



The SWENET Software Infrastructure

P. Beltrami
K. Ruhl

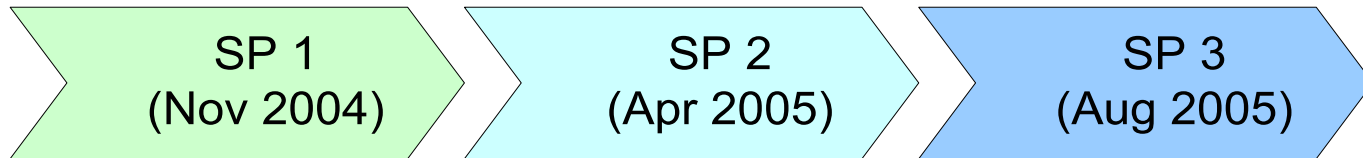
eta_max space GmbH

Richard-Wagner-Str. 1
D-38106 Braunschweig
Tel: +49-531-3802-400
Fax: +49-531-3804-401
info@etamax.de
www.etamax.de

- Scope of the SWENET Infrastructure
- Project Timetable
- Overview of the SWENET Portal Structure
 - SWENET Service Browser
 - The SWENET Database
 - Data Analysis Tools
 - Report Browsing
 - Data Dissemination via Email
- Summary

- Objectives:
 - Provision of a central resource and information centre for the activities/SDAs in ESA's space weather pilot project
 - Common IT framework for SWENET members and external visitors
 - Web based, user friendly
 - Provision of services for the members of the pilot project
 - The SWENET infrastructure comprises two main components
 - A database containing:
 - Space weather data from external resources
 - Data generated by the SDAs in the pilot project
 - A portal for accessing the services and data generated by the Service Development Activities (SDAs) of the space weather pilot project
- Developed jointly by eta_max space (Germany) and BIRA (Belgium)

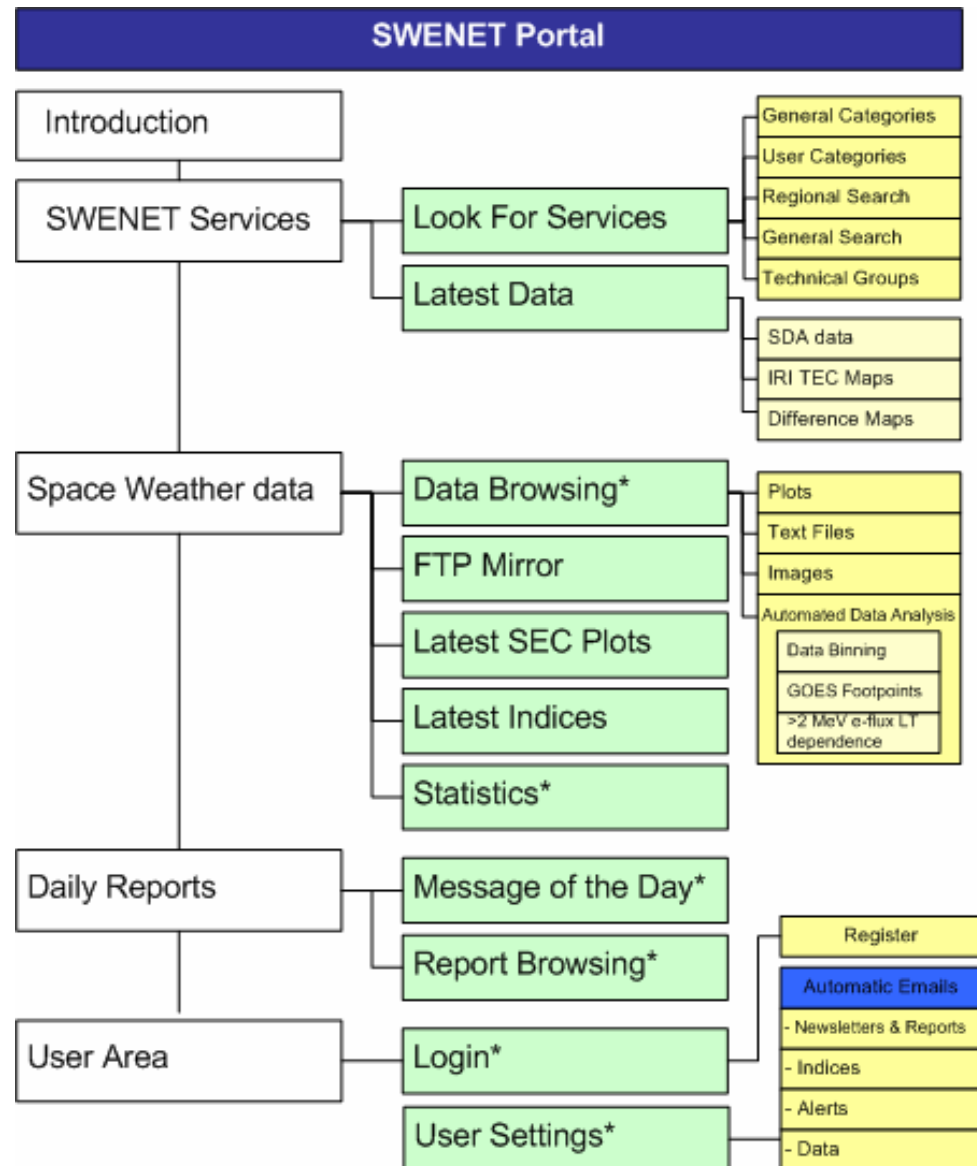
- The development of the SWENET IT was divided into 3 parts:



- Data access and distribution system (Software Package 1)
 - SWENET IT is able to **collect** data
 - SWENET IT is able to **provide access to** data
- SDA portal system (Software Package 2)
 - Provision of **access to the SDA services** and data
- Product dissemination functionality (Software Package 3)
 - SWENET IT is able to **distribute** data (e.g. daily forecasts per email)

Overview of the SWENET Portal structure

- The SWENET Portal is the interface to the infrastructure
- The SWENET Portal has four main sections:
 - SWENET Services
 - Space Weather Data
 - Daily Reports
 - User Area



Look for Services/SDA Browsing

→ Provides the user with the ability to look for specific SDA services

➤ Categorical searches

- General categories
- User categories
- Region
- Technical groups

➤ Free Search

- By keyword (google-style)



ESA Space WeatherSite - Mozilla Firefox

SWENET

SWENET Contents

- Introduction
- SWENET Services
- Look for Services
- Latest Data
- Space Weather Data
- Data Browsing
- FTP Mirror
- Latest SEC Plots
- Latest Indices
- Statistics
- Daily Reports
- Message of the Day
- Report Browsing
- User Area
- Login
- Register

go to ESA Space Weather Web Server

SWENET Services (SDAs)

The European Space Weather Network (SWENET) portal provides access to the services and resources developed by SWENET members. These include 16 activities co-funded by ESA as part of its *Space Weather Applications Pilot Project* together with a number of other activities with independent funding.

These Service Development Activities (SDAs) focus on a wide range of space weather user domains, providing services and products to address the needs of specific users.

SWENET provides a common access point to the SDAs services and products, facilitating the users to find & access the information he is looking for.

The Service Development Activities are grouped into three **technical categories**. SWENET also offers the possibility to search for services through various category groups as listed below.

Look for services & Products [show all](#)

Search for SDA's by

General categories	SDA services classified by domains/keywords
User Categories	SDA services classified by user categories Search for services depending on the user
Region	Regional distribution of the services
Latest Data	Latest data provided by the SWENET SDAs
General Search	

Please enter the keyword(s) to search for. All SDAs that contains at least one of the keywords will be listed.

Technical Group Lists

- Ionospheric Effects & Activity Forecast
- GIC & Ground Effects
- Spacecraft and Aircraft

SWENET Contents

- Introduction
- SWENET Services
- Look for Services
- Latest Data
- Space Weather Data
- Data Browsing
- FTP Mirror
- Latest SEC Plots
- Latest Indices
- Statistics
- Daily Reports
- Message of the Day
- Report Browsing
- User Area
- Login
- Register

