



Updates and Developments of the SWENET Software Infrastructure

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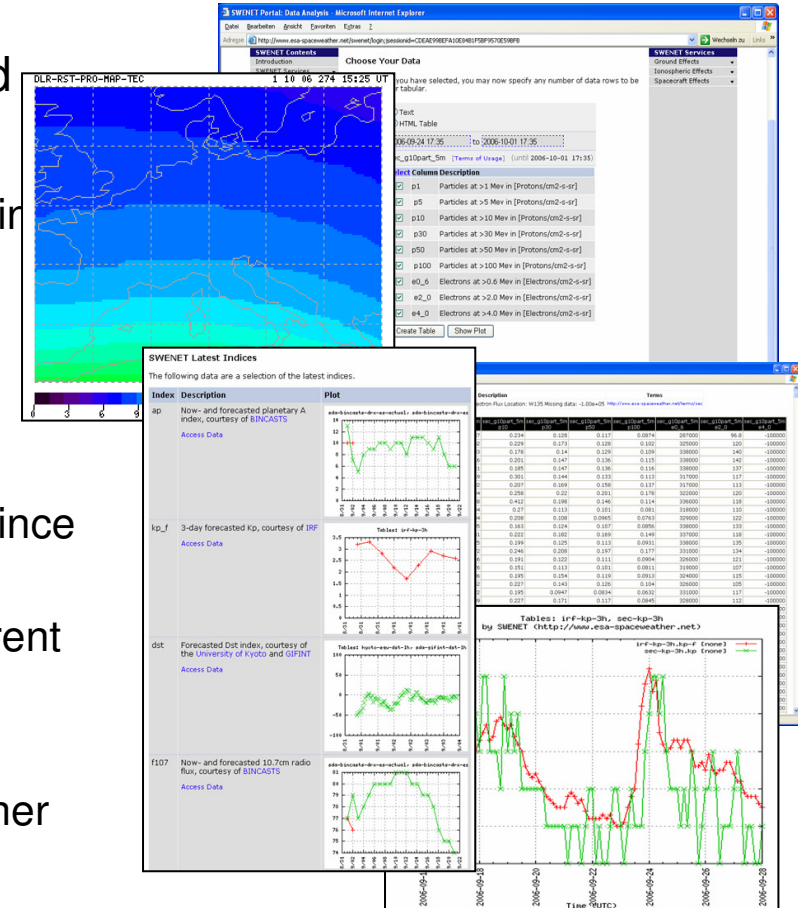
www.etamax.de

Overview

- Overview of the SWENET Infrastructure
 - Current Status
 - SDAs
- Updates and developments
 - Maintenance tasks
 - Indices and statistics
 - Web services
 - Plotting
- Summary

- SWENET provides a wide range of services and data related to space weather

- A central access point to the services developed in the SDAs
- A browseable database containing
 - Space weather data from external resources
 - Data generated by the SDAs in the pilot project.
- Large volumes of space weather data collected since the beginning of SWENET operations
- Capability to search and combine data from different sources
- Graphical display and data analysis tools
- Overview of the latest SDA data and space weather indices
- Daily reports, alerts and data sets via email



1. Web interface for the database
2. Access to graphics and images
3. Daily reports of relevant data
4. Provision of numerical data (a) and plotting tools (b)

www.esa-spaceweather.net/swenet

Maintenance and extensions


- Current Status
 - Initial project (SWENET development) finalised in March 2006
 - Currently planned maintenance phase planned up to the beginning of 2008
 - General software maintenance tasks
 - Hosting of the server at eta_max facilities
 - Maintenance and monitoring of the server hardware
 - Additional tasks include
 - Addition of new SDAs and data sources
 - Performance of polishing tasks and addition of small functionalities to the SWENET portal.
- Extensions to the tool
 - Index nowcast & forecast quality statistics
 - Data Access via Web Service
 - Upgraded plotting capabilities

- BINCASTS
 - Aa, Ap now- and forecasts
 - DRX, Ap, F10.7 now- and forecasts from three stations in UK

- GIFINT
 - WP 200: foF2 and M(3000)F2 maps of central mediterranean area

- ISGI
 - aa, am quicklook, provisional, definitive values
 - ... work in progress.

- Thanks for your continued efforts, SDAs!

