



SWENET Software Infrastructure Space Weather Data Specification - External Data Resources -

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Document Information

I. Release Note



	Name	Function	Date	Signature
Established by:	J. Demol	Project Engineer	2004-10-20	
Released by:	P. Beltrami	Project Manager	2004-06	

II. Revision History

Version	Date	Initials	Changed	Reason for Revision
0.1	2004-06-08	MT		created
0.2	2004-07-08	JD	changed all	External data resources information added
0.3	2004-07-16	JD	Added abbreviations	Comments from PM2
0.4	2004-09-01	JD	Table Definitions updated	Some definitions had to be changed to implement them
0.5	2004-09-16	JD	New tables added	Added tables for: irf kp forecast and now-cast, sec dregion, and kyoto equatorial dst
0.6	2004-10-11	JD	changed all	Replaced Data type integer with smallint to be conform with postgresql documentation.
0.7	2004-10-20	JD	changed all	Removed the decoding matrix tables form the GEOA section, added a short description to various sections

III. Distribution List

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IV. List of References

- /1/ SWENET External Data Resources, R047rep022, eta_max space/BIRA
 /2/ Online Documentation for PostgreSQL, <http://www.postgresql.org/docs/index.php>

V. List of Abbreviations

Abbreviation	Description
ACE	Advanced Composition Explorer
CME	Coronal Mass Ejection
DB	Database
ESA	European Space Agency
ESTEC	European Space Research & Technology Centre
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GSE coordinates	Geocentric Solar Ecliptic coordinates
ISES	International Space Environment Service
LASCO	Large Angle and Spectrometric COronagraph
NGDC	National Geophysical Data Center
NOAA	National Oceanic and Atmospheric Administration
NOAA/SEC	NOAA / Space Environment Center
POES	Polar-Orbiting Environmental Satellite
RB	Requirements Baseline
SDA	Service Development Activity
SIDC	Sunspot Index Data Center
SIMT	Study Information Management Tool
SOHO	Solar and Heliospheric Observatory
SQL	Structured Query Language
SW	Space Weather
SWENET	Space Weather European Network
TBD	To Be Determined
TEC	Total Electron Content
UCMEO	Coronal Mass Ejection Observations
UGEOA	GEOAlert Advices
UGEOE	GEOAlert Event summary
UGEOI	GEOAlert Daily Indices
UGEOR	GEOAlert Region summary and forecasts
USAF	United States Air Force
UTC	Universal Time Coordinated

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1 Introduction

This document provides a list of the space weather data that will be stored in the database. The data resource are defined in /1/ and by the SDAs. This list is not exhaustive, additional resources may be added in the course of the project.

1.1 Data Specification

Each data resource defined in /1/ has to be specified as in Table 1. This table is an *example* for specified data of the NOAA/SEC file 'lists/xray/G10xr_1m.txt'.



Data File	lists/xray/G10xr_1m.txt
Comments	no comments

Column/Index	Data Type	Modifiers	Description	Check
UTC	timestamp	key	UTC date and time	> 2004-01-01
Julian Day	integer	not null	Modified Julian Day	
Seconds of day	integer	not null	Seconds of the Day	
xray short	double		X-ray Flux of GOES-10, 0.05-0.4 nm [W/m ²]	
xray long	double		X-ray Flux of GOES-10, 0.1-0.8 nm [W/m ²]	

Table 1: Example Data Specification – 1-minute GOES-10 Solar X-ray Flux

Explanations:

Data File	The data files, which include the space weather data
Comments	Additional comments
Column / Index	Name of the column / index.
Data Type	The data type of the index. For a list of the PostgreSQL data types see Annex A:.
Modifiers	The following modifiers are possible: <i>key</i> index is part of the primary key of the table <i>unique</i> the value of the index is unique for the whole table <i>not null</i> the index shall not have NULL values <i>default=xy</i> the default value xy for the index, if no value is specified while inserting into the DB
Description	A short description of the column / index
Check	description of ranges and checks of the index

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2 External data resources

2.1 NOAA/SEC FTP

This section contains data from the NOAA/SEC ftp server.

2.1.1 GOES

This section contains data in 1 and 5 minute resolutions from the different instruments aboard the GOES spacecrafts.

The GOES data files are grouped per data type (xray, particle, geomag) . Each data types database structure is explained only once, but they will be placed in separate tables. So G10, G11 and G12 will have their own tables.

Table Name	tb_sec_g10xr_1m, tb_sec_g10xr_5m, tb_sec_g12xr_1m, tb_sec_g12xr_5m
Data File	lists/xray/G10xr_1m.txt, lists/xray/G10xr_5m.txt, lists/xray/G12xr_1m.txt, lists/xray/G12xr_5m.txt
Comments	GOES-x Solar X-ray Flux Location: Wxxx Missing data: -1.00e+05

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp	key	UTC date and time	
xray short	float(4)		X-ray Flux of GOES-10/-12, 0.05-0.4 nm [W/m ²]	
xray long	float(4)		X-ray Flux of GOES-10/-12, 0.1-0.8 nm [W/m ²]	

Table 2: 1- and 5-minute GOES-10 and GOES 12 Solar X-ray Flux

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Table Name	tb_sec_g10pchan_5m, tb_sec_g11pchan_5m, tb_sec_g12pchan_5m
Data File	lists/pchan/G10pchan_5m.txt, lists/pchan/G11pchan_5m.txt, lists/pchan/G12pchan_5m.txt
Comments	GOES-x 5-minute Energetic Proton Flux Channels Location: Wxxx Missing data: -1.00e+05

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
p1	float(4)		Protons from 0.8 - 4 MeV in [#/cm ² -s-sr-MeV]	
p2	float(4)		Protons from 4 - 9 MeV in [#/cm ² -s-sr-MeV]	
p3	float(4)		Protons from 9 - 15 MeV in [#/cm ² -s-sr-MeV]	
p4	float(4)		Protons from 15 - 40 MeV in [#/cm ² -s-sr-MeV]	
p5	float(4)		Protons from 40 - 80 MeV in [#/cm ² -s-sr-MeV]	
p6	float(4)		Protons from 80 - 165 MeV in [#/cm ² -s-sr-MeV]	
p7	float(4)		Protons from 165 - 500 MeV in [#/cm ² -s-sr-MeV]	
p8	float(4)		Protons from 350 - 420 MeV in [#/cm ² -s-sr-MeV]	
p9	float(4)		Protons from 420 - 510 MeV in [#/cm ² -s-sr-MeV]	
p10	float(4)		Protons from 510 - 700 MeV in [#/cm ² -s-sr-MeV]	
p11	float(4)		Protons from > 700 MeV in [#/cm ² -s-sr]	

Table 3: GOES-x 5-minute Energetic Proton Flux Channels



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Table Name	tb_sec_g10part_5m, tb_sec_g11part_5m, tb_sec_g12part_5m
Data File	lists/particle/G10part_5m.txt, lists/particle/G11part_5m.txt, lists/particle/G12part_5m.txt
Comments	GOES-x 5-minute Solar Particle and Electron Flux Location: Wxxx Missing data: -1.00e+05

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp	key	UTC date and time	
p1	float(4)		Particles at >1 Mev in [Protons/cm2-s-sr]	
p5	float(4)		Particles at >5 Mev in [Protons/cm2-s-sr]	
p10	float(4)		Particles at >10 Mev in [Protons/cm2-s-sr]	
p30	float(4)		Particles at >30 Mev in [Protons/cm2-s-sr]	
p50	float(4)		Particles at >50 Mev in [Protons/cm2-s-sr]	
p100	float(4)		Particles at >100 Mev in [Protons/cm2-s-sr]	
e0_6	float(4)		Electrons at >0.6 Mev in [Electrons/cm2-s-sr]	
e2_0	float(4)		Electrons at >2.0 Mev in [Electrons /cm2-s-sr]	
e4_0	float(4)		Electrons at >4.0 Mev in [Electrons /cm2-s-sr]	

Table 4: GOES-x 5-minute Solar Particle and Electron Flux





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Table Name	tb_sec_g10mag_1m, tb_sec_g12mag_1m
Data File	lists/geomag/G10magt_1m.txt, lists/geomag/G12magt_1m.txt
Comments	GOES-x 1-minute Geomagnetic Components and Total Field Location: Wxxx Missing data: -1.00e+05

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
hp	float(4)		Hp component = perpendicular to the satellite orbital plane or parallel to the Earth's spin axis [nT]	
he	float(4)		He component = perpendicular to Hp and directed earthwards [nT]	
hn	float(4)		perpendicular to both Hp and He, directed eastwards [nT]	
total_field	float(4)			

Table 5: GOES-x 1-minute Geomagnetic Components and Total Field

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2.1.2 ACE

This section contains data in various resolutions from the different instruments aboard the ACE spacecraft.

All ACE data files (mag, sis, epam and swepam) have corresponding data files with a resolution of one hour. Their structure is the same as the higher resolution data files, so they are not listed here, but they will have their own table. Table names will be the same except for the time resolution part. Replace `_1m` and `_5m` with `_1h` to get the correct table name.

Table Name	tb_sec_ace_mag_1m
Data File	lists/ace/ace_mag_1m.txt
Comments	<p>ACE 1-minute averaged Real-time Interplanetary Magnetic Field Values</p> <p>Magnetometer values are in GSM coordinates</p> <p>Source: ACE Satellite - Magnetometer</p> <p>Missing data values: -999.9</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
status	smallint		0 = nominal data, 1 to 8 = bad data record, 9 = no data	0<= and <=9
bx	float(4)		[nT]	
by	float(4)		[nT]	
bz	float(4)		[nT]	
bt	float(4)		[nT]	
latitude	float(4)		[degrees]	-90<= and <=90 or -999.9
longitude	float(4)		[degrees]	0<= and <=360 or -999.9

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Table 6: ACE 1-minute averaged Real-time Interplanetary Magnetic Field Values

Table Name	tb_sec_ace_epam_5m
Data File	lists/ace/ace_epam_5m.txt
Comments	ACE 5-minute averaged Real-time Differential Electron and Proton Flux Source: ACE Satellite - Electron, Proton, and Alpha Monitor Missing data values: -1.00e+05, index = -1.00

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
electron_status	smallint		0 = nominal, 4,6,7,8 = bad data, unable to process, 9 = no data	0<= and <=9
e_38_53	float(4)		electrons from 38 – 53 keV [#/cm2-s-ster-MeV]	
e_175_315	float(4)		electrons from 175 – 315 keV [#/cm2-s-ster-MeV]	
proton_status	smallint		0 = nominal, 4,6,7,8 = bad data, unable to process, 9 = no data	0<= and <=9
p_47_68	float(4)		protons from 47 – 68 keV [#/cm2-s-ster-MeV]	
p_115_195	float(4)		protons from 115 – 195 keV [#/cm2-s-ster-MeV]	
p_310_580	float(4)		protons from 310 – 580 keV [#/cm2-s-ster-MeV]	
p_761_1220	float(4)		protons from 761 – 1120 keV [#/cm2-s-ster-MeV]	
p_1060_1900	float(4)		protons from 1060 – 1900 keV [#/cm2-s-ster-MeV]	
anisotropy_ratio	float(4)		Anisotropy Index 0.0 - 2.0	

