Debrecen White Light Images – 1986-1989; 1993-1996
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/DEBRECEN/Debrecen_Photoheliographic_Data/images/
- ISOON – Fe I @ 630.3 nm - 2005-present
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/ISOON-OSPaN-WhiteLight/

STATUS

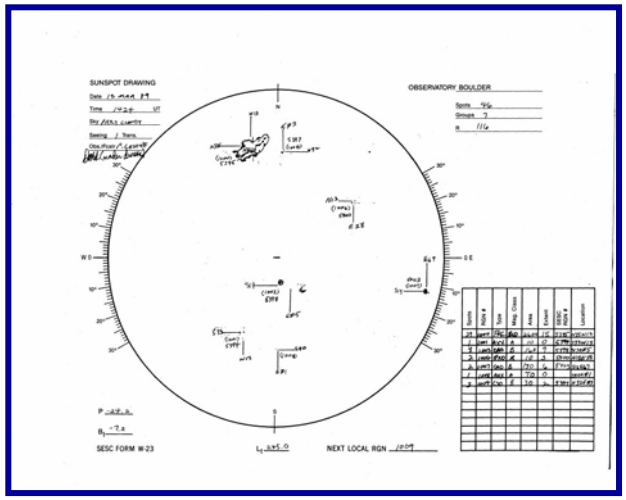
Media: Data available on-line

Dates: 1957-present (Intermittent)

Metadata Record: G10109

Note: Fe I (630.3 nm) imagery usually used for solar vector magnetic observations (see IVM)

SOLAR DATA SERVICES
S.I. – Photosphere – Sunspot Drawings



Boulder Sunspot Drawings

BACKGROUND

Title: Solar Imagery – Photosphere - Solar Drawings

Description: Drawings of the solar surface indicating the location of sunspots on the photosphere.

Source: Haynald Observatory (Kalocsa, Hungary), Boulder Solar Observatory (CO), USAF Solar Observing Optical Network (Holloman, San Vito Learmonth, Ramey

DATA SETS

- Kalocsa – Daily Sunspot Drawings – 1880; 1883-1888; 1891-1919
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SUNSPOT_REGIONS/DEBRECEN/historical_solar_image_database/
- Boulder – Daily Sunspot Drawings – 1966-1991
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/BoulderSunspotDrawings/
- USAF SOON – Daily Sunspot Drawings – 1999-present
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/SUNSPOT_DRAWINGS/

STATUS

Media: Data available on-line

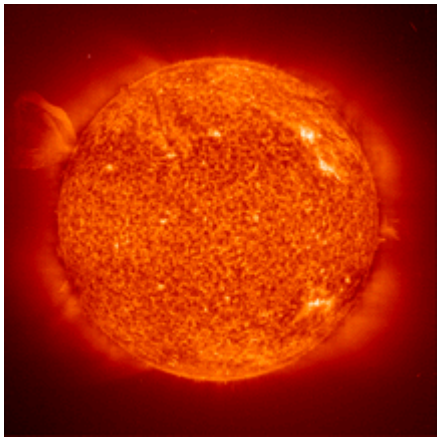
Dates: Intermittent 1880-present

Metadata Record: G10109

Related Metadata: G00532
G01342

SOLAR DATA SERVICES
Solar Imagery - Chromosphere

Imaged in He II @ 30.4 nm



Solar Chromosphere

BACKGROUND

Title: Solar Imagery - Chromosphere

Description: Hotter, less dense outer thin layer. Thickness is ~2000 km. Temperature is 6,000-to ~50,000 oK. Spectrally imaged in H-alpha (656.3 nm, Ca-II K (393.4 nm), He I (108.3 nm) and He II (30.4 nm). Features include the chromospheric network, filaments, plage, prominances and spicules.

Source: Ground-based observatory data.

DATA SETS

- Solar calcium imagery – 1915-1984
- Solar hydrogen alpha imagery – 1948-present
- Solar infrared imagery – 1999-present
- Solar magnetograms – 1999-present

STATUS

Media: Data available on-line

Dates: 1880-present

Metadata record: gov.noaa.ngdc.G10109

Related metadata:

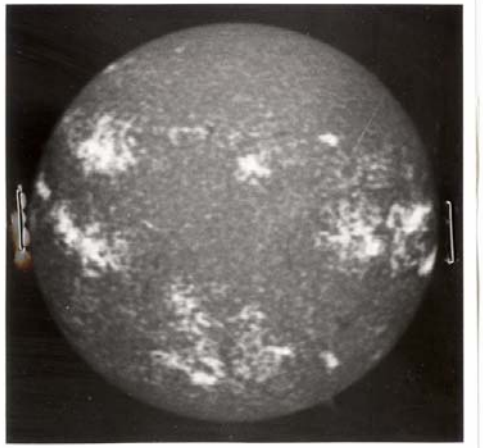
MAIN ACCESS

http://ngdc/stp/SOLAR/ftpsolarimages.html#chromo

SOLAR DATA SERVICES

Solar Imagery – Chromosphere – Ca-II K

14 Sep 1957



McMath-Hulbert Ca-K Photograph

BACKGROUND

Title: Solar Imagery – Chromosphere – Ca-II K

Description: Photographs and drawings of the sun at Ca-II K wavelengths (393.3 nm). Shows prominences and filaments and bright plague (flocculi) regions.

Source: Mt Wilson, McMath-Hulbert.

DATA SETS

- Mt Wilson – Ca-K Images - 1915-1984
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsi_mtwilson.html
- McMath-Hulbert – Ca-K Images – 1948-1979
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/McMathCalcium/
- McMath-Hulbert – Ca-K Drawings – 1952-1960
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/McMathCalcium/

STATUS

Media: Data available on-line

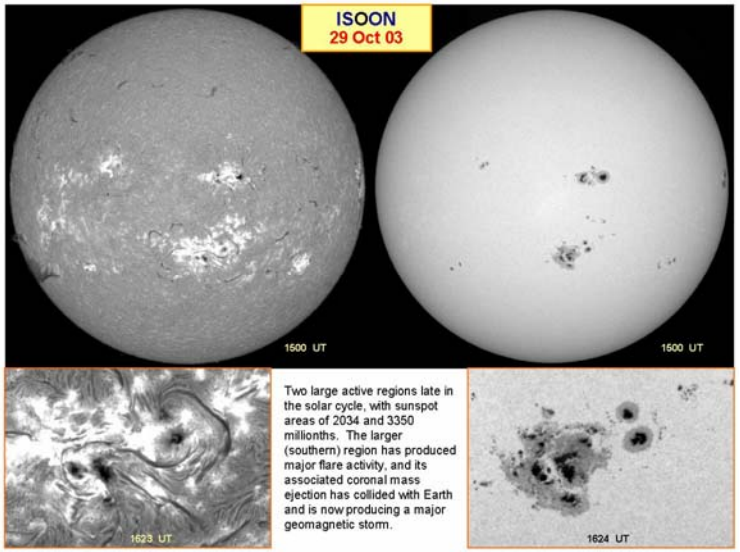
Dates: 1915-1984

Metadata record: gov.noaa.ngdc.G10109

Related metadata: gov.noaa.ngdc.G10111

gov.noaa.ngdc.G00535

SOLAR DATA SERVICES
Solar Imagery – Chromosphere – Hα



BACKGROUND

Title: Solar Imagery – Chromosphere – Hα

Description: Photographs and drawings of the sun in hydrogen alpha (656.3 nm). Shows prominences and filaments and bright plage regions. Includes H synoptic charts according to McIntosh (see UAG-40)

Source: Various ground-based solar observatories.

