

**NATIONAL WEATHER SERVICE INSTRUCTION 10-1101**

**October 28, 2010**

**Operations and Services**

**Space Weather Services NWSPD 10-11**

**SPACE WEATHER PRODUCTS**

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**NOTICE:** This publication is available at: <http://www.nws.noaa.gov/directives/>.

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**Certified by:** W/OS7 (K. Schrab)

**Type of Issuance:** Routine

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**SUMMARY OF REVISIONS:** This instruction supersedes NWS Policy Instruction 10-1101, dated October 11, 2005 and subsequent recertification. Changed the name of governing directive 10-11 to reflect 10-11 dropping word "Program." OPR and names for certification and signature have changed. Numerous minor grammatical and context corrections throughout document. Updated information on specific products and services since last recertification, where needed. All references to "Space Environment Center" and "SEC" have been changed to "Space Weather Prediction Center" and "SWPC," respectively. Deleted outdated description in Section 4.b. Added Section 4.h: 3-hourly Space Weather Conditions, Section 4.i: Space Weather Advisory Outlooks (with associated example in Appendix A), and Forecast and Section 5.f: Relativistic Electron Forecast Model (REFM). Added Section 4.j: Space Weather for Aviation Service Providers. Per NOAA GCW, replaced "customer" with "user" in Sections 4.f and 5.b., and removed word "must" from Section 5.e, replacing with "are."

Signed

October 14, 2010

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Date

Director, Office of Climate, Water and Weather Services

<u>Table of Contents</u>	<u>Page</u>
1. General.....	2
2. Background.....	2
3. Event-Driven Products.....	2
4. Regularly Scheduled Products.....	3
5. Space Weather Models.....	4
6. Space Weather Impacts.....	5

Appendices

A. Space Weather Product Data.....	7
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**1. General.** This instruction describes the space weather products provided by the Space Weather Prediction Center (SWPC) in Boulder, Colorado. Additionally, the last section of this directive depicts impacts space weather activity can have on certain operations.

**2. Background.** SWPC, located in Boulder CO, is one of the nine National Centers for Environmental Prediction and is the nation's official source of space weather alerts, watches and warnings. SWPC provides a wide array of space weather products in three categories: Event-Driven Products, Regularly Scheduled Products, and Space Weather Models.

**3. Event-Driven Products.** Watches, Warnings, and Alerts are the primary event-driven products issued by SWPC. They can be issued any time when conditions meet, or activity is expected to exceed, specified thresholds.

a. Watch: Issued when conditions are favorable for the geomagnetic A-index to be above specific thresholds – for up to three days in advance of expected activity.

b. Warning: Issued when exceeding thresholds for energetic protons or geomagnetic activity is considered to be imminent. The messages contain the warning's valid period and the expected maximum level of activity. A high level of confidence is required before a warning is issued.

c. Alert: Issued when an event threshold is reached; contains information available at the time of issue. Alerts are issued for solar x-ray, radio, proton, and geomagnetic activity.

d. Summary: Issued after a solar x-ray, radio, or proton event ends; specifies the beginning, peak, and end of event times, along with the peak value of flux observed. Summary messages are also issued when geomagnetic activity ends subsequent to a sudden impulse.

Space weather notification messages are issued for these categories:

Category	Watch	Warning	Alert	Summary
Geomagnetic A-index	◆			
X-Ray Flux			◆	◆
Radio Bursts			◆	◆
Geomagnetic Sudden Impulse		◆		◆
Geomagnetic K-index		◆	◆	
Electron Flux			◆	
Proton 10 MeV and 100 MeV		◆	◆	◆

These alerts are available at <http://www.swpc.noaa.gov/alerts/index.html>. Examples of some of these products can be found in Appendix A.