Table 7: ACE 5-minute averaged Real-time Differential Electron and Proton Flux

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Table Name	tb_sec_ace_sis_5m
Data File	lists/ace/ace_sis_5m.txt
Comments	ACE 5-minute averaged Real-time Integral Flux of High-energy Solar Protons Source: ACE Satellite - Solar Isotope Spectrometer Missing data values: -1.00e+05

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
status1	smallint		0 = nominal data, 1 to 8 = bad data record, 9 = no data	0<= and <=9
p10	float(4)		protons > 10 MeV [p/cs2-sec-ster]	
status2	smallint		0 = nominal data, 1 to 8 = bad data record, 9 = no data	0<= and <=9
p30	float(4)		protons > 30 MeV [p/cs2-sec-ster]	

Table 8: ACE 5-minute averaged Real-time Integral Flux of High-energy Solar Protons

Table Name	tb_sec_ace_swepam_5m
Data File	lists/ace/ace_swepam_5m.txt
Comments	ACE 1-minute averaged Real-time Bulk Parameters of the Solar Wind Plasma Source: ACE Satellite - Solar Wind Electron Proton Alpha Monitor Missing data values: Density and Speed = -9999.9, Temp. = -1.00e+05

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
status	smallint		0 = nominal data, 1 to 8 = bad data record, 9 = no data	0<= and <=9
proton_density	float(4)		Solar wind proton density [p/cc]	
bulk_speed	float(4)		Solar wind bulk speeds [km/s]	
ion_temp	float(4)		Solar wind ion temperature [K]	



Table 9: ACE 1-minute averaged Real-time Bulk Parameters of the Solar Wind Plasma

Table Name	tb_sec_ace_loc_1h
Data File	lists/ace2/ace_loc_1h.txt
Comments	ACE 1-hour predicted ACE Satellite Locations in GSE Coordinates Missing data values: -999.9

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
x	float(4)		X position in GSE coordinates in earth radii(Re) Accuracy 0.1 earth radii (about 600 km)	0.0<= and <=300.0 or -999.9
y	float(4)		Y position in GSE coordinates in earth radii(Re) Accuracy 0.1 earth radii (about 600 km)	-200.0<= and <=200.0 or -999.9
z	float(4)		Z position in GSE coordinates in earth radii(Re) Accuracy 0.1 earth radii (about 600 km)	-200.0<= and <=200.0 or -999.9

Table 10: ACE 1-hour predicted ACE Satellite Locations in GSE Coordinates

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2.1.3 POES

Table Name	tb_sec_bi
Data File	lists/bi/bi*.txt
Comments	Belt Indices of Relative Intensities of NOAA/POES Energetic Particles

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
sensor_nr	smallint		1 >30 keV Electrons (90 deg detector) 3 >100 keV Electrons (90 deg detector) 5 >300 keV Electrons (90 deg detector) 7 30-80 keV Protons (90 deg detector) 9 80-250 keV Protons (90 deg detector) 11 250-800 keV Protons (90 deg detector) 13 800-2500 keV Protons (90 deg detector) 15 2500-6900 keV Protons (90-deg detector) 17 >6.9 MeV Protons (90 deg detector) 18 16-70 MeV Protons (Omnidirectional) 20 35-70 MeV Protons (Omnidirectional) 21 70-235 MeV Protons (Omnidirectional) 22 140-275 MeV Protons (Omnidirectional)	
total_belt_index	float(4)			
inner_belt_index	float(4)			
slot_belt_index	float(4)			
outer_belt_index	float(4)			

Table 11: POES Belt Indices.

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2.1.4 Real-Time Ionosonde Data

Table Name	tb_sec_iono_station
Data File	NA
Comments	Real-Time Ionosonde Data Station information

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
name	varchar(50)		Station Name	
location	varchar(7)		Geographic location	
sonde	varchar(50)		Sonde Operator and Sonde Model	



Table 12: Real-Time Ionosonde Data Station information

Table Name	tb_sec_iono
Data File	lists/iono_day/*.txt
Comments	Real-Time Ionosonde Data

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
station_id	>tb_sec_iono_station_id		foreign key into the ionosonde station table	
fof2	float(4)		foF2 : F2 layer critical frequency, including the adjustment by the true height profile algorithm [MHz]	
hmf2	smallint		h'F2 : Minimum virtual height of F2 trace [km]	
m_d	float(4)		M(D) = MUF(D)/foF2	
d	smallint		D : Distance for MUF calculation [km]	
hmf	smallint		h'F : Minimum virtual height of F trace [km]	
yf2	smallint		yF2 : half thickness of the F2 layer, parabolic model [km]	
fmuf	float(4)		fMUF : MUF/OblFactor [MHz]	
h	smallint			
fxi	float(4)		fxI : Maximum frequency of F-trace [MHz]	
fof1	float(4)		foF1 : F1 layer critical frequency [MHz]	
foe	float(4)		foE : E layer critical frequency [MHz]	
hme	smallint		h'E : Minimum virtual height of E trace [km]	
foes	float(4)		foEs : Es layer critical frequency [MHz]	
fbes	float(4)		fbEs : blanketing frequency of Es layer [MHz]	
itec	float(4)		TEC : total electron content [10^{16} el/m ²]	

Table 13: Real-Time Ionosonde Data

 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft



2.1.5 Solar Radio Flux

Table Name	tb_sec_radio
Data File	lists/radio/rad.txt
Comments	Daily local noon solar radio flux values Missing Data: -1

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
frequency	smallint		[MHz]	
utc_04	smallint		Learmonth solar radio flux at 0400UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_11	smallint		San Vito solar radio flux at 1100UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_16	smallint		Sag Hill solar radio flux at 1600UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_17	smallint		Penticton solar radio flux at 1700UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_20	smallint		Penticton solar radio flux at 2000UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_22	smallint		Palehua solar radio flux at 2200UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1
utc_23	smallint		Penticton solar radio flux at 2300UTC [10^{-22} W/m ² /Hz]	(1<= and <=999) or -1

Table 14: Daily local noon solar radio flux values

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	External data resources	Status: Draft

2.1.6 Geomagnetic Data

Table Name	tb_sec_ak
Data File	lists/geomag/*AK.txt
Comments	Geomagnetic A and K indices from the U.S. Geological Survey Stations Missing Data: -1

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
station	varchar(50)		Geological Survey Station Name	
latitude	varchar(3)		Geomagnetic dipole latitude	
longitude	varchar(4)		Geomagnetic dipole longitude	
a	smallint		Geomagnetic A index	
k_0003	smallint		Geomagnetic K index between 00 and 03 h	
k_0306	smallint		Geomagnetic K index between 03 and 06 h	
k_0609	smallint		Geomagnetic K index between 06 and 09 h	
k_0912	smallint		Geomagnetic K index between 09 and 12 h	
k_1215	smallint		Geomagnetic K index between 12 and 15 h	
k_1518	smallint		Geomagnetic K index between 15 and 18 h	
k_1821	smallint		Geomagnetic K index between 18 and 21 h	
k_2124	smallint		Geomagnetic K index between 21 and 24 h	

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2.1.7 Forecasts

Table Name	tb_sec_dayobs
Data File	forecasts/dayobs/*.txt
Comments	The Summary of Space Weather Observations is a daily report of solar regions with sunspot groups observed on the preceding day

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
region_number	smallint		The 4-digit region number assigned by SEC to each sunspot group during its disk passage	
location_cmd	varchar(6)		Location, in heliographic degrees latitude and degrees east or west from central meridian (CMD), rotated to 2400 UTC	
location_long	smallint		Carrington longitude of the center of the group	
spot_area	smallint		he total corrected area of the sunspots in the sunspot group expressed in millionths of the solar hemisphere	
spot_extent	smallint		Length of the group in degrees heliographic longitude as measured between the most extreme edges of the two most widely separated spots along the group's major axis	
spot_class	varchar(3)		Modified Zurich classification of the sunspot group	
spot_count	smallint		Number of spots (umbra) visible within the sunspot group	
mag_class	varchar(3)		The magnetic classification of the sunspot group	

Table 15: Daily report of solar regions

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 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Table Name	tb_sec_srs_spots
Data File	forecasts/SRS/*.txt
Comments	The Solar Region Summary is a daily report about the active solar regions observed during the preceding day. It contains a detailed description of the active regions currently visible on the solar disk. Active regions with sunspot groups.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
region_number	smallint		The 4-digit region number assigned by SEC to each sunspot group during its disk passage	
location_cmd	varchar(6)		Location, in heliographic degrees latitude and degrees east or west from central meridian (CMD), rotated to 2400 UTC	
location_long	smallint		Carrington longitude of the center of the group	
spot_area	smallint		he total corrected area of the sunspots in the sunspot group expressed in millionths of the solar hemisphere	
spot_class	varchar(3)		Modified Zurich classification of the sunspot group	
spot_extent	smallint		Longitudinal extent of the group in heliographic degrees	
spot_count	smallint		Number of spots (umbra) visible within the sunspot group	
mag_class	varchar(32)		The magnetic classification of the sunspot group	

Table 16: Solar Region Summary - Active regions with sunspot groups.



 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft

Table Name	tb_sec_srs_plages
Data File	forecasts/SRS/*.txt
Comments	<p>The Solar Region Summary is a daily report about the active solar regions observed during the preceding day. It contains a detailed description of the active regions currently visible on the solar disk.</p> <p>Previously numbered active regions which still contain plage but no visible sunspots.</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
region_number	smallint		The 4-digit region number assigned by SEC to each sunspot group during its disk passage	
location_cmd	varchar(6)		Plage region location in heliographic degrees latitude and degrees east or west from central meridian rotated to 2400 UTC	
location_long	smallint		Carrington longitude of the center of the group	

Table 17: Solar Region Summary - Regions which still contain plage but no visible sunspots.


 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Table Name	tb_sec_srs_return
Data File	forecasts/SRS/*.txt
Comments	<p>The Solar Region Summary is a daily report about the active solar regions observed during the preceding day. It contains a detailed description of the active regions currently visible on the solar disk.</p> <p>Active regions that were observed on the previous solar rotation and are due to reappear on the East limb in the next 3 days</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
region_number	smallint		The 4-digit region number assigned by SEC to each sunspot group during its disk passage	
location_lat	varchar(3)		Heliographic degrees latitude of the group on its last disk passage	
location_long	smallint		Carrington longitude of the group on its last disk passage	

Table 18: Solar Region Summary - Regions that were observed on the previous solar rotation and are due to reappear.