DATA SETS

- Boulder H-alpha daily images – 1967-1990
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/BoulderH-alphaFilmScans/
- McMath-Hulbert scout photos – 1948-1965
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/McMathHalpha/
- USAF ISOON images – 2002-present
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/ISOON-OSPaN_WL_Halpha_10830/
- Assorted solar images – 1999-present
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/H_ALPHA/2006/
- Synoptic H-α Maps - McIntosh - 1966-1987
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarcorona.html#synoptic

STATUS

Media: Data available on-line

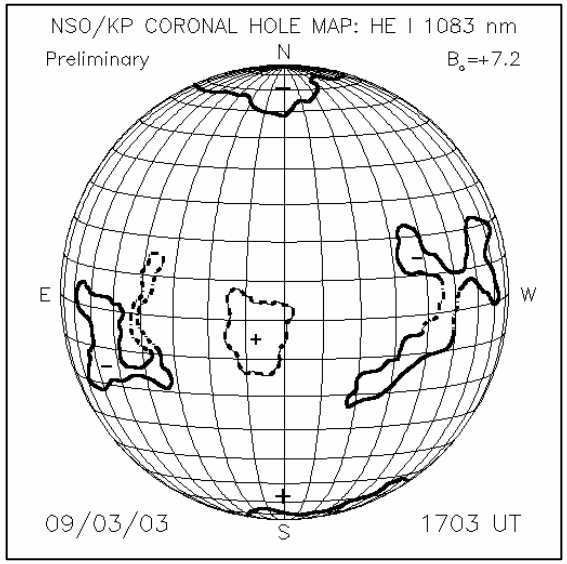
Dates: 1948-present

Metadata record: gov.noaa.ngdc.G10109

Related metadata: gov.noaa.ngdc.G00534
gov.noaa.ngdc.G10536

SOLAR DATA SERVICES

Solar Imagery – Chromosphere – Infrared



BACKGROUND

Title: Solar Imagery – Chromosphere – Infrared

Description: Photographs and drawings of the sun at infrared wavelengths, He I (1083 nm). The infrared imagery highlights coronal holes at the source of high-speed solar wind streams.

Source: Various ground-based solar observatories.

DATA SETS

- USAF ISOON – He I photos - 2002-present
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/ISOON-OSPaN_WL_Halpha_10830/
- Kitt Peak - Coronal Hole Maps – 1999-2003
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/KITTPEAK_CORONAL_HOLE_MAPS/

Note: ISOON is now the Optical Solar Patrol Network (OSPaN)

STATUS

Media: Data available on-line

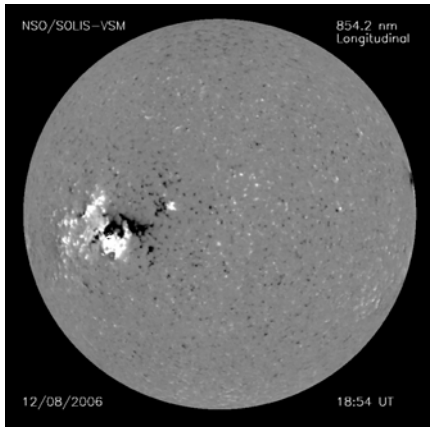
Dates: 1999-present

Metadata Record: gov.noaa.ngdc.G10109

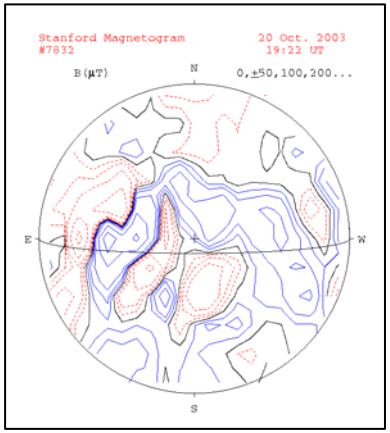
Related Metadata:

SOLAR DATA SERVICES
Imagery – Chromosphere – Magnetograms

20 Oct 2003



Kitt Peak



Stanford

BACKGROUND

Title: Solar Imagery – Chromosphere – Magnetograms

Description: Solar magnetograms measured in several wavelengths 868.8 (photospheric)

Source: Kitt Peak NSO, Mt Wilson, and Stanford

DATA SETS

- Daily Solar Magnetograms – 1999-present
  - ✓ Kitt Peak – 1999-present
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/MAGNETOGRAMS/KITT_PEAK/
  - ✓ Mt Wilson – 1999-2001
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/MAGNETOGRAMS/MT_WILSON/
  - ✓ Stanford – Contour Plots – 1999-present
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/MAGNETOGRAMS/STANFORD/

STATUS

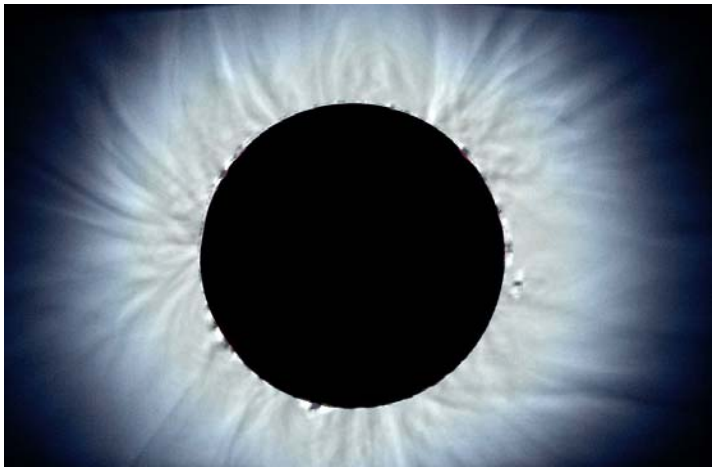
Media: Data available on-line

Dates: 1999-present

Metadata Record: G10109

SOLAR DATA SERVICES
Solar Imagery – Corona

Solar Eclipse – Hungary 1999



Composite Coronal Image

Courtesy: EurAstro Team Szeged I (Manfred Rudolf, Alfred Jakoblich, Franz Michlmayer, Carmen Ortega)

BACKGROUND

Title: Solar Imagery - Corona

Description: Faint, outer-most layer. Imaged in radiowaves, X-rays and spectral lines of H-alpha, Ca-II K, Fe XIV (530.3 nm) and Fe X (637.4 nm). Features include helmet streamers, polar plumes, coronal loops, coronal holes, CMEs and solar flares.

