Space Weather Service in CBK PAN

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Heliogeophysical Prediction Service Laboratory

http://rwc.cbk.waw.pl

Heliogeophysical Prediction Service Laboratory of the Space Research Centre, as RWC Warsaw (Regional Warning Centre) operating within the global ISES (International Space Environment Service) system, is responsible for measurements and predictions of solar activity and related Earth phenomena.

Our team

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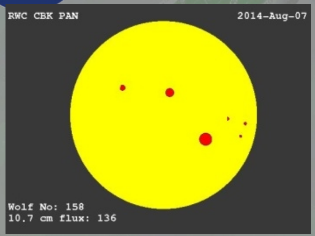
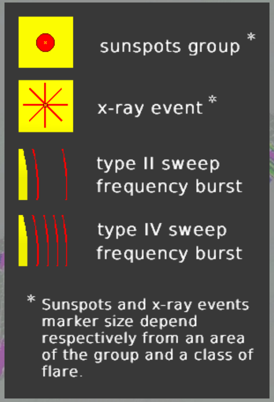
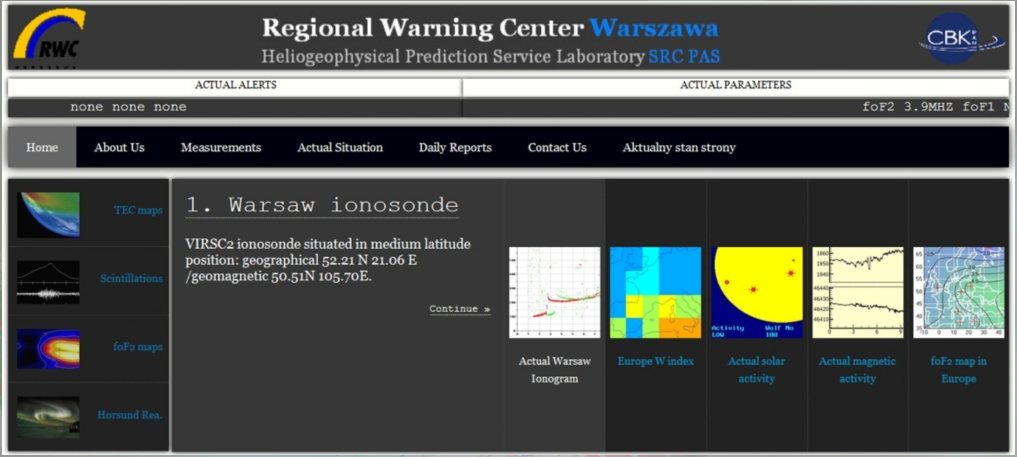
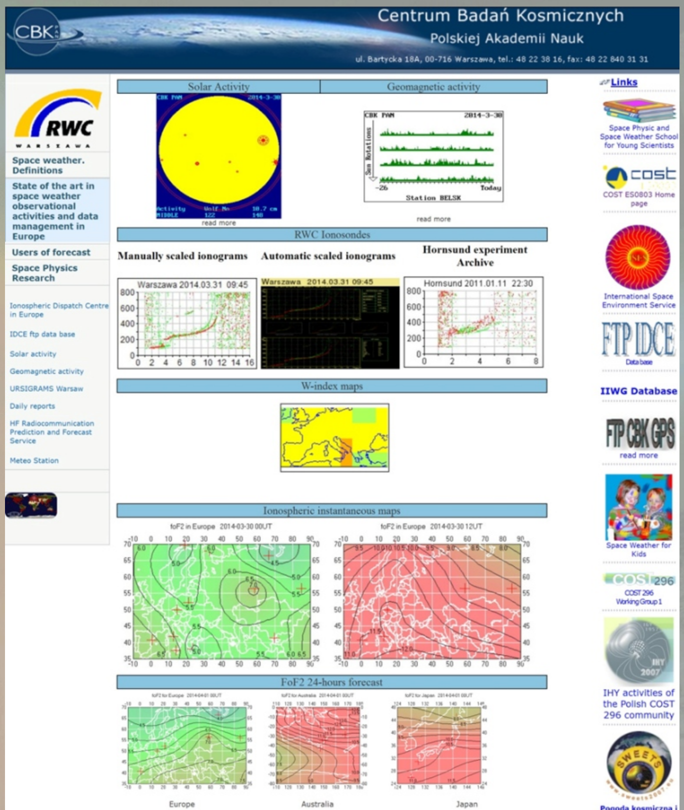




