3-day Space Weather Conditions (SUPARCO)

Friday, July 21, 2023, 12:13 PST
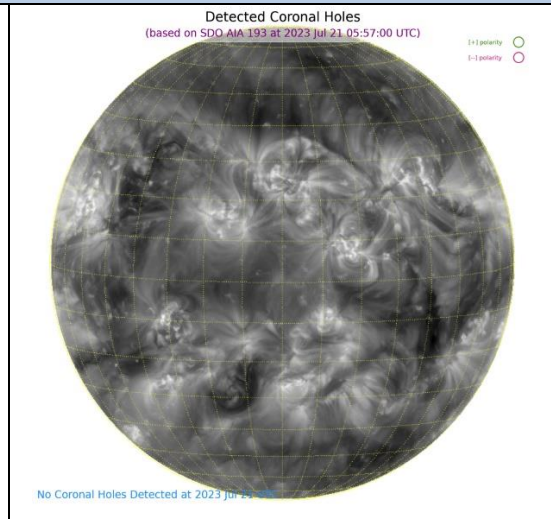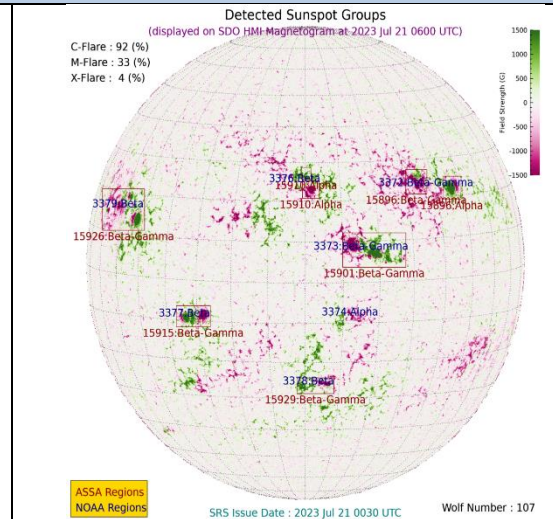
SUPARCO

LOCAL CURRENT IONOSPHERIC CONDITIONS (SON)			
DATE	**21-Jul-23 (noon)**	**22-Jul-23 (noon)**	**23-Jul-23 (noon)**
foF2	10.4 MHz	10.2 MHz	10.0 MHz
h'F2	310 km	290 km	278 km
TEC	47 TECU	45 TECU	42 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 (21 Jul – 23 Jul)	10.5	10.9	12.3	14.0	16.3	18.3	22.4	28.0
	10.3	10.7	12.1	13.8	15.9	18.0	21.9	27.7
	10.1	10.5	11.9	13.5	15.4	17.8	21.5	27.3
FOT (MHz) for 3 days (21 Jul – 23 Jul)	8.9	9.3	10.3	11.9	14.8	15.5	19.9	23.8
	8.8	9.1	10.2	11.7	14.5	15.3	18.6	23.5
	8.6	8.9	10.1	11.5	13.1	15.1	18.3	23.2

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

LOCAL GEOMAGNETIC CONDITIONS			
K-index	2 (Quiet)	Quiet geomagnetic activity is expected.	Quiet geomagnetic activity is expected.
F (SON/ISB)	45525/50035 nT	45538±10 /50045±20 nT	45538±10/50045±20 nT

The local geomagnetic field is Quiet at the moment.

SOLAR CONDITIONS			
SN	131	128 (SSN-predicted)	125 (SSN-predicted)
F 10.7	184 sfu	182 sfu	180 sfu
Vsw	412.3 km/s (Varied in the past 12 hrs between 346 & 487 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 24 hrs: M2, 1920 UT)	Moderate levels of solar activity expected.	Low to moderate levels of solar activity expected.
IMF Bt	+5.2 nT (varied in the past 12 hrs between +6.9 nT & +11.7 nT)	Expected to vary between positive and negative sectors.	Expected to vary between positive and negative sectors.
Bz	+2.8 nT (varied in the past 12 hrs between -7.0 nT & +4.7 nT)		

Solar conditions are at moderate levels with background X-ray flux at M-class levels.

Daily Sun: 21 July 2023

There are two active regions AR3372 and AR3373 present on the Sun capable of producing strong M and X-class solar flares having chances of 33% and 4% respectively.

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

Detected Sunspot Groups
(displayed on SDO HMI Magnetogram at 2023 Jul 21 0600 UTC)

C-Flare : 92 (%)
M-Flare : 33 (%)
X-Flare : 4 (%)

3376:Beta
15910:Alpha
15926:Beta-Gamma
3370:Beta
3373:Beta-Gamma
15901:Beta-Gamma
3374:Beta-Gamma
15896:Beta-Gamma
15888:Alpha
3377:Beta
15915:Beta-Gamma
3374:Alpha
3378:Beta
15929:Beta-Gamma

ASSA Regions
NOAA Regions
SRS Issue Date : 2023 Jul 21 0030 UTC
Wolf Number : 107

Detected Coronal Holes
(based on SDO AIA 193 at 2023 Jul 21 05:57:00 UTC)

[+] polarity
[–] polarity

No Coronal Holes Detected at 2023 Jul 21

2-Day Conditions

Solar activity is expected to be at low to moderate levels. In case of solar flares, short wave 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:

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
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
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.