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1. Hot News

New space weather services for CME prediction and L1 alerts, including auroral activity and impact efficiencies, are available through RSS feeds and will be introduced at the upcoming AFFECTS User Workshop.

2. News from the European Commission

- Dr. Terrance Onsager from NOAA Space Weather Prediction Center at Boulder, CO, USA, excellently represented the AFFECTS project at the second **FP7 Space Conference in Larnaca, Cyprus on 15-16 November 2012**. All presentations are now online and can be downloaded here:
http://ec.europa.eu/enterprise/newsroom/cf/itemdetail.cfm?item_id=5903&lang=en&title=Scientific-conference-presenting-the-results-of-the-FP7-Space-Research-Programme.
- Recently, the European Commission published a new version of **Guidance Notes on Project Reporting**, covering the topics reporting requirements during and at the end of the project. Please take a special look at the parts dealing with publications. The guide is available on the AFFECTS project website and here:
ftp://ftp.cordis.europa.eu/pub/fp7/docs/project-reporting_en.pdf



3. Status of Deliverables

The deliverable reports from the first project year can be found at <http://www.affects-fp7.eu/project/deliverables/>.

Project year 2 (March 2012 – February 2013) comprises the following nine deliverables:

- D3.3: Provision of final version of Early Warning System (Lead: ROB)
- D4.1: Provision of software tool for forecasting indices (Lead: SRI NASU-NSAU)
- D4.2: Report on solar EUV characteristics (Lead: FHG)
- D4.3: Online provision of auroral alert and tracking system (Lead: UoT)
- D4.4: Provision of software tool for forecasting perturbed TEC (Lead: DLR)
- D2.2: Online provision of solar activity proxies and solar activity data base (Lead: ROB)
- D2.7: SPIS model (Lead: ASTRIUM)
- D3.4: Report on quality control and user feedback (Lead: ROB)
- D6.2: International user workshop documentation (Lead: ROB)

All deliverables are progressing. The first 5 were due at the end of August and have been submitted via the Participant Portal. The 4 remaining deliverables are due at the end of February. A draft version of D2.2 has been submitted to the project coordinator and the draft of D2.7 is under completion. Deliverable Reports can be downloaded from the AFFECTS website upon their approval by the Commission.

4. Status of Work Packages

4.1 WP2: Data, Calibration, Maintenance and Instrumentation

The housekeeping of the data flow from the various instruments and missions is continuing smoothly. The provision of high quality of magnetometer data has been established by UoT through replacement of specific instruments, notably on Svalbard and Sørøya (northern Norwegian mainland). Data from all sources – ground based and spacecraft – flow seamlessly into the designated repositories such as the DLR SWACI system for subsequent access by other WPs.

Excellent progress has been achieved in development of STAFF, the Solar Timelines viewer for AFFECTS (www.staff.oma.be). STAFF is a powerful, fast and easy tool for viewing, combining and exporting a whole range of timelines related to solar activity and space weather. Currently, timelines include the International Sunspot Number, the four Lyra EUV channels, the GOES X ray curves, GOES electrons and protons, ACE solar wind parameters and Interplanetary Magnetic field measurements. The F10.7 radio flux and various K and A indices are soon to be added to this list. We are currently updating the draft of deliverable D2.2 (Online provision of solar activity proxies and solar activity data base), in which STAFF is described in detail. STAFF will be presented at the 2nd AFFECTS General Meeting and User Workshop.

4.2 WP3: Early Warning System

ROB and DLR have defined a new AFFECTS product, which is currently in the commissioning stage: the machine readable CME arrival alert. Whenever a CME is heading towards Earth, an XML file is sent, whose content can be processed right away by DLR's



SWACI system in order to take this information into account in the Early Warning System (<http://swaciwebdevelop.dlr.de/early-warning-gnss/>).