Source: Satellites and ground-based observatories.

DATA SETS

- Radioheliograph (ground-based array)
  - ✓ Nobeyama radio images - 1999-present
- X-rays (satellites)
  - ✓ GOES SXI – 2000-present
  - ✓ YOHKOH soft X-ray – 1999-2001
- Coronagraphs (ground observatories)
  - ✓ Sacramento Peak – 1999-present
  - ✓ Lomnicky Stit Observatory – 1999-present

http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarimages.html#corona

STATUS

Media: Data available on-line

Dates: 1999-present

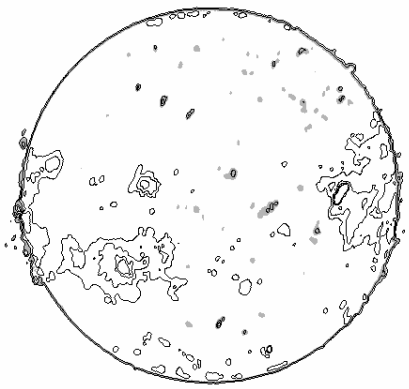
Metadata Record: G10109

Related Metadata:

SOLAR DATA SERVICES

Solar Imagery – Corona – Radioheliograph

27 October 2003



Nobeyama Radioheliograph (NoRH)

BACKGROUND

Title: Solar Imagery – Corona – Radio-heliographic Imagery

Description: Radioheliographic images of the sun obtained with an 84-dish array of solar radio telescopes operating at 17 MHz. Solar sketches of increased solar radio "brightness" can be identified on the solar disk.

Source: Nobeyama Radioheliograph (NoRH), Japan.

DATA SETS

- Nobeyama daily Solar RadioHeliograph images, 1999-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarimages.html#corona
- RSTN spectral data – 2000-present
  http://ngdc/stp/SOLAR/ftpsolarradio.html#spectralgraphs

STATUS

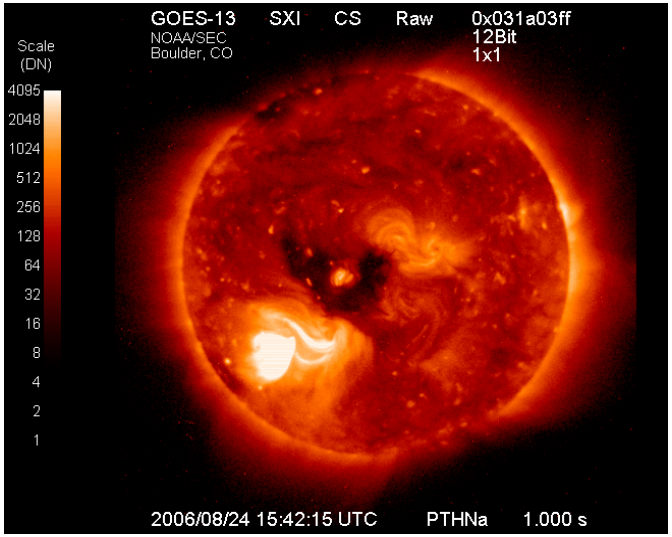
Media: Data available on-line

Dates: 1999-present

Metadata Record: G10109

Related Metadata:

SOLAR DATA SERVICES
Solar Imagery – Corona – X-rays



BACKGROUND

Title: SOLAR Imagery – Corona – X-rays

Description: X-ray images of the solar corona measured in soft X-rays from GOES and Yohkoh. Soft X-rays (<10 keV) are created during the precursor phase of a solar flare as trapped magnetic energy is released. Soft X-ray flux continues to increase during the impulsive & gradual phases before decreasing.

Source: GOES & Yohkoh satellites.

DATA SETS

- GOES SXI imagery, 2000 to present
  http://sxi.ngdc.noaa.gov/
- YOHKOH SXT imagery, 1999-2001
  ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/YOHKOH_SOFT_XRAY/

STATUS

Media: Data available on-line

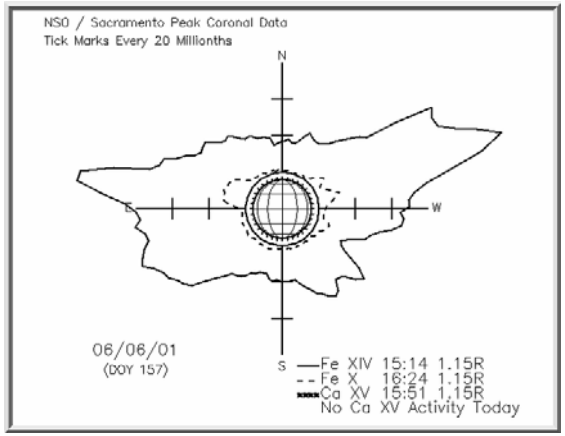
Dates: 1999-present

Metadata Record: G10109

Related Metadata:

SOLAR DATA SERVICES
Solar Imagery – Corona – Coronagraphs

06 Jun 2001



NSO Sacramento Peak

BACKGROUND

Title: Visible-light images of the corona

Description: Sketches of the solar corona obtained from ground-based conographs. Corona is imaged in Fe XIV (530.3 nm), Fe X (637.4 nm), and Ca XV (569.4 nm).

Source: Ground-based observatories: NSO Sacramento Peak (NM) and Lomnicky Stit (Slovakia).

DATA SETS

- Solar Coronagraph plots
  - ✓ Sacramento Peak – monthly - 2002-present
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/CORONA/SacramentoPeakCorona/
  - ✓ Lomnicky Stit – daily - 1999-present
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/CORONA/
  - ✓ Lomnicky Stit – Prominences – 2000-present
    ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SOLAR_IMAGES/CORONA/LomnickyProminences/

STATUS

Media: Data available on-line

Dates: 1999-present

Metadata Record: gov.noaa.ngdc:G10109

Related Metadata:

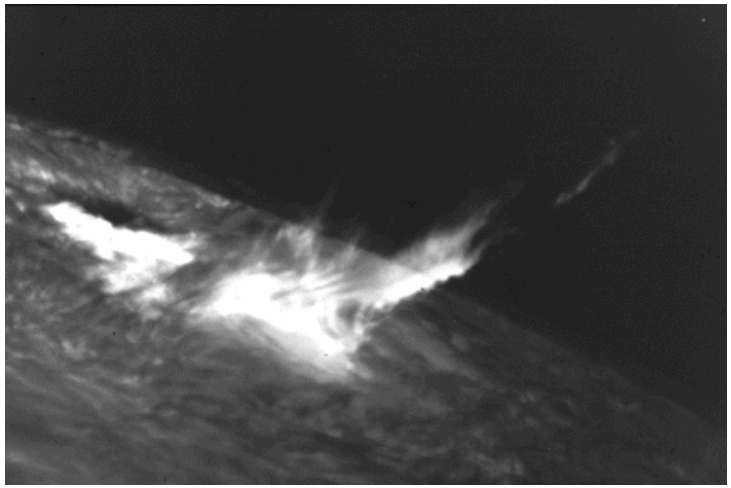
SOLAR DATA SERVICES
Taxonomy

Solar Features*

- Solar Flares
  - ✓H-alpha
  - ✓X-rays
  - ✓Solar Radio Burst
- Prominences/Filaments
  - ✓Listings
  - ✓Cartes synomtique
  - ✓Filament disappearances
- Plague Regions
- Faculae & Sunspot Areas
- Sunspot Regions