**4. Regularly Scheduled Products.** SWPC’s regularly scheduled products are issued at specified intervals.

a. Report and Forecast of Solar and Geophysical Activity (RSGA): A joint product of NOAA and the USAF issued daily at 2200 Universal Time Coordinated (UTC) and is the primary daily report prepared by SWPC forecasters. It provides a summary and analysis of solar and geophysical activity during the previous 24 hours as well as the most recent solar indices. It also provides a forecast of solar and geomagnetic activity and indices for the following three (3) days.

b. Preliminary Report and Forecast of Solar Geophysical Data (commonly known as the Weekly): Compiled every Tuesday and made available on SWPC’s website. It contains space weather highlights from the previous week and an outlook for the following 27 days, including tables and plots of solar and geophysical indices, data, activity and reports of special events and missing data not included previously.

c. GEOALERT: A coded message issued daily at 0330 UTC. It contains a summary of sunspot characteristics, energetic solar-geophysical activity, and selected solar-geophysical indices for the previous day. It also contains a brief encoded forecast of solar-geophysical activity that may affect people and systems. This product is issued by SWPC in its capacity as the International Space Environment Service (ISES) World Warning Agency for the space environment.

d. Solar and Geophysical Activity Summary (SGAS): A joint product of NOAA and the USAF issued daily at 0245 UTC. It is a brief list of solar and geophysical events and indices for the previous UTC day, including energetic solar flares, proton events, and geomagnetic activity.

e. The Solar Cycle prediction charts and tables: Used to track solar cycle progression, are updated monthly by the SWPC using the latest International Space Environment Service (ISES) predictions.

f. SWPC's Space Weather Now World Wide Web page gives the non-technical user

a ‘plain language’ look at space weather, providing users with notification of expected or observed space weather conditions. The page refreshes every 5 minutes and is located at <http://swpc.noaa.gov/SWN/index.html>.

g. The Solar Region Summary (SRS), a joint product of NOAA and the USAF issued daily at 0030 UTC, providing a detailed description of active regions currently visible on the solar disk. Active solar regions are sources of potential x-ray flares that may affect people and systems.

h. 3-hourly Space Weather Conditions and Forecast: Issued every 3 hours. Provides 10.7 cm radio flux information (from Penticton, Canada); A-index (from NOAA-Boulder ground-based magnetometer); and K-index (from NOAA-Boulder ground-based magnetometer). The messages contain recent solar and geophysical indices, plus a summary of recent significant activity and a forecast of activity in the next 24 hours (based on NOAA Space Weather Scales).

Additionally, special advisories, which are designed to inform the general public and media of special circumstances and to increase awareness of the potential effects of space weather, are issued as necessary. Examples of some of these products can be found in Appendix A.

i. Space Weather Advisory Outlooks: Issued every Tuesday, provide general descriptions of space weather conditions during the past week and an outlook for the next 7 days. Outlooks are based on the NOAA Space Weather Scales.

j. The Space Weather for Aviation Service Providers web page is designed to communicate space weather information to the aviation community in terms that are easy to interpret and understand. This web page is designed to provide the most applicable space weather information addressing aviation concerns, and make it accessible in one location on the web site. The web site address is: <http://www.spaceweather.gov/aviation/index.html>.

**5. Space Weather Models.** Space weather models cover a range of areas designed to stabilize predictions of solar activity which impacts our daily lives. The following is a list of current models, each with a brief description:

a. Costello Geomagnetic Activity Index: A neural network algorithm trained on the response of the Kp geomagnetic activity index to solar wind parameters. The model takes the most recent two hours of solar wind data and returns a 3-hour activity index prediction in units of Kp. SWPC operations staff use the model output as an aid in issuing warnings for alert level geomagnetic disturbances. The graphic output for this model is displayed in two versions: a 1-day and a 7-day. An output list is also available. A brief description follows:

- (1) 1-day: Shows the latest output from the past 24 hours in two panels. The top panel plots the magnitude of the predicted index in Kp units and the 3-hour interval over which the prediction is valid. Error bars are plotted on the most recent prediction to show the 50% confidence interval. There is also an over plot of the most recent observed estimates of the Kp index, determined by the USAF methods. The plot automatically updates after

each model run (every 15 minutes).