Solar Demon (previously called NEMO), the near real time dimming and EIT wave detector on quicklook SDO-AIA data, has seen extra progress, mainly in distinguishing large and clear dimmings from smaller, less certain events. As dimmings and EIT waves are often the precursors of CMEs, careful detection and characterization of these features will aid space weather forecasters, leading to more accurate forecasts. First results have been presented as a poster at the Solar Information Processing Workshop 6 in Bozeman, Montana, as well as at the European Space Weather Week 9 (ESWW9) in Brussels. Solar Demon will be presented both at the 2nd AFFECTS General Meeting and the AFFECTS User Workshop in February.

ROB is adding the final touches to the statistical quality control of the space weather forecasts from its Regional Warning Center Belgium. After a full-blown comparative report on the accuracy of ROB's F10.7 forecasts was presented at the ISES meeting in July 2012 and an extended study including the predictions of geomagnetic indices was displayed as a poster at the ESWW9 in Brussels, the final details are currently being compiled in deliverable D3.4 (Report on Quality Control and User Feedback). This document will also contain a quality control report about the space weather predictions produced by SWPC. The results will also be presented at the 2nd AFFECTS General Meeting.

At UGOE, RSS feeds for L1 solar wind and ap alerts and CME arrival time and impact prediction services have been established and will be presented at the upcoming project meeting and the User Workshop. Real time tests have been performed with a German Media group in Norway.

4.3 WP4: Forecasting Tools and Modelling

WP4 is preparing the developed products for conversion into operational services and updating the products as necessary to optimize system performances. The main activities during this period focus on the integration of the established space weather products into the FSI (WP5). A considerable progress has been made in Task 4.2 in terms of achieving the compatibility of the geomagnetic forecast tool with SWACI housekeeping services. This facilitated the SRI NASU-NSAU team to run a live demonstration of near-real time operation of the geomagnetic forecast tool at the 9th European Space Weather Week (Brussels, Nov. 2012). A demonstration of TEC forecast over Europe was shown at the same event by the DLR team. The **Report on Solar EUV Characteristics** (Deliverable 4.2), measuring and deriving solar EUV spectral irradiance data, is progressing as planned. The general importance of these data has been acknowledged by the five nations organizing the operation of the International Space Station, maneuvering the ISS to an attitude such that the payload SOLAR with SolACES can perform continuous measurements over the time period of a full solar rotation, which will take place from 21st November to 23rd December 2013. The corresponding EUV spectra are available in 1 nm bins. Comparing the SSI values in the spectral interval from 16 to 30 nm provided by SolACES with those from the SDO/EVE instrument (collaboration with Tom Woods and Frank Eparvier, LASP Boulder University) an



overall accuracy is achieved that has not been reached by any previous combination of EUV instruments (see Fig. 1). Beyond that, the inter-comparison of SDO/EVE spectral data with SolACES calibration measurements has been extended from the solar bridging period back to the beginning of the operations of SDO in 2010, showing good overall agreement:

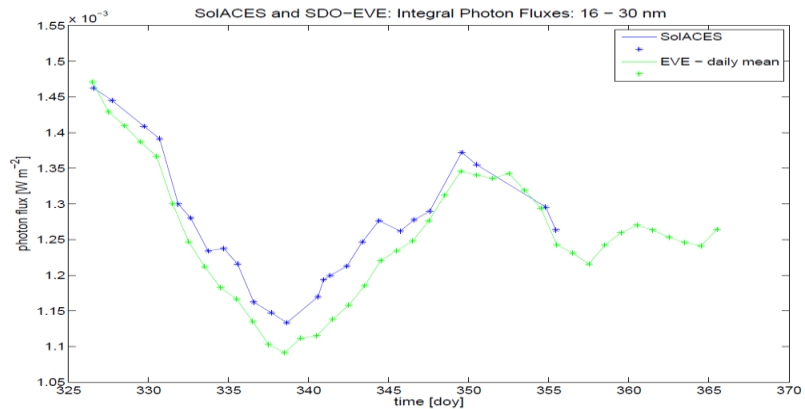


Fig. 1: Intercomparison of SolACES with SDO/EVE data for the period of ISS SOLAR Bridging

