



Australian Government
Bureau of Meteorology

SPACE WEATHER SERVICES

SOLAR

AND

GEOPHYSICAL

SUMMARY

February 2018

Solar Activity

Solar activity was predominately at very low levels this month with no M and X class flares observed.

DATE	FLARES		FLARE MAX	FADEOUT POSSIBLE ON DAYLIGHT CIRCUIT
	CLASS M	CLASS X		

None.

FLARE ALERT	SWF ALERT
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None issued.

PROTON ALERT					
DATE	BEGIN TIME	END TIME	DATE	ENERGY THRESHOLD	

None issued.

Ionospheric Activity

No ionospheric depressions associated with geomagnetic activity were observed this month. However, lower than normal maximum usable frequencies (MUFs) were observed at times during the month in the northern Australian region, possibly in association with generally low solar flux levels.

Ionospheric depressions listed below are calculated using foF2 data from the SWS ionosonde network.

IONOSPHERIC DISTURBANCES (MUFs for the Australian region)

01 Feb 18	Northern region MUFs Depressed by 15%
02 Feb 18	Northern region MUFs Depressed by 15%
03 Feb 18	Northern region MUFs Depressed by 20%
04 Feb 18	Northern region MUFs Depressed by 20%
07 Feb 18	Northern region MUFs Depressed by 15%
08 Feb 18	Northern region MUFs Depressed by 20%
11 Feb 18	Northern region MUFs Depressed by 20%
24 Feb 18	Northern region MUFs Depressed by 20%
25 Feb 18	Northern region MUFs Depressed by 25%
26 Feb 18	Northern region MUFs Depressed by 20%
28 Feb 18	Northern region MUFs Depressed by 15%

RADIO COMMUNICATIONS WARNINGS

DATE	N°.	BEGIN	END
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07 Feb 18	03	08 Feb 18	09 Feb 18
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Geomagnetic Activity

No significant geomagnetic activity was observed during the month.

DATE	GEOMAGNETIC DISTURBANCES (for the Australian region)
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No days with A index 16 or more.

GEOMAGNETIC WARNINGS AND ALERTS				
DATE	Nº.	BEGIN	END	ISSUED
13 Feb 18	01	14 Feb 18	15 Feb 18	Warning
18 Feb 18	02	19 Feb 18	19 Feb 18	Warning

Solar And Geophysical Indices

DATE	10cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX	DATE	10 cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX
01 Feb	69	3	-4	15 Feb	73	9	8
02 Feb	69	2	-12	16 Feb	72	10	8
03 Feb	69	3	-11	17 Feb	69	7	10
04 Feb	73	4	-13	18 Feb	70	9	10
05 Feb	74	6	0	19 Feb	69	11	15
06 Feb	77	4	-3	20 Feb	70	2	-4
07 Feb	77	2	2	21 Feb	68	2	-11
08 Feb	78	3	-7	22 Feb	68	8	-7
09 Feb	78	2	4	23 Feb	68	11	-9
10 Feb	78	7	9	24 Feb	68	5	-10
11 Feb	78	1	6	25 Feb	67	2	-12
12 Feb	79	3	6	26 Feb	70	5	-1
13 Feb	76	2	1	27 Feb	68	13	1
14 Feb	75	1	3	28 Feb	69	4	-4

DATE	10cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX	SUNSPOT NUMBER		FLARES
	Monthly Average	Monthly Average	Monthly Average	Monthly Average	13-month smoothed	>M1.0
Mar 17	74.7	8.4	11.1	17.7	25.8	0
Apr 17	81	7.3	14.4	32.6	24.9	7
May 17	73.6	5	9.9	18.8	23.4	0
Jun 17	74.8	3.4	9.2	19.4	22.3	0
Jul 17	78	5.8	10.5	18.3	21	3
Aug 17	78	7.3	10.4	33.1	19.5	1
Sep 17	93.4	10.4	19.5	43.6	18.5	31
Oct 17	76.4	6.9	4.6	13.2	17.2	1
Nov 17	72.2	7.1	-5.6	5.7	15.8	0
Dec 17	71.7	5.8	-9.2	8.2	14.8	0
Jan 18	70	4.8	-6.5	6.7	13.9	0
Feb 18	72.1	5	-0.9	10.6	12.3	0

Predicted sunspot numbers

SPECIAL NOTE

In June 2015, WDC-SILSO, Royal Observatory of Belgium, Brussels, adjusted their original observed sunspot numbers (Version 1.0) to a Version 2.0 series in which the sunspot numbers are higher. In the Version 1.0 data series, some of the sunspot numbers were weighted. The new (Version 2.0) sunspot numbers are unweighted sunspot number counts (for more information see: www.sidc.be/silso/home). The Bureau of Meteorology SWS solar cycle prediction is now based on the Version 2.0 values. As a result of this recalibration, the observed monthly and observed and predicted smoothed sunspot numbers are higher in the monthly table and solar cycle graph.