- (2) 7-day: Similar to the 1-day plot, but shows the most recent seven (7) days of model output. Additionally, simple statistics are calculated to characterize the model's performance on accuracy (rms error), bias (mean error), association (correlation), and skill or prediction efficiency (relative error). This plot and the statistics are updated after each model run (every 15 minutes).
- (3) Output List: A tabulated listing of model output which includes model run time, prediction valid time, prediction magnitude in Kp units, prediction lead time (L1 propagation time), and observed Kp index estimate.

b. D Region Absorption Prediction: Addresses the operational impact of x-ray and proton fluxes on HF radio communication. The model can be viewed in near-real time on the SWPC's web site. Primary users of this SWPC product are concerned with communication system outages or degradation. The model consists of four dynamic components: a global frequency map, an attenuation bar graph, status messages, and an estimated recovery clock. All of the components update continuously and are driven by one-minute GOES X-ray flux data, 5-minute GOES proton flux data, and the 15 minute estimated planetary Kp index. The product has three projections, north and south pole projections and a Cartesian global projection.

c. United States Total Electron Content (US-TEC) Model. The US Total Electron Content (US-TEC) product, which evolved through a collaboration between the Space Weather Prediction Center (SWPC), the [National Geodetic Survey](#) (NGS), the [National Geophysical Data Center](#) (NGDC), and the [Global Systems Division](#) (GSD), is designed to specify Vertical and Slant TEC over the Continental US (CONUS) in near real-time. The product uses a Kalman Filter data assimilation model, and is of particular interest to the Global Positioning System /Global Navigation Satellite System (GPS/GNSS) user community. This model is driven by data from ground-based GPS dual frequency receivers. The primary data stream comes from the Maritime and Nationwide Differential GPS (M/NDGPS) real time network of stations operated by the US Coast Guard (USCG). Secondary data streams are provided by the [GPS/Met](#) network (meteorological application of GPS data) and the [IGS](#) (International GNSS Service) network. Currently, there are about 80 Continuously Operating Reference Stations (CORS), 30 GPS/Met, and 15 International GNSS Service (IGS) stations ingested into the model. This number has been gradually increasing and will be augmented by Federal Aviation Administration/Wide Area Augmentation System (FAA/WAAS) data, etc.

d. Wang-Sheeley Arge Model: Predicts background solar wind speed and interplanetary magnetic field (IMF) polarity at Earth, two important parameters required for predicting geomagnetic activity. Advanced solar wind speed 1-day to 7-day plots and IMF polarity predictions are created using daily updated synoptic maps from Wilcox (WSO), Mount Wilson (MWO), and National/Kitt Peak (NSO) Solar Observatories.

e. Empirical Storm-time Ionospheric Correction Model (STORM): STORM

provides an estimate of expected ionospheric change during periods of increased geomagnetic activity. The model estimates the departure from the norm of the F-region critical frequency (foF2) every hour of the day for the current and previous day. During a geomagnetic storm the F-region ionosphere can be either depleted or enhanced. When the ionosphere is enhanced, higher communication frequencies can be used, enabling a reduction in absorption and an increase in received signal strength. If the ionosphere is depleted, the maximum usable communication frequencies are reduced to ensure reflection of the radio signal by the ionosphere to the receiver.

f. Relativistic Electron Forecast Model (REFM): Predicts the occurrence of high energy electrons in the geosynchronous satellite environment. These electrons can cause serious problems for satellites in orbit around Earth by disrupting electrical components and even causing failure of entire satellites. Using input from the Advanced Composition Explorer (ACE) satellite, the REFM model provides 1-3 day forecasts of daily averaged fluences of >2MeV electrons.

**6. Space Weather Impacts.** The most significant impacts are noted in the following table:

Category	Effects
X-Ray Flux	<p><b>HF Radio:</b> HF (high frequency) radio blackouts are possible on the entire sunlit side of the Earth. This results in degraded HF radio contact with mariners and en route aviators in the sunlit sector.</p> <p><b>Navigation:</b> Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth, causing loss in positioning. Increased satellite navigation errors in positioning are possible on the sunlit side of Earth, which may spread into the night side.</p>
Radio Bursts	<p><b>Mobile communications:</b> may disrupt cellular phone communications.</p> <p><b>Navigation:</b> GPS system performance may be significantly degraded due to difficulty in signal acquisition. Radar surveillance systems are also affected.</p>
Energetic Electrons	<p><b>Spacecraft operations:</b> may experience surface charging that can cause temporary or permanent damage to spacecraft systems.</p>
Energetic Protons	<p><b>Biological:</b> exposure to elevated radiation hazards are possible to astronauts on EVA (extra-vehicular activity) and passengers and crew in high-flying aircraft at high latitudes.</p> <p><b>Satellite operations:</b> satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage or reduction in efficiency to solar panels possible.</p>