Table Name	tb_sec_wwv
Data File	forecasts/wwv/*.txt
Comments	Three-hourly Space Weather Conditions and Forecast

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
report	text		WWV report http://www.sec.noaa.gov/Data/info/WWVdoc.html for report description	

Table 19: WWV - Three-hourly Space Weather Conditions and Forecast.



 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft

Table Name	tb_sec_alts
Data File	forecasts/*ALTS.txt
Comments	SEC Space Weather Alerts http://www.sec.noaa.gov/alerts/

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
alert	text		Space weather alert	

Table 20: SEC Space Weather Alerts.

Table Name	tb_sec_45df
Data File	forecasts/45DF/*.txt
Comments	The USAF 45-Day Ap/F10 Forecast Bulletins

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
forecast_date	date		Date for which the forecast applies	
ap	smallint		The 24-hour planetary geomagnetic index Ap	
f107	smallint		The daily 10.7 cm solar radio flux F10	
forecaster	varchar(32)		forecaster identification	

Table 21: The USAF 45-Day Ap/F10 Forecast Bulletins.


 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Table Name	tb_sec_sgas
Data File	forecasts/SGAS.txt
Comments	Joint USAF/NOAA Solar and Geophysical Activity Summary.



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
summary	text		Solar and Geophysical Activity Summary	

Table 22: Joint USAF/NOAA Solar and Geophysical Activity Summary.

Table Name	tb_sec_rsga
Data File	forecasts/rsga.txt
Comments	Joint USAF/NOAA Report of Solar and Geophysical Activity.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
report	text		Joint USAF/NOAA Report of Solar and Geophysical Activity	



Table 23: Joint USAF/NOAA Report of Solar and Geophysical Activity.

 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

2.1.8 Indices

Table Name	tb_sec_dsd
Data File	indices/DSD.txt, indices/quar_DSD.txt, indices/old_indices/*_DSD.txt
Comments	<p>Daily Solar Data</p> <p>Goes X-ray background flux values prior to 8 april 2003 come from GOES8, values after this date are from GOES12</p> <p>Missing data values: new_regions = -999, stanford_solar_mean_field = -999, goes_xray_background_flux = * , flare_ = -1</p>

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
f107	smallint		10.7cm Radio Flux	
sesc_nr	smallint		SESC sunspot number	
sunspot_area	smallint		Sunspot Area 10E-6 hemisphere	
new_regions	smallint		New sunspot regions	
stanford_solar_mean_field	smallint		Stanford Solar Mean Field	
goes_xray_background_flux	varchar(4)		GOES x-ray background flux. Values prior to 8 april 2003 come from GOES8, values after this date are from GOES12.	
flare_xray_c	smallint		# flares of x-ray class C : minor event	
flare_xray_m	smallint		# flares of x-ray class M : medium event	
flare_xray_x	smallint		# flares of x-ray class X : major event	
flare_optical_s	smallint		# flares of optical class S : subflares	
flare_optical_1	smallint		# flares of optical class 1 : minor	
flare_optical_2	smallint		# flares of optical class 2 : medium	
flare_optical_3	smallint		# flares of optical class 3 : major	

Table 24: Daily Solar Data






 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft

Table Name	tb_sec_events
Data File	indices/events
Comments	<p>Contains preliminary solar event reports received at SEC and manually reviewed and edited by the duty forecaster. SEC compiles these lists from preliminary reports received from contributing stations. Incorrect, missed, and incomplete reports are possible.</p> <p>more info concerning the different columns can be found at ftp://ftp.sec.noaa.gov/pub/indices/events/readme</p>

 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
event	smallint		This is an arbitrary event number assigned by SEC. It groups several reports into a single event, as determined by the SEC forecaster.	0<= and <=10000
utc_begin	timestamp		The UTC date and Time of the beginning of the event as reported by the observing site.	
utc_max	timestamp	default=NULL	The UTC date and Time of the maximum of the event as reported by the observing site.	
utc_end	timestamp		The UTC date and Time of the end of the event as reported by the observing site.	
station_id	varchar(3)		The reporting observatory	
quality	varchar(1)		Quality of observation	
type	varchar(3)		Type of report	
loc_frq	varchar(8)		Location is in degrees latitude, north or south, and degrees longitude, east or west, from central meridian. The location is the spherical, heliographic coordinates of the solar region, as a distance in degrees from a line extending from the solar equator (heliographic latitude), and distance in degrees from a line extending from the north solar rotational pole to the south solar rotational pole through the center of the solar disk, as viewed from Earth (central meridian) in H-alpha. Frequencies are in Mhz.	
particular1	varchar(8)		particular info depending on the type	
particular2	varchar(8)	default=NULL	particular info depending on the type	
region_nr	smallint	default=NULL	The SEC-assigned solar region number	0<= and <=10000

Table 25: Preliminary solar event reports.

 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft



2.1.9 Latest

Table Name	tb_sec_DGD
Data File	latest/DGD.txt
Comments	Daily Geomagnetic Data Missing data: -1

 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
middle_a	smallint		Middle Latitude Fredericksburg A-index	
middle_k_3	smallint		Middle Latitude Fredericksburg K-index at 0300	
middle_k_6	smallint		Middle Latitude Fredericksburg K-index at 0600	
middle_k_9	smallint		Middle Latitude Fredericksburg K-index at 0900	
middle_k_12	smallint		Middle Latitude Fredericksburg K-index at 1200	
middle_k_15	smallint		Middle Latitude Fredericksburg K-index at 1500	
middle_k_18	smallint		Middle Latitude Fredericksburg K-index at 1800	
middle_k_21	smallint		Middle Latitude Fredericksburg K-index at 2100	
middle_k_24	smallint		Middle Latitude Fredericksburg K-index at 2400	
high_a	smallint		High Latitude College A-index	
high_k_3	smallint		High Latitude College K-index at 0300	
high_k_6	smallint		High Latitude College K-index at 0600	
high_k_9	smallint		High Latitude College K-index at 0900	
high_k_12	smallint		High Latitude College K-index at 1200	
high_k_15	smallint		High Latitude College K-index at 1500	
high_k_18	smallint		High Latitude College K-index at 1800	
high_k_21	smallint		High Latitude College K-index at 2100	
high_k_24	smallint		High Latitude College K-index at 2400	
planet_a	smallint		Estimated Planetary A-index	
planet_k_3	smallint		Estimated Planetary K-index at 0300	
planet_k_6	smallint		Estimated Planetary K-index at 0600	
planet_k_9	smallint		Estimated Planetary K-index at 0900	

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Column/Index	Data Type	Modifiers	Description	Check
planet_k_12	smallint		Estimated Planetary K-index at 1200	
planet_k_15	smallint		Estimated Planetary K-index at 1500	
planet_k_18	smallint		Estimated Planetary K-index at 1800	
planet_k_21	smallint		Estimated Planetary K-index at 2100	
planet_k_24	smallint		Estimated Planetary K-index at 2400	

Table 26: Daily Geomagnetic Data.

Table Name	tb_sec_dpd
Data File	latest/DPD.txt
Comments	Daily Particle Data

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
p1	float(4)		GOES>1 MeV Proton Fluence [Protons/cm2-day-sr]	
p10	float(4)		GOES>10MeV Proton Fluence [Protons/cm2-day-sr]	
p100	float(4)		GOES>100 MeV Proton Fluence [Protons/cm2-day-sr]	
e06	float(4)		GOES>0.6 MeV Electron Fluence [Electrons/cm2-day-sr]	
e2	float(4)		GOES>2 MeV Electron Fluence [Electrons/cm2-day-sr]	
neutron_monitor	float(4)		% of background	

Table 27: Daily Particle Data.




 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Table Name	tb_sec_predict
Data File	latest/Predict.txt
Comments	<p>Predicted Sunspot Number And Radio Flux Values With Expected Ranges</p> <p>Sunspot Number: S.I.D.C. Brussels International Sunspot Number.</p> <p>10.7cm Radio Flux value: Penticton, B.C. Canada.</p> <p>Prediction values are based on ISES cycle 23 forecast of 13-month running smoothed values.</p> <p>Current interpolation prepared by IPS Radio and Space Services, Australia</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
sunspot_predicted	float(4)		Predicted sunspot number	
sunspot_high	float(4)		Max of predicted sunspot number	
sunspot_low	float(4)		Min of predicted sunspot number	
f107_predicted	float(4)		Predicted 10.7cm radio flux	
f107_high	float(4)		Max of predicted 10.7cm radio flux	
f107_low	float(4)		Min of predicted 10.7cm radio flux	

Table 28: Predicted Sunspot Number And Radio Flux Values With Expected Ranges.

Table Name	tb_sec_wkhf
Data File	latest/WKHF.txt
Comments	Weekly Highlights and Forecasts of Solar and Geomagnetic Activity

 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
message	text		Weekly Highlights and Forecasts of Solar and Geomagnetic Activity in plaintext	



Table 29: Weekly Highlights and Forecasts of Solar and Geomagnetic Activity.

Table Name	tb_sec_27do
Data File	latest/27DO.txt
Comments	27-day Space Weather Outlook Table



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
f107	smallint		Predicted 10.7 cm Radio Flux	
ap	smallint		Predicted planetary A index	
kp	smallint		Predicted largest Kp index	

Table 30: 27-day Space Weather Outlook Table.

