3-day Space Weather Conditions (SUPARCO)

Friday, December 22, 2023, 12:15 PST



LOCAL CURRENT IONOSPHERIC CONDITIONS (SON)								
DATE	22-	Dec-23 (noon)		23-Dec-23	3 (noon)		24-Dec-23 (noc	on)
foF2	10.3 MHz			10.0 MHz			9.7 MHz	
h′F2	285 km			280 km			276 km	
TEC	42 TECU		40 TECU			38 TECU		
Maximum Usable Frequency (MUF) and Optimum Traffic Frequency (FOT) for various distances								
Distance (km)	100	200	400	600	800	1000	1500	3000
MUF (MHz) for 3	10.5	10.9	12.4	14.4	16.4	18.7	23.5	27.7
days (22 Dec - 24	10.2	10.7	11.8	14.0	16.1	18.4	23.4	27.4
Dec)	9.9	10.0	11.3	12.4	15.4	17.0	22.5	26.7
FOT (MHz) for 3	8.8	9.3	10.9	11.6	13.9	15.5	19.9	23.6
days (22 Dec - 24	8.6	9.1	10.7	11.5	13.7	15.3	19.7	23.4
Dec)	8.1	8.5	10.4	10.5	13.2	15.0	19.2	23.3

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

LOCAL GEOMAGNETIC CONDITIONS				
K-index	0 (Quiet)	Quiet geomagnetic activity is expected.	Quiet geomagnetic activity is expected.	
F (SON/ISB)	45510/50020 nT	45520±10 /50028±20 nT	45520±10/50028±20 nT	
	,	•	,	

The local geomagnetic field is Quiet at the moment.

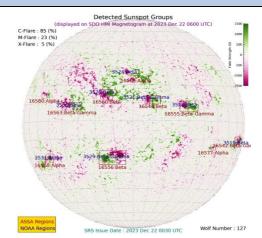
		SOLAR CONDITIONS		
SN	138	125 (SSN-predicted)	110 (SSN-predicted)	
F 10.7	194 sfu	182 sfu	174 sfu	
V _{sw}	345.4 km/s (Varied in the past 12 hrs between 324 & 500 km/s)	Low to moderate levels of solar windspeed may prevail.	Low to moderate levels of solar windspeed may prevail.	
Solar flares	C1.5 (max. flare in the past M3, 0004 UT)	Low to moderate levels of solar activity expected.	Low to moderate levels of solar activity expected.	
IMF Bt	+5.9 nT (varied in the past 12 hrs between +4.0 nT & +5.8 nT)	Expected to vary between positive and	Expected to vary between positive	
Bz	+1.6 nT (varied in the past 12 hrs between -2.4 nT & +1.9 nT)	negative sectors.	and negative sectors.	

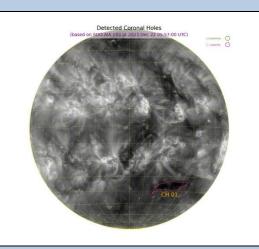
Solar conditions are at low to moderate moderate levels with background X-ray flux at C-class levels.

Daily Sun: 22 December 2023

There are two active regions AR3521 and AR3529 present on the Sun capable of producing strong M and X-class solar flares having chances of 23% and 5% respectively.

01 Coronal Hole (CH) is detected on the solar disk.





2-Day Conditions

Solar activity is expected to be at low to moderate levels. In case of solar flares, shortwave fadeouts may be observed.

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

Normal 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:

<u>Images source</u>: 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.			