	<p><b>Other systems:</b> blackout of HF (high frequency) communications possible through the polar regions, and electronic navigation may be prone to errors.</p>
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## Appendix A – Space Weather Product Data

This appendix contains Space Weather product examples and descriptions. The most current issue/version of each product in this appendix can be found at <http://www.swpc.noaa.gov/ftpmenu/latest.html> and <http://www.swpc.noaa.gov/Data/index.html>

### 1. Space Weather Product Examples.

#### a. **Geomagnetic A-index**

- (1) Space Weather Message Code: WATA20  
Serial Number: 414  
Issue Time: 2005 Jul 13 2118 UTC

WATCH: Geomagnetic A-index of 20 or greater predicted  
Valid for UTC Day: 2005 Jul 16

#### b. **X-ray Flux**

- (1) Space Weather Message Code: ALTXMF  
Serial Number: 110  
Issue Time: 2005 Jul 13 1445 UTC

ALERT: X-Ray Flux exceeded M5  
Threshold Reached: 2005 Jul 13 1444 UTC  
NOAA Scale: R2 - Moderate

- (2) Space Weather Message Code: SUMX01  
Serial Number: 50  
Issue Time: 2005 Jul 14 1147 UTC

SUMMARY: X-ray Event exceeded X1  
Begin Time: 2005 Jul 14 1016 UTC  
Maximum Time: 2005 Jul 14 1055 UTC  
End Time: 2005 Jul 14 1129 UTC  
X-ray Class: X1.2  
NOAA Scale: R3 - Strong  
Comment: The X-ray event occurred in Region 786 on the NW limb. No optical observation with this flare.

#### c. **Radio Bursts**

- (1) Space Weather Message Code: ALTTP2  
Serial Number: 654  
Issue Time: 2005 Aug 02 1859 UTC



ALERT: Type II Radio Emission  
Begin Time: 2005 Aug 02 1824 UTC  
Estimated Velocity: 2528 km/s

- (2) Space Weather Message Code: SUM10R  
Serial Number: 418  
Issue Time: 2005 Aug 02 1302 UTC

SUMMARY: 10cm Radio Burst  
Begin Time: 2005 Aug 02 1240 UTC  
Maximum Time: 2005 Aug 02 1242 UTC  
End Time: 2005 Aug 02 1244 UTC  
Duration: 4 minutes  
Peak Flux: 240 sfu  
Latest Penticton Noon Flux: 111 sfu

**c. Geomagnetic Sudden Impulse**

- (1) Space Weather Message Code: WARSUD  
Serial Number: 53  
Issue Time: 2005 Aug 01 0626 UTC

WARNING: Geomagnetic Sudden Impulse expected  
Valid From: 2005 Aug 01 0627 UTC  
Valid To: 2005 Aug 01 0800 UTC  
IP Shock Passage Observed: 2005 Aug 01 0607 UTC

- (2) Space Weather Message Code: SUMSUD  
Serial Number: 72  
Issue Time: 2005 Aug 01 0647 UTC

SUMMARY: Geomagnetic Sudden Impulse  
Observed: 2005 Aug 01 0641 UTC  
Deviation: 18 nT  
Station: Boulder

**d. Geomagnetic K-index**

- (1) Space Weather Message Code: WARK04  
Serial Number: 1136  
Issue Time: 2005 Aug 01 0138 UTC

WARNING: Geomagnetic K-index of 4 expected  
Valid From: 2005 Aug 01 0139 UTC  
Valid To: 2005 Aug 01 1500 UTC

Warning Condition: Onset

- (2) Space Weather Message Code: ALTK04  
Serial Number: 1077  
Issue Time: 2005 Aug 01 0143 UTC

ALERT: Geomagnetic K-index of 4  
Threshold Reached: 2005 Aug 01 0141 UTC  
Synoptic Period: 0000-0300 UTC  
Station: Boulder  
Active Warning: Yes

