

### 3-day Space Weather Conditions (SUPARCO)

Friday, January 03, 2025, 14:15 PST



| Radio Blackouts |         |           | Solar Radiation Storms |         |           | Geomagnetic Storms |         |           |
|-----------------|---------|-----------|------------------------|---------|-----------|--------------------|---------|-----------|
| -24 Hr          | Current | Predicted | -24 Hr                 | Current | Predicted | -24 Hr             | Current | Predicted |
| R1              | R0      | R0 – R1   | S0                     | S0      | S0        | G1                 | G0      | G0        |

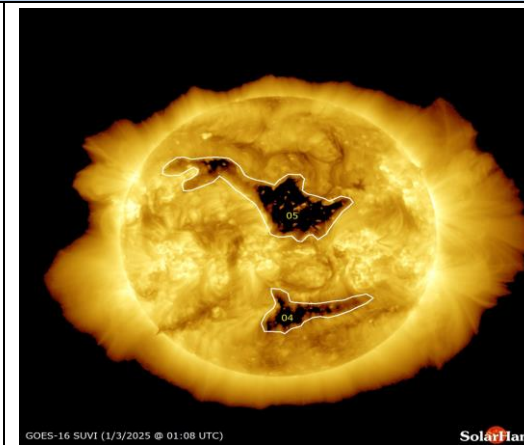
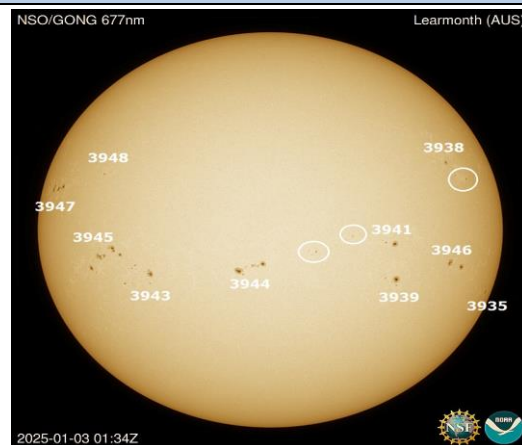
| LOCAL CURRENT IONOSPHERIC CONDITIONS (SON)  |   |      |      |   |      |   |      |      |
|---|---|------|------|---|------|---|------|------|
| DATE  | 3-Jan-25 (noon)   |      |      | 4-Jan-25 (noon)   |      | 5-Jan-25 (noon)   |      |      |
| foF2  | 14.5 MHz  |      |      | 14.2 MHz  |      | 14.1 MHz  |      |      |
| h'F2  | 318 km  |      |      | 290 km  |      | 287 km  |      |      |
| TEC   | 68 TECU   |      |      | 63 TECU   |      | 60 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 (03 Jan – 05 Jan)  | 14.8  | 15.2 | 17.2 | 20.0  | 23.1 | 26.3  | 29.9 | 33.9 |
|   | 14.4  | 14.9 | 16.9 | 19.7  | 22.9 | 26.2  | 29.7 | 33.7 |
|   | 14.3  | 14.7 | 16.7 | 19.4  | 22.6 | 26.0  | 29.4 | 33.4 |
| FOT (MHz) for 3 days (03 Jan – 05 Jan)  | 12.5  | 12.9 | 14.6 | 17.0  | 19.6 | 22.4  | 25.5 | 28.8 |
|   | 12.2  | 12.6 | 14.4 | 16.8  | 19.5 | 22.2  | 25.2 | 28.7 |
|   | 12.0  | 12.4 | 14.1 | 16.5  | 19.2 | 21.9  | 24.9 | 28.4 |
| Local ionospheric conditions are slightly enhanced 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)   | 45675/50515 nT  |      |      | 45682±10 /50520±20 nT                                   |      | 45682±10/50520±20 nT                                    |      |      |
| The local geomagnetic field is quiet at the moment.   |   |      |      |   |      |   |      |      |
| SOLAR CONDITIONS  |   |      |      |   |      |   |      |      |
| SN  | 173   |      |      | 162 (SSN-predicted)                                     |      | 153 (SSN-predicted)                                     |      |      |
| F 10.7  | 212 sfu   |      |      | 207 sfu   |      | 187 sfu   |      |      |
| V <sub>sw</sub>   | 448.7 km/s (Varied in the past 12 hrs between 423 & 552 km/s)   |      |      | Low to moderate levels of solar wind speed may prevail. |      | Low to moderate levels of solar wind speed may prevail. |      |      |
| Solar flares  | C3.2 (max. flare in the past (M1, 1740 UT)  |      |      | Low to moderate levels of solar activity is expected.   |      | Low to moderate levels of solar activity is expected.   |      |      |
| IMF<br>B <sub>t</sub><br><br>B <sub>z</sub>   | +14.73 nT (varied in the past 12 hrs between +7.94 nT & +15.72 nT)<br><br>+11.82 nT (varied in the past 12 hrs between +0.45 nT & +8.16 nT) |      |      | Expected to vary between positive and negative sectors. |      | Expected to vary between positive and negative sectors. |      |      |

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

### Daily Sun: 3 January 2025

There are two active regions AR3945 and AR3947 present on the Sun capable of producing strong solar flares.

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



### 2-Day Conditions

- Solar activity is expected to be at low to moderate levels.
- In case of M/X-class solar flares, minor level radio blackouts are expected.
- Low to moderate levels of solar wind speed is expected due to the effect of coronal holes.
- Quiet geomagnetic activity is expected to prevail.
- Slightly enhanced ionospheric conditions are expected for the next 2 days. It is advised to use the frequency ranges mentioned in the ionospheric section.

### Credits:

*Solar conditions courtesy to SOHO, DSCOVR and GOES-16 missions.*

*NOAA SWPC is acknowledged for solar radio flux conditions.*

*Korean Space Weather Centre is acknowledged for solar disk and coronal hole images.*

**Sonmiani (SON): 25.2° N, 66.75° E**

**Islamabad (ISB): 33.7° N, 73.13° E**

## ANNEXURE

|                 | <b>DEFINITIONS OF TERMINOLOGIES USED IN THIS SUMMARY</b>   |
|-----------------|--|
| 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   |
| V <sub>sw</sub> | 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)   |
| B <sub>t</sub>  | Total IMF (unit in Nano Teslas)  |
| B <sub>z</sub>  | 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 day lit 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.   |

## **RSG SCALES**

| <b><u>Radio Blackouts</u></b> |                              |                            |                            |                             |
|-------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|
| <b>Minor</b><br><b>R1</b>     | <b>Moderate</b><br><b>R2</b> | <b>Strong</b><br><b>R3</b> | <b>Severe</b><br><b>R4</b> | <b>Extreme</b><br><b>R5</b> |

| <b><u>Solar Radiation Storms</u></b> |                              |                            |                            |                             |
|--------------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|
| <b>Minor</b><br><b>S1</b>            | <b>Moderate</b><br><b>S2</b> | <b>Strong</b><br><b>S3</b> | <b>Severe</b><br><b>S4</b> | <b>Extreme</b><br><b>S5</b> |

| <b><u>Geomagnetic Storms</u></b> |                              |                            |                            |                             |
|----------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|
| <b>Minor</b><br><b>G1</b>        | <b>Moderate</b><br><b>G2</b> | <b>Strong</b><br><b>G3</b> | <b>Severe</b><br><b>G4</b> | <b>Extreme</b><br><b>G5</b> |