The SWENET Software Infrastructure

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Overview

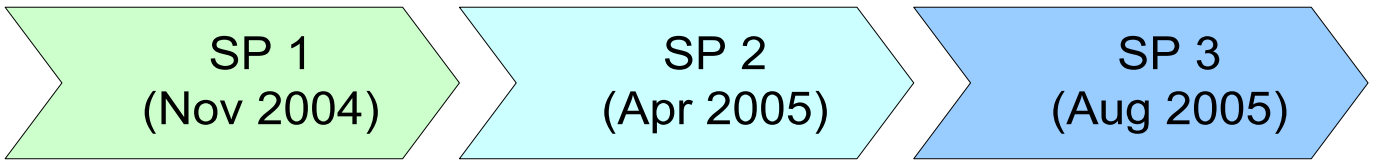
- Scope of the SWENET Infrastructure
- Project Timetable
- Overview of the SWENET Portal Structure
  - SWENET Service Browser
  - The SWENET Database
  - Data Analysis Tools
  - Report Browsing
  - Data Dissemination via Email
- Summary

Scope of the SWENET Infrastructure

- 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)

Timetable: Development of the Infrastructure

- 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

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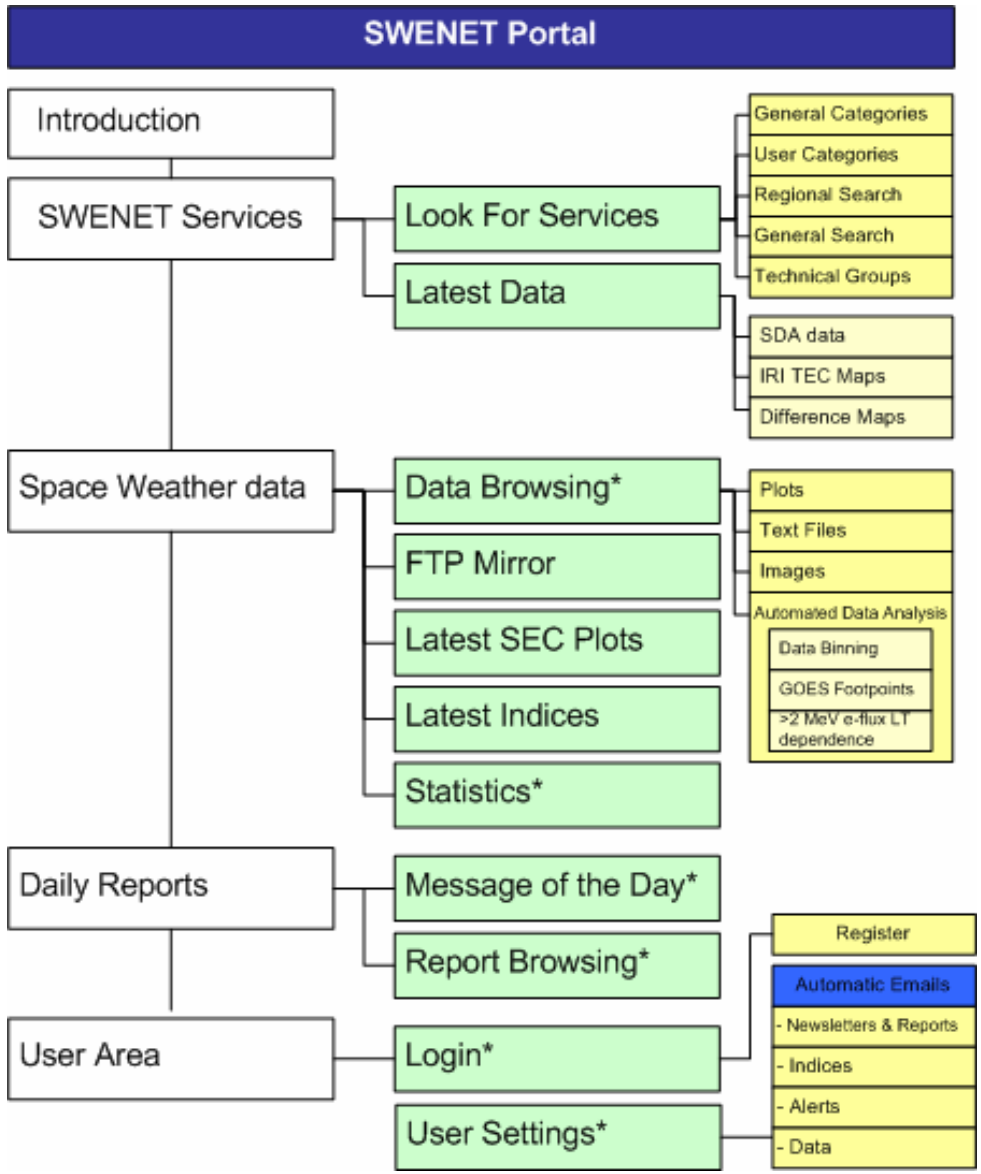
- The SWENET Portal is the interface to the infrastructure
- The SWENET Portal has four main sections:
  - SWENET Services
  - Space Weather Data
  - Daily Reports
  - User Area