go to ESA Space Weather Web Server

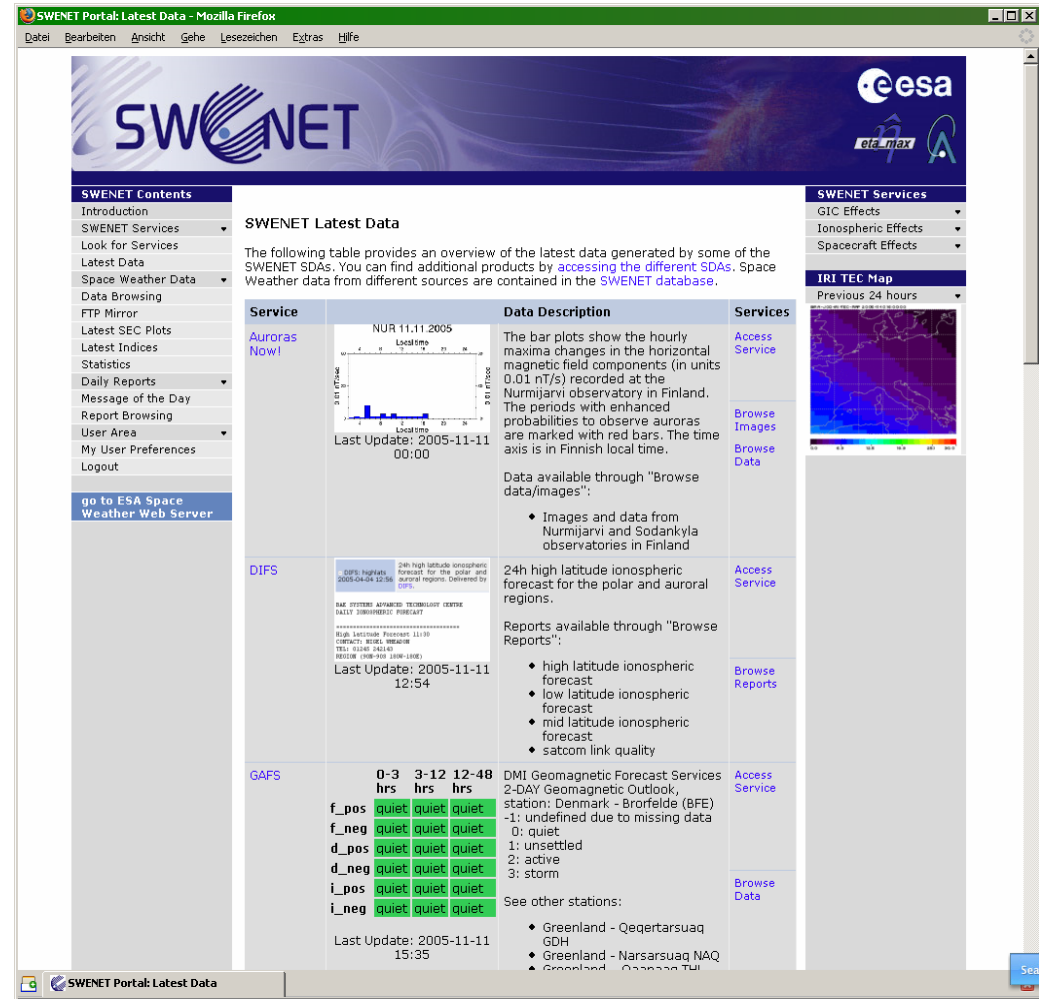
SWENET Services

- GIC Effects
- Ionospheric Effects
- Spacecraft Effects

Coverage

Region	Service Development Activities
Canada	GIC Simulator, Pipeline DWS, SFC
Denmark	SAFS
Europe	SEPS, SPECTRE, STP, SWAPNA, SFC, SWINOC
Finland	Auroras Power, GIC Now!
Greenland	SAFS
Lapland	Auroras Power!
Scandinavia	Auroras Power!, SAFS, GIC Forecast, GIC Now!
Switzerland	SWINOC
Spain and Mediterranean CDR	SEPSNA, GEOSHAFT, SAAPS, SEES
Sweden	GIC Forecast
World	FORCASTS, GIC Now!, GIC Validation, Ionosphere, IONOS, Scintillation Outbreaks, SFC, SDC, SOARS, TERS

- The "Latest Data" page provides an overview of the integrated SDAs
- Each SDAs has one row
 - SDA name with link to the description page
 - Image / icon of one latest data set with link to its full content
 - Description of the data
 - Links to SDA content in the database
- More data is available through SDA description page

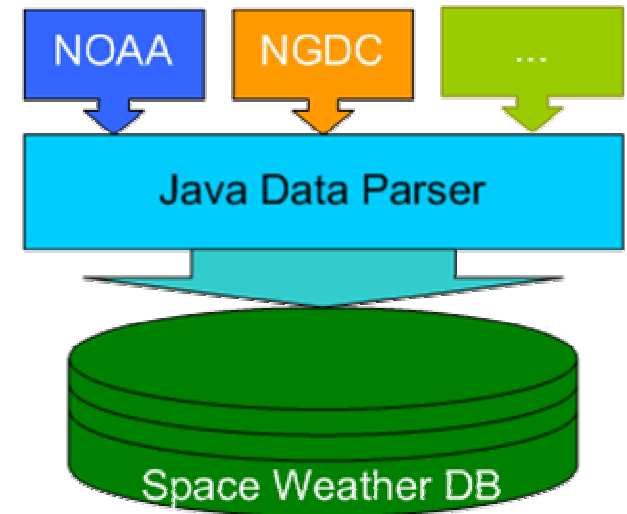


- Access is provided to all SDAs in the pilot projects
 - SDA short description
 - link to the SDA service
- Integrated SDAs provide data for common use in SWENET (→ database)

➢ SDAs providing data or services through SWENET	Auroras now! BINCASTS DIFS GAFS GEISHA GIFINT	Ionosfera* ISGI* Scintillation-Quickmaps SIDC SWIPPA TSRS
➢ Description and access to the SDA provided through SWENET	GEOSHAFT GIC Forecast GIC Now! GIC Simulator GPS Validation MuSTAnG PipelineSWS	SEIS SFC SOARS SPECTRE STIF SWIMIC SAAPS

- Replication from following sources:

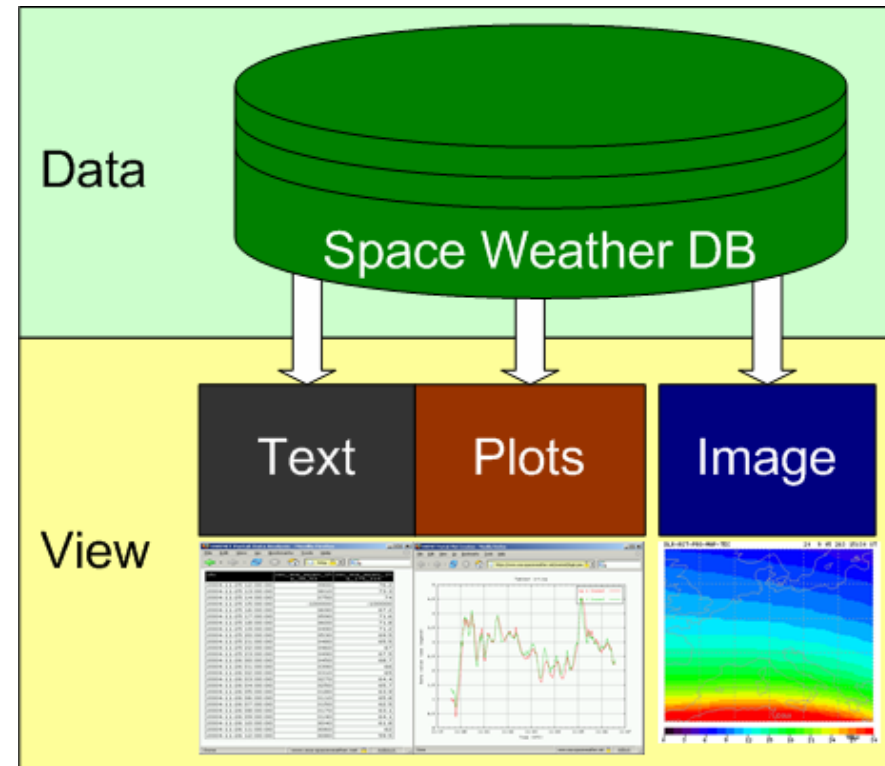
- Integrated SDAs
- External data resources
 - NOAA/SEC ftp server and website
 - NGDC ftp server
 - IRF ftp server
 - Kyoto University ftp server
 - SOHO ftp server
 - HaloCME mails
 - SEC/NOAA Database → High resolution Data



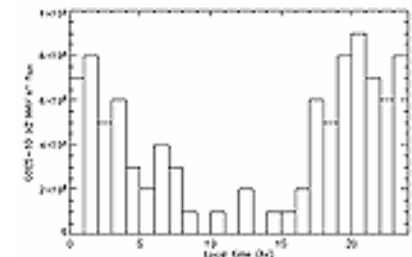
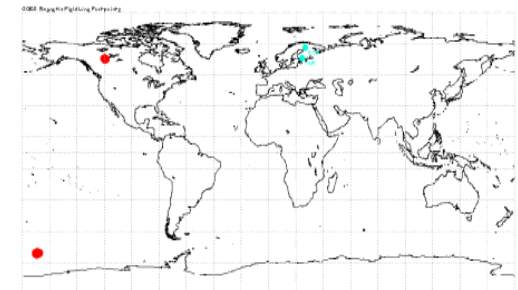
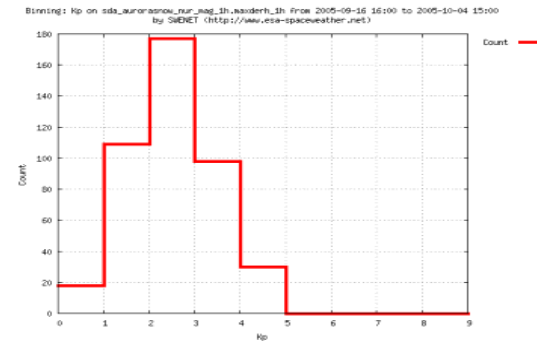
- Functional approach:

- Data is loaded from FTP or other sources as files
- Files are parsed by Java Dataparser
- Dataparser writes data into SWENET space weather database
- Delay: 30 seconds or less
- PostgreSQL database

- Access to the database available via web interface
 - Tables (text or html) of all numerical data
 - Ordered by UTC
 - Plots of all numerical data
 - Image browsing for image data
 - Data from different sources can be searched and combined
 - Technical background: Java Servlet technology
- Data also available via FTP
 - All replicated files are accessible
 - Only latest version, no historical data
- Overview of the latest space weather indices and latest plots from SEC



- Data binning of numerical data
 - Allows binning of datasets over indices like kp, ap, etc.
- GOES footpoints
 - Finds the footpoints of the GOES satellites and plots them on a world map, together with locations of ground based magnetometers.
- GOES >2 MeV e- flux local time dependence
 - Plots for a selected time period



Space Weather Report Browser

- Provides access to current space weather reports
- Currently 3 report providers
 - DIFS: 4 reports
 - SIDC: 7 reports
 - SWEN newsletter
- Reports can be obtained
 - as a message of the day
 - by email
 - through the database
- Search historical reports by date



- Data in the database can be received automatically via email
 - Daily reports via email
 - Summary mail
 - Latest space weather indices
 - Indices alerts
 - Fully customisable alert thresholds for Kp, Ap, Dst, GOES ≥ 10 MeV flux and Solar X-ray Flux
 - Automatic data delivery via email
 - Every table of the database can be selected
 - Daily, weekly or monthly delivery
- Registration free of charge!
 - Needed to access the data services of SWENET
 - Users can freely configure preferences for data dissemination