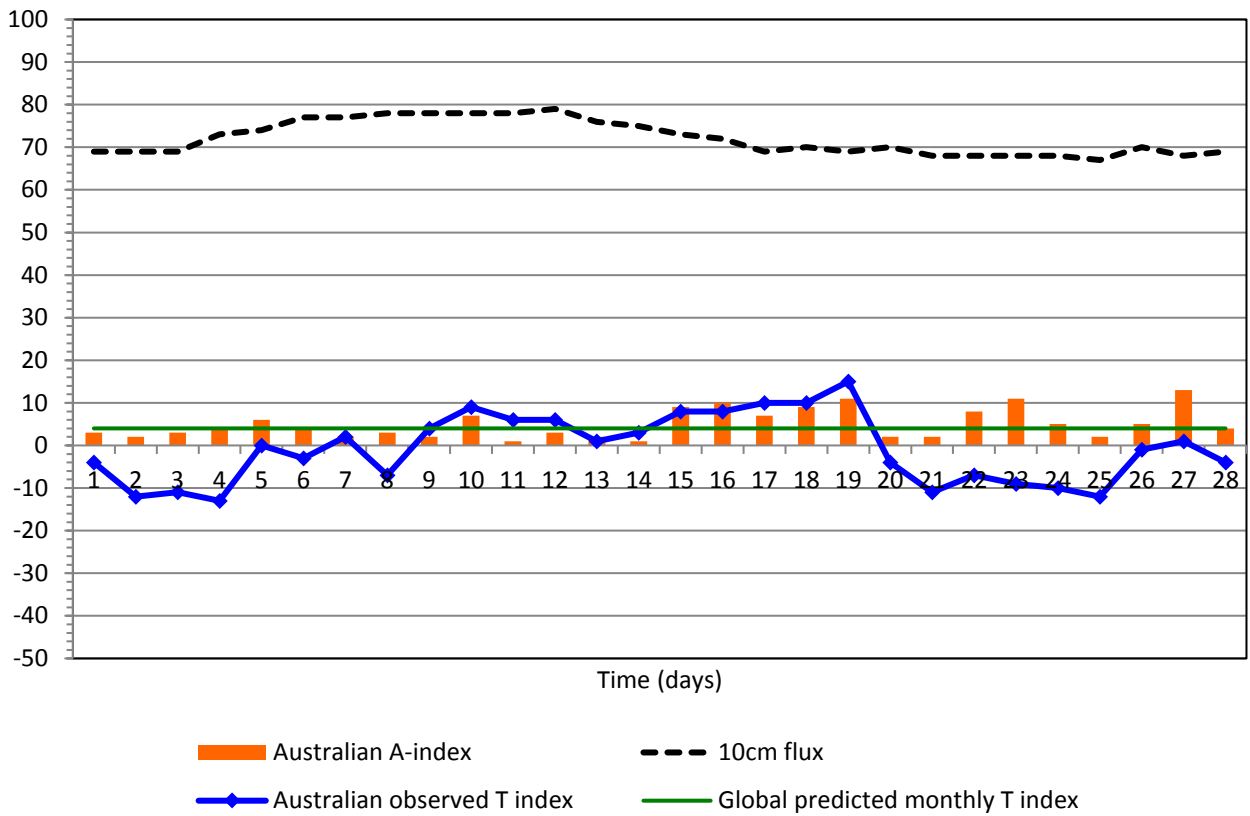
SWS WORLD T-INDICES

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	74	62	69	84	92	82	81	76	68	76	86	90
2014	91	108	130	114	96	84	86	81	90	94	98	103
2015	92	101	91	97	85	79	71	48	40	43	53	50
2016	52	57	46	30	34	28	26	25	28	17	12	10
2017	14	19	11	8	2	2	0	3	16	13	5	6
2018	8	3*	3	2	1	0	-1	-2	-2	-3	-3	-4
2019	-4	-5	-5	-5	-5	-4	-4	-3	-3	-2	-1	0
2020	1	3	5	7	9	11	14	17	20	23	26	28
2021	32	35	38	40	42	44	46	49	50	51	52	54