SWENET Services Browser

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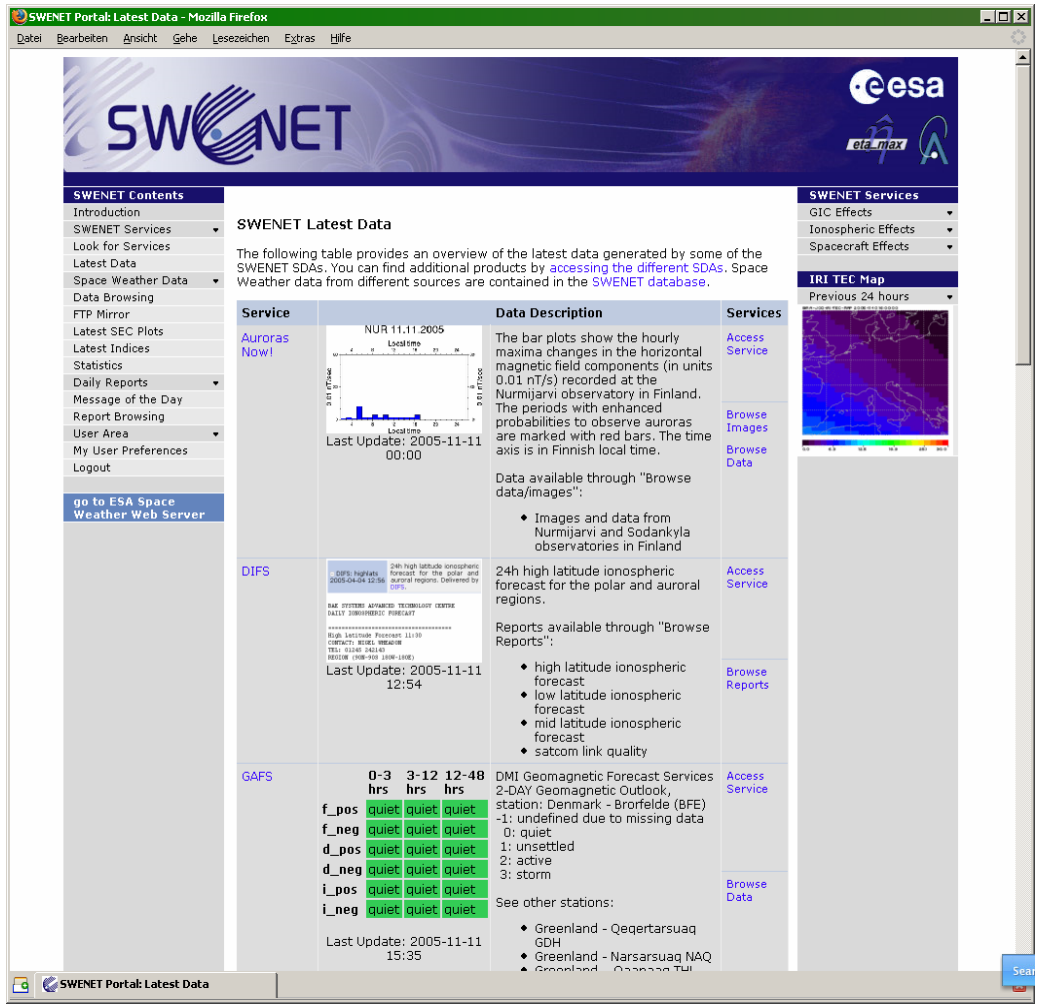
Look for Services/SDA Browsing

→ 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)