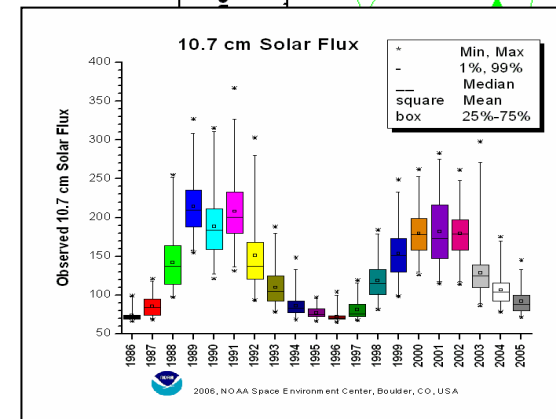
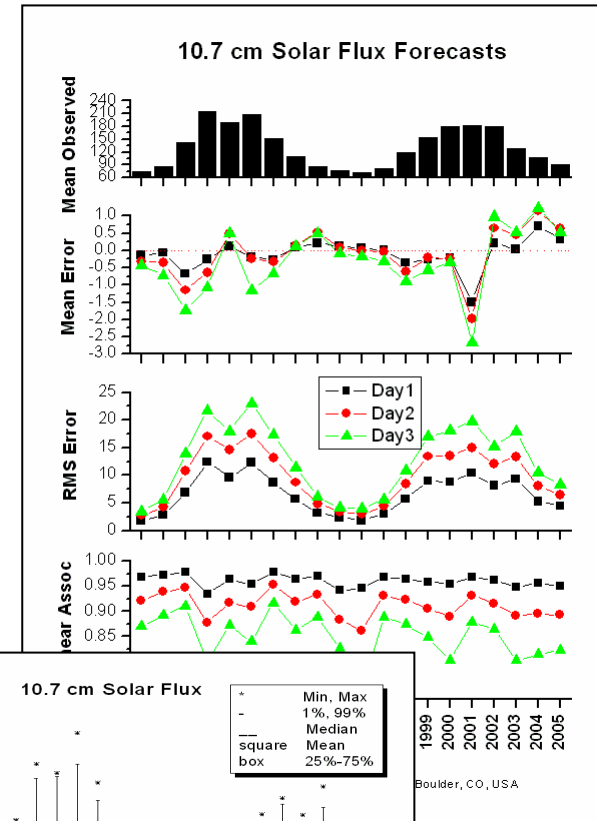


<input type="checkbox"/>	bincasts_solmag	Observatory Lerwick, UK. Monthly observed and predicted values for sunspot numbers, 10.7cm radio flux, aa, and ap. The data has been generated by the BINCASTS SDA. A value of -99.9 indicates that no value is available.
<input checked="" type="checkbox"/>	bincasts_solmag_plots	Long-Term Predictions of Smoothed Monthly Solar and Geomagnetic Activity. BGS Uses A Modified McNish-Lincoln Method Based on all Activity Cycles Since Cycle 12 or 18 (see image footer)
<input type="checkbox"/>	gifint_dst_1h	Hourly DST forecast from the GIFINT SDA, in [nT]
<input checked="" type="checkbox"/>	gifint_fof2	Map of the ionospheric F region critical frequency foF2 over Central Mediterranean area derived from the Simplified Ionospheric Regional Model (SIRM) updated by real-time autoscaled measured foF2 values at Rome and Gibilmanna ionospheric stations (the R12 on the figure is the effective sunspot number)
<input type="checkbox"/>	isgi_aa_d	three-hourly aa indices as definitive values.
<input type="checkbox"/>	isgi_aa_q	three-hourly aa indices as quicklook values.
<input type="checkbox"/>	isgi_am_p	three-hourly am indices as provisional values.
<input type="checkbox"/>	isgi_am_q	three-hourly am indices as quicklook values.

Technical Groups	Service Examples	SDAs	
Ionospheric Effects & Activity Forecast <ul style="list-style-type: none"> ➤ Effects of space weather on the ionosphere and those technical fields affected by it. 	<ul style="list-style-type: none"> • Ionosphere fore- & nowcasting • TEC Maps • GPS quality services • Solar activity fore- & nowcasting • Radio and SatCom conditions 	DIFS GIFINT GPS Validation Ionosfera Scint. Quickm. SFC	SIDC SOARS SPECTRE STIF SWIPPA TSRS
GIC & Ground Effects <ul style="list-style-type: none"> ➤ Effects of Ground Induced Currents and other ground effects associated to space weather 	<ul style="list-style-type: none"> • Geomagnetic indices • Aurora forecast • Ground Induced Current fore- & nowcasting 	BINCASTS GAFS GIC Forecast GIC Now! GIC Simulator GIFINT	GPS Validation ISGI MuSTAnG PipelineSWS SWIMIC
Spacecraft and Aircraft <ul style="list-style-type: none"> ➤ Effects of space weather on on-orbit Spacecrafts and high flying aircraft. 	<ul style="list-style-type: none"> • Radiation and Space Environment effects on satellites • Radiation effects on aircraft 	GEISHA GEOSHAFT MuSTAnG	SAAPS SEIS SOARS