- Inherent gaps of SolACES SSI data due to the ISS orbital conditions and the limited angular range of the SOLAR pointing device can be filled up with SDO data, providing a full set of validated EUV SSI data to characterize the relevant energy input for the IT system and other applications.
- Work has started to improve the Hinteregger model for testing this method for the applicability to predict solar EUV irradiance (see Section 3.1.2. Quantitative Characterization of EUV-SSI in **Report on Solar EUV Characteristics**).
- SolACES calibration data will be applied to the TIMED/SEE data extending a validated data pool back to the beginning of 2003.
- Adding the data of SOLSPEC aboard SOLAR, a set of SSI data covering the full interval of electromagnetic radiation can be used for climate modeling.
- Combined SEE/TIMED, SDO/EVE and SolACES data provide the basis dataset for calculating EUV-TEC proxies.

The achieved progresses are represented best through the unprecedented accuracy numbers of EUV data generated for the past (Figures 1 and 2). The range from 16 to 30 nm has been selected because it is a critical one with respect to degradation of EUV instrumentation.

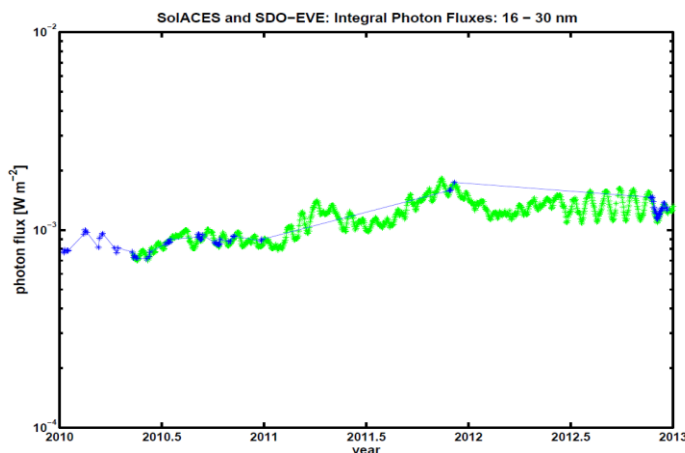


Fig. 2: Intercomparison of SolACES (blue) with SDO/EVE (green) data for the mission period of SDO (only some SolACES calibration data are selected in a first run to demonstrate the tendency from the beginning 2010 to the bridging).



4.4 WP5: Forecast System Ionosphere, User Interfaces

Integration of the geomagnetic activity forecast module provided by SRI NASU-NSAU (Deliverable Report D4.1) into the Forecast System Ionosphere (FSI) will take place in calendar week 8/2013. All arrangements concerning data format, structure of job order files and meta data files, adaptations needed for the FSI system platform as well as software used by the geomagnetic activity module have already been undertaken in close communication between DLR and SRI NASU-NSAU. The TEC forecast module (Deliverable Report D4.4), which will receive input data from the geomagnetic forecast module, is now in its integration phase into the FSI. A smooth interaction between both modules will be ensured through combined efforts (DLR, SRI NASU-NSAU) in calendar week 8.

4.5 WP6: Data and Product Dissemination, Product Sustainability

User Workshop fever is rising, as the AFFECTS User Workshop at ROB on February 28 is coming near. We've already received a fair number of registrations from various user communities. Don't miss this opportunity, where a whole set of AFFECTS space weather products will be demonstrated (<http://www.affects-fp7.eu/news-events/user-ws/>)! All users of space weather are kindly invited to attend this meeting.

5. Featured Beneficiary

Each newsletter will introduce one AFFECTS beneficiary, starting with the coordinator, the Institute for Astrophysics of the Georg-August-University Göttingen, and followed by ROB, SRI NASU-NSAU, FHG, UoT, DLR and ASTRIUM ST. This includes the National Oceanic and Atmospheric Administration (NOAA in Boulder, USA) and the Planetarium Hamburg (Germany) as external collaborators. This issue features the **Institute of Communications and Navigation** of the **German Aerospace Center (DLR)** at Neustrelitz in Germany.