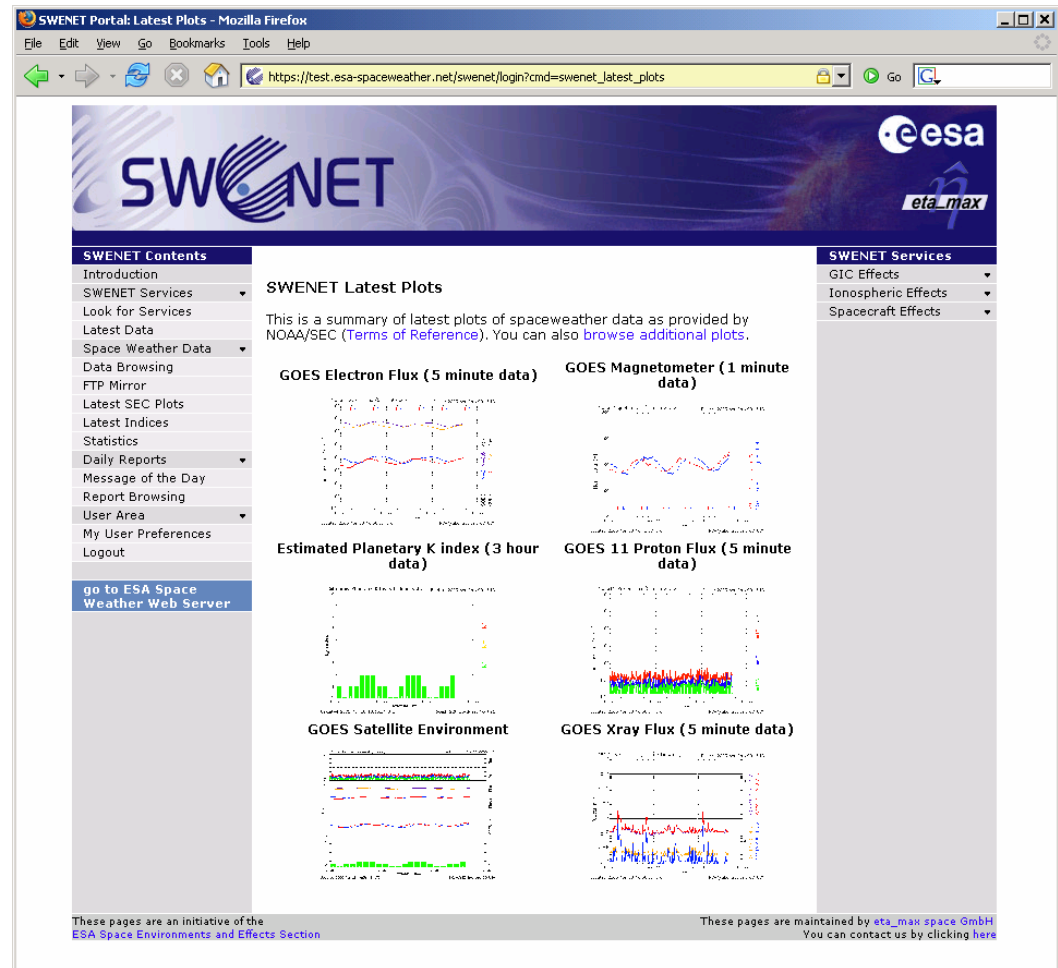
- SWENET provides services and data related to space weather and to the Service Development Activities of the pilot project
- The SWENET Portal provides a wide range of functionalities:
 - A central access point to the services developed in the SDAs
 - A browseable Space Weather database
 - Capability to search and combine data from different sources
 - Graphical display and data analysis tools
 - FTP mirror of data from different sources
 - Overview of the latest SDA data and space weather indices
 - Daily reports, alerts and data sets via email
- Development has been finalised and is available at:

www.esa-spaceweather.net/swenet

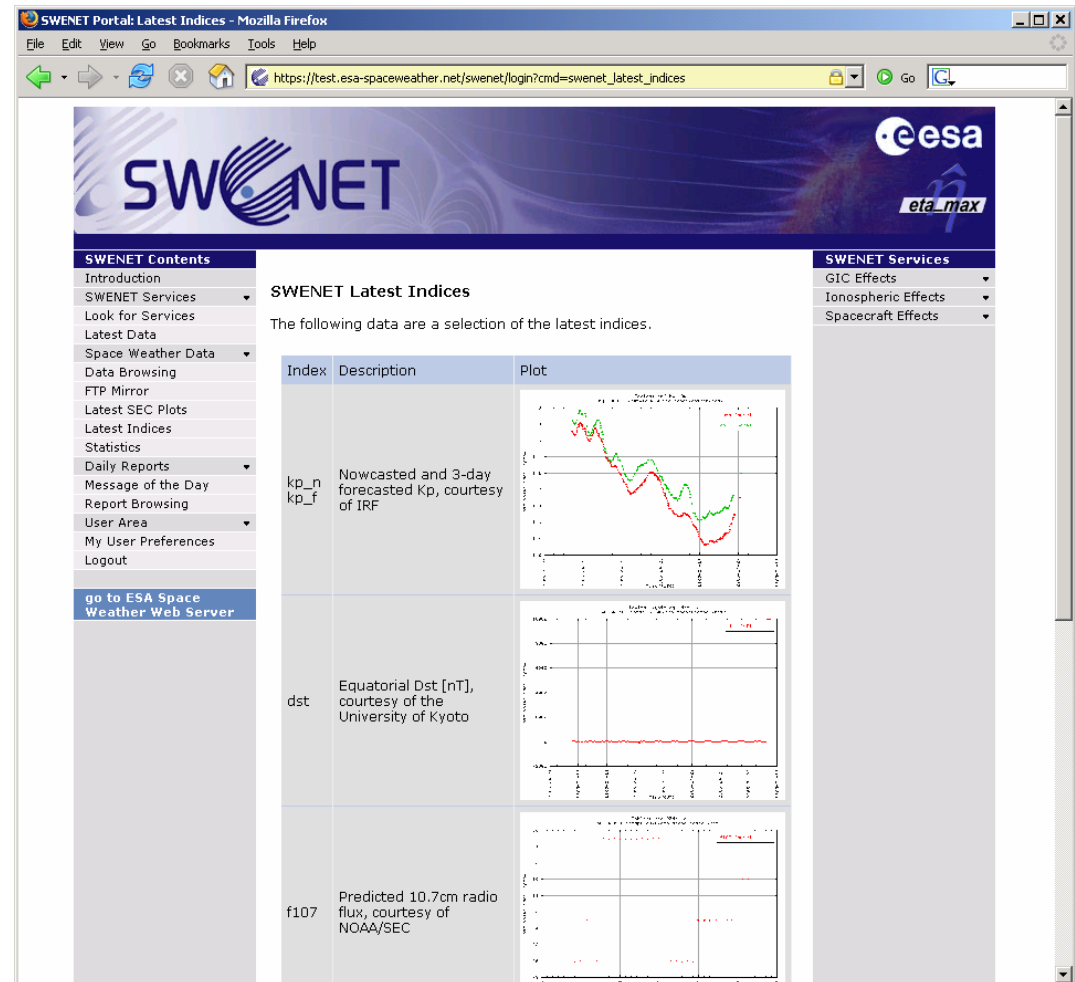
SWENET Web Portal

Hands-on Presentation Screenshots


- Selection of latest plots that were replicated
 - Directly loaded from database
- All from database section "Image Data"
- Currently, all plots are from NOAA/SEC



- Overview of relevant space weather indices
 - Kp, Dst, ap, F 10.7
- Selection of indices data from the database
 - Refresh every minute
- All images are generated on-the-fly
 - Refresh every minute



- Simplest form of data browsing: Text
 - HTML for direct viewing in browser
 - Alternative: Download of text file (tab separated values)
- Target data: Numbers and text
 - Binary data (like images) available separately
 - Ordering always according to UTC
- Advanced option: Combination of several tables
 - Rows are unified where UTC matches