Tables

SOLAR DATA SERVICES
Solar Features – Flares



National Solar Observatory

Surge Prominence and Flare in H-alpha

BACKGROUND

Title: Solar Features Tables – Flares

Description: Tablular listing of solar transients including H-alpha, EUV, X-ray, while light, coronal line and radio observations. Includes recommended flare classification and location on the solar disk.

Source: Ground-based and space-based solar observations

DATA SETS

Solar H-alpha Flares – 1938-present
Solar X-ray Flares – 1968-present
Solar H-alpha Flare Index – 1976-present
Comprehensive Flare Index - 1955 – 1980
Solar Radio Bursts – 1960 – present

MAIN LINK

http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html

STATUS

Media: available on-line

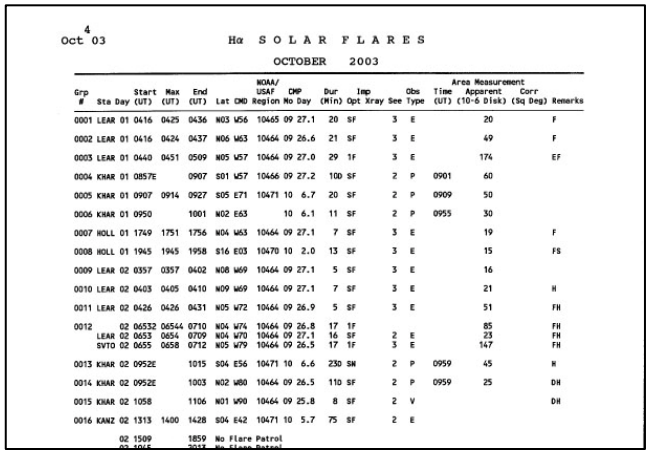
Dates: 1938 - present

Metadata Record: G00537

Related Metadata: G00130
G00580
G00118
G01256
G01254
G00747

SOLAR DATA SERVICES
Solar Features – Flares – H-alpha

October 2003



4
Oct 03 Hα SOLAR FLARES

OCTOBER 2003

Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP No	Day	Dur (Min)	Imp	Opt	Xray	Seq	Obs Type	Area Measurement Time (UT)	Area Measurement Apparent (10-6 Disk)	Area Measurement Corr (Sq Deg)	Remarks
0001	LEAR	01	0416	0425	0436	N03	W56	10465	09	27.1	20	SF		3	E			20		F
0002	LEAR	01	0416	0424	0437	N06	W63	10464	09	26.6	21	SF		3	E			49		F
0003	LEAR	01	0440	0451	0509	N05	W57	10464	09	27.0	29	1F		3	E			174		EF
0004	KHAR	01	0857E		0907	S01	W57	10466	09	27.2	10D	SF		2	P		0901	60		
0005	KHAR	01	0907	0914	0927	S05	E71	10471	10	6.7	20	SF		2	P		0909	50		
0006	KHAR	01	0950		1001	N02	E63		10	6.1	11	SF		2	P		0955	30		
0007	HOLL	01	1749	1751	1756	N04	W63	10464	09	27.1	7	SF		3	E			19		F
0008	HOLL	01	1945	1945	1958	S16	E03	10470	10	2.0	13	SF		3	E			15		FS
0009	LEAR	02	0357	0357	0402	N08	W69	10464	09	27.1	5	SF		3	E			16		
0010	LEAR	02	0403	0405	0410	N09	W69	10464	09	27.1	7	SF		3	E			21		H
0011	LEAR	02	0426	0426	0431	N05	W72	10464	09	26.9	5	SF		3	E			51		FH
0012		02	06532	06544	0710	N04	W74	10464	09	26.8	17	1F						85		FH
	LEAR	02	0653	0654	0709	N04	W70	10464	09	27.1	16	SF		2	E			23		FH
	SVTO	02	0655	0658	0712	N05	W79	10464	09	26.5	17	1F		3	E			147		FH
0013	KHAR	02	0952E		1015	S04	E56	10471	10	6.6	23D	SN		2	P		0959	45		H
0014	KHAR	02	0952E		1003	N02	W80	10464	09	26.5	11D	SF		2	P		0959	25		DH
0015	KHAR	02	1058		1106	N01	W90	10464	09	25.8	8	SF		2	V					DH
0016	KANZ	02	1313	1400	1428	S04	E42	10471	10	5.7	75	SF		2	E					
		02	1509		1859	No Flare Patrol														

Solar Flare List – H-alpha

BACKGROUND

Title: Solar Features Tables – Flares – H-alpha

Description: Comprehensive solar flare list derived from numerous solar observatories viewing in H-alpha (636.5 nm). These data Archival data includes 1938 to present.

Source: Ground-based solar observatories; USAF SEON (Holloman, Learmonth, San Vito) & Kanzelhöhe Solar Observatory (Austria)

DATA SET

- Solar H-alpha Flare events - 1980-present
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#halpha
- Early H-alpha solar flare data 1938-1999
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#halpha

- Archive also includes:
  - ✓ Flare patrol intervals – 1955-present

STATUS

Media: available on-line

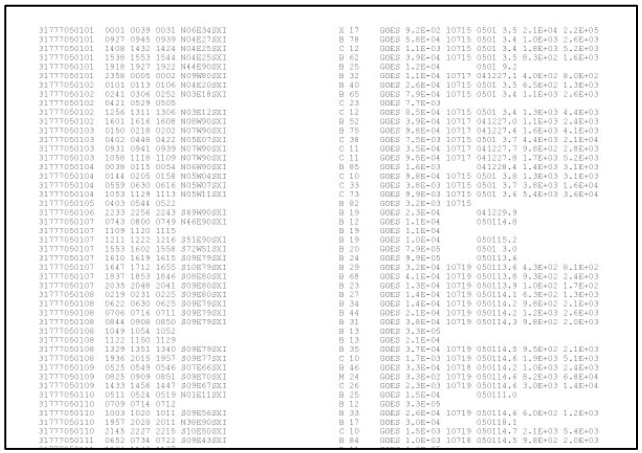
Dates: 1938 - present

Metadata Record: G01256

Related Metadata: G00580
G00537
G00118
G00747

SOLAR DATA SERVICES
Solar Features – Flares – X-rays

2005



Solar Flare List – X-rays

BACKGROUND

Title: Solar Features table – Flares – X-rays

Description: Yearly tabular lists of solar flare observed by the GOES (XRS) and SOLRAD satellites. Solar X-rays can only be observed from space.