Table Name	tb_sec_daypre
Data File	latest/daypre.txt
Comments	3-day Space Weather Predictions

 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
prediction_date	date		Date for which the prediction applies	
a_fredericksburg	smallint		Predicted Geomagnetic A indicex Fredericksburg	
a_planet	smallint		Predicted Geomagnetic A indicex planetary	
middle_k_3	smallint		Predicted Middle Latitude K-index from 0000 to 0300	
middle_k_6	smallint		Predicted Middle Latitude K-index from 0300 to 0600	
middle_k_9	smallint		Predicted Middle Latitude K-index from 0600 to 0900	
middle_k_12	smallint		Predicted Middle Latitude K-index from 0900 to 1200	
middle_k_15	smallint		Predicted Middle Latitude K-index from 1200 to 1500	
middle_k_18	smallint		Predicted Middle Latitude K-index from 1500 to 1800	
middle_k_21	smallint		Predicted Middle Latitude K-index from 1800 to 2100	
middle_k_24	smallint		Predicted Middle Latitude K-index from 2100 to 2400	
high_k_3	smallint		Predicted High Latitude K-index from 0000 to 0300	
high_k_6	smallint		Predicted High Latitude K-index from 0300 to 0600	
high_k_9	smallint		Predicted High Latitude K-index from 0600 to 0900	
high_k_12	smallint		Predicted High Latitude K-index from 0900 to 1200	
high_k_15	smallint		Predicted High Latitude K-index from 1200 to 1500	
high_k_18	smallint		Predicted High Latitude K-index from 1500 to 1800	
high_k_21	smallint		Predicted High Latitude K-index from 1800 to 2100	
high_k_24	smallint		Predicted High Latitude K-index from 2100 to 2400	
middle_active	smallint		Probability of Active Geomagnetic conditions at Middle Latitude	
middle_minor_storm	smallint		Probability of Minor Storm Geomagnetic conditions at Middle Latitude	

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	External data resources	Status: Draft

Column/Index	Data Type	Modifiers	Description	Check
middle_severe_storm	smallint		Probability of Severe Storm Geomagnetic conditions at Middle Latitude	
high_active	smallint		Probability of Active Geomagnetic conditions at High Latitude	
high_minor_storm	smallint		Probability of Minor Storm Geomagnetic conditions at High Latitude	
high_severe_storm	smallint		Probability of Severe Storm Geomagnetic conditions at High Latitude	
polar_cap	varchar(32)		Polar Cap Absorption Forecast	
f107	smallint		10.7cm Solar radio flux prediction	
class_m	smallint		Predicted number of Whole Disk Flares of class m	
class_x	smallint		Predicted number of Whole Disk Flares of class x	
proton	smallint		Predicted number of Whole Disk Proton Flares	

Table 31: 3-day Space Weather Predictions.

Table Name	tb_sec_mada1
Data File	latest/MAda.txt
Comments	USAF Daily Magnetometer Analysis Report 24 hour summary of 3-hourly max gamma deflections and k indices Missing data: -1

 	SWENET Software Infrastructure	Date: 2004-10-20
	Space Weather Data Specification	Version: 0.
	External data resources	Status: Draft

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
station	varchar(50)		Station name	
max_g_def_3	smallint		Max Gamma Deflection from 0000 to 0300	
max_g_def_6	smallint		Max Gamma Deflection from 0300 to 0600	
max_g_def_9	smallint		Max Gamma Deflection from 0600 to 0900	
max_g_def_12	smallint		Max Gamma Deflection from 0900 to 1200	
max_g_def_15	smallint		Max Gamma Deflection from 1200 to 1500	
max_g_def_18	smallint		Max Gamma Deflection from 1500 to 1800	
max_g_def_21	smallint		Max Gamma Deflection from 1800 to 2100	
max_g_def_24	smallint		Max Gamma Deflection from 2100 to 2400	
k_3	smallint		K-index from 0000 to 0300	
k_6	smallint		K-index from 0300 to 0600	
k_9	smallint		K-index from 0600 to 0900	
k_12	smallint		K-index from 0900 to 1200	
k_15	smallint		K-index from 1200 to 1500	
k_18	smallint		K-index from 1500 to 1800	
k_21	smallint		K-index from 1800 to 2100	
k_24	smallint		K-index from 2100 to 2400	

Table 32: USAF Daily Magnetometer Analysis Report - part1.







 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft

Table Name	tb_sec_mada2
Data File	latest/MAda.txt
Comments	USAF Daily Magnetometer Analysis Report the 3-hour ap (and corresponding 3-hour Kp) index, as well as the 24-hour running mean of the Ap index Missing data: -1

 	SWENET Software Infrastructure	Date: 2004-10-20
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	External data resources	Status: Draft

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
ap_3	smallint		Three hour Ap index from 0000 to 0300	
ap_6	smallint		Three hour Ap index from 0300 to 0600	
ap_9	smallint		Three hour Ap index from 0600 to 0900	
ap_12	smallint		Three hour Ap index from 0900 to 1200	
ap_15	smallint		Three hour Ap index from 1200 to 1500	
ap_18	smallint		Three hour Ap index from 1500 to 1800	
ap_21	smallint		Three hour Ap index from 1800 to 2100	
ap_24	smallint		Three hour Ap index from 2100 to 2400	
kp_3	varchar(2)		Three hour Kp index from 0000 to 0300	
kp_6	varchar(2)		Three hour Kp index from 0300 to 0600	
kp_9	varchar(2)		Three hour Kp index from 0600 to 0900	
kp_12	varchar(2)		Three hour Kp index from 0900 to 1200	
kp_15	varchar(2)		Three hour Kp index from 1200 to 1500	
kp_18	varchar(2)		Three hour Kp index from 1500 to 1800	
kp_21	varchar(2)		Three hour Kp index from 1800 to 2100	
kp_24	varchar(2)		Three hour Kp index from 2100 to 2400	
mean_ap_3	smallint		24 hour running mean of the Ap index from 0000 to 0300	
mean_ap_6	smallint		24 hour running mean of the Ap index from 0300 to 0600	
mean_ap_9	smallint		24 hour running mean of the Ap index from 0600 to 0900	
mean_ap_12	smallint		24 hour running mean of the Ap index from 0900 to 1200	
mean_ap_15	smallint		24 hour running mean of the Ap index from 1200 to 1500	
mean_ap_18	smallint		24 hour running mean of the Ap index from 1500 to 1800	

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Column/Index	Data Type	Modifiers	Description	Check
mean_ap_21	smallint		24 hour running mean of the Ap index from 1800 to 2100	
mean_ap_24	smallint		24 hour running mean of the Ap index from 2100 to 24 00	

Table 33: USAF Daily Magnetometer Analysis Report – part2.

Table Name	tb_sec_mahr1
Data File	forecasts/MAhr.txt
Comments	USAF Hourly Magnetometer Analysis Report. Hourly max gamma deflections and k indices Missing data: -1

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
station	varchar(50)		Station name	
max_g_def	smallint		Max Gamma Deflection at this time	
k	smallint		K-index at this time	

Table 34: USAF Hourly Magnetometer Analysis Report.



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Table Name	tb_sec_mahr2
Data File	forecasts/MAhr.txt
Comments	USAF Hourly Magnetometer Analysis Report. The 3-hour ap (and corresponding 3-hour Kp) index, as well as the 12 and 24-hour running mean of the Ap index Missing data: -1

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
ap	varchar(2)		The 3-hour ap index	
kp	varchar(2)		The 3-hour kp index	
ap_12	varchar(2)		The 12-hour running mean of the Ap index	
ap_24	varchar(2)		The 24-hour running mean of the Ap index	
syn_kp_1	varchar(2)		1-hour kp Synoptic value estimated from available data	
syn_ap_3	varchar(2)		The 3-hour running mean of the Ap index. Synoptic value estimated from available data	
syn_kp_3	varchar(2)		The 3-hour running mean of the Kp index. Synoptic value estimated from available data	

Table 35: USAF Hourly Magnetometer Analysis Report – part 2.





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Table Name	tb_sec_dayevt
Data File	latest/dayevt.txt
Comments	<p>A summary of significant solar events including start, maximum, and end times, region number and location, x-ray and optical classification of flares and significant radio emission. All available data for an event are included in this section if one or more of the following thresholds are reached:</p> <ul style="list-style-type: none"> • Class-M or greater x-ray flare, • Optical flare of importance > 2b, • Radio burst of > 100 sfu at 245 MHz, • Radio burst > 100% above background at 2695 MHz, • Type II or IV sweep frequency burst

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
report	text		The summary of significant solar events	

Table 36: Summary of the Energetic Solar events.

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2.1.9.1 GEOA

This section contains data from the GEOALERT messages. This data is available in decoded ISES code.

Table Name	tb_sec_geoa_ugeoa
Data File	latest/GEOA.txt
Comments	ISES encoded Flare, Magnetic, and Proton event Advice

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time of forecast issue	
station_id	smallint		Observation Station Indicator	
ground_data	-> tb_sec_geoa_ugeoa _ground_data.code_ id	fkey	Ground-based solar data used in forecast	
space_data	-> tb_sec_geoa_ugeoa _space_data.code_ id	fkey	Space-based solar data used in forecast	
mag_data	-> tb_sec_geoa_ugeoa _mag_data.code_id	fkey	Magnetic data used in forecast	
iono_data	-> tb_sec_geoa_ugeoa _iono_data.code_id	fkey	Ionospheric data used in forecast	
flare_forecast	-> tb- sec_geoa_ugeoa_fl are_forecast_code.c ode_id	fkey	flare forecast (whole sun)	



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Column/Index	Data Type	Modifiers	Description	Check
flare_start_day	smallint		day of start of forecast period	
flare_duration	smallint		duration in days	
mag_forecast	-> tb- sec_geoa_ugeoa_m ag_forecast_code.c ode_id	fkey	magnetic forecast (local conditions)	
mag_start_day	smallint		day of start of forecast period	
mag_duration	smallint		duration in days	
proton_forecast	-> tb- sec_geoa_ugeoa_pr oton_forecast_code. code_id	fkey	proton forecast	
proton_start_day	smallint		day of start of forecast period	
proton_duration	smallint		duration in days	

Table 37: ISES encoded Flare, Magnetic, and Proton event Advice.

Table Name	tb_sec_geoa_ugeoe
Data File	latest/GEAO.txt
Comments	ISES encoded significant solar events.

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time of summary	
station_id	smallint		Observation Station Indicator	
start_day	smallint		UT day of month of beginning of event	
utc_start	time		UTC time of event start	
start_qualifier	-> tb_sec_geoa_ugeoe _time_qualifier_cod e.code_id	fkey	start time qualifier	
utc_max	time		UTC time of event maximum	
utc_end	time		UTC time of event end	
end_qualifier	-> tb_sec_geoa_ugeoe _time_qualifier_cod e.code_id	fkey	end time qualifier	
xray_class	-> tb_sec_geoa_ugeoe _xray_class_code.c ode_id	fkey	indicates x-ray event class	
xray_intensity	float(4)		x-ray intensity from 1.0 to 9.9 (report x-ray intensity >=9.9 as 9.9)	0.0<= and <=9.9 or -1.00e+05
optical_importance	-> tb_sec_geoa_ugeoe _optical_importance _code.code_id	fkey	optical flare importance based upon corrected area in square degrees	
optical_intensity	-> tb_sec_geoa_ugeoe _optical_intensity_c ode.code_id	fkey	optical flare intensity	

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Column/Index	Data Type	Modifiers	Description	Check
sweep_2_importance	-> tb_sec_geoa_ugeoe _sweep_importance _code.code_id	fkey	Indicates if a Type II sweep was observed and the importance of the Type II sweep	
sweep_2_peak_flux	float(4)		Peak flux of radio burst at approximately 245 MHz [10^{-22} Wm ⁻² Hz ⁻¹]	
sweep_4_importance	-> tb_sec_geoa_ugeoe _sweep_importance _code.code_id	fkey	Indicates if a Type IV sweep was observed and the importance of the Type IV sweep	
sweep_4_peak_flux	float(4)		Peak flux of radio burst at approximately 245 MHz [10^{-22} Wm ⁻² Hz ⁻¹]	
event_quadrant	varchar(2)		quadrant (heliographic coordinates) in which the event is observed	
event_distance	smallint		distance to central meridian in degrees	
event_latitude	smallint		heliographic latitude in degrees	
region_nr	smallint		region number	

Table 38: ISES encoded significant solar events.