- Index nowcast & forecast quality statistics

- Automatic generation of statistic on the accuracy of forecasts of indices available in the database
 - Automatic comparison of indices and predictions available in the SWENET database.
 - Same forecast verification methods as NOAA's Space Environment Center.
- Results will be stored in the database.
- Results and plots will be displayed on the web interface

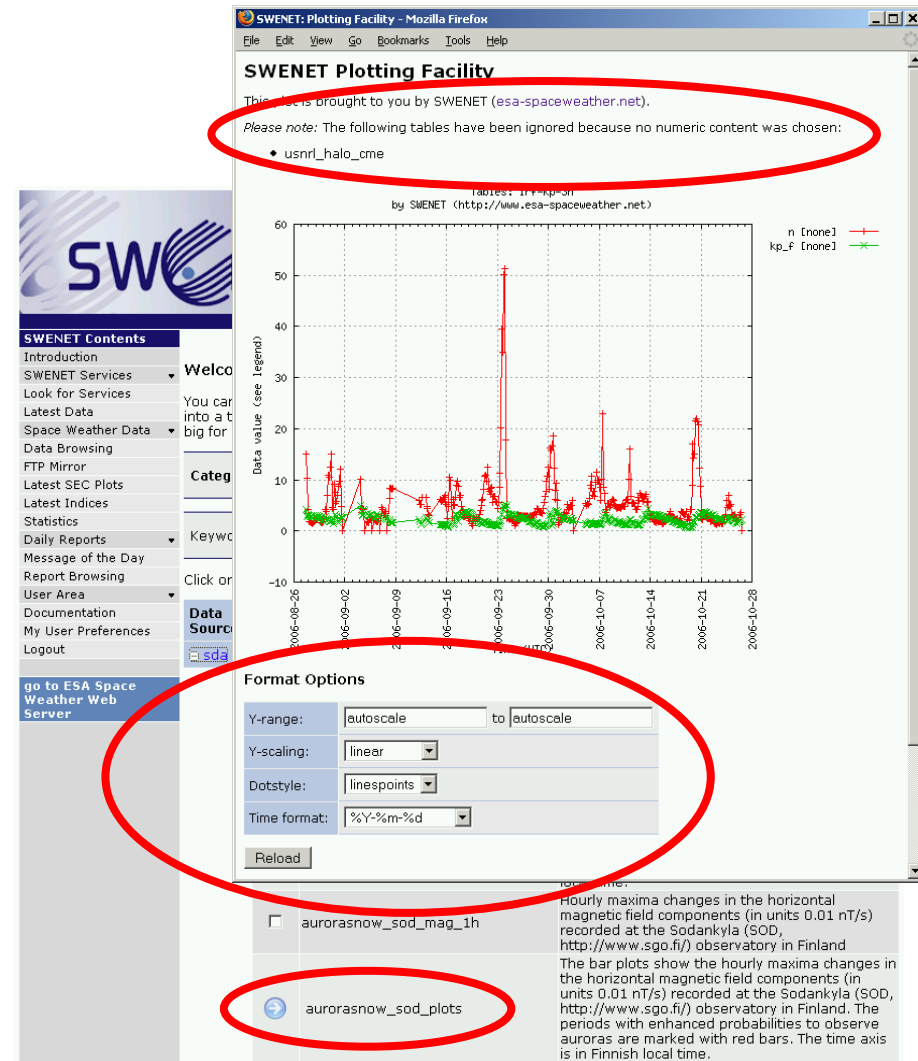


1999 2000 2001 2002 2003 2004 2005
Boulder, CO, USA

New: Unified Data Browsing

- Previously: Access to data separated for textual, numerical and binary (images) data
 - Cannot browse all tables for keywords etc.

