



Australian Government
Bureau of Meteorology

IPS RADIO AND SPACE SERVICES

SOLAR

AND

GEOPHYSICAL

SUMMARY

January 2012

Solar Activity

Solar activity was predominately at very low to low levels this month, with high solar activity observed on 23 and 27 Jan. A total of 5 flares were observed during the month, 4 M class flares and 1 X class flare. The largest flare for the month was the X1.7 on 27 Jan. Another significant flare, an M8.7 from the same solar region, (region number 1402), was observed on 23 Jan. Solar proton events and coronal mass ejections followed the M8.7 and X1.7 flares. Region 1402 also produced the M3.2 flare on 19 Jan, which was also associated with a coronal mass ejection. Solar region 1402 showed substantial decay as it rotated around the west limb of the Sun on 28 Jan.

DATE	FLARE ALERT	SWF ALERT *
14 Jan 12	Flare Alert	
17 Jan 12	Flare Alert	
18 Jan 12	Flare Alert	
19 Jan 12	Flare Alert	
23 Jan 12	Flare Alert	SWF Alert (0250-0550 UT)
27 Jan 12	Flare Alert	

PROTON ALERT					
DATE	BEGIN	TIME	DATE	END	TIME
23 01 2012		0545UT	27 01 2012		1100UT
27 01 2012		1915UT	31 01 2012		0715UT

FLARES				
DATE	CLASS >M1.0	CLASS X	EVENT MAX	DURATION >M3
14 Jan 12	M1.4		1318UT	
18 Jan 12	M1.7/1N		1912UT	
19 Jan 12	M3.2/SF		1605UT	1344-1750UT
23 Jan 12	M8.7/2B		0359UT	0338-0434UT
27 Jan 12		X1.7 /1F	1837UT	1737-1856UT

Ionospheric Conditions

The deepest ionospheric depression for the month was observed on 23 Jan following coronal mass ejection induced geomagnetic activity. Transpolar HF circuits probably experienced increased absorption 23-31 Jan.

DATE	IONOSPHERIC DISTURBANCES (MUFs for the Australian Region)
22 Jan 12	Northern region MUFs depressed 16%
23 Jan 12	Northern region MUFs depressed 23%
	Southern region MUFs depressed 28%
25 Jan 12	Southern region MUFs depressed 16%

RADIO COMMUNICATIONS WARNINGS			
DATE	N°.	BEGIN	END
23 Jan 12	01	23 Jan 12	23 Jan 12
24 Jan 12	02	24 Jan 12	26 Jan 12
26 Jan 12	03	26 Jan 12	28 Jan 12

Geomagnetic Activity

The strongest disturbance for the month was observed on 22 Jan with a local A index of 27 reached. This activity was associated with a coronal mass ejection observed on 19 Jan. The strong flare activity and coronal mass ejections on 23 and 27 Jan failed to produce significant geomagnetic storm activity, although there were some reports of auroral observations at high latitudes.

DATE	GEOMAGNETIC DISTURBANCES (for the Australian region)
22 Jan 12	Isolated minor storm periods.
24 Jan 12	Isolated minor storm period late in UT day.

GEOMAGNETIC WARNINGS AND ALERTS

DATE	N°.	BEGIN	END	ISSUED
22 Jan 12				Alert
23 Jan 12	01	23 Jan 12	23 Jan 12	Warning
23 Jan 12	02	24 Jan 12	26 Jan 12	Warning
24 Jan 12				Alert

Solar And Geophysical Indices

DATE	10 cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX	DATE	10 cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX
1-Jan	130	5	100	17-Jan	139	6	73
2-Jan	135	6	115	18-Jan	148	3	99
3-Jan	135	7	124	19-Jan	157	4	84
4-Jan	136	3	105	20-Jan	141	4	90
5-Jan	141	6	115	21-Jan	142	9	90
6-Jan	136	6	104	22-Jan	141	27	58
7-Jan	141	6	94	23-Jan	144	9	47
8-Jan	136	6	112	24-Jan	136	18	90
9-Jan	142	6	84	25-Jan	126	12	64
10-Jan	129	6	83	26-Jan	128	7	82
11-Jan	120	5	101	27-Jan	142	6	89
12-Jan	117	8	79	28-Jan	115	5	79
13-Jan	124	7	108	29-Jan	110	5	105
14-Jan	132	3	84	30-Jan	114	7	90
15-Jan	134	6	95	31-Jan	117	4	80
16-Jan	140	9	105				