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Table Name	tb_sec_geoa_ugeoi
Data File	latest/GEAO.txt
Comments	ISES encoded daily index summary.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time of summary publication	
station_id	smallint		Observation Station Indicator	
start_day	smallint		UT day of month of beginning of event	
sunspot_nr	smallint		relative sunspot number	
f107	smallint		10.7 cm radio flux	
tenflares_nr	smallint		number of TENFLARES (solar radio-emission outbursts at 10 cm that are greater than 100% over background)	
geomag_a	smallint		Geomagnetic A-index	
geomag_importance	-> tb_sec_geoa_ugeoi_geomag_importance_code_code_id	fkey	important geomagnetic event observed	
cosmic_ray_intensity	smallint		median level of cosmic ray intensity (where 1000 is the normal level)	
cosmic_ray_importance	-> tb_sec_geoa_ugeoi_cosmic_ray_importance_code_code_id	fkey	important cosmic-ray event observed	

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Column/Index	Data Type	Modifiers	Description	Check
mflare_count	smallint		number of M flares observed	
xflare_count	smallint		number of X flares observed	
xray_background	float(4)		x-ray background (.1-.8 nm) [Wm ⁻²]	
particle_flux	float(4)		particle fluence (>10MeV) [particles/cm ² -sr-day]	
spotgroup_count	smallint		number of new spot groups	
region_count	smallint		number of spotted regions	
sunspot_area	smallint		total sunspot area in millionths of the solar hemisphere	



Table 39: ISES encoded daily index summary.

Table Name	tb_sec_geoa_ugeor
Data File	latest/GEAO.txt
Comments	ISES encoded sunspot region data and forecasts.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time of summary publication	
station_id	smallint		Observation Station Indicator	
forecast_start	smallint		UTC day of forecast	
forecast_period	smallint		period (days) of forecast (usually 1 day)	
region_nr	smallint		Sunspot region number	
mflare_count	smallint		number of M flares observed	
xflare_count	smallint		number of X flares observed	
subflare_count	smallint		number of sub flares	

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Column/Index	Data Type	Modifiers	Description	Check
subflare1_count	smallint		number of importance 1 flares	
subflare2_count	smallint		number of flares greater than importance 1	
zurich_class	-> tb_sec_geoa_ug eor_zurich_class _code.code_id	fkey	Modified Zurich classification	
penumbra	-> tb_sec_geoa_ug eor_penumbra_c ode.code_id	fkey	Penumbra of largest spot (see Modified Zurich, "McIntosh", Sun-spot Classification)	
compactness	-> tb_sec_geoa_ug eor_compactnes s_code.code_id	fkey	Compactness of central spots	
mag_class	-> tb_sec_geoa_ug eor_mag_class_ code.code_id	fkey	Magnetic classification	
sunspot_area	smallint		total sunspot area in millionths of the solar hemisphere	
sunspot_count	smallint		total number of sunspots	
region_quadrant	varchar(2)		quadrant (heliographic coordinates) of the region	
region_distance	smallint		distance to central meridian in degrees	
region_latitude	smallint		heliographic latitude in degrees	
general_forecast	smallint		general forecast for the region	

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Column/Index	Data Type	Modifiers	Description	Check
cclass_probability	-> tb_sec_geoa_ug eor_cclass_prob ability_code.cod e_id	fkey	probability of class C flares divided by ten	
mclass_probability	-> tb_sec_geoa_ug eor_mclass_prob ability_code.cod e_id	fkey	probability of class M flares divided by ten	
xclass_probability	-> tb_sec_geoa_ug eor_xclass_prob ability_code.cod e_id	fkey	probability of class X flares divided by ten	
pclass_probability	-> tb_sec_geoa_ug eor_pclass_prob ability_code.cod e_id	fkey	probability of proton flares divided by ten	

Table 40: ISES encoded sunspot region data and forecasts.



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Table Name	tb_sec_geoa_ugeoa_flare_forecast_code, tb_sec_geoa_ugeoa_ground_data_code, tb_sec_geoa_ugeoa_iono_data_code, tb_sec_geoa_ugeoa_mag_data_code, tb_sec_geoa_ugeoa_mag_forecast_code, tb_sec_geoa_ugeoa_proton_forecast_code, tb_sec_geoa_ugeoa_space_data_code, tb_sec_geoa_ugeoe_optical_importance_code, tb_sec_geoa_ugeoe_optical_intensity_code, tb_sec_geoa_ugeoe_sweep_importance_code, tb_sec_geoa_ugeoe_time_qualifier_code, tb_sec_geoa_ugeoe_xray_class_code, tb_sec_geoa_ugeoi_cosmic_ray_importance_code, tb_sec_geoa_ugeoi_geomag_importance_code, tb_sec_geoa_ugeor_compactness_code, tb_sec_geoa_ugeor_general_forecast_code, tb_sec_geoa_ugeor_mag_class_code, tb_sec_geoa_ugeor_penumbra_code, tb_sec_geoa_ugeor_probability_code, tb_sec_geoa_ugeor_zurich_class_code
Data File	tbd
Comments	Contains the decoding matrix for decoding the UGEOA, UGEOE, UGEOI and UGEOR code.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
code_id	smallint		Code Identifier	
code_description	varchar(256)		Code description	

Table 41: UGEOA, UGEOE, UGEOI and UGEOR decoding tables.

Table Name	tb_sec_curind
Data File	latest/curind.txt
Comments	Current Space Weather Indices.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
message	text		Current Space Weather Indices	

Table 42: Current Space Weather Indices.





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Table Name	tb_sec_dayind
Data File	latest/dayind.txt
Comments	Daily Space Weather Indices.

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
message	text		Daily Space Weather Indices	

Table 43: Daily Space Weather Indices.



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2.1.10 Plots

Table Name	tb_sec_plot
Data File	plots/electron, plots/goeshp, plots/kp, plots/proton, plots/satenv, plots/xray
Comments	<p>3-day plots of Space Weather data:</p> <p>xray GOES X-ray Flux Data (5-min data)</p> <p>electron GOES Energetic Electron Flux (5-min data)</p> <p>proton GOES Integral Proton Flux (5-min data)</p> <p>goeshp GOES Magnetometer, H-component (1-min data)</p> <p>kp Estimated Planetary K-indices (5-min data)</p> <p>satenv Satellite Environment (Protons, Electrons, HP, and est. Kp)</p>



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
image_name	varchar(64)		Image filename	
image_data	bytea		Image content	

Table 44: 3-day plots of Space Weather data.



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2.1.11 Station List

Table Name	tb_sec_stationlist
Data File	welcome/stations/SLaplh.txt
Comments	Space Environment Center Contributing Stations. These station lists have not been updated since 1995, but are occasionally useful to SEC customers. Please use with caution.



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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
abr	varchar(3)		station name abbreviation	
name	varchar(32)		station name	
country	varchar(32)			
location	varchar(7)		Geographic location	
affl	varchar(4)		The station's affiliation: URSI - International IUWDS stations USGS - U.S. Geological Survey USAF - U.S. Air Force RGON - International Intermagnet magnetometer stations	
reports	varchar(32)		Type of data sent: Opt - Optical Observatory reporting solar limb and disk events including solar flares, and region summaries. Mag - Ground-based magnetometer sites, some send A and K indices, others send H, D, and Z components, and some send both. Iono - Ionospheric stations sending hourly values of foF2, M3000, fmin, and/or foEs. Radio - Solar Radio Flux at various frequencies. Some also report radio bursts. TEC - Total Electron Content. Fsct - Stations that routinely forecast solar and geomagnetic activity. Sat - Satellites. GOES satellites are tracked by SEL in real-time but the NOAA satellite data is received only every ??hours.	
iuwds	integer			

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Column/Index	Data Type	Modifiers	Description	Check
wmo	integer			

Table 45: Space Environment Center Contributing Stations



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2.2 NOAA/SEC other

2.2.1 STORM



This section contains data from the STORM model at NOAA's space environment center. The STORM model provides an estimate of the expected change in the ionosphere during periods of increased geomagnetic activity.

Table Name	tb_storm
Data File	http://www.sec.noaa.gov/storm/RTST-today.txt , Errors-today.txt
Comments	STORM Time Empirical Ionospheric Correction Model and Estimated Error.

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
hap	smallint		3 hour Planetary A Geomagnetic index updated hourly	
intap	float(4)		Integral of Planetary Ap Geomagnetic index over the previous 33 values	
cor_70n	float(4)		Correction factor at 70N Geomagnetic latitude	
cor_70n_error	float(4)		Estimated Average Error at 70N Geomagnetic latitude	
cor_70n_mean_error	float(4)		Estimated Standard Error of the Mean at 70N Geomagnetic latitude	
cor_70n_geovar	float(4)		Estimated Geophysical Variability at 70N Geomagnetic latitude	
cor_50n	float(4)		Correction factor at 50N Geomagnetic latitude	
cor_50n_error	float(4)		Estimated Average Error at 50N Geomagnetic latitude	
cor_50n_mean_error	float(4)		Estimated Standard Error of the Mean at 50N Geomagnetic latitude	
cor_50n_geovar	float(4)		Estimated Geophysical Variability at 50N Geomagnetic latitude	
cor_30n	float(4)		Correction factor at 30N Geomagnetic latitude	
cor_30n_error	float(4)		Estimated Average Error at 30N Geomagnetic latitude	
cor_30n_mean_error	float(4)		Estimated Standard Error of the Mean at 30N Geomagnetic latitude	
cor_30n_geovar	float(4)		Estimated Geophysical Variability at 30N Geomagnetic latitude	
cor_30s	float(4)		Correction factor at 30S Geomagnetic latitude	
cor_30s_error	float(4)		Estimated Average Error at 30S Geomagnetic latitude	
cor_30s_mean_error	float(4)		Estimated Standard Error of the Mean at 30S Geomagnetic latitude	

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Column/Index	Data Type	Modifiers	Description	Check
cor_30s_geovar	float(4)		Estimated Geophysical Variability at 30S Geomagnetic latitude	
cor_50s	float(4)		Correction factor at 50S Geomagnetic latitude	
cor_50s_error	float(4)		Estimated Average Error at 50S Geomagnetic latitude	
cor_50s_mean_error	float(4)		Estimated Standard Error of the Mean at 50S Geomagnetic latitude	
cor_50s_geovar	float(4)		Estimated Geophysical Variability at 50S Geomagnetic latitude	
cor_70s	float(4)		Correction factor at 70S Geomagnetic latitude	
cor_70s_error	float(4)		Estimated Average Error at 70S Geomagnetic latitude	
cor_70s_mean_error	float(4)		Estimated Standard Error of the Mean at 70S Geomagnetic latitude	
cor_70s_geovar	float(4)		Estimated Geophysical Variability at 70S Geomagnetic latitude	
interpolated	smallint			

Table 46: STORM Time Empirical Ionospheric Correction Model and Estimated Error.