- Now: Unified access to all data
 - Textual data browsing links to other (numerical; binary) sections:
 - Plots: Post-configuring of GNUplot options possible
 - Images: Leads to image browsing section
 - Plots: Ignored data (when non-numeric) are reported

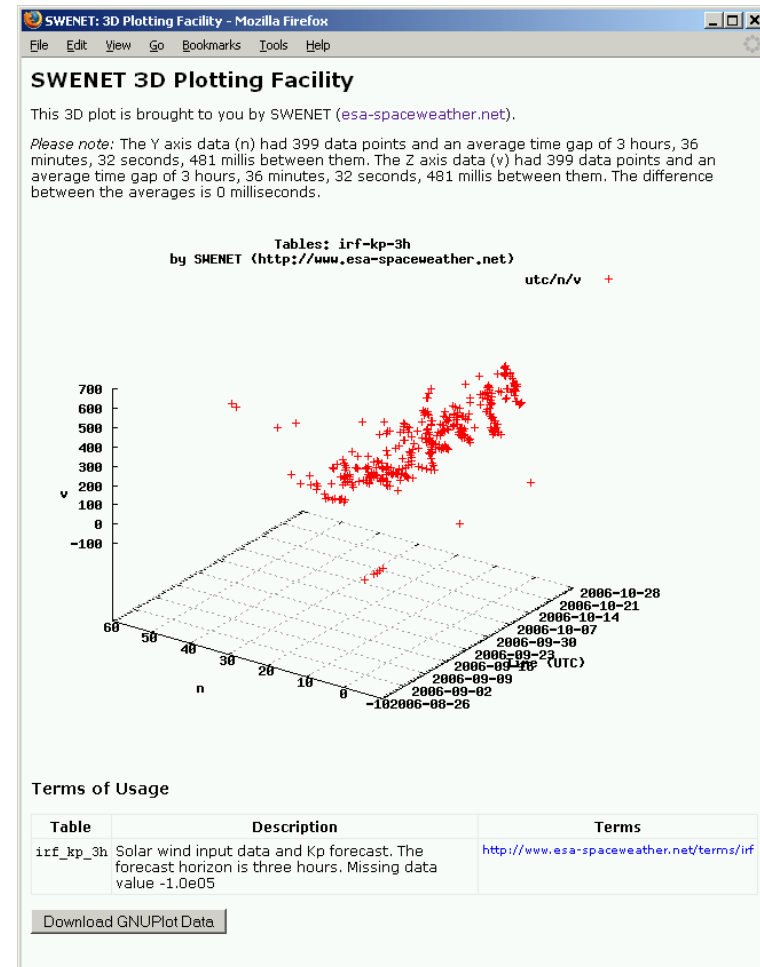


New: 3D Plotting

- Previously: 2D plots
 - All numeric data indexed by UTC

- Now possible: 3D plots
 - X-Axis = UTC
 - Y-Axis = user defined
 - Z-Axis = user defined

- Animated (rotating) GIF for improved viewing possibilities
 - GNUplot driver can be downloaded
 - Planned: Carpet plots



New: Data Access via Web Service

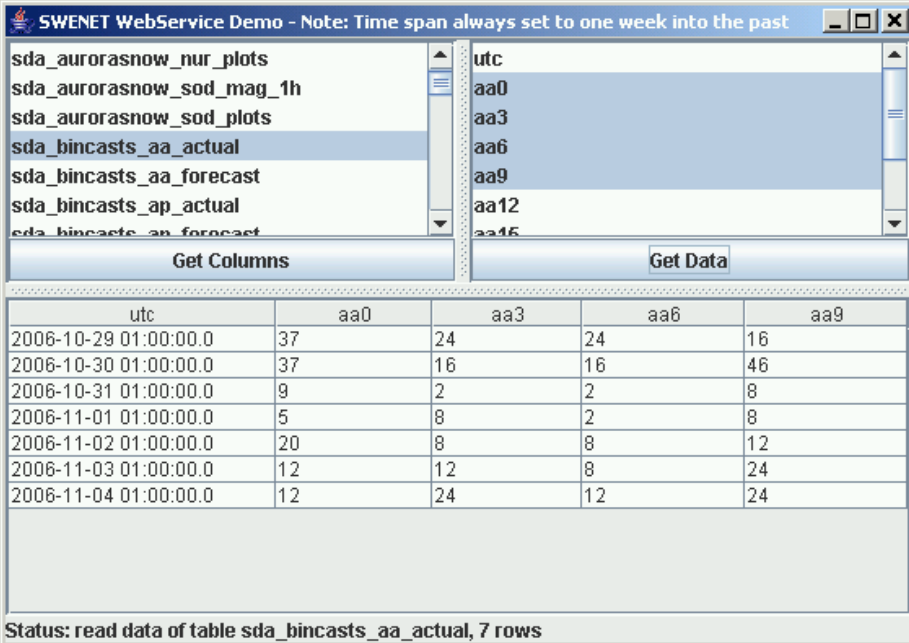
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- Web services are a standard for RPC over internet
 - Remote Procedure Call
 - XML for request and response