MONTH/ YEAR	10cm FLUX	AUSTRALIAN A-INDEX	AUSTRALIAN T-INDEX	SUNSPOT NUMBER		FLARES
	Monthly Average	Monthly Average	Monthly Average	Monthly Average	Yearly Average	>M1.0
Feb-11	94.6	7.1	30	29.4	33.5	11
Mar-11	115.4	6.6	54.7	56.2	36.9	21
Apr-11	112.6	6.9	68.6	54.4	41.8	3
May-11	96	6	48.6	41.6	47.6	2
Jun-11	95.8	5.7	43.9	37	53.2	2
Jul-11	94.3	5.8	40.5	43.9	57.3	2
Aug-11	101.8	5.2	45.2	50.6	60.7	8
Sep-11	134.5	8.7	65.4	78	63.4	35
Oct-11	137.3	5.7	96.2	88	65.1	8
Nov-11	153.2	5.3	136	96.7	67.7	13
Dec-11	141.4	5	129.1	73	71.2	8
Jan-12	133.2	7.1	91.2	58.3	74.8	5

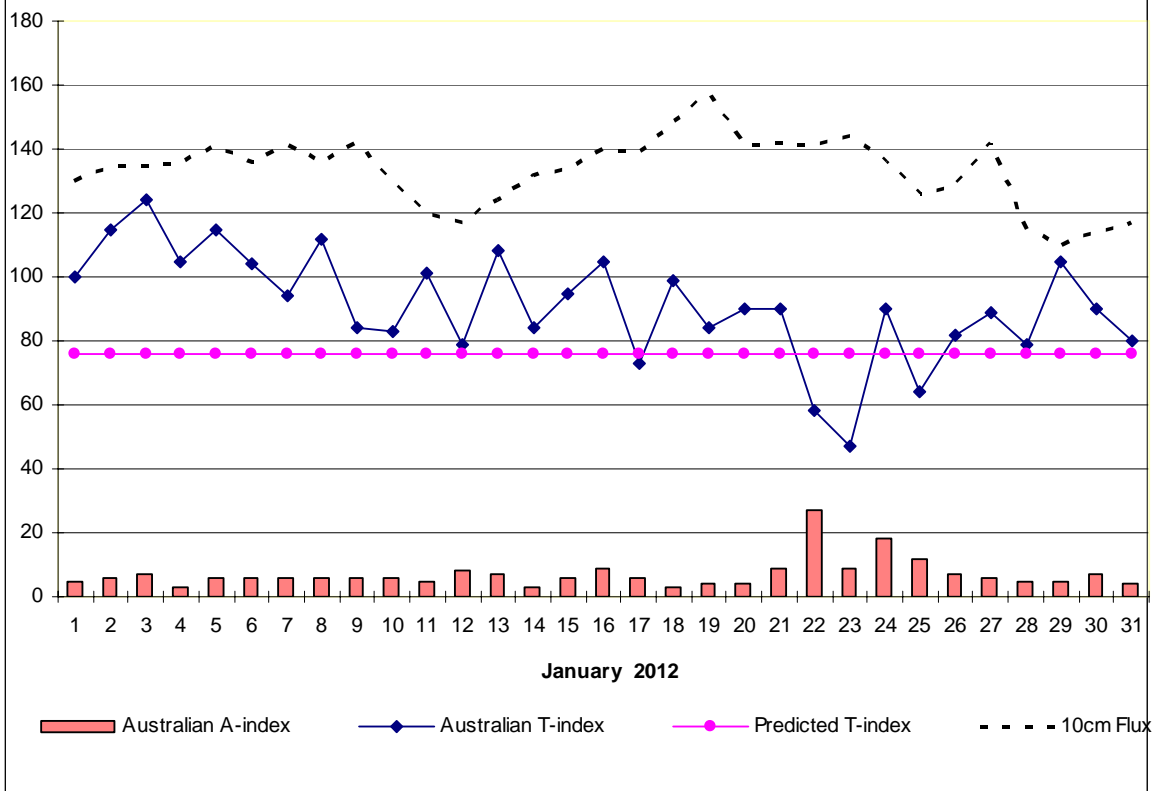
Predicted Sunspot numbers

IPS T-INDICES												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	20	16	11	9	9	10	7	1	0	-2	-7	-1
2008	6	4	6	2	-5	-11	-7	-8	-5	-9	-8	-9
2009	-2	-1	-2	0	2	-3	-4	-7	-2	-3	-3	-2
2010	12*	29	31	21	13	7	18	24	28	19	19	23
2011	22	32	52	63	53	49	44	49	65*	86*	103*	93*
2012	77*	80	82	82	81	80	80	82	82	82	83	83
2013	84	85	87	87	88	87	87	86	85	84	83	81
2014	80	78	76	75	74	73	73	72	71	70	70	69
2015	69	68	68	67	67	66	64	63	61	59	56	54