**e. Electron Flux**

- (1) Space Weather Message Code: ALTEF3  
Serial Number: 988  
Issue Time: 2005 Jul 26 1045 UTC

ALERT: Electron 2MeV Integral Flux exceeded 1000pfu  
Threshold Reached: 2005 Jul 26 1005 UTC  
Station: GOES12  
Observed Yesterday: Yes  
Yesterday Maximum 2MeV Flux: 4800 pfu

**f. Proton Flux**

- (1) Space Weather Message Code: WARPX1  
Serial Number: 267  
Issue Time: 2005 Jul 28 2243 UTC

EXTENDED WARNING: Proton 10MeV Integral Flux above 10pfu  
expected  
Extension to Serial Number: 266  
Valid From: 2005 Jul 27 2305 UTC  
Now Valid Until: 2005 Jul 29 2359 UTC  
Warning Condition: Persistence  
Predicted NOAA Scale: S1 - Minor  
Comment: Predicted NOAA Scale: S1 Minor

- (2) Space Weather Message Code: ALTPX1  
Serial Number: 257  
Issue Time: 2005 Jul 30 0104 UTC

CONTINUED ALERT: Proton Event 10MeV Integral Flux exceeded  
10pfu  
Continuation of Serial Number: 255

Begin Time: 2005 Jul 27 2300 UTC

NOAA Scale: S1 - Minor

Comment: The current flux is 29 pfu s. A maximum flux of 41 pfu s was reached at 1715 UTC on July 29th 2005

- (3) Space Weather Message Code: SUMPX1  
Serial Number: 34  
Issue Time: 2005 Aug 01 1815 UTC

SUMMARY: Proton Event 10MeV Integral Flux exceeded 10pfu

Begin Time: 2005 Jul 27 2300 UTC

Maximum Time: 2005 Jul 29 1715 UTC

End Time: 2005 Aug 01 1040 UTC

Maximum 10MeV Flux: 41 pfu

NOAA Scale: S1 – Minor

**g. Report and Forecast of Solar and Geophysical Activity (RSGA)**

Joint USAF/NOAA Report of Solar and Geophysical Activity SDF Number 213 Issued at 2200Z on 01 Aug 2005

IA. Analysis of Solar Active Regions and Activity from 31/2100Z to 01/2100Z: Solar activity was at moderate levels. Region 792 (N12E25) produced the largest flare during the period, a long duration M1/1f flare that occurred at 01/1351Z. This event generated an associated Tenflare (290 sfu), a Type IV radio sweep, and a CME that may have a weak geoeffective component. Region 792 underwent a decrease in sunspot number. However, sunspot area has remained the same. This region continues to exhibit beta-gamma-delta magnetic features. Region 794 (S11E60) produced the second largest flare during the period, a C5 x-ray event that occurred at 01/1221Z. This region has shown growth in sunspot area over the interval. No new regions were numbered today.

IB. Solar Activity Forecast: Solar activity is expected to be at moderate levels. Region 792 is capable of producing M-class flares.

IIA. Geophysical Activity Summary 31/2100Z to 01/2100Z: The geomagnetic field was at quiet to active levels. The elevated activity may be attributed to a weak transient that was observed at the ACE spacecraft at approximately 01/0500Z. The greater than 10 MeV proton event that began at 27/2300Z ended at 01/1040Z; a maximum of 41 pfu occurred at 29/1715Z.

IIB. Geophysical Activity Forecast: The geomagnetic field is expected to be at predominantly quiet to unsettled levels. Isolated active conditions are possible on 04 August due to a glancing blow from the CME that was associated with the M1/1f flare that occurred today.