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2.2.2 Ace plots

Table Name	tb_ace_plot
Data File	http://www.sec.noaa.gov/ace/* .gif
Comments	Ace plots with different intervals

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
image_name	varchar(64)		Image filename	
image_data	bytea		Image content	

Table 47: Ace plots with different intervals.

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2.2.3 Wang – Sheeley solar wind model data

This section contains solar wind data from the Wang –Sheeley model. This model predicts the background solar wind speed and the interplanetary magnetic field (IMF) polarity at earth, two important parameters required for predicting geomagnetic activity.

Table Name	tb_wang_sheeley_mwo
Data File	ftp://fusion.sec.noaa.gov/dist/narge/predictions/mwopred*.dat
Comments	Wang-Sheeley solar wind model data from the Mount Wilson Solar Observatory. 1 to 7 day predictions

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp	key	UTC date and time	
solar_wind_speed	float(4)		solar wind speed [km/s] at 1AU	
imf_polarity	smallint		IMF polarity at 1AU (-1 <= field directed toward sun and +1 away from Sun)	= -1 or 1
last_update	smallint		number of days since the last update (i.e., new magnetogram) of the photospheric field synoptic map (used to drive the model)	
prediction_date	date		UTC date the prediction was made	
prediction_set	smallint		indicates to which prediction set the predicted value belongs	

Table 48: Wang – Sheeley solar wind model data from Mount Wilson

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Table Name	tb_wang_sheeley_wso
Data File	ftp://fusion.sec.noaa.gov/dist/narge/predictions/wsopred*.dat
Comments	Wang-Sheeley solar wind model data from the Wilcox Solar Observatory. 1 to 7 day predictions



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
UTC	timestamp	key	UTC date and time	
solar_wind_speed	float(4)		solar wind speed [km/s] at 1AU	
imf_polarity	smallint		IMF polarity at 1AU (-1 => field directed toward sun and +1 away from Sun)	= -1 or 1
last_update	smallint		number of days since the last update (i.e., new magnetogram) of the photospheric field synoptic map (used to drive the model)	
prediction_date	date		UTC date the prediction was made	
prediction_time	smallint		indicates to which prediction set the predicted value belongs.	

Table 49: Wang – Sheely solar wind model data from Wilcox



2.2.4 Dregion Absorption

This section contains data about the operational impact of x-ray flux on High Frequency radio communication.

Table Name	tb_sec_dregion
Data File	http://www.sec.noaa.gov/rt_plots/dregion_tab.html
Comments	D-Region Absorption Highest Affected Frequency (MHz) as a function of Latitude and Longitude



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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
latitude	smallint		latitude	
freq_long_min_180	float(4)		Highest affected frequency at -180 degrees longitude	
freq_long_min_165	float(4)		Highest affected frequency at -165 degrees longitude	
freq_long_min_150	float(4)		Highest affected frequency at -150 degrees longitude	
freq_long_min_135	float(4)		Highest affected frequency at -135 degrees longitude	
freq_long_min_120	float(4)		Highest affected frequency at -120 degrees longitude	
freq_long_min_105	float(4)		Highest affected frequency at -105 degrees longitude	
freq_long_min_90	float(4)		Highest affected frequency at -90 degrees longitude	
freq_long_min_75	float(4)		Highest affected frequency at -75 degrees longitude	
freq_long_min_60	float(4)		Highest affected frequency at -60 degrees longitude	
freq_long_min_45	float(4)		Highest affected frequency at -45 degrees longitude	
freq_long_min_30	float(4)		Highest affected frequency at -30 degrees longitude	
freq_long_min_15	float(4)		Highest affected frequency at -15 degrees longitude	
freq_long_0	float(4)		Highest affected frequency at 0 degrees longitude	
freq_long_15	float(4)		Highest affected frequency at 15 degrees longitude	
freq_long_30	float(4)		Highest affected frequency at 30 degrees longitude	
freq_long_45	float(4)		Highest affected frequency at 45 degrees longitude	
freq_long_60	float(4)		Highest affected frequency at 60 degrees longitude	
freq_long_75	float(4)		Highest affected frequency at 75 degrees longitude	
freq_long_90	float(4)		Highest affected frequency at 90 degrees longitude	
freq_long_105	float(4)		Highest affected frequency at 105 degrees longitude	
freq_long_120	float(4)		Highest affected frequency at 120 degrees longitude	

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Column/Index	Data Type	Modifiers	Description	Check
freq_long_135	float(4)		Highest affected frequency at 135 degrees longitude	
freq_long_150	float(4)		Highest affected frequency at 150 degrees longitude	
freq_long_165	float(4)		Highest affected frequency at 165 degrees longitude	
freq_long_180	float(4)		Highest affected frequency at 180 degrees longitude	

Table 50: Dregion Absorption.

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	External data resources	Status: Draft

2.3 SOHO

This sections contains solar wind data from the Proton Monitor on the SOHO Spacecraft

Table Name	tb_soho_2m
Data File	http://umtof.umd.edu/pm/pmsw.used
Comments	<p>SOHO solar wind proton parameters with a 2 minute resolution</p> <p>Vsw : the bulk speed in kilometers per second</p> <p>Density : the density (protons per cm³)</p> <p>Vth : the most probable thermal speed (km/sec) = Sqrt(2kT/m)</p> <p>Angle : the flow direction in the plane perpendicular to the ecliptic plane, with positive values indicating flow FROM the south. On rare occasions the spacecraft's roll angle is changed for brief periods, during which the derived flow direction will refer to a different plane</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
angle	float(4)		the flow direction in the plane perpendicular to the ecliptic plane, with positive values indicating flow FROM the south	
vth	float(4)		the most probable thermal speed [km/sec]	
density	float(4)		the density [protons/cm ³]	
vsw	float(4)		the bulk speed [km/s]	
pm_min	float(4)			
pm_max	float(4)			

Table 51: 2-minute SOHO solar wind proton parameters




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Table Name	tb_soho_15m
Data File	http://umtof.umd.edu/pm/pmsw_2week.used
Comments	<p>SOHO solar wind proton parameters with a 15 minute resolution</p> <p>Vsw : the bulk speed in kilometers per second</p> <p>Density : the density (protons per cm³)</p> <p>Vth : the most probable thermal speed (km/sec) = Sqrt(2kT/m)</p> <p>Angle : the flow direction in the plane perpendicular to the ecliptic plane, with positive values indicating flow FROM the south. On rare occasions the spacecraft's roll angle is changed for brief periods, during which the derived flow direction will refer to a different plane</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
angle	float(4)		the flow direction in the plane perpendicular to the ecliptic plane, with positive values indicating flow FROM the south	
vth	float(4)		the most probable thermal speed [km/sec]	
density	float(4)		the density [protons/cm ³]	
vsw	float(4)		the bulk speed [km/s]	
pm_min	float(4)			
pm_max	float(4)			

Table 52: 15-minute SOHO solar wind proton parameters

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2.4 NGDC



This section contains historical data from the solar terrestrial physics program at NOAA's National Geophysical Data Center.

2.4.1 Historical Kp and Ap values

Table Name	tb_ngdc_kp_ap
Data File	ftp.ngdc.noaa.gov\STP\GEOMAGNETIC_DATA\INDICES\KP_AP
Comments	<p>THREE-HOUR-RANGE INDEX K:</p> <p>K indices range in 28 steps from 0 (quiet) to 9 (greatly disturbed) with fractional parts expressed in thirds of a unit. A K-value equal to 27, for example, means 2 and 2/3 or 3-; a K-value equal to 30 means 3 and 0/3 or 3 exactly; and a K-value equal to 33 means 3 and 1/3 or 3+.</p> <p>The arithmetic mean of the K-values scaled at the 13 observatories listed above gives Kp.</p> <p>EQUIVALENT AMPLITUDE</p> <p>The a-index ranges from 0 to 400 and represents a K-value converted to a linear scale in gammas (nanoTeslas)--a scale that measures equivalent disturbance amplitude of a station at which K=9 has a lower limit of 400 gammas.</p>

Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp	key	UTC date and time	
bartels_srn	smallint		BARTELS SOLAR ROTATION NUMBER--a sequence of 27-day intervals counted continuously from February 8, 1832	
bartels_nod	smallint		NUMBER OF DAY within the Bartels 27-day cycle	
kp_00_03	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 0000 - 0300 UT	
kp_03_06	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 0300 - 0600 UT	
kp_06_09	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 0600 - 0900 UT	

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Column/Index	Data Type	Modifiers	Description	Check
kp_09_12	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 0900 - 1200 UT	
kp_12_15	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 1200 - 1500 UT	
kp_15_18	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 1500 - 1800 UT	
kp_18_21	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 1800 - 2100 UT	
kp_21_24	smallint		Kp or PLANETARY 3-HOUR RANGE INDEX for 2100 - 2400 UT	
kp_sum	smallint		SUM of the eight Kp indices for the day expressed to the nearest third of a unit	
ap_00_03	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 0000 - 0300 UT	
ap_03_06	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 0300 - 0600 UT	
ap_06_09	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 0600 - 0900 UT	
ap_09_12	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 0900 - 1200 UT	
ap_12_15	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 1200 - 1500 UT	
ap_15_18	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 1500 - 1800 UT	
ap_18_21	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 1800 - 2100 UT	
ap_21_24	smallint		ap or PLANETARY EQUIVALENT AMPLITUDE for 2100 - 2400 UT	

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Column/Index	Data Type	Modifiers	Description	Check
ap_sum	smallint		Ap or PLANETARY EQUIVALENT DAILY AMPLITUDE--the arithmetic mean of the day's eight ap values	
cp	float(4)		PLANETARY DAILY CHARACTER FIGURE--a qualitative estimate of overall level of magnetic activity for the day determined from the sum of the eight ap amplitudes. Cp ranges, in steps of one-tenth, from 0 (quiet) to 2.5 (highly disturbed)	0<= and <=2.5
c9	smallint		a conversion of the 0-to-2.5 range of the Cp index to one digit between 0 and 9	0<= and <=9
sunspot_nr	smallint		INTERNATIONAL SUNSPOT NUMBER. Records contain the Zurich number through December 31, 1980, and the International Brussels number thereafter	
f107	float(4)		OTTAWA 10.7-CM SOLAR RADIO FLUX ADJUSTED TO 1 AU--measured at 1700 UT daily and expressed in units of [10 ⁻²² W/m ² /Hz]. Observations began on February 14, 1947. From that date through December 31, 1973, the fluxes given here don't reflect the revisions Ottawa made in 1966	
flux_qualifier	smallint		FLUX QUALIFIER. "0" indicates flux required no adjustment; "1" indicates flux required adjustment for burst in progress at time of measurement; "2" indicates a flux approximated by either interpolation or extrapolation; and "3" indicates no observation	0<= and <=3

Table 53: NGDC Historical Kp and Ap values.