SWENET Services: Latest Data

- 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



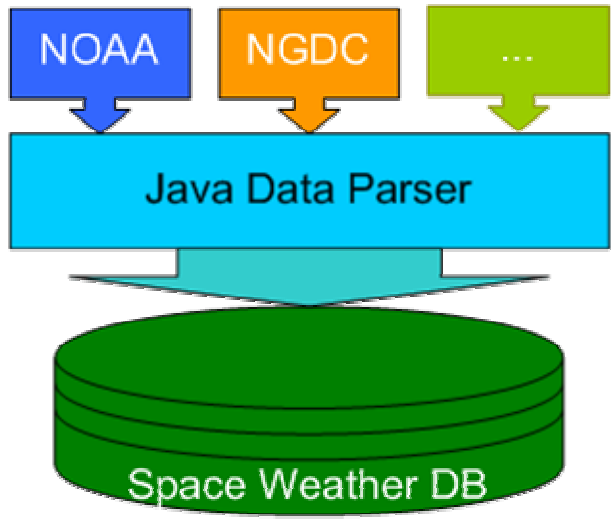
SDA Services

- 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

The SWENET Database

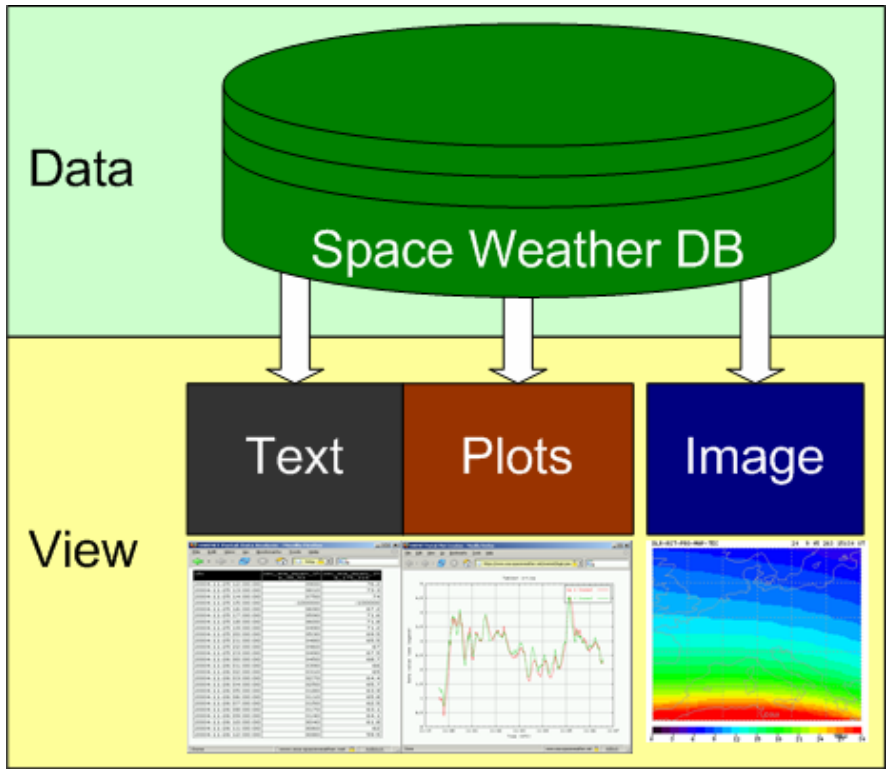
- Replication from following sources:
  - Integrated SDAs
  - External data resources
    - NOAA/SEC ftp server and website
    - NGDC ftp server
    - IRF ftp server
    - Kyoto University ftp server
    - SOHO ftp server
    - HaloCME mails
    - SEC/NOAA Database → High resolution Data



- 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

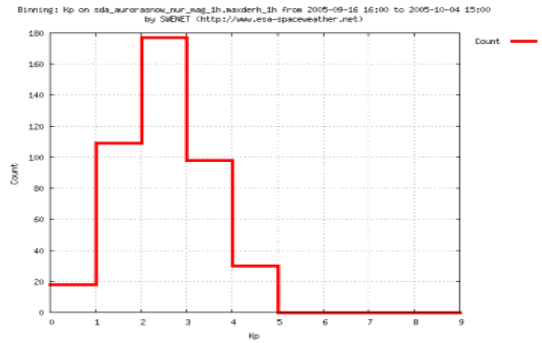
The SWENET Database (cont.)

- 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

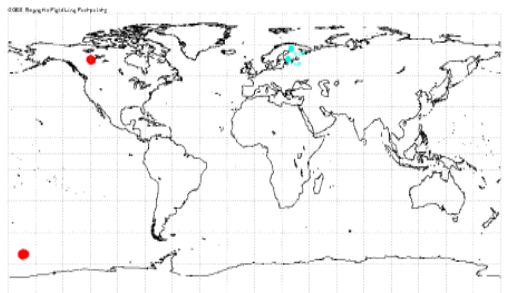


Data Analysis Tools

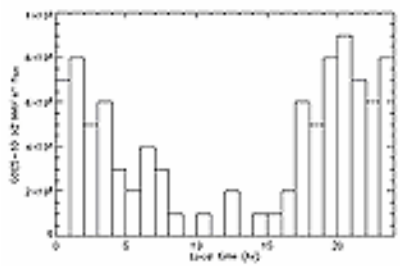
- Data binning of numerical data
  - Allows binning of datasets over indices like kp, ap, etc.