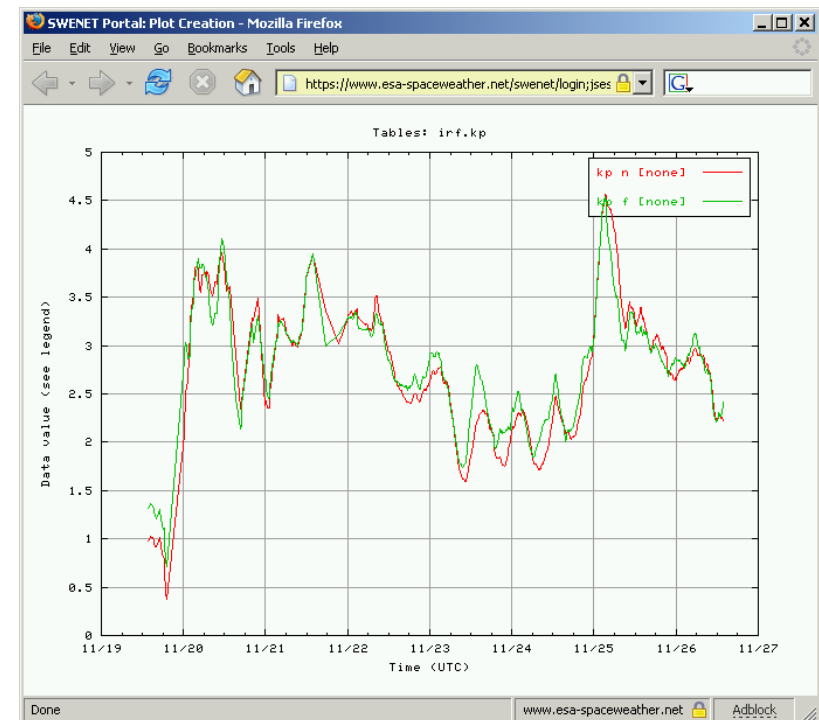


utc	sec_ace_epam_1h_e_38_53	sec_ace_epam_1h_e_175_315
2004-11-25 12:00:00	3900	76.2
2004-11-25 13:00:00	3810	73.3
2004-11-25 14:00:00	3750	74
2004-11-25 15:00:00	-100000	-100000
2004-11-25 16:00:00	3690	67.2
2004-11-25 17:00:00	3590	71.6
2004-11-25 18:00:00	3600	71.8
2004-11-25 19:00:00	3490	71.2
2004-11-25 20:00:00	3530	69.5
2004-11-25 21:00:00	3480	65.5
2004-11-25 22:00:00	3460	67
2004-11-25 23:00:00	3490	67.5
2004-11-26 00:00:00	3450	68.7
2004-11-26 01:00:00	3390	66
2004-11-26 02:00:00	3310	65
2004-11-26 03:00:00	3270	64.4
2004-11-26 04:00:00	3250	65.7
2004-11-26 05:00:00	3180	63.9
2004-11-26 06:00:00	3110	65.8
2004-11-26 07:00:00	3150	62.5
2004-11-26 08:00:00	3170	63.1
2004-11-26 09:00:00	3140	64.1
2004-11-26 10:00:00	3040	61.8
2004-11-26 11:00:00	3060	62
2004-11-26 12:00:00	3080	59.5

- Data visualisation and analysis: Plots
 - Plots as PNG images for viewing and download

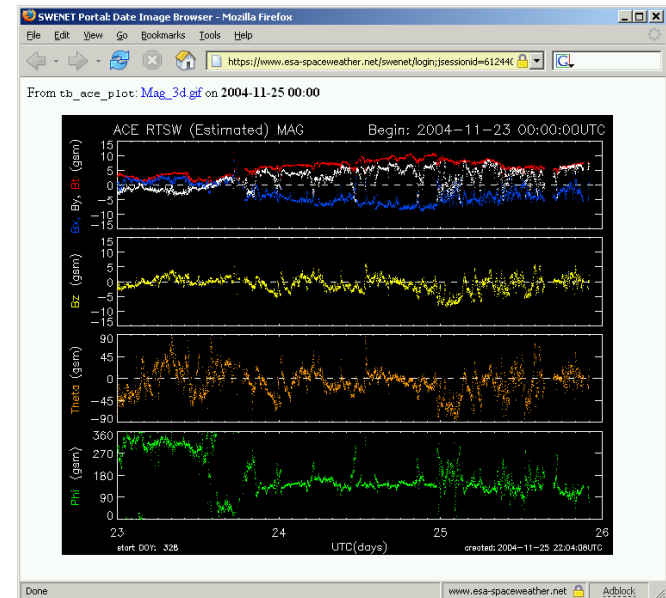
- Target data: All numbers
 - ... naturally for graphs.
 - X axis is always UTC

- Advanced: Combination of tables possible
 - Direct graphical comparison of several tables




- Images are a special kind of data
 - Not suitable for text exports
 - Not suitable for graphs
 - Large data objects

- Image Browsing allows for comparison of image data
 - According to UTC, but because of size:
 - Only two images to be selected per data set
 - Image at a chosen UTC
 - Reference image at second UTC



Example, Step I: Choose Browse Method


Space Weather Web Server



Contents
Welcome
Introduction
What is Space Weather
Physics
Applications
Current Space Weather
ESA Space Weather Studies
Applications Pilot Project (SWENET)
CDF Study
Feasibility Studies
International Activities
Models and Data Resources
Space Weather Working Team (SWWT)
SWEN Newsletter
ESA Space Weather Workshops
Miscellaneous
Events & Conferences
Publications
Sitemap
Mail to Webmaster

SWENET
Introduction
SWENET SDAs
Space Weather Data
Data Browsing
FTP Mirror
Statistics
Daily Reports
Message of the Day
User Area
My User Preferences
Logout

Welcome to the SWENET data browsing and plotting section.

This service concerns itself with the data that SWENET has replicated from manifold sources. You can browse all of it, using different methods to view it. These are illustrated below.

☒ **Plots**

You can make plots (PNG image files) from any numerical data in the database. Please be aware that plotting may take some time, e.g. if you selected a weeks worth of data with 1 minute resolution.

☐ **Text**

You can retrieve data sets from one or several tables and put them into a text table. Numerical as well as text data can be retrieved; the only exception are binary data such as images. The standard option is to view the data sets in the web browser, but you can also choose to download a tab separated text file.

☐ **Images**

The only data that cannot be retrieved via text tables are images; for these, you need to use the image browser. You can select images from various tables and times.