5.1 Institute of Communications and Navigation of the German Aerospace Center (DLR)

DLR is Germany's national research centre for aeronautics and space. Its extensive research and development work in aeronautics, space, transportation and energy is integrated into national and international cooperative ventures. As Germany's space agency, the German federal government has given DLR responsibility for the forward planning and implementation of the German space programme



Fig. 3: Working group "Ionospheric Effects and Mitigation Techniques" in front of the ACE antenna. From left to right: Mainul Mohammed Hoque, Daniela Wenzel, Jens Berdermann, Tatjana Gerzen, Claudia Borries, Volker Wilken, Norbert Jakowski.



as well as international representation of Germany's interests.

DLR is a privileged partner of NOAA, the US Space Weather Prediction Center, and is, as a member of the Real Time Solar Wind (RTSW) observation network, engaged in the data transfer and analysis of the ACE (Advanced Composition Explorer) satellite. The Institute of Communications and Navigation (IKN) develops and investigates new systems and methods for radio transmission and positioning. In particular, the Ionospheric group in Neustrelitz is involved in ionospheric monitoring, modelling and studying ionospheric impact on radio signals for many years. Ionospheric monitoring over Europe is carried out on a routine basis since 1995, i.e. over more than one solar cycle. IKN operates an own GPS receiver network for scintillation measurements across Europe from high to lower latitudes.

Besides satellite data reception, the German Remote Sensing Data Center (DFD) branch in Neustrelitz develops processor systems for generating value-added geo-information products for environmental research. The institute manages the reception of geophysical research satellites such as CHAMP and GRACE which are used to derive three-dimensional ionospheric information on global scale. Both institutes offer a unique infrastructure for sounding, monitoring and modelling the ionosphere, for analysing and interpreting ionospheric data and for operating adequate data management systems for data use and dissemination. Thus, both institutes together have established a Space Weather Application Center Ionosphere (SWACI), which was essentially supported by the state government of Mecklenburg - Western Pomerania. SWACI is established on the heritage of the former

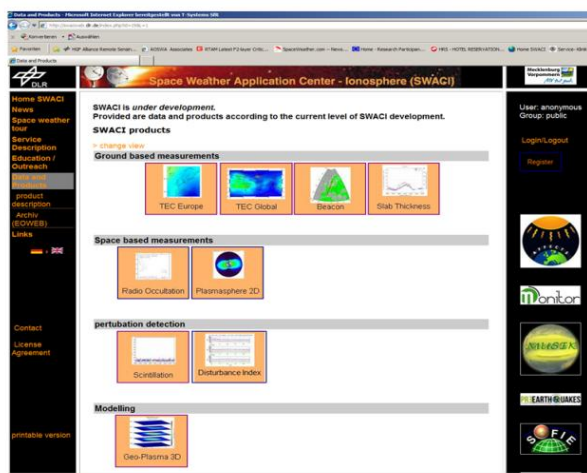


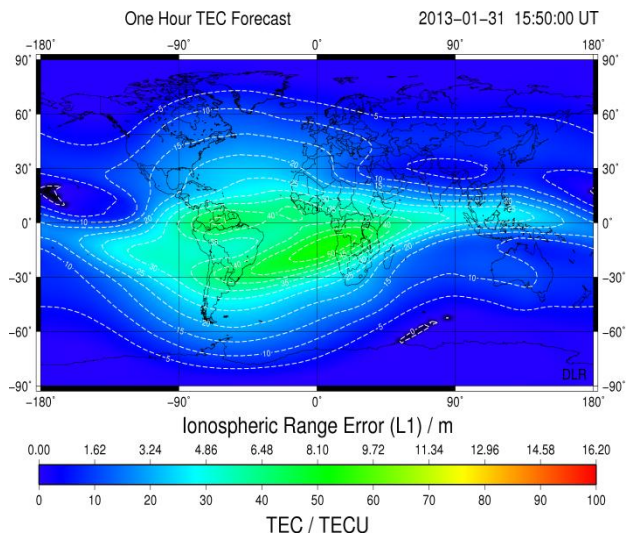
Fig. 4: SWACI

project SWIPPA which was one of the Space Weather Pilot Projects funded by ESA. As formerly SWIPPA, also SWACI contributes to the Space Weather European Network (SWENET) with various nowcast data. Ground and space based GNSS measurements form the main data base for the SWACI data service which provides already some selected data products via the internet portal <http://swaciweb.dlr.de> (see Fig. 4).