- 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 dissemination via Email

- 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

Summary

- 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:

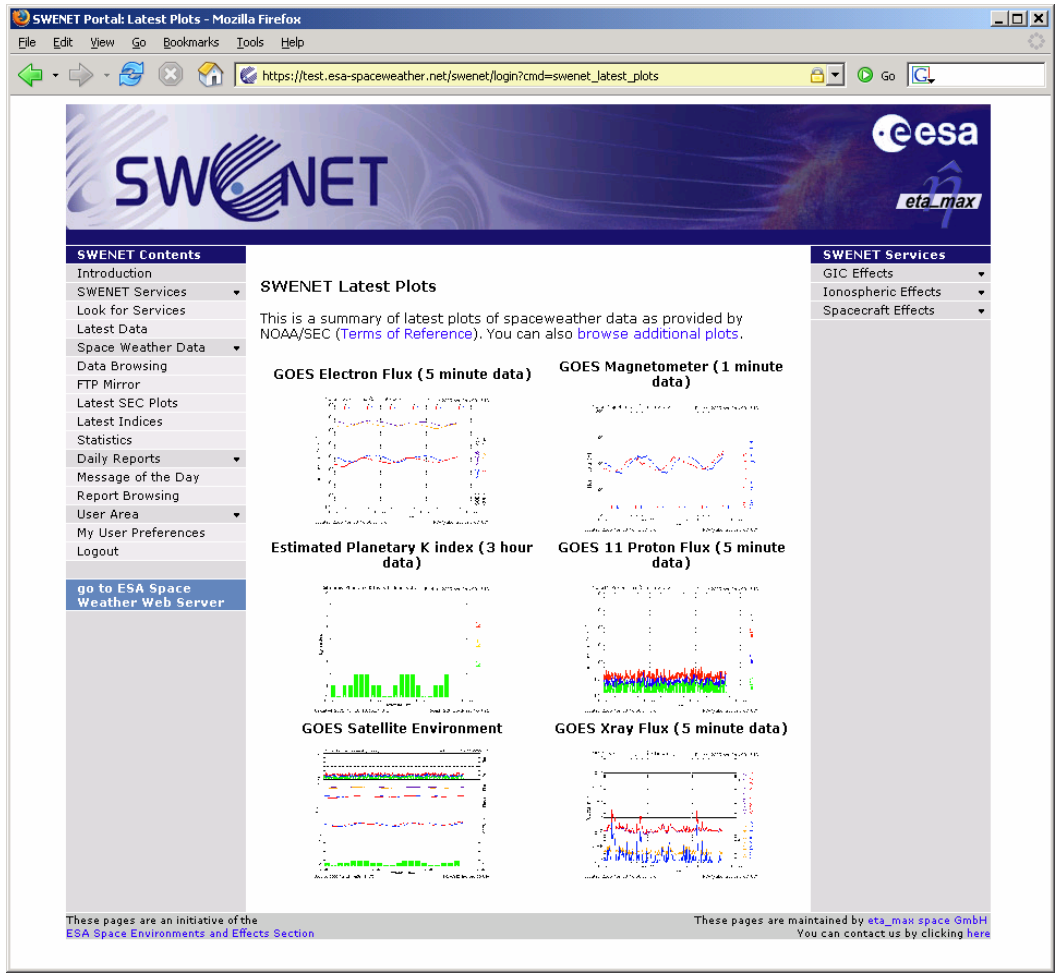
www.esa-spaceweather.net/swenet

SWENET Web Portal

Hands-on Presentation Screenshots

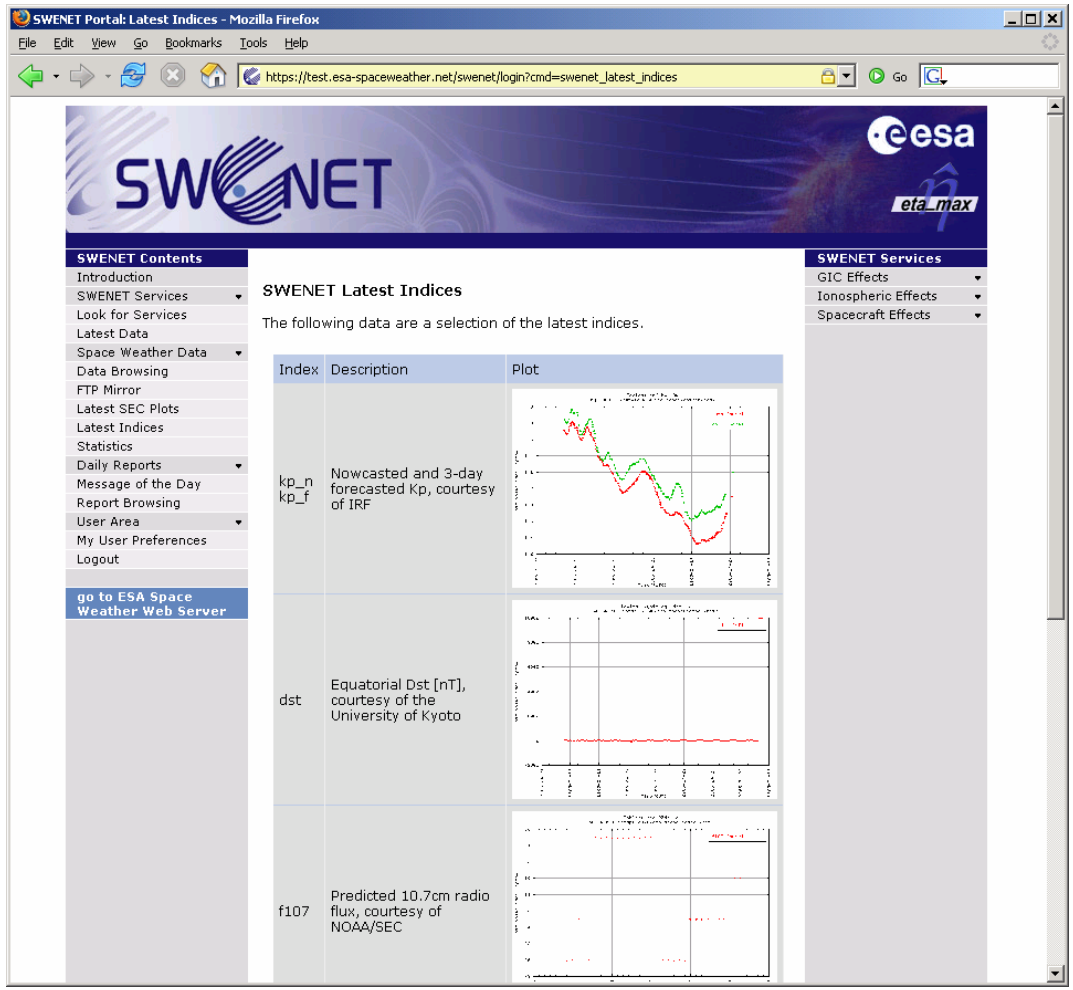
Latest SEC Plots

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



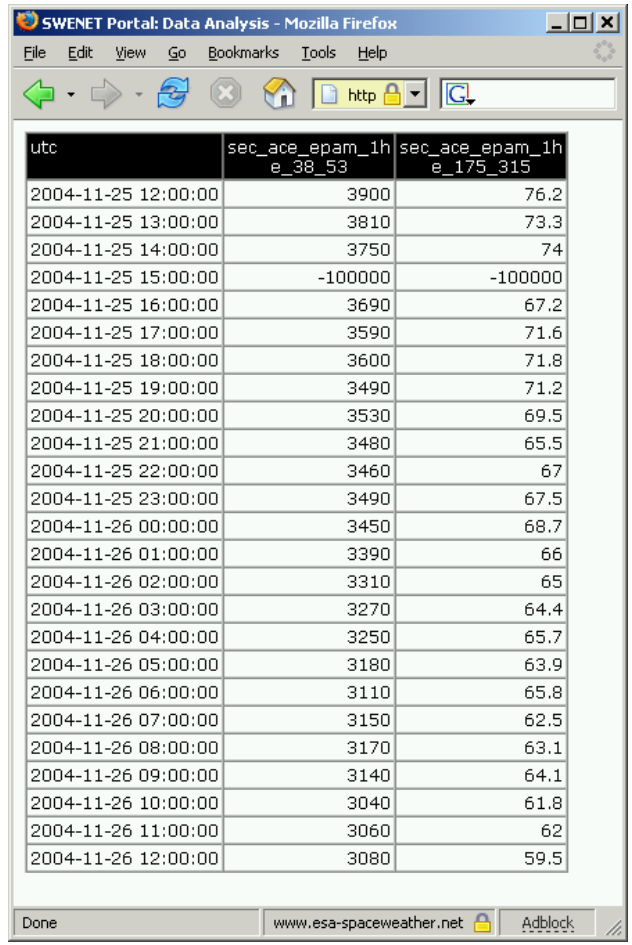