III. Event Probabilities 02 Aug-04 Aug

Class M 70/70/70

Class X 15/15/15

Proton 20/20/20  
 PCAF yellow

IV. Penticton 10.7 cm Flux

Observed 01 Aug 111  
 Predicted 02 Aug-04 Aug 110/105/105  
 90 Day Mean 01 Aug 096

V. Geomagnetic A Indices

Observed Afr/Ap 31 Jul 010/009  
 Estimated Afr/Ap 01 Aug 015/015  
 Predicted Afr/Ap 02 Aug-04 Aug 012/015-005/005-012/015

VI. Geomagnetic Activity Probabilities 02 Aug-04 Aug

A. Middle Latitudes

Active 30/15/30  
 Minor storm 10/05/10  
 Major-severe storm 05/01/05

B. High Latitudes

Active 35/20/35  
 Minor storm 15/05/15  
 Major-severe storm 05/01/05

**h. Solar and Geophysical Activity Summary (SGAS)**

:Product: Solar and Geophysical Activity Summary

:Issued: 2005 Aug 02 0248 UTC

# Prepared jointly by the U.S. Dept. of Commerce, NOAA,

# Space Weather Prediction Center and the U.S. Air Force.

#

Joint USAF/NOAA Solar and Geophysical Activity Summary

SGAS Number 214 Issued at 0245Z on 02 Aug 2005

This report is compiled from data received at SWO on 01 Aug

A. Energetic Events

Begin Max End Rgn Loc Xray Op 245MHz 10cm Sweep

B. Proton Events: The greater than 10 MeV proton event that began at 27/2300Z ended at 01/1040Z, a maximum of 41 pfu occurred at 29/1715Z.

C. Geomagnetic Activity Summary: The geomagnetic field was at quiet to active levels. The elevated activity may be attributed to a weak transient that was observed at the ACE spacecraft at approximately 01/0500Z.

D. Stratwarm: Not Available

E. Daily Indices: (real-time preliminary/estimated values)

10 cm 111 SSN 102 Afr/Ap 017/016 X-ray Background B2.0

Daily Proton Fluence (flux accumulation over 24 hrs)

GT 1 MeV 5.9e+07 GT 10 MeV 9.3e+05 p/(cm2-ster-day)  
 (GOES-11 satellite synchronous orbit W114 degrees)  
 Daily Electron Fluence  
 GT 2 MeV 1.60e+07 e/(cm2-ster-day)  
 (GOES-12 satellite synchronous orbit W76 degrees)  
 3 Hour K-indices:  
 Boulder 4 2 3 4 4 3 2 3 Planetary 4 1 3 4 3 3 3 3  
 F. Comments: None

**i. Solar Region Summary (SRS)**

:Product: Solar Region Summary  
 :Issued: 2005 Aug 02 0033 UTC  
 # Prepared jointly by the U.S. Dept. of Commerce, NOAA,  
 # Space Weather Prediction Center and the U.S. Air Force.  
 #  
 Joint USAF/NOAA Solar Region Summary  
 SRS Number 214 Issued at 0030Z on 02 Aug 2005  
 Report compiled from data received at SWO on 01 Aug  
 I. Regions with Sunspots. Locations Valid at 01/2400Z  

Nmbr	Location	Lo	Area	Z	LL	NN	Mag	Type
0791	N12W75	157	0080	Hsx	02	02	Alpha	
0792	N12E25	057	0420	Ekc	11	34	Beta-Gamma-Delta	
0793	N13W29	111	0060	Cso	07	08	Beta	
0794	S11E60	022	0110	Dao	06	07	Beta	
0795	N15E64	018	0110	Hax	02	01	Alpha	

 IA. H-alpha Plages without Spots. Locations Valid at 01/2400Z Aug  

Nmbr	Location	Lo
None		

 II. Regions Due to Return 02 Aug to 04 Aug  

Nmbr	Lat	Lo
None		

**j. Space Weather Advisory Outlook**

SPACE WEATHER ADVISORY OUTLOOK #04- 29  
 2004 July 19 at 03:08 p.m. MDT (2004 July 19 2108 UTC)

SPACE WEATHER OUTLOOK \*\*\*\*\*  
 Summary For July 12-18

Space weather reached strong levels this period. Minor (R1), moderate (R2), and strong (R3) radio blackouts were observed every day of the summary period due to solar flare activity from active sunspot Regions 646 and 649. Category G1 (minor) and G2 (moderate) geomagnetic storming occurred on 17 July due to a cloud of magnetic material from a solar flare on the Sun that impacted Earth.