Source: GOES and SOLRAD satellites

DATA SETS

- Solar X-ray Flares – 1968 – present
  - ✓ SOLRAD X-rays – 1968-1974
  - ✓ GOES XRS X-rays – 1975-present
    http://www.ngdc.noaa.gov/stp/SOLAR/ftpsolarflares.html#xray

- Archive also includes:
  - ✓ Non-NGDC hard X-ray solar flare data sources

STATUS

Media: available on-line

Dates: 1968 - present

Metadata Record: G01256

Related Metadata: G00537
G00118
G00747

SOLAR DATA SERVICES

Solar Features – Flares – Solar Radio Bursts

98
Oct 03

S O L A R R A D I O E M I S S I O N
Spectral Observations

OCTOBER 2003

Day	OBSERVATION Start (UT)	OBSERVATION End (UT)	Sta	EVENT Start (UT)	EVENT End (UT)	EVENT Spectral Class	EVENT Event Remarks	Int (1-3)	FREQUENCY Lower (MHz)	FREQUENCY Upper (MHz)	Remarks
01	0000	0750	CULG	0043.0	0047.0	III	G	2	23	180	
	0000	0823	HIRA	0043.0	0043.5	III	B	1	25X	150	
			CULG	0134.0	0134.0	III	B	1	50	150	
			CULG	0141.0	0141.0	III	B	1	90	170	
			CULG	0454.0	0555.0	I	S,C	1	40	180	
			LEAR	0517.0	0517.0	III		1	25	91	
			HIRA	0517.5	0518.0	III	B	1	30	60	
			CULG	0518.0	0518.0	III	B	1	23	160	
	0555	1200	IZMI	0555.0E	1200.0D	I	N	1	120	270	
	0612	1531	ONDR								
			CULG	0705.0	0750.0D	III	N	1	27	100	
			IZMI	0719.6	0722.8	III	G	1	60	100	
			IZMI	0737.0	0737.3	III	G	1	45	95	
			IZMI	0743.1	0743.2	III	B	1	200	270X	
			SVTO	0953.0	0954.0	III		1	25	39	
			IZMI	1115.5	1116.5	III	G	2	25X	70	
			IZMI	1118.4	1121.2	III	GG	2	160	270X	
	0605	1600	BLEN	1118.4	1121.8	III	GG	2	150	400	
			IZMI	1148.9	1150.9	III	G	2	50	160	

BACKGROUND

Title: Solar Radio Event Tables of Fixed Frequency Bursts, Radio Flux Densities, and Radio Spectral Events

Description: Tables of solar radio bursts classified in discrete frequency bands and spectral content.

Source: Ground-based solar observatories

DATA SETS

- Solar Radio Bursts - 1960 - present
  http://ngdc/stp/SOLAR/ftpsolarradio.html#fixedbursts
- USAF RSTN – 1980-present
  http://ngdc/stp/SOLAR/ftpsolarradio.html#onesec
- Solar Spectral Data – 1967-present
  http://ngdc/stp/SOLAR/ftpsolarradio.html#spectralevents
- Stanford Solar 9.1 cm – 1962-1973
  http://ngdc/stp/SOLAR/ftpsolarradio.html#stanford
- East-West solar radio – 1957-present (SGD only)

STATUS

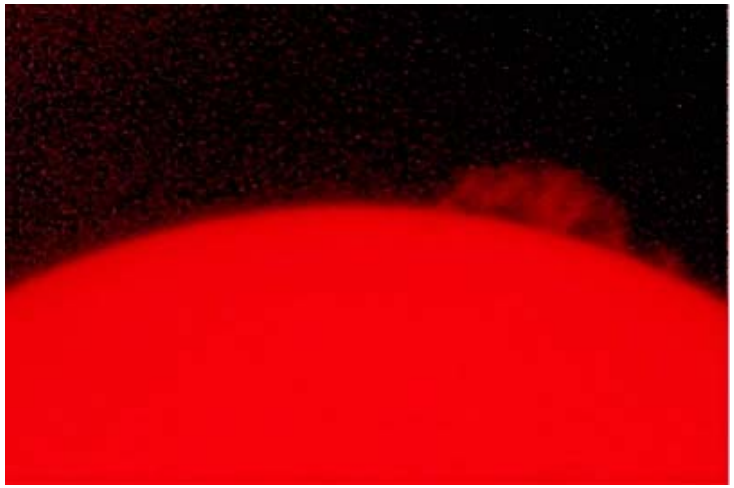
Media: Available on-line

Dates: 1960 – present

Metadata Record: G00130

Related Matadata: G00537

SOLAR DATA SERVICES
Solar Features – Prominences/Filaments



Prominence in H-alpha (656.1 nm)

BACKGROUND

Title: Solar Prominences and Filaments

Description: Solar prominences and filaments appear as dark filamentary objects on the solar disk (filaments) and as protuberances on the edge of the solar disk (prominences). The are viewed in H-alpha and Ca-K line emissions from the solar chromosphere.

Source: Ground-based observatories

DATA SETS

- Prominences & Filaments - 1957-present
- Cartes Synoptiques de la Chromosphere – 1919-present
- Solar Filament Disappearances – 1964-1980