Latest Indices

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



Data Browsing I: Text

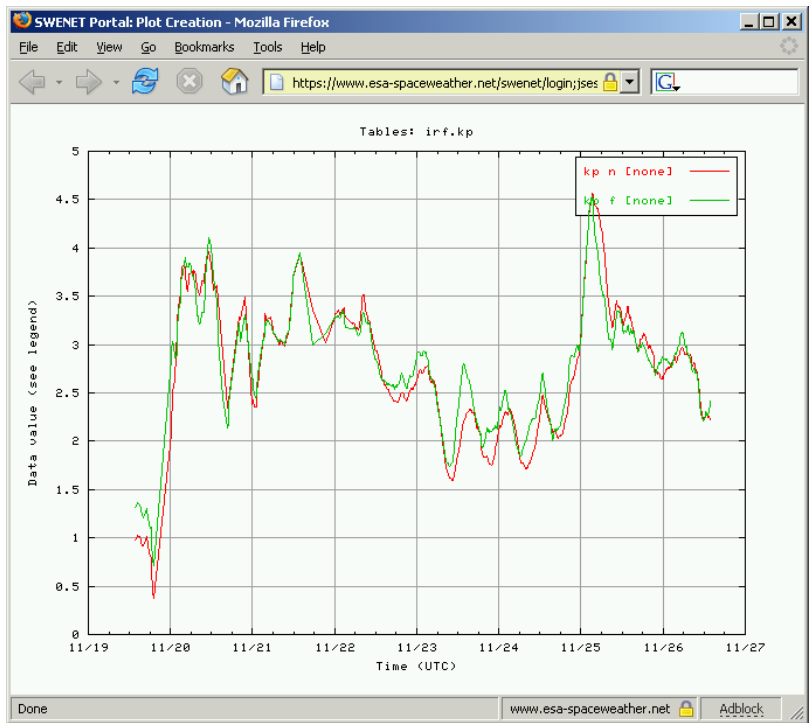
- Simplest form of data browsing: Text
  - HTML for direct viewing in browser
  - Alternative: Download of text file (tab separated values)
- Target data: Numbers and text
  - Binary data (like images) available separately
  - Ordering always according to UTC
- Advanced option: Combination of several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