- SWENET provides 100 million data sets
 - Previously: Via web interface
 - Now also via web service
 - Data accessible for applications
 - Available for all programming languages (WDSL file gives instructions)
 - Demo application (written in Java with Axis2) available
 - Planned: Encryption (HTTPS)

- Anyone can program their own access to the data from their tools



SWENET WebService Demo - Note: Time span always set to one week into the past

Get Columns Get Data

utc	aa0	aa3	aa6	aa9
2006-10-29 01:00:00.0	37	24	24	16
2006-10-30 01:00:00.0	37	16	16	46
2006-10-31 01:00:00.0	9	2	2	8
2006-11-01 01:00:00.0	5	8	2	8
2006-11-02 01:00:00.0	20	8	8	12
2006-11-03 01:00:00.0	12	12	8	24
2006-11-04 01:00:00.0	12	24	12	24

Status: read data of table sda_bincasts_aa_actual, 7 rows

- Many minor user interface enhancements
 - Filtering "null" values, better plot legends, new Alert wizard, admin tools for the web interface, improved data browsing filter, etc.

- Structural improvements
 - Refined monitoring tools, unification of database schemata, additional metadata, easier deployment of upgrades, etc.

- Planned: Continued improvements
 - Extended monitoring tools
 - Performance boosts through meta data

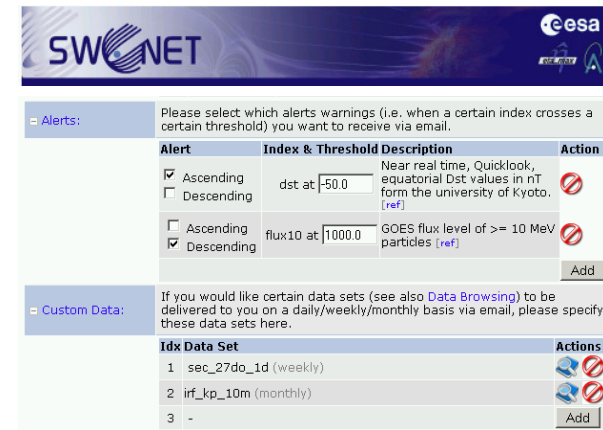


Table	Comment
tb_alert_threshold_crossing	Contains the list of raised threshold crossings
tb_bin_description	
tb_bins	Contains the bin values for a specific binner
tb_category	Contains categories
tb_category_parent_child	Indicates that a category child is a subcategory of a category parent
tb_category_table	Maps a table to a category
tb_column_missing_data_value	Stores the value that indicates a missing data entry for a certain col.
tb_column_unit	Maps columns in tables to an id in the tb_unit table
tb_imported_files	Contains absolute file names of parsed files and their md5 checksum
tb_latest_date_record	Contains information about the latest date of tables.
tb_null_values	The tables for defining null values inside the space weather table.
tb_outdated_acceptable_threshold	This table holds information about outdated tables; in particular, how
tb_property	Contains properties
tb_table	Contains meta-data associated to a table
tb_table_filter_id	Some space weather data tables have additional IDs such as station,
tb_table_has_property_with_value	Maps a property of a table to a value
tb_unit	Contains units in text format
tb_value	Contains values for properties
tb_view_table	Maps view names to table names.
tb_web_invisible_views	This tables holds view name that should not be visible in the web inte

Summary

- SWENET is available since the beginning of 2006
- The web portal provides access to a wide range of services of data
 - integrates the results of the pilot project with data from external resources
- A “power maintenance” phase is planned up to the beginning of 2008
 - General software maintenance tasks
 - Hosting of the server at eta_max facilities
 - Maintenance and monitoring of the server hardware
 - Addition of new SDAs and data sources
 - Performance of polishing tasks and addition of small functionalities to the SWENET portal.
- Extensions to the tool
 - Data Access via Web Service (finalised)
 - Upgraded plotting capabilities (3D plotting available)
 - Index nowcast & forecast quality statistics (1st quarter 2007)