2016	51	49	46	44	42	40	38	36	35	33	32	31
2017	30	29	28	27	26	25	23	22	21	21	20	18
2018	17	16	15	14	13	12	12	11	10	9	9	8

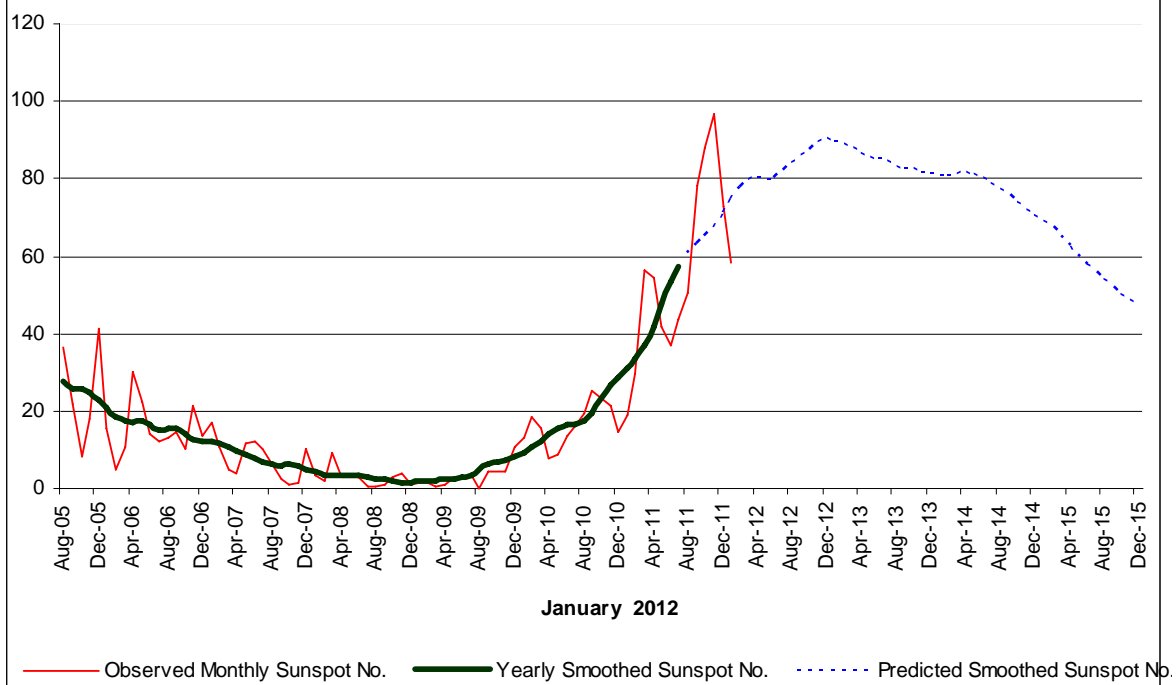
IPS Predicted T index

* = new data. T index may have been changed

Solar and Geophysical Indices



Sunspot Number - Solar Cycle 24



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 T-index is a measure of the average level 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 IPS Monthly T-index for ASAPS is derived from the observed monthly median values of foF2 for each hour at up to 40 ionospheric stations worldwide. These records become available from IPS stations in Australia very soon after each month, but the majority are received up to one year later. This means that the exact observed value of the monthly T-index is not available until some months later.

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 IPS T-indices for ASAPS may not be updated each month but only when sufficient new data becomes available.

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