MAIN LINK

http://ngdc/stp/SOLAR/ftpfilaments.html

STATUS

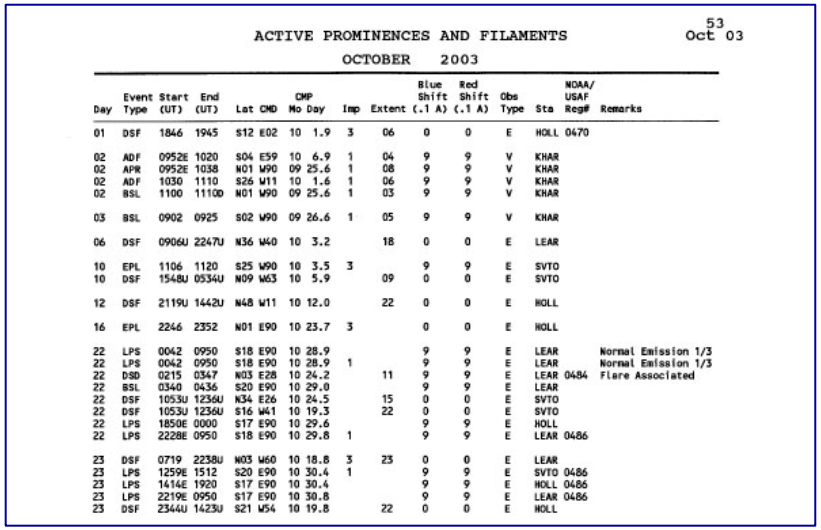
Media: Available on-line

Dates: 1919-present

Metadata Record: G00534
G00636

SOLAR DATA SERVICES

S/F – Prominences/Filaments – Listings



ACTIVE PROMINENCES AND FILAMENTS 53 Oct 03

OCTOBER 2003

Day	Event Type	Start (UT)	End (UT)	Lat	CMD	CMP Mo	CMP Day	Imp	Extent	Blue Shift (.1 A)	Red Shift (.1 A)	Obs Type	Sta	NOAA/ USAF Reg#	Remarks
01	DSF	1846	1945	S12	E02	10	1.9	3	06	0	0	E	HOLL	0470	
02	ADF	0952E	1020	S04	E59	10	6.9	1	04	9	9	V	KHAR		
02	APR	0952E	1038	N01	W90	09	25.6	1	08	9	9	V	KHAR		
02	ADF	1030	1110	S26	W11	10	1.6	1	06	9	9	V	KHAR		
02	BSL	1100	1110D	N01	W90	09	25.6	1	03	9	9	V	KHAR		
03	BSL	0902	0925	S02	W90	09	26.6	1	05	9	9	V	KHAR		
06	DSF	0906U	2247U	N36	W40	10	3.2		18	0	0	E	LEAR		
10	EPL	1106	1120	S25	W90	10	3.5	3		9	9	E	SVTO		
10	DSF	1548U	0534U	N09	W63	10	5.9		09	0	0	E	SVTO		
12	DSF	2119U	1442U	N48	W11	10	12.0		22	0	0	E	HOLL		
16	EPL	2246	2352	N01	E90	10	23.7	3		0	0	E	HOLL		
22	LPS	0042	0950	S18	E90	10	28.9			9	9	E	LEAR		Normal Emission 1/3
22	LPS	0042	0950	S18	E90	10	28.9	1		9	9	E	LEAR		Normal Emission 1/3
22	DSD	0215	0347	N03	E28	10	24.2		11	9	9	E	LEAR	0484	Flare Associated
22	BSL	0340	0436	S20	E90	10	29.0			9	9	E	LEAR		
22	DSF	1053U	1236U	N34	E26	10	24.5		15	0	0	E	SVTO		
22	DSF	1053U	1236U	S16	W41	10	19.3		22	0	0	E	SVTO		
22	LPS	1850E	0000	S17	E90	10	29.6			9	9	E	HOLL		
22	LPS	2228E	0950	S18	E90	10	29.8	1		9	9	E	LEAR	0486	
23	DSF	0719	2238U	N03	W60	10	18.8	3	23	0	0	E	LEAR		
23	LPS	1259E	1512	S20	E90	10	30.4	1		9	9	E	SVTO	0486	
23	LPS	1414E	1920	S17	E90	10	30.4			9	9	E	HOLL	0486	
23	LPS	2219E	0950	S17	E90	10	30.8			9	9	E	LEAR	0486	
23	DSF	2344U	1423U	S21	W54	10	19.8		22	0	0	E	HOLL		

BACKGROUND

Title: Solar Prominences and Filaments

Description: Solar prominences and filaments appear as dark filamentary objects on the solar disk (filaments) and as protuberances on the edge of the solar disk (prominences). Data set contains tabular listings of solar prominences and filaments measured by solar observatories.

Source: Various ground-based observatories, including USAF SEON

DATA SETS

- Prominences & Filaments - 1957-present

  http://www.ngdc.noaa.gov/stp/SOLAR/ftpfilaments.html#filaments

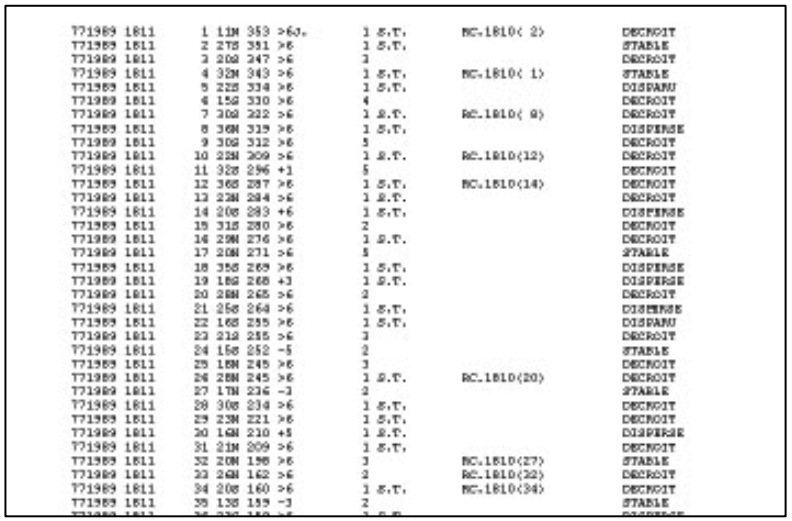
STATUS

Media: Available on-line

Dates: 1957 – present

Metadata Record: G00534

SOLAR DATA SERVICES
S/F – P/F – Cartes Synoptiques



Cartes Synoptiques de la Chromosphere

BACKGROUND

Title: Solar Maps, Prominences and Filaments

Description: Tabular listing of derived information from solar synoptic charts project the sun's "surface" onto a rectangular grid. Each chart (not shown) spans a 27-day solar rotation., the time required for the sun to make one complete rotation.

Source: Meudon Solar Observatory (France)

DATA SETS

- Cartes Synoptiques – 1919 – 1989
  http://www.ngdc.noaa.gov/stp/SOLAR/ftpfilaments.html#cartes
  - ✓ Carte Synoptiques Solar Filaments - 1919 - 1957
  - ✓ Carte Synoptiques Active Centres - 1957-1989
  - ✓ Carte Synoptiques Solar Filaments - 1957-1989

Note: Cartes Synoptique drawings were included in the SGDs through 1989.