Outlook For July 21-27

Space weather for the next week is expected to reach moderate levels with a chance for strong levels. Two complex sunspot clusters currently are visible on the Sun and both have potential to produce R1 (minor) and R2 (moderate) radio blackouts. There is a chance also for an isolated R3 (strong) blackout from these sunspot groups. Minor to moderate geomagnetic storms and radiation storms are also possible.

**2. Space Weather Product Identification.** The following are specific identification for SWPC products, issued under the SWPC's World Meteorological Organization (WMO) identifier, KWNP. A complete list of SWPC Space Weather Products transmitted on the National Weather Wire Service (NWS) Direct Broadcast Systems can be found at <http://www.swpc.noaa.gov/wwire.html>. Note: WMO header identifiers appear on messages from NWS systems, but not on SWPC messages.

<b>AWIPS ID</b>	<b>WMO ID</b>	<b>Title</b>	<b>Issue Frequency/Time</b>
SWXCURIND	AXXX83	Current Space Weather Indices – Current Day	Hourly, beginning 0035 UTC
SWX3HRCON	FXXX04	3-hourly Space Weather Conditions and Forecast	Every 3 hours, beginning 0000 UTC
SWXDAYSGA	AXXX01	Solar and Geophysical Activity Summary	Daily at 0245 UTC
SWXDAYSR5	AXXX02	Solar Region Summary	Daily at 0030 UTC
SWXDAYIND	AXXX81	Daily Space Weather Indices	Every 6 hours beginning 0015 UTC
SWXDAYOBS	AXXX82	Summary of Space Weather Observations – Previous Day	Daily after 0030 UTC
SWXDAYEVT	AXXX80	Space Weather Event Reports – Previous Day	Daily after 0250 UTC
SWXDAYDSF	FXXX01	Report and Forecast of Solar and Geophysical Activity	Daily after 2200 UTC
SWXDAYPRE	FXXX04	3-Day Space Weather Predictions	Daily after 2200 UTC
SWXWEKHIL	FXXX06	7-Day Space Weather Highlights	Tuesdays, 2212 UTC
SWXWEKFOR	FXXX02	27-Day Space Weather	Tuesdays, 2212 UTC

Forecast

SWXWEKOUT FXXX05 27-Day Space Weather Outlook Table Tuesdays, 2212 UTC

SWXADVOUT NWXX04 Space Weather Advisory Outlook Tuesdays, 1800 UTC

SWXADVBUL NWXX05 Space Weather Advisory Bulletin As needed

**AWIPS ID WMO ID Title Issue Frequency/Time**

SWXADVMSG NWXX06 Space Weather Advisory Messages – General messages from SWPC As needed

SWXxxxxxx See second column below for xxxxxx) Space Weather Alerts (See third column below) (add KWNP) As conditions warrant

X-ray Flux Alert and Event Summaries				
ALTXMF	WOXX01	ALERT: X-ray Flux exceeded M5	R2	
SUMXM5	WOXX01	SUMMARY: X-ray Event exceeded M5	R2	
SUMX01	WOXX02	SUMMARY: X-ray Event exceeded X1	R3	
SUMX10	WOXX02	SUMMARY: X-ray Event exceeded X10	R4	
SUMX20	WOXX02	SUMMARY: X-ray Event exceeded X20	R5	
Radio Burst Summaries				
ALTTP2	WOXX04	ALERT: Type II Radio Emission		
ALTTP4	WOXX04	ALERT: Type IV Radio Emission		
SUM10R	WOXX03	SUMMARY: 10cm Radio Burst		
Geomagnetic Warnings, Alerts, and Watches				
WARSUD	WOXX10	WARNING: Geomagnetic Sudden Impulse expected		
SUMSUD	WOXX10	SUMMARY: Geomagnetic Sudden Impulse		
WARK04	WOXX13	WARNING: Geomagnetic K-index of 4 expected	G1 G2 G3 or greater	Extended Warning Extended Warning Extended Warning Extended
WARK05	WOXX11	WARNING: Geomagnetic K-index of 5 expected		
WARK06	WOXX12	WARNING: Geomagnetic K-index of 6 expected		
WARK07	WOXX14	WARNING: Geomagnetic K-index of 7 or		