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2.4.2 Historical Dst Values

Table Name	tb_ngdc_dst
Data File	ftp.ngdc.noaa.gov\STP\GEOMAGNETIC_DATA\INDICES\DST
Comments	Dst (Disturbance Storm Time) equivalent equatorial magnetic disturbance indices are derived from hourly scalings of low-latitude horizontal magnetic variation. They show the effect of the globally symmetrical westward flowing high altitude equatorial ring current, which causes the "main phase" depression worldwide in the H-component field during large magnetic storms.



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp	key	UTC date and time	
geomag_fieldcomp	varchar(1)		Geomagnetic Field Component H,D,Z,X,Y, or *=index, p=preliminary	
base_value	smallint		Tabular or Base Value (100 nT units for H,Z,X,Y and degrees for D)	
dst_01	smallint		Value for hour 1 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_02	smallint		Value for hour 2 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_03	smallint		Value for hour 3 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_04	smallint		Value for hour 4 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_05	smallint		Value for hour 5 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	

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Column/Index	Data Type	Modifiers	Description	Check
dst_06	smallint		Value for hour 6 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_07	smallint		Value for hour 7 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_08	smallint		Value for hour 8 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_09	smallint		Value for hour 9 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_10	smallint		Value for hour 10 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_11	smallint		Value for hour 11 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_12	smallint		Value for hour 12 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_13	smallint		Value for hour 13 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_14	smallint		Value for hour 14 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_15	smallint		Value for hour 15 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_16	smallint		Value for hour 16 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_17	smallint		Value for hour 17 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	

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Column/Index	Data Type	Modifiers	Description	Check
dst_18	smallint		Value for hour 18 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_19	smallint		Value for hour 19 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_20	smallint		Value for hour 20 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_21	smallint		Value for hour 21 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_22	smallint		Value for hour 22 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_23	smallint		Value for hour 23 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_24	smallint		Value for hour 24 of day H,Z,X,Y in units of 1 nT; D in units of 0.1 min	
dst_mean	smallint		Daily Mean Value	

Table 54: NGDC Historical Dst values



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2.5 TEC and scintillation data from Douala (Cameroon)

Table Name	tb_douala
Data File	GPSW_DOW_HH.GPS
Comments	Contains GPS Scintillation data form Douala station in Cameroon



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
prn	smallint		Pseudo Random Number code	
rxstatus	varchar(8)		Receiver Status	
az	float(4)		SV Azimuth angle [degrees]	
elv	float(4)		SV Elevation angle [degrees]	
l1_cno	float(4)		C/No [dB-Hz]	
s4	float(4)		Total S4 scintillation index. The S4 index is an indicator of the standard deviation of the GPS satellites' received signal power as seen on the ground	
s4_cor	float(4)		Correction to the total S4	
one_secsigma	float(4)		1-second phase sigma [radians]	
three_secsigma	float(4)		3-second phase sigma [radians]	
ten_secsigma	float(4)		10-second phase sigma [radians]	
thirty_secsigma	float(4)		30-second phase sigma [radians]	
sisty_secsigma	float(4)		60-second phase sigma [radians]	
code_carrier	float(4)		Average of Code/Carrier divergence [meters]	
cc_stdev	float(4)		Sigma of Code/Carrier Divergence [meters]	
tec45	float(4)		TEC at TOW - 45 [TECU]	
tecrate45	float(4)		delta TEC from TOW - 60 to TOW - 45 [TECU]	

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Column/Index	Data Type	Modifiers	Description	Check
tec30	float(4)		TEC at TOW - 30 [TECU]	
tecrate30	float(4)		delta EC from TOW - 45 to TOW - 30 [TECU]	
tec15	float(4)		TEC at TOW - 15 [TECU]	
tecrate15	float(4)		delta TEC from TOW - 30 to TOW - 15 [TECU]	
tec0	float(4)		TEC at TOW [TECU]	
tecrate0	float(4)		delta TEC from TOW - 15 to TOW [TECU]	
l1_locktime	float(4)		L1 Lock time [seconds]	
chanstatus	varchar(8)		Channel status	
l2_locktime	float(4)		L2 Lock Time [seconds]	
l2_cno	float(4)		L2 C/No [dB/Hz]	

Table 55: Douala tec and scintillation data.

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2.6 Halo CME mails

This section contains information received by email from the LASCO instrument aboard the SOHO spacecraft about Coronal mass ejections. This information is available in plain text and in decoded ISES code.

Table Name	tb_halo_cme
Data File	mail
Comments	Occurrence, position, time, and type of Coronal Mass Ejections observed by space and ground-based coronagraphs. Also includes, if available, correlative data from the disk/limbs to determine CME launch location and possible geo-effectiveness.



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
station_id	integer		Observation Station Indicator	
utc	timestamp		UTC date and time of warning	
utc_cme_start	timestamp		UTC date and time of CME start (appearance above occulting disk)	
cme_start_qualifier	-> tb_halo_cme_cme_time_code.code_id		start time qualifier 6= approximate start time of CME 7= CME observed in progress at this time	
utc_cme_end	timestamp		UTC date and time of CME end (leading edge out of field of view)	
cme_end_qualifier	-> tb_halo_cme_cme_time_code.code_id		end time qualifier 8= approximate end of CME 9= last observation of CME in progress	
first_position_angle	smallint		Heliocentric position angle boundary of CME (0-360 degrees - 0=north pole, 90= east limb at equator, 180=south pole, 270= west limb at equator)	

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Column/Index	Data Type	Modifiers	Description	Check
cme_direction	-> tb_halo_cme_cme_direction_code.code_id		Apparent direction of CME	
second_position_angle	smallint		Second position angle of CME (next highest position angle of other CME "leg")	0<= and <=360
cme_type	-> tb_halo_cme_cme_type_code.code_id		CME visual type	
cme_brightness	i-> tb_halo_cme_cme_brightness_code.code_id		CME brightness	
fov	-> tb_halo_cme_fov_code.code_id		CME instrument field of view	
observation_qual	-> tb_halo_cme_observation_qual_code.code_id		Quality of observation	
cme_velocity	smallint		Velocity of CME in plane of the sky [km/s]	
utc_disk_start	timestamp		UTC date and time of disk/limb start	
disk_start_qualifier	-> tb_halo_cme_disk_time_code.code_id		start time qualifier 6=start of disk/limb event 7= disk/limb event observed already in progress	
utc_disk_end	timestamp		UTC date and time of disk/limb end	
disk_end_qualifier	-> tb_halo_cme_disk_time_code.code_id		end time qualifier 8= end of disk/limb event observed 9= disk/limb event in progress at last observation	

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Column/Index	Data Type	Modifiers	Description	Check
disk_quadrant	-> tb_halo_cme_disk_q uadrant_code.code_ id		Solar quadrant of disk/limb event	
disk_position	smallint		Heliographic location (centroid) of disk/limb event	
noaa_nr	smallint		NOAA Active Region Number	
disk_type	-> tb_halo_cme_disk_t ype_code.code_id		Type of disk/limb event	
disk_wavetype	-> tb_halo_cme_disk_ wavetype_code.cod e_id		Moreton or EIT wave	
disk_dim	-> tb_halo_cme_disk_d im_code.code_id		Coronal Dimming	
disk_wavelength	-> tb_halo_cme_disk_ wavelength_code.co de_id		Wavelength utilized	
description	text		Plaintext description of the CME event	

Table 9: Halo CME warnings


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Table Name	tb_halo_cme_cme_brightness_code, tb_halo_cme_cmedirection_code, tb_halo_cme_cme_time_code, tb_halo_cme_cme_type_code, tb_halo_cme_disk_dim_code, tb_halo_cme_disk_quadrant_code, tb_halo_cme_disk_time_code, tb_halo_cme_disk_type_code, tb_halo_cme_disk_wavelength_code, tb_halo_cme_disk_wavetype_code, tb_halo_cme_fov_code, tb_halo_cme_observation_qual_code
Data File	tbd
Comments	Contains the decoding matrix for decoding the UGEOA, UGEOE, UGEOI and UGEOR code.



Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
code_id	smallint		Code Identifier	
code_description	varchar(256)		Code description	

Table 56: Halo CME mails, decoding tables.

2.7 IRF Kp forecast and nowcast

This section contains forecasted and nowcasted Kp values from the Swedish Institute of Space Physics.

Table Name	tb_irf_kp
Data File	sol.irfl.lu.se\KpForecast\kpoutput.txt
Comments	<p>Nowcasting and forecasting of Kp from ACE solar wind data.</p> <p>All parameters are 3-hour averages. The averaged solar wind data for time t are formed from data over the interval t-3 hours to t.</p> <p>The Kp(t) is the nowcast and corresponds to Kp in the interval [t-3h,t], where t is the time when the prediction was made. The nowcast is the Kp for the current 3-hour interval.</p> <p>The Kp(t+3) is the forecast and corresponds to Kp in the interval [t,t+3h]. The forecast is the Kp for the coming 3-hour interval.</p>

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
n	float(4)		solar wind density	
v	float(4)		velocity	
bz	float(4)		magnetic field component	
kp_n	float(4)		nowcasted Kp	
kp_f	float(4)		forecasted Kp	

Table 57: IRF Kp forecast and nowcast.

2.8 Kyoto University Hourly Equatorial Dst values (near real time)

This section contains hourly equatorial Dst values from the Kyoto University.