STATUS

Media: Data available on-line

Dates: 1919 – 1989

Metadata Record: G00536

SOLAR DATA SERVICES

S/F – P/F – Filament Disappearances

Date	Time	Err	Position		W	D	P	L	H	A	Eta	Phi	Alph	Midpt	Comments
641027	0633	1202	S22E26	S15E12	1.0	1	S	15	1.7	25	22	30	11	S19E19	CULG
641028	1942	1849	2											GAP	CULG
641102	0643	1152	N08E24	N04E20	0.8	1	S	6	0.7	4	42	22	15	N06E22	CULG
641103	1959	1956	2											GAP	CULG
641104	1958	2359	N35E03	N28W10	0.6	2	N	13	0.3	4	66	28	25	N32W04	CULG
641108	1934	2101	2											GAP	CULG
641109	2018	2444	S43W21	S43W33	1.0	1	N	9	0.8	7	55	53	41	S43W27	CULG
641110	2101	1837	2											GAP	CULG
641114	0635	1157	N35W48	N43W52	0.8	2	S	8	0.5	4	43	58	35	N39W50	CULG
641117	1840	1816	2											GAP	CULG
641118	1828	2348	S25E34	S20E22	1.0	2	N	12	1.4	17	15	37	9	S23E28	CULG
641121	0644	1158	S00E14	S06E14	0.8	1	S	6	0.7	4	70	15	14	S03E14	CULG
641121	0644	1158	N50E39	N52E26	1.8	2	N	8	1.8	15	63	56	48	N51E33	CULG
641122	0637	1156	N26E01	N18W03	0.6	2	S	9	0.3	3	28	20	9	N22W01	CULG
641125	1846	1855	2											GAP	CULG
641201	1845	1817	5											GAP	CULG
641207	1812	1834	3											GAP	CULG
641215	1835	1831	2											GAP	CULG
641216	1833	2358	S45W27	S45W31	2.0	2	N	3	2.3	6	51	51	37	S45W29	CULG
641217	1831	1852	2											GAP	CULG
641218	1842	2411	N18E48	N12E47	1.0	1	S	6	0.8	5	66	50	44	N15E47	CULG
641221	1837	1835	2											GAP	CULG
641224	2005	1836	2											GAP	CULG
641226	1836	1832	2											GAP	CULG
641229	0706	1234	N50E83	N45E53	1.0	2	S	21	0.3	6	5	77	5	N48E67	CULG
641230	1844	1954	3											GAP	CULG
650105	0645	1203	N37E63	N25E60	1.8	2	N	12	1.7	21	59	68	53	N31E61	CULG
650105	1847	2207	3											GAP	CULG
650111	2131	2029	2											GAP	CULG
650113	2029	1314	2											GAP	CULG
650114	1952	2323	S22E29	S16E24	2.0	3	S	8	3.2	25	25	30	12	S19E26	CULG

Catalog of Disappearing Filaments

BACKGROUND

Title: Solar Features – Prominences/Filaments – Disappearing Filaments

Description: Tabular listing of disappearing solar filaments or “disparition brusque” can be used as a proxy for solar energetic particle events. This catalog is a listing of solar filament disappearances observed in H-alpha imagery. The list was compiled by C.S. Wright.

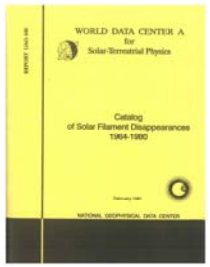
Source: Culgoora solar observatory and the Boulder observatory.

DATA SETS

- Solar Filament Disappearances - 1964-1980

  http://ngdc/stp/SOLAR/ftpfilaments.html#disappearances

Originally published in UAG-100, “Catalog of Solar Filament Disappearances 1964 - 1980” by C.S. Wright Feb ’91.



STATUS

Media: Data available on-line

Dates: 1964 – 1980

Metadata Record: G00536

SOLAR DATA SERVICES
Solar Features – Plage Regions

CFDT1: 1988-1998 K-line

Date	U.T.	Wave-length	Hemiarea (pixels)	Fac Area (ppm)	PFIFX (ppm)	PFIFA (ppm)	PFIFB (ppm)	PFIFC (ppm)	PFIF2 (ppm)	PFIF (ppm)	PFIFOUKAL (ppm)	PFI8OFIA (ppm)
30-May-88	18:19:14	3934	215630.3	14201.7	2178.9	331.5	262.5	193.6	106.6	538.3	308.3	192.8
31-May-88	19:58:41	3934	215234.6	16099.6	2243.7	437.2	372.3	307.4	129.0	631.9	354.0	258.7
01-Jun-88	23:41:30	3934	215383.5	14851.7	2065.0	357.7	289.5	221.3	110.0	562.4	290.1	208.7
02-Jun-88	21:34:54	3934	215256.8	12477.4	1826.6	249.7	182.3	114.8	85.9	452.1	222.3	149.2
03-Jun-88	19:28:11	3934	215199.3	12602.0	1986.6	207.8	130.5	53.2	82.4	439.7	212.1	131.0
04-Jun-88												
05-Jun-88	18:42:29	3934	215048.5	16679.1	2944.7	223.0	110.9	-1.3	100.3	559.5	242.5	144.1
06-Jun-88												
07-Jun-88	18:02:10	3934	215055.8	21125.7	3486.3	353.3	224.4	95.4	139.7	740.0	368.9	222.2
08-Jun-88	18:17:51	3934	214945.8	21824.8	3525.6	402.2	276.2	150.1	149.3	780.3	413.7	244.6
09-Jun-88	17:47:08	3934	214831.5	23952.9	3828.0	473.9	343.4	212.9	163.1	865.3	425.1	279.7
10-Jun-88	19:46:12	3934	214673.9	18577.5	3082.3	311.3	199.2	87.1	120.1	647.7	278.2	199.3
11-Jun-88	19:57:53	3934	214630.6	14642.6	2555.5	204.9	109.3	13.6	87.1	491.9	170.8	137.1
12-Jun-88	20:45:30	3934	214733.5	11894.8	2186.2	129.9	45.2	-39.5	64.3	383.9	119.2	87.4
13-Jun-88	18:49:52	3934	214633.7	11302.2	2076.8	140.0	61.9	-16.2	66.3	374.3	154.1	92.5
14-Jun-88	19:10:20	3934	214579.1	10901.9	1832.7	180.4	114.0	47.7	71.2	379.6	172.5	116.9
15-Jun-88	21:36:52	3934	214691.6	9759.4	1388.9	213.5	164.5	115.5	69.4	360.4	170.9	128.8
16-Jun-88	18:56:58	3934	214662.5	10640.0	1470.7	252.4	202.8	153.2	78.0	401.3	207.6	146.0
17-Jun-88												
18-Jun-88	18:55:49	3934	214612.3	13053.2	1852.9	272.9	204.7	136.6	91.1	477.5	235.3	162.1
19-Jun-88												
20-Jun-88	22:35:09	3934	214519.5	13739.7	2278.3	213.7	127.1	40.5	87.5	473.4	214.7	137.1
21-Jun-88	18:04:57	3934	214575.8	15304.6	2642.6	222.3	122.6	22.8	95.4	521.6	244.5	141.0
22-Jun-88												
23-Jun-88	18:14:56	3934	214454.4	15213.4	2616.7	236.8	140.4	44.0	97.9	526.0	266.7	147.0
24-Jun-88	19:15:00	3934	214457.7	13172.2	2110.9	234.1	156.7	79.3	88.0	466.4	230.5	144.2
25-Jun-88	19:49:38	3934	214217.5	12226.0	1812.2	242.8	176.5	110.2	83.0	441.7	214.6	142.5
26-Jun-88												
27-Jun-88	17:51:58	3934	214326.9	15703.2	2161.2	383.6	311.9	240.2	119.5	598.7	325.6	227.6
28-Jun-88	18:53:20	3934	214420.5	16046.2	2431.0	351.9	269.8	187.8	119.4	598.0	344.4	212.5
29-Jun-88	18:45:44	3934	214295.5	16186.5	2591.0	279.4	182.7	85.9	106.7	569.7	281.8	171.0
30-Jun-88	18:42:17	3934	214242.8	16504.2	2845.9	210.7	98.5	-13.7	95.7	547.3	205.9	138.1
01-Jul-88	17:53:38	3934	214503.3	16962.6	3073.6	161.4	35.9	-89.7	90.0	538.1	150.2	120.1

San Fernando K-line facular

BACKGROUND

Title: Solar Features – Plage Regions

Description: Tabular listings of solar chromospheric plage regions (data & indices) measured in Ca II K (393.4 nm). SGD tables list daily white light sunspot regions are tied to the overlying Ca K plage regions each day.