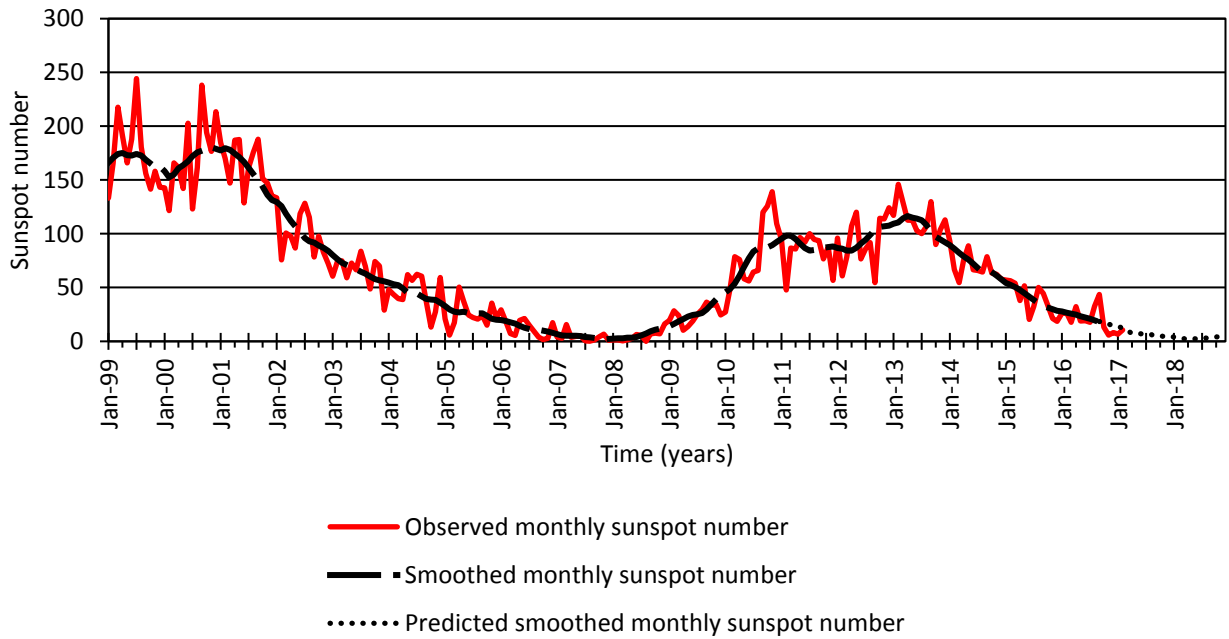
SWS predicted T-index

* New observed data. T-index value may have changed

Solar and Geophysical Indices - February 2018



Solar Cycle



Observed monthly sunspot numbers courtesy of WDC-SILSO, Royal Observatory of Belgium, Brussels (www.sidc.be/silso/home)

NOTES - notes - NOTES - notes - NOTES - notes

- a. Times quoted in this publication are all Universal Time (UT).
- b. The values of all indices are provisional. Final values are not available for several months.
- c. M or X class flares refer to the X-ray classification system for solar flares. In this system, X class flares are more energetic than M class flares.

FLARE CLASS	X-RAY FLUX DENSITY	
	Ergs/cm ² /sec	W/m ²
M	0.01-0.1	10 ⁻⁵ to 10 ⁻⁴
X	>0.1	> 10 ⁻⁴

- d. Class M flares, particularly the less energetic ones, are likely to cause a fadeout on only the lowest frequencies. Class X flares are likely to cause a fadeout over the entire HF spectrum. It should be noted that a fadeout will only occur on those circuits having a reflection point in the daylight hemisphere of the earth. Circuits having only night hemisphere reflection points will not be affected no matter the energy of the solar flares.
- e. The 10cm flux is the radio power of the sun at a frequency of 2800 MHz (wavelength 10.7 cm). This flux is a good indicator of solar activity and is widely used in place of the sunspot number. The values are measured by the Penticton radio observatory, Canada. Unlike the sunspot number, the 10cm flux never drops to zero even during solar minimum. With no sunspots visible on the solar disk, the 10cm flux will still have a value of around 67. The table below gives a (statistical) comparison between 10cm flux and sunspot number. The 10cm flux is measured in solar flux units (10⁻²² W m⁻² Hz⁻¹).

SUNSPOT No.	10 cm FLUX
0	67
20	78
40	93
60	110
100	147
150	195
200	243

- f. Ionospheric disturbances refer to measurements made across Australia, but are generally applicable to mid-latitude Southern Hemisphere conditions. Spread F conditions indicate tilts in the ionosphere,

which may result in multipath fading on some HF circuits.

- g. The magnetic A-indices are for the Australian region. Large values for the A index correspond to disturbed conditions. Levels of magnetic disturbances are described in the following terms.

A INDEX VALUE	DESCRIPTION
0 up to 7	Quiet
8 up to 15	Unsettled
16 up to 24	Active
25 up to 35	Minor Storm
36 and above	Major Storm

- h. The Australian daily T-index is a measure of the average of the ionospheric critical frequencies available on a particular day - the higher the value of the T-index, the higher the ionospheric critical frequencies (and Maximum Usable Frequencies on HF circuits) for that day. The T-index is based on data from Australian ionospheric stations and so is most applicable to HF circuits with reflection points in the Australian region.
- i. The SWS monthly observed T-index is derived from the observed monthly median values of foF2 for each hour from ionospheric stations worldwide.

The predicted smoothed monthly T-indices are computed by using a statistical analysis of the observed monthly T-indices for all solar cycles since 1938.

The SWS T-indices may not be updated each month but only when sufficient new data becomes available.

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