		greater expected		Warning
<b>ALTK04</b>	WOXX13	<b>ALERT: Geomagnetic K-index of 4</b>		
<b>ALTK05</b>	WOXX11	<b>ALERT: Geomagnetic K-index of 5</b>	<b>G1</b>	
<b>ALTK06</b>	WOXX12	<b>ALERT: Geomagnetic K-index of 6</b>	<b>G2</b>	
<b>ALTK07</b>	WOXX14	<b>ALERT: Geomagnetic K-index of 7</b>	<b>G3</b>	
<b>ALTK08</b>	WOXX15	<b>ALERT: Geomagnetic K-index of 8</b>	<b>G4</b>	
<b>ALTK09</b>	WOXX16	<b>ALERT: Geomagnetic K-index of 9</b>	<b>G5</b>	
<b>WATA20</b>	WOXX20	<b>WATCH: Geomagnetic A-index of 20 or greater predicted</b>		
<b>WATA30</b>	WOXX21	<b>WATCH: Geomagnetic A-index of 30 or greater predicted</b>		
<b>WATA50</b>	WOXX22	<b>WATCH: Geomagnetic A-index of 50 or greater predicted</b>		
<b>WATA99</b>	WOXX23	<b>WATCH: Geomagnetic A-index of 100 or greater predicted</b>		
<b>Electron Flux Alert</b>				
<b>ALTEF3</b>	WOXX30	<b>ALERT: Electron 2MeV Integral Flux exceeded 1000pfu</b>		
<b>Proton Flux Warnings, Event Alerts, and Event Summaries</b>				
<b>WARPX1</b>	WOXX32	<b>WARNING: Proton 10MeV Integral Flux above 10pfu expected</b>	<b>S1 to S5</b>	<b>Extended Warning</b>
<b>ALTPX1</b>	WOXX32	<b>ALERT: Proton Event 10MeV Integral Flux exceeded 10pfu</b>	<b>S1</b>	<b>Continued Alert</b>
<b>ALTPX2</b>	WOXX32	<b>ALERT: Proton Event 10MeV Integral Flux exceeded 100pfu</b>	<b>S2</b>	<b>Continued Alert</b>
<b>ALTPX3</b>	WOXX32	<b>ALERT: Proton Event 10MeV Integral Flux exceeded 1000pfu</b>	<b>S3</b>	<b>Continued Alert</b>
<b>ALTPX4</b>	WOXX32	<b>ALERT: Proton Event 10MeV Integral Flux exceeded 10000pfu</b>	<b>S4</b>	<b>Continued Alert</b>
<b>ALTPX5</b>	WOXX32	<b>ALERT: Proton Event 10MeV Integral Flux exceeded 100000pfu</b>	<b>S5</b>	<b>Continued Alert</b>
<b>SUMPX1</b>	WOXX32	<b>SUMMARY: Proton Event 10MeV Integral Flux exceeded 10pfu</b>	<b>S1</b>	
<b>SUMPX2</b>	WOXX32	<b>SUMMARY: Proton Event 10MeV Integral Flux exceeded 100pfu</b>	<b>S2</b>	
<b>SUMPX3</b>	WOXX32	<b>SUMMARY: Proton Event 10MeV Integral Flux exceeded 1000pfu</b>	<b>S3</b>	
<b>SUMPX4</b>	WOXX32	<b>SUMMARY: Proton Event 10MeV Integral Flux exceeded 10000pfu</b>	<b>S4</b>	



<b>SUMPX5</b>	WOXX32	<b>SUMMARY: Proton Event 10MeV Integral Flux exceeded 100000pfu</b>	<b>S5</b>	
<b>WARPC0</b>	WOXX31	<b>WARNING: Proton 100MeV Integral Flux above 1pfu expected</b>		<b>Extended Warning</b>
<b>ALTPC0</b>	WOXX31	<b>ALERT: Proton Event 100MeV Integral Flux exceeded 1pfu</b>		<b>Continued Alert</b>
<b>SUMPC0</b>	WOXX31	<b>SUMMARY: Proton Event 100MeV Integral Flux exceeded 1pfu</b>		