Source: Ground-based solar telescopes; Mt Wilson, San Fernando, Big Bear, etc.

DATA SETS

- Data – 1915-1998
  - ✓ Mt Wilson daily Ca plage areas 1915-1984 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#mtwilson
  - ✓ San Fernando K-line facular - 1988-1998 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#sanfernando
  - ✓ McMath/Hale/Big Bear - 1942-1987 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#mcmath
- SGD Tables – Active regios – 1969-1982 http://www.ngdc.noaa.gov/stp/SOLAR/ftpcalcium.html#sgd

STATUS

Media: Available on-line

Dates: 1915 – 1998

Metadata Record: G10111

SOLAR DATA SERVICES

Solar Features – Faculae & Sunspot Areas

SAMPLE DATA:

YYYYMM	St a	DoY decday	Group Numbere	Cod r/R	Position angle	Long	Lat	Umbra Area	Total Area	Faculae Area
189301	I	318.255	2787a	0.970	(196.3)	317.3	+17.2	(3550)	(1080)	(3533)
189301	I	0.255		0.970	288.6	7.3	+17.2			75
189301	I	0.255		0.910	241.9	357.2	-26.8			455
189301	I	0.255		0.736	292.3	337.7	+13.8			179
189301	I	0.255	2787	0.966	257.2	8.4	-13.2	0	24	587C
189301	I	0.255	2787a	0.954	255.1	5.9	-15.3	6	19	
189301	I	0.255	2787c	0.945	247.5	3.8	-22.3	0	17	379C
189301	I	0.255	2792	0.627	234.0	327.0	-24.3	0	4	
189301	I	0.255	2792	0.616	228.6	324.3	-26.8	0	7	293C
189301	I	0.255	2792	0.569	235.2	323.4	-21.7	0	3	
198301	I	0.255	2792a	0.580	230.7	322.7	-24.3	53	395	
189301	I	0.255	2792	0.531	229.0	319.1	-23.3	2	10	
189301	I	0.255	2792	0.470	227.9	315.2	-21.4	0	2	109C
189301	I	0.255	2792c	0.480	221.6	313.6	-24.1	16	102	
189301	I	0.255	2800a	0.358	138.0	278.7	-18.5	2	14	

White-light Faculae/Sunspot Areas

BACKGROUND

Title: Solar Features – Faculae & Sunspot Areas

Description: Listings of the positions & areas of sunspots and faculae measured at the Royal Greenwich Observatory from 1874-1955. Between 1955-1-76 Greenwich produced daily summaries only.

Source: Royal Greenwich Observatory, UK

DATA SETS

- White light faculae & sunspot area by group - 1874-1955
  http://ngdc/stp/SOLAR/ftpwhitelightfaculae.html
- Photoheliographic results - daily summaries - 1956-1976
  http://ngdc/stp/SOLAR/ftpwhitelightfaculae.html

STATUS

Media: available on-line

Dates: 1874-1976

Metadata Record: *TBD*

SOLAR DATA SERVICES
Solar Features – Sunspot Regions

YEAR	NUM GROUPS	PROJECTED PROJ. UMBRAL AREA	PROJECTED WHOLE SPOT AREA	PROJECTED PROJ. FACULAE AREA	CORRECTED CORR. UMBRAL AREA	CORRECTED WHOLE SPOT AREA	CORRECTED FACULAE AREA
1875	1.1	48.3	291.6	307	33.7	207.7	0
1876	0.7	26.4	150.2	160.6	18.5	107.7	0
1877	0.6	23.2	130.6	88.6	16	91.5	0
1878	0.2	6.3	33.5	62.5	4.1	22.2	0
1879	0.3	10	54.5	129.2	6.6	36	0
1880	2.2	123.4	584	813	90.2	436.5	0
1881	4	194.5	940.5	1723.4	138.8	679	0
1882	4.5	246.9	1286.9	2015.1	181.2	963.5	0
1883	4.9	249.2	1587.7	1605.7	174.5	1149.7	0
1884	5.6	204.2	1427.7	1688.3	143	1032.8	0
1885	4.3	145.3	1124.9	1249.2	100.1	807.5	0
1886	2.1	70.8	524	470.4	49.9	377.8	0
1887	1.2	36	240	253.8	25.1	176.8	0
1888	0.7	19.7	122.7	200.5	14	87.3	0
1889	0.5	17.5	101.8	105.3	12.9	76.9	0
1890	0.7	21.4	134.1	275	15.6	99.8	0
1891	3.4	118.3	742.3	1320.6	85.5	564.7	0
1892	6.4	256.9	1618.4	3220.7	188	1225.8	0
1893	8.5	325	1985.3	2286.2	233.8	1461.7	0
1894	7.5	311.5	1741.3	1666.2	228.8	1275.8	0
1895	5.9	236.3	1334.3	2058.5	168.8	973.3	0

Annual Mean Sunspot Area

BACKGROUND

Title: Solar Features – Sunspot Regions

Description: Daily measurements of sunspots and characteristics from a variety of sources

Source: Ground-based observatories

DATA SETS

- Sunspot region data – 1958-present
  http://ngdc/stp/SOLAR/ftpsunspotregions.html#catania
- Greenwich Heliophysical Observatory Archives - 1874-1976
  http://ngdc/stp/SOLAR/ftpsunspotregions.html#greenwich
- Debrecen Heliophysical Observatory Data -- 1977-present
  http://ngdc/stp/SOLAR/ftpsunspotregions.html#debrecen
- Sunspot Region Tilt Data from Mt. Wilson and Kodaikanal Observatories 1917-1985
  http://ngdc/stp/SOLAR/ftpsunspotregions.html#mtwilson

STATUS

Media: available on-lne

Dates: 1874 - present

Metadata Record: *TBD*

SOLAR DATA SERVICES
Future Directions

I would appreciate having you consider the following:

- **What are your general thoughts regaring the archived datasets within NGDC**
- **How useful is the SGD for the solar physics community**
- **What recommendations you have for maintaining the existing datasets within the archive**
- **Where do you believe I should go in the future**