Provided are regional and global data on the ionosphere such as the Total Electron Content (TEC) and related quantities such as horizontal gradients and TEC rate of change in near real time. Satellite missions such as GRACE and TerraSAR-X and SWARM shall be used to get global three-dimensional information on the ionosphere. The SWACI team is in close contact with customers to find solutions really needed by the users.



The German Aerospace Center (DLR) contributes to FP7 projects (e.g. AFFECTS, Pre-Earthquake, TRANSMIT, ESPAS) and ESA projects (e.g. MONITOR, EGNOS-V3) to monitor space weather, develop protection strategies and correction algorithms and to warn GNSS users in time. Modelling and real time monitoring of the ionosphere at the DLR with satellite and ground based observation leads already to a promising space weather forecast.



6. Press & Media

The latest news is provided at the AFFECTS website. Solar activity was relatively weak so that the press releases on solar storms were rare after mid 2012. Successful provision has been achieved for a Media group visiting Norway in the week of February 4-8, 2013.

7. Collaborations

AFFECTS is actively collaborating with several other EU FP7 projects, such as eHeroes, HELIO and COMESEP. Media collaboration with **infoNetwork GmbH** has been officially declared through a letter of agreement. Collaboration with Dusan Odstrcil at **NASA/GSFC** has been established to develop CME modelling input for the **ENLIL** code. Dr. Odstrcil visited the Institute for Astrophysics in Göttingen in January and will also participate in the upcoming General Meeting and User Workshop.

8. Upcoming Events

February 5-7: eHeroes First Annual Meeting in Leuven, Belgium (V. Bothmer and R. Kanzler (UGOE))

February 18-19: ILWS Tenth Anniversary Symposium and Celebration, Vienna, Austria, http://ilwsonline.org/tenthanniversary/tenth_program.html (poster presentation by A. Parnowski)

February 18-19: EC Horizon 2020 Space Science and Exploration Workshop, Madrid, Spain (Contribution by V. Bothmer)

February 26-27: 2nd AFFECTS General Meeting at ROB, Brussels, Belgium

February 28: AFFECTS International User Workshop at ROB, Brussels, Belgium

April 07-12: European Geosciences Union General Assembly 2013, Vienna, Austria, <http://www.egu2013.eu>. Solar Physics Secretary Volker Bothmer, EU FP project session.

May 21-23: Sixth IAASS conference, Safety is not an option, Montreal, CAN (PC V. Bothmer)



June 24-29: 2013 ILWS Workshop on Space Weather Research with Space and Ground-based Observations at Irkutsk, Russia. The workshop will be hosted by the Institute of Solar-Terrestrial Physics of the Russian Academy of Sciences (<http://en.iszf.irk.ru/>). It is open to the international space weather research community. Additional information about the workshop will be available at the workshop web site: http://en.iszf.irk.ru/ILWS_2013.

June 24-28: AOGS 10th Annual Meeting, Brisbane Convention & Exhibition Centre, Australia, <http://www.asiaoceania.org/aogs2013/public.asp?page=home.htm> (Convener V. Bothmer)

July 8-12: **2013 Beacon Satellite Symposium**, Bath, UK,
<http://people.bath.ac.uk/ee3jarr/beaconsatellite2013/>

July 16-25: Summer School Alpach 2013, Space Weather: Science, Missions and Systems, <http://www.summerschoolalpbach.at> (participation by V. Bothmer)

For further meetings see <http://sohowww.nascom.nasa.gov/community/>

All previous newsletters can be downloaded from the AFFECTS website at <http://www.affects-fp7.eu/news-events/>.