3-day Space Weather Conditions (SUPARCO)

Friday, December 16, 2022, 12:47 PST

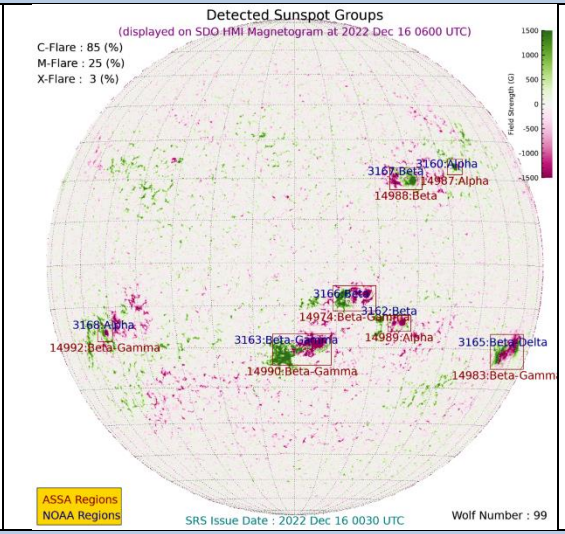
SUPARCO

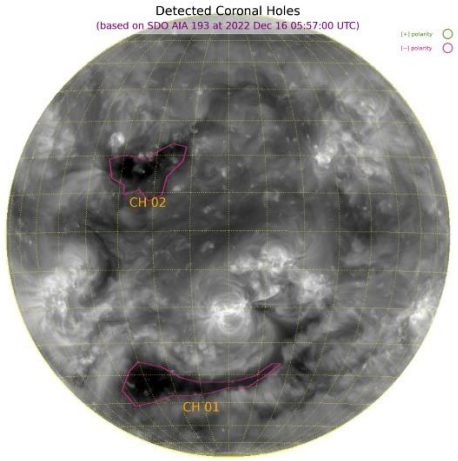
DATE	LOCAL CURRENT IONOSPHERIC CONDITIONS (SON)							
	16-Dec-22(noon)		17-Dec-22 (noon)			18-Dec-22 (noon)		
foF2	9.9 MHz		10.2 MHz			9.1 MHz		
h'F2	300 km		315 km			290 km		
TEC	44 TECU		48 TECU			38 TECU		
Maximum Usable Frequency (MUF) and Optimum Traffic Frequency (FOT) for various distances								
Distance (km)	**100**	**200**	**400**	**600**	**800**	**1000**	**1500**	**3000**
MUF (MHz) for 3 days (16 Dec - 18 Dec)	10.1	10.4	11.6	13.2	15.1	17.0	21.4	26.6
	10.4	10.7	11.9	13.4	15.2	17.1	21.6	26.9
	9.3	9.7	10.8	12.4	14.2	16.0	20.2	24.9
FOT (MHz) for 3 days (16 Dec - 18 Dec)	8.6	8.8	9.9	11.2	12.8	14.5	18.2	22.6
	8.8	9.1	10.1	11.4	12.9	14.6	18.4	22.9
	7.9	8.2	9.2	10.5	12.1	13.6	17.2	21.2
Local ionospheric conditions are normal 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)	45533/50043 nT		45545±10 /50050±20 nT			45545±10/50050±20 nT		
The local geomagnetic field is quiet at the moment.								
SOLAR CONDITIONS								
SN	140		157 (SSN-predicted)			133 (SSN-predicted)		
F 10.7	166 sfu		175 sfu			142 sfu		
V_{sw}	315.3 km/s (Varied in the past 12 hrs between 316 & 546 km/s)		Slightly enhanced levels of solar wind speed may prevail.			Moderate levels of solar wind speed may prevail.		
Solar flares	M1.1 (max. flare in the past 24 hrs: M5, 2240 UT)		Moderate levels of solar activity expected.			Low to moderate levels of solar activity expected.		
IMF Bt	+5.03 nT (varied in the past 12 hrs between +4.2 nT & +6.5 nT)		Expected to vary between positive and negative sectors.			Expected to remain in the negative sectors.		
Bz	+0.87 nT (varied in the past 12 hrs between -4.2 nT & +4.6 nT)							
Solar conditions are at moderate to high levels with background X-ray flux at M-class levels.								

Daily Sun: 16 December 2022

There are two active regions AR3163 and AR3165 present on the Sun capable of producing strong M and X-class solar flares having chances of 25% and 3% respectively.

02 Coronal Holes (CHs) are detected on the solar limb.





2-Day Conditions

Solar activity is expected to be at moderate to high levels with background X-ray flux at M-class levels.
There are chances of shortwave fadeouts in which higher frequencies will diminished and only lower frequencies will remain operational. In case of occurrence of total blackout, all frequencies will be jammed for half to one hour in the day light hours.
Light to slightly elevated solar wind speed is expected to prevail due to the presence of coronal hole.
Quiet geomagnetic activity is expected to prevail over the weekend.
Normal to slightly 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).

Data sources: 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, difference limit from night time value of quiet conditions: 25-30 nT, max: 260 nT
ISB	Islamabad Geomagnetic Observatory mean value
SN	Relative sunspot numbers
V_{SW}	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
CH	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.