utc	sec_ace_epam_1he_38_53	sec_ace_epam_1he_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 Browsing II: Plots

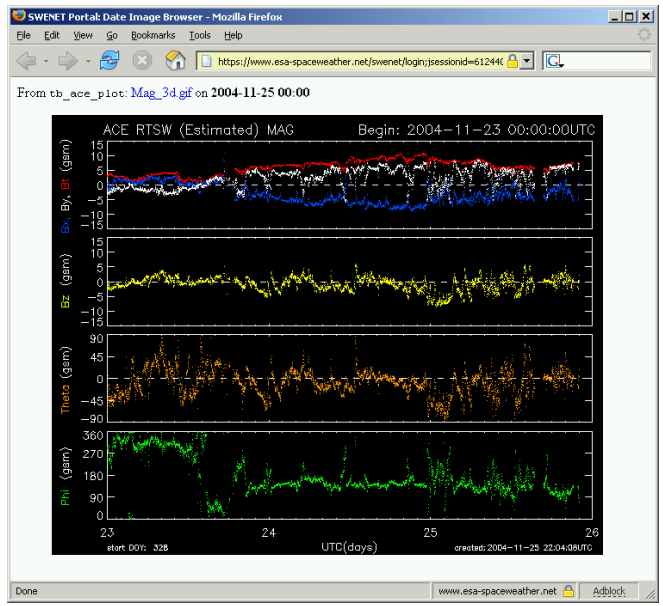
- Data visualisation and analysis: Plots
  - Plots as PNG images for viewing and download
- Target data: All numbers
  - … naturally for graphs.
  - X axis is always UTC
- Advanced: Combination of tables possible
  - Direct graphical comparison of several tables