Table Name	tb_kyoto_equ_dst
Data File	swdcdb.kugi.kyoto-u.ac.jp\dstdir\dst1\q\Dstqthism.html
Comments	<p>This version of QL-Dst is made from unchecked data sent from observatories without checks. The users should note that this version is only for forecast and monitoring. The observatories or we do not have any responsibility caused by uncontrollable noises and baseline shifts.</p> <p>For data analyses we ask users to use later versions [final Dst or provisional Dst].</p> <p>ACKNOWLEDGEMENTS: We thank for cooperation of Kakioka [JMA], Honolulu and San Juan [USGS], Hermanus [RSA], Alibag [IIG] and CRL, INTERMAGNET and many others to make this QL-Dst in near real time.</p>

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Column/Index	Data Type	Modifiers	Description	Check
id	serial	key		
utc	timestamp		UTC date and time	
dst_1	smallint		Equatorial Dst value at 0100 utc [nT]	
dst_2	smallint		Equatorial Dst value at 0200 utc [nT]	
dst_3	smallint		Equatorial Dst value at 0300 utc [nT]	
dst_4	smallint		Equatorial Dst value at 0400 utc [nT]	
dst_5	smallint		Equatorial Dst value at 0500 utc [nT]	
dst_6	smallint		Equatorial Dst value at 0600 utc [nT]	
dst_7	smallint		Equatorial Dst value at 0700 utc [nT]	
dst_8	smallint		Equatorial Dst value at 0800 utc [nT]	
dst_9	smallint		Equatorial Dst value at 0900 utc [nT]	
dst_10	smallint		Equatorial Dst value at 1000 utc [nT]	
dst_11	smallint		Equatorial Dst value at 1100 utc [nT]	
dst_12	smallint		Equatorial Dst value at 1200 utc [nT]	
dst_13	smallint		Equatorial Dst value at 1300 utc [nT]	
dst_14	smallint		Equatorial Dst value at 1400 utc [nT]	
dst_15	smallint		Equatorial Dst value at 1500 utc [nT]	
dst_16	smallint		Equatorial Dst value at 1600 utc [nT]	
dst_17	smallint		Equatorial Dst value at 1700 utc [nT]	
dst_18	smallint		Equatorial Dst value at 1800 utc [nT]	
dst_19	smallint		Equatorial Dst value at 1900 utc [nT]	
dst_20	smallint		Equatorial Dst value at 2000 utc [nT]	
dst_21	smallint		Equatorial Dst value at 2100 utc [nT]	
dst_22	smallint		Equatorial Dst value at 2200 utc [nT]	

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Column/Index	Data Type	Modifiers	Description	Check
dst_23	smallint		Equatorial Dst value at 2300 utc [nT]	
dst_24	smallint		Equatorial Dst value at 2400 utc [nT]	



Table 58: Kyoto University Hourly Equatorial Dst values.

2.9 Space Weather Indices

Data File	tbd
Comments	

Column/Index	Data Type	Modifiers	Description	Check
UTC	timestamp	key	UTC date and time	
tbd				

Table 11: tbd

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Annex

Annex A: Data Types

The following sections describe the data types of the database management system (DBMS) PostgreSQL (for details see /2/). These data types shall be used to specify the space weather data to be stored in the database (DB).

In some cases it's not possible to use a standard data type for example for enumerations or lists. In this cases please describe the "new" data type by naming it and the values, which are possible.

Examples:

"new" Data Type	Description	Values
weekdays	days of the week	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
url	Internet address	An URL has the following structure: <protocol> ://<service>. <2 nd _subdomain>. <1 st _subdomain>.<domain>/<path>/<file>



A.1 Numeric Types

Data Type	Storage Size [byte]	Description	Range
smallint	2	small-range integer	-32768 to +32767
integer	4	usual choice for integer	-2147483648 to +2147483647
bigint	8	large-range integer	-9223372036854775808 to 9223372036854775807
decimal	variable	user-specified precision, exact	no limit
numeric	variable	user-specified precision, exact	no limit
real	4	variable-precision, inexact	6 decimal digits precision
double precision	8	variable-precision, inexact	15 decimal digits precision
serial	4	auto incrementing integer	1 to 2147483647
bigserial	8	large auto incrementing integer	1 to 9223372036854775807

Table 59: PostgreSQL Numeric Data Types

A.1.1 Arbitrary Precision Numbers

The type `numeric` can store numbers with up to 1000 digits of precision and perform calculations exactly. It is especially recommended for storing monetary amounts and other quantities where exactness is required. However, the `numeric` type is very slow compared to the floating-point types.

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In what follows we use these terms: The scale of a `numeric` is the count of decimal digits in the fractional part, to the right of the decimal point. The precision of a `numeric` is the total count of significant digits in the whole number, that is, the number of digits to both sides of the decimal point. So the number 23.5141 has a precision of 6 and a scale of 4. Integers can be considered to have a scale of zero.

Both the precision and the scale of the `numeric` type can be configured. To declare a column of type `numeric` use the syntax

```
NUMERIC (precision, scale)
```

The precision must be positive, the scale zero or positive. Alternatively,

```
NUMERIC (precision)
```

selects a scale of 0. Specifying

```
NUMERIC
```

without any precision or scale creates a column in which numeric values of any precision and scale can be stored, up to the implementation limit on precision. A column of this kind will not coerce input values to any particular scale, whereas numeric columns with a declared scale will coerce input values to that scale.

If the precision or scale of a value is greater than the declared precision or scale of a column, the system will attempt to round the value. If the value cannot be rounded so as to satisfy the declared limits, an error is raised.



The types `decimal` and `numeric` are equivalent. Both types are part of the SQL standard.

A.1.2 Floating-Point Types

The data types `real` and `double precision` are inexact, variable-precision numeric types. In practice, these types are usually implementations of IEEE Standard 754 for Binary Floating-Point Arithmetic (`single` and `double precision`, respectively), to the extent that the underlying processor, operating system, and compiler support it.

Inexact means that some values cannot be converted exactly to the internal format and are stored as approximations, so that storing and printing back out a value may show slight discrepancies. Managing these errors and how they propagate through calculations is the subject of an entire branch of mathematics and computer science and will not be discussed further here, except for the following points:

- If you require exact storage and calculations (such as for monetary amounts), use the `numeric` type instead.
- If you want to do complicated calculations with these types for anything important, especially if you rely on certain behaviour in boundary cases (infinity, underflow), you should evaluate the implementation carefully.
- Comparing two floating-point values for equality may or may not work as expected.

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On most platforms, the `real` type has a range of at least $1E-37$ to $1E+37$ with a precision of at least 6 decimal digits. The `double precision` type typically has a range of around $1E-307$ to $1E+308$ with a precision of at least 15 digits. Values that are too large or too small will cause an error. Rounding may take place if the precision of an input number is too high. Numbers too close to zero that are not representable as distinct from zero will cause an underflow error.

PostgreSQL also supports the SQL-standard notations `float` and `float(p)` for specifying inexact numeric types. Here, `p` specifies the minimum acceptable precision in binary digits. PostgreSQL accepts `float(1)` to `float(24)` as selecting the `real` type, while `float(25)` to `float(53)` select `double precision`. Values of `p` outside the allowed range draw an error. `float` with no precision specified is taken to mean `double precision`.

A.2 Character Types

Data Type	Description
<code>character(n)</code>	fixed-length, blank padded
<code>char(n)</code>	
<code>character varying(n)</code>	variable-length with limit
<code>varchar(n)</code>	
<code>text</code>	variable unlimited length

Table 60: PostgreSQL Character Data Types



SQL defines two primary character types: `character varying(n)` and `character(n)`, where `n` is a positive integer. Both of these types can store strings up to `n` characters in length. An attempt to store a longer string into a column of these types will result in an error, unless the excess characters are all spaces, in which case the string will be truncated to the maximum length. (This somewhat bizarre exception is required by the SQL standard.) If the string to be stored is shorter than the declared length, values of type `character` will be space-padded; values of type `character varying` will simply store the shorter string.

If one explicitly casts a value to `character varying(n)` or `character(n)`, then an over-length value will be truncated to `n` characters without raising an error. (This too is required by the SQL standard.)

The notations `varchar(n)` and `char(n)` are aliases for `character varying(n)` and `character(n)`, respectively. `character` without length specifier is equivalent to `character(1)`; if `character varying` is used without length specifier, the type accepts strings of any size. The latter is a PostgreSQL extension.

In addition, PostgreSQL provides the `text` type, which stores strings of any length. Although the type `text` is not in the SQL standard, several other SQL database management systems have it as well.

The storage requirement for data of these types is 4 bytes plus the actual string, and in case of `character` plus the padding. Long strings are compressed by the system automatically, so the physical requirement on disk may be less. Long values are also stored in background tables so they do not interfere with rapid access to the shorter column values. In any case, the longest possible character string that can be stored is about 1 GB. (The maximum value

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that will be allowed for n in the data type declaration is less than that. It wouldn't be very useful to change this because with multi-byte character encodings the number of characters and bytes can be quite different anyway. If you desire to store long strings with no specific upper limit, use text or character varying without a length specifier, rather than making up an arbitrary length limit.)

A.3 Date/Time Types

Data Type	Storage Size [byte]	Description	Low Value	High Value	Resolution
date	4	dates only	4713 BC	32767 AD	1 day
time	8	times of day only	00:00:00.00	23:59:59.99	1 microsecond
time with time zone	12	times of day only, with time zone	00:00:00.00+12	23:59:59.99-12	1 microsecond
timestamp	8	both date and time	4713 BC	5874897 AD	1 microsecond / 14 digits
timestamp with time zone	8	both date and time, with time zone	4713 BC	5874897 AD	1 microsecond / 14 digits

Table 61: PostgreSQL Date/Time Data Types



A.3.1 Special Date/Time Values

The following SQL-compatible functions can be used as date or time values for the corresponding data type: CURRENT_DATE, CURRENT_TIME, CURRENT_TIMESTAMP, LOCALTIME, LOCALTIMESTAMP.

PostgreSQL also supports several special date/time input values for convenience, as shown in Table 62. The values `infinity` and `-infinity` are specially represented inside the system and will be displayed the same way; but the others are simply notational shorthands that will be converted to ordinary date/time values when read. All of these values are treated as normal constants and need to be written in single quotes.

Input String	Valid Types	Description
epoch	date, timestamp	1970-01-01 00:00:00+00 (Unix system time zero)
infinity	timestamp	later than all other time stamps
-infinity	timestamp	earlier than all other time stamps
now	date, time, timestamp	current transaction's start time
today	date, timestamp	midnight today
tomorrow	date, timestamp	midnight tomorrow
yesterday	date, timestamp	midnight yesterday
allballs	time	00:00:00.00 UTC

Table 62: PostgreSQL Special Date/Time Values

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A.4 Boolean Type

PostgreSQL provides the standard SQL type `boolean`. `boolean` can have one of only two states: "true" or "false". A third state, "unknown", is represented by the SQL `NULL` value.

Valid literal values for the "true" state are:

```
TRUE
't'
'true'
'y'
'yes'
'1'
```

For the "false" state, the following values can be used:

```
FALSE
'f'
'false'
'n'
'no'
'0'
```

Using the key words `TRUE` and `FALSE` is preferred (and SQL-compliant).