3-day Space Weather Conditions (SUPARCO)



Friday, January 13, 2023, 12:18 PST

LOCAL CURRENT IONOSPHERIC CONDITIONS (SON)								
DATE	13-	Jan-23 (noon)		14-Jan-23	(noon)		15-Jan-23 (noc	on)
foF2	11.1 MHz			10.9 MHz			10.4 MHz	
h′F2	318 km			310 km			290 km	
TEC	53 TECU			50 TECU			47 TECU	
1	Maximum Us	able Frequency	(MUF) and	Optimum Traffic Fr	equency (FOT)	for various dist	ances	
Distance (km)	100	200	400	600	800	1000	1500	3000
MUF (MHz) for 3	11.2	11.5	12.7	14.4	16.3	18.4	23.0	28.9
days (13 Jan – 15	11.0	11.4	12.6	14.3	16.1	18.3	22.8	28.7
Jan)	10.5	10.9	12.2	14.0	16.0	18.1	22.7	28.5
FOT (MHz) for 3	9.5	9.8	10.8	12.2	13.9	15.6	19.6	24.5
days (13 Ĵan - 15	9.4	9.7	10.7	12.1	13.7	15.5	19.4	24.4
Jan)	8.9	9.3	10.4	11.9	13.6	15.4	19.3	24.2

Local ionospheric conditions are enhanced as compared to the predicted monthly median MUF.

LOCAL GEOMAGNETIC CONDITIONS				
K-index	1	Quiet geomagnetic activity is expected.	Quiet geomagnetic activity is expected.	
F (SON/ISB)	45525/50035 nT	45538±10 /50040±20 nT	45538±10/50040±20 nT	

The local geomagnetic field is quiet at the moment.

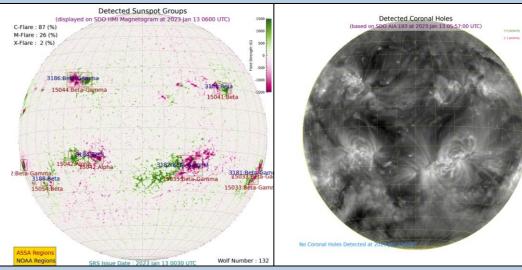
		SOLAR CONDITIONS		
SN	151	148 (SSN-predicted)	139 (SSN-predicted)	
F 10.7	212 sfu	208 sfu	198 sfu	
V _{sw}	456.4 km/s (Varied in the past 12 hrs between 376 & 496 km/s)	Low levels of solar wind speed may prevail.	Low to moderate levels of solar wind speed may prevail.	
Solar flares	C3.3 (max. flare in the past 24 hrs: M1, 0650 UT)	Moderate to high levels of solar activity expected.	Moderate to high levels of solar activity expected.	
IMF Bt	+6.2 nT (varied in the past 12 hrs between +6.6 nT & +8.3 nT)	Expected to vary between positive and	Expected to vary between positive and	
Bz	-3.4 nT (varied in the past 12 hrs between +3.3 nT & -7.7 nT)	negative sectors.	negative sectors.	

Solar conditions are at moderate to high levels with background X-ray flux at C-class levels.

Daily Sun: 13 January 2023

There are three active regions AR3181, AR3182 and AR3186 present on the Sun capable of producing strong M and X-class solar flares having chances of 26% and 2% respectively.

No Coronal Hole (CH) is detected on the solar disk.



2-Day Conditions

Solar activity is expected to be at moderate to high levels. Multiple M/X flares have already occurred from the regions mentioned causing shortwave fadeouts. In case of more M/X flares, minor to moderate radio blackouts may be observed which may last up to 90 minutes.

Light to moderate solar windspeed and quiet geomagnetic activity is expected over the weekend.

Enhanced ionospheric conditions are expected for the next 2 days. It is advised to use the frequency ranges mentioned in the ionospheric section.

For information on radio blackout levels, please follow the link:

http://www.swpc.noaa.gov/noaa-scales-explanation

Acknowledgements:

Images source: Solar Dynamics Observatory-SDO both images showing the Solar disk and Coronal Holes have been processed at SUPARCO using Automatic Solar Synoptic Analyzer (ASSA), developed jointly by the Korean Space Weather Centre of the Radio Research Agency (RRA) & Space Environment Laboratory (SE Lab).

<u>Data sources</u>: The planetary indices and solar data are taken from the URLs below:

http://www.spaceweather.go.kr http://www.sws.bom.gov.au http://www.solarmonitor.org

Sonmiani (SON): 25.2º N, 66.75º E Islamabad (ISB): 33.7º N, 73.13º E

ANNEXURE

	DEFINITIONS OF TERMINOLOGIES USED IN THIS SUMMARY			
foF2	Maximum frequency of F2-layer of the ionosphere			
h′F2	Virtual height of the F2-layer			
MUF	Maximum usable frequency for 3000 km			
K-index	Local index defining geomagnetic conditions			
Declination	Planetary A index defining geomagnetic conditions, predicted value during geomagnetic unsettled Conditions			
F	Magnitude of the total geomagnetic field vector (unit in nano Teslas)			
SON, difference	Sonmiani Geomagnetic Observatory mean value, <u>difference limit</u> from night time value of quiet conditions: 25-30 nT, max: 260 nT			
ISB	Islamabad Geomagnetic Observatory mean value			
SN	Relative sunspot numbers			
Vsw	Solar Wind Speed (km/s)			
F10.7	Solar radio flux at 2.8 GHz (10.7 cm wavelength)			
sfu	Solar flux unit (defines the solar radio 10.7 cm flux)			
Solar Flare	Could be B, C, M and X depending upon the intensity of x-rays being emitted (each type has further 10 classes based on amount of energy released by the flare)			
IMF	Interplanetary magnetic field (the source of which is the Sun)			
Bt	Total IMF (unit in Nano Teslas)			
Bz	Vertical component of IMF (could be north/upward/positive or south/downward/negative) (unit in nano Teslas)			
AR	Active Regions on the sun currently in view			
CME	Coronal Mass Ejection			
СН	Coronal Hole			
KASI	Korean Astronomy & Space Science Institute			
SWFs	Short-wave fadeouts, caused by M/X class flares on the daylit side of the hemisphere absorbing lower Frequencies and hampering HF communication.			
SSN-predicted	Smooth Sunspot Number-it is an estimated value using a mathematical relation to forecast it.			