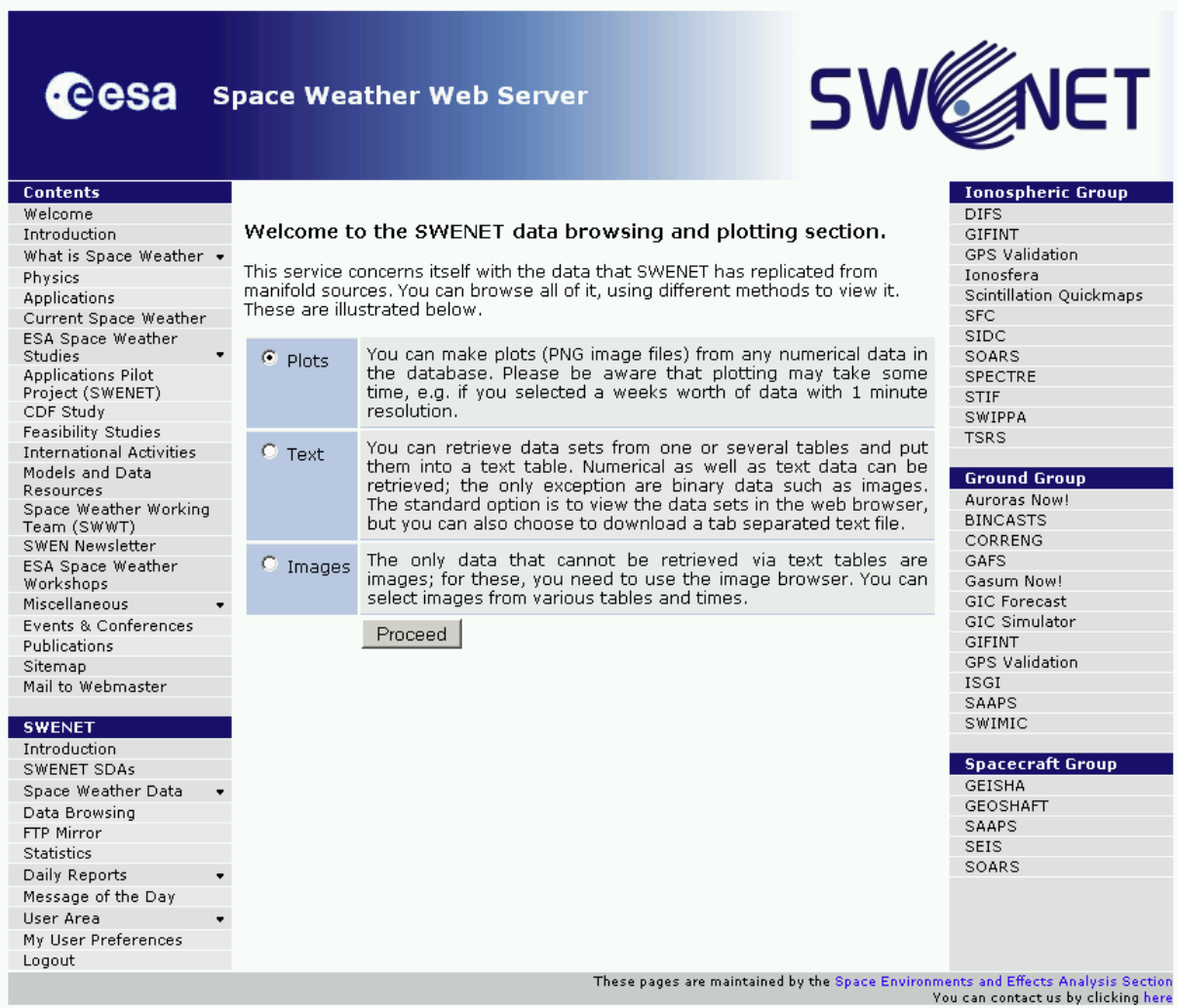
Data Browsing III: Images

- 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



Example, Step II: Choose Tables

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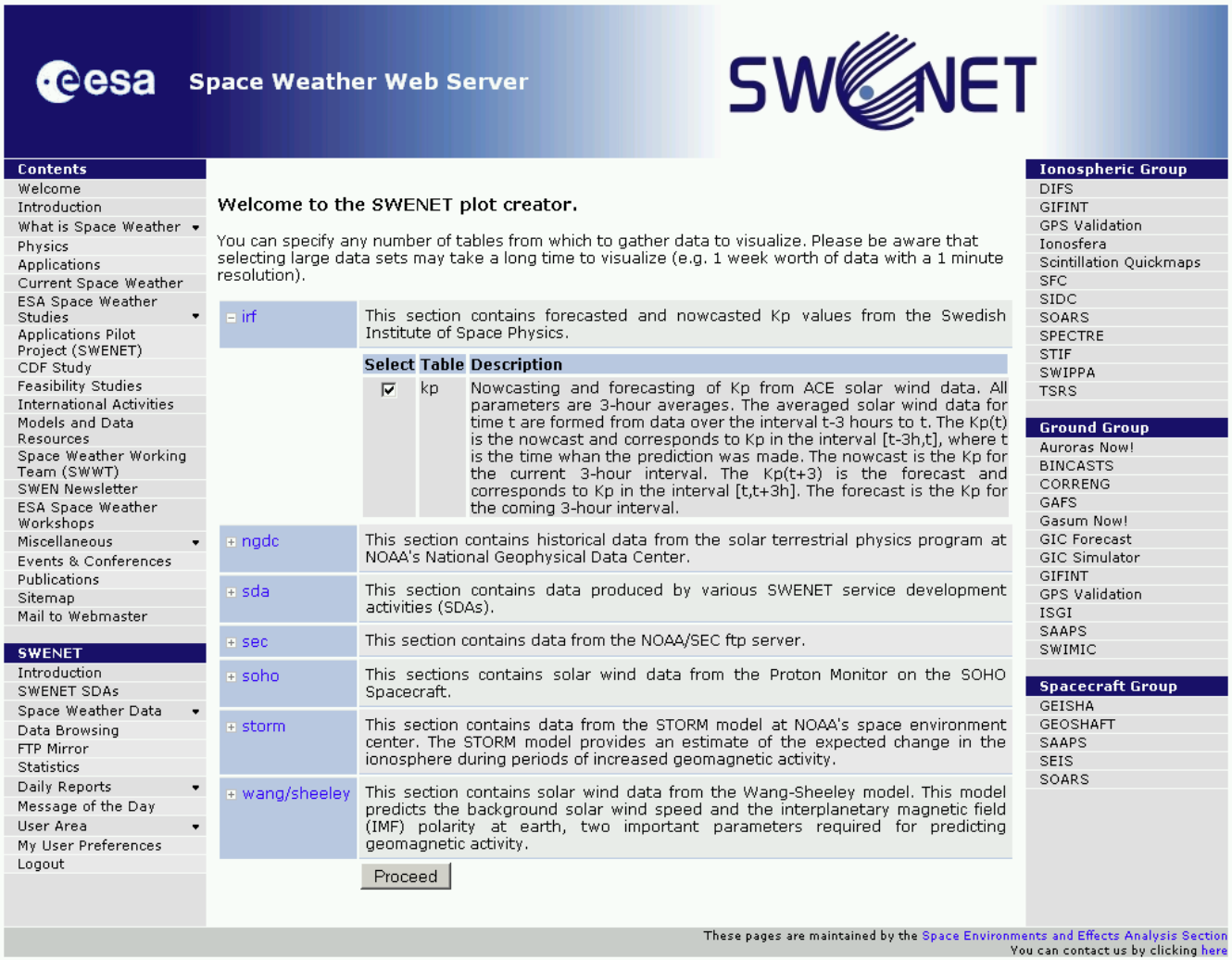