Proceed


Ionospheric Group
DIFS
GIFINT
GPS Validation
Ionosfera
Scintillation Quickmaps
SFC
SIDC
SOARS
SPECTRE
STIF
SWIPPA
TSRS


Ground Group
Auroras Now!
BINCASTS
CORRENG
GAFS
Gasum Now!
GIC Forecast
GIC Simulator
GIFINT
GPS Validation
ISGI
SAAPS
SWIMIC

Spacecraft Group
GEISHA
GEOSHAF
SAAPS
SEIS
SOARS

These pages are maintained by the [Space Environments and Effects Analysis Section](#)
You can contact us by clicking [here](#)

Example, Step II: Choose Tables


Space Weather Web Server



Contents
Welcome
Introduction
What is Space Weather
Physics
Applications
Current Space Weather
ESA Space Weather Studies
Applications Pilot Project (SWENET)
CDF Study
Feasibility Studies
International Activities
Models and Data Resources
Space Weather Working Team (SWWT)
SWEN Newsletter
ESA Space Weather Workshops
Miscellaneous
Events & Conferences
Publications
Sitemap
Mail to Webmaster

SWENET
Introduction
SWENET SDAs
Space Weather Data
Data Browsing
FTP Mirror
Statistics
Daily Reports
Message of the Day
User Area
My User Preferences
Logout

Welcome to the SWENET plot creator.

You can specify any number of tables from which to gather data to visualize. Please be aware that selecting large data sets may take a long time to visualize (e.g. 1 week worth of data with a 1 minute resolution).

irf	This section contains forecasted and nowcasted Kp values from the Swedish Institute of Space Physics.						
Select Table <table> <tr> <th>Select</th> <th>Table</th> <th>Description</th> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>kp</td> <td>Nowcasting and forecasting of Kp from ACE solar wind data. 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. 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. 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.</td> </tr> </table>		Select	Table	Description	<input checked="" type="checkbox"/>	kp	Nowcasting and forecasting of Kp from ACE solar wind data. 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. 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. 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.
Select	Table	Description					
<input checked="" type="checkbox"/>	kp	Nowcasting and forecasting of Kp from ACE solar wind data. 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. 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. 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.					
ngdc	This section contains historical data from the solar terrestrial physics program at NOAA's National Geophysical Data Center.						
sda	This section contains data produced by various SWENET service development activities (SDAs).						
sec	This section contains data from the NOAA/SEC ftp server.						
soho	This sections contains solar wind data from the Proton Monitor on the SOHO Spacecraft.						
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.						
wang/sheeley	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.						

Proceed


Ionospheric Group
DIFS
GIFINT
GPS Validation
Ionosfera
Scintillation Quickmaps
SFC
SIDC
SOARS
SPECTRE
STIF
SWIPPA
TSRS

Ground Group
Auroras Now!
BINCASTS
CORRENG
GAFS
Gasum Now!
GIC Forecast
GIC Simulator
GIFINT
GPS Validation
ISGI
SAAPS
SWIMIC


Spacecraft Group
GEISHA
GEOSHAFT
SAAPS
SEIS
SOARS

These pages are maintained by the [Space Environments and Effects Analysis Section](#)
You can contact us by clicking [here](#)

Example, Step III: Choose Datasets



Space Weather Web Server



Contents

- Welcome
- Introduction
- What is Space Weather
- Physics
- Applications
- Current Space Weather
- ESA Space Weather Studies
- Applications Pilot Project (SWENET)
- CDF Study
- Feasibility Studies
- International Activities
- Models and Data Resources
- Space Weather Working Team (SWWT)
- SWEN Newsletter
- ESA Space Weather Workshops
- Miscellaneous
- Events & Conferences
- Publications
- Sitemap
- Mail to Webmaster

SWENET

- Introduction
- SWENET SDAs
- Space Weather Data
- Data Browsing
- FTP Mirror
- Statistics
- Daily Reports
- Message of the Day
- User Area
- My User Preferences
- Logout

Choose Your Data

For each table you have selected, you may now specify any number of data rows to be included in your graph.

Timespan:

to

Y-range:

to

Y-scaling:

Dotstyle:

Time format:

Table 1:

irf_kp (data: 2000-08-31 to 2004-11-25)

Select	Column	Description
<input type="checkbox"/>	n	solar wind density
<input type="checkbox"/>	v	velocity
<input type="checkbox"/>	bz	magnetic field component
<input checked="" type="checkbox"/>	kp_n	nowcasted Kp
<input checked="" type="checkbox"/>	kp_f	forecasted Kp

Ionospheric Group

- DIFS
- GIFINT
- GPS Validation
- Ionosfera
- Scintillation Quickmaps
- SFC
- SIDC
- SOARS
- SPECTRE
- STIF
- SWIPPA
- TSRS

Ground Group

- Auroras Now!
- BINCASTS
- CORRENG
- GAFS
- Gasum Now!
- GIC Forecast
- GIC Simulator
- GIFINT
- GPS Validation
- ISGI
- SAAPS
- SWIMIC

Spacecraft Group

- GEISHA
- GEOSHAF
- SAAPS
- SEIS
- SOARS

These pages are maintained by the Space Environments and Effects Analysis Section
 You can contact us by clicking [here](#)

Example, Step IV: Receive Result