Example, Step III: Choose Datasets

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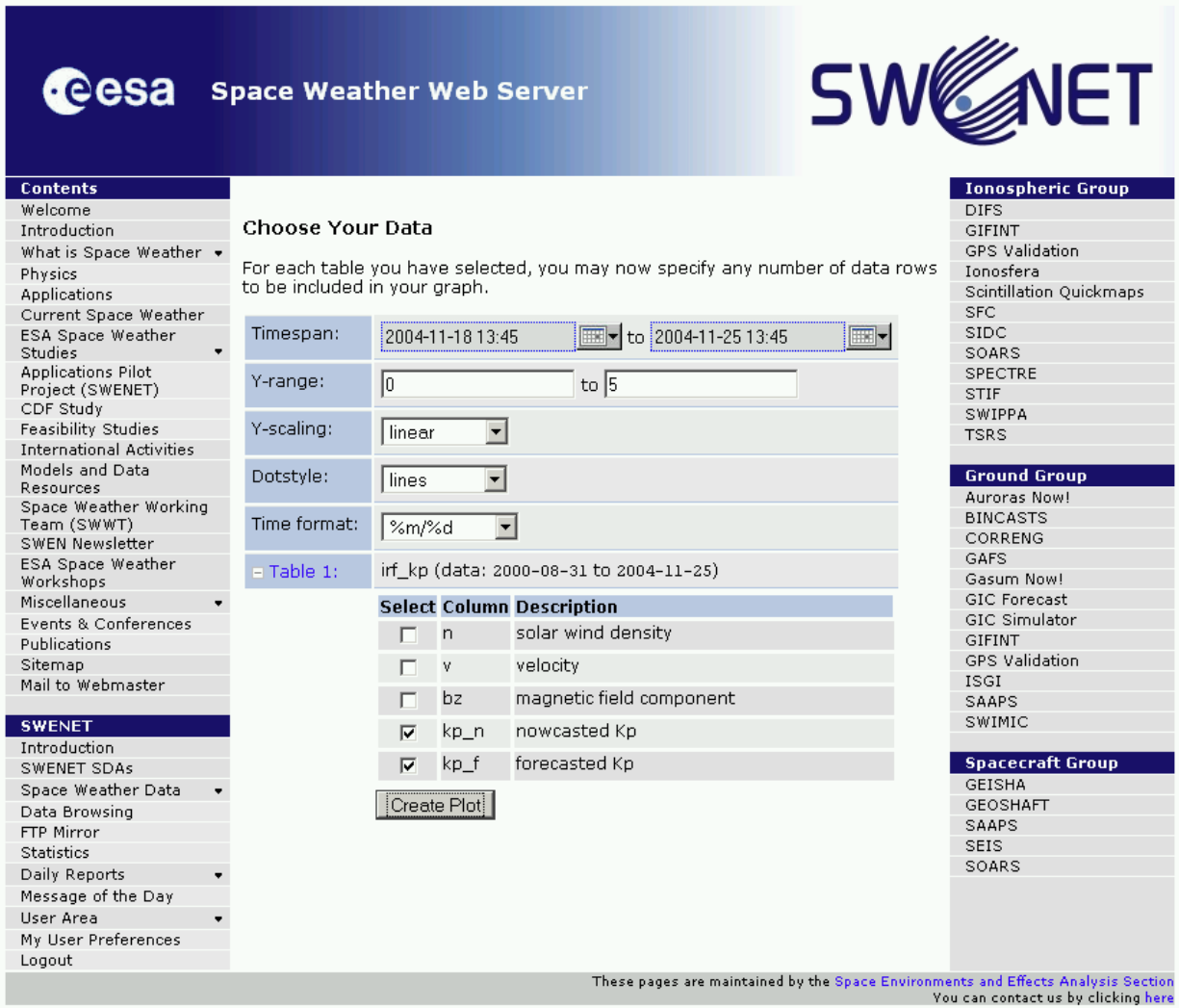

Example, Step IV: Receive Result