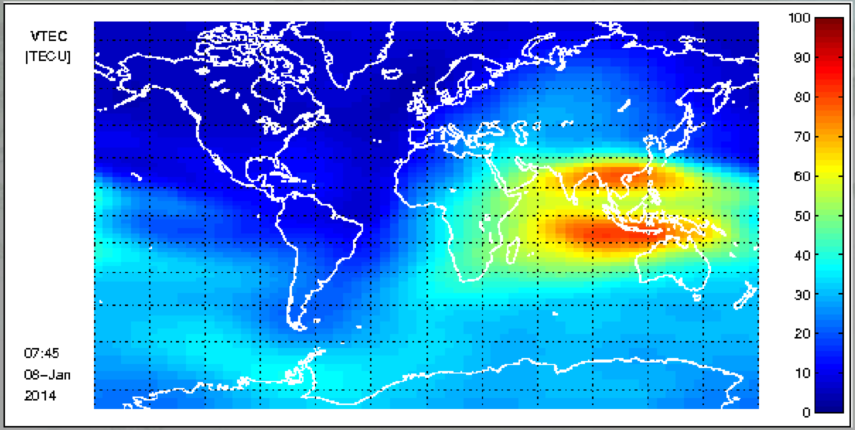
http://rwc.cbk.waw.pl/RWC2/



Space Research Centre **exchanges data with other Warning Centers**, a large portion of data is received directly from various national observatories from different countries.



http://rwc.cbk.waw.pl/



Regional Warning Centre RWC Warszawa

Solar-geophysical prediction service SRC
53. Solar-geophysical activity, propagation conditions

review 2014.3.17 (Monday)
---- Solar act. ----
Activity : low(2)
Flares : 5 class 0
---- magnetic act. ----
activity : low k=1
storm : -
---- ionosphere ----
fof2-deviation from monthly prediction based on ITU algorithms:

zone(lt)	3	6	9	12	15	18	21	24
c	32.2	18.1	62.5	-92.5	-31.4	7.7	3.3	30.8
d	14.2	0.0	-	-	28.3	25.6	23.1	14.1
e	2.7	20.5	33.7	19.6	27.6	18.4	12.8	0.5
f	19.3	29.6	10.4	5.2	-0.0	-6.9	7.0	6.7
g	8.7	14.3	7.7	12.6	13.3	4.7	1.6	10.3
g	20.7	-1.5	-1.2	14.7	10.9	12.1	24.5	13.8
f	29.1	13.1	15.5	15.2	20.0	16.3	30.0	29.6
e	23.0	30.7	33.7	22.7	21.3	20.3	34.5	31.9
d	32.0	37.9	32.9	29.1	29.0	28.4	34.2	39.5
Europe	12.0	21.9	12.2	15.3	20.5	13.4	17.5	13.9

fof2-actualization:

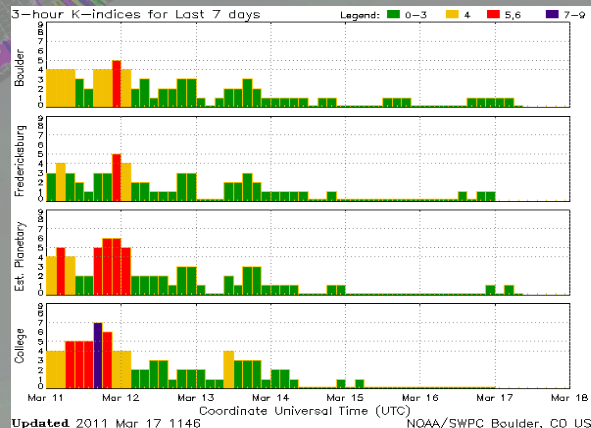
zone(lt)	3	6	9	12	15	18	21	24
c	40.1	10.3	39.0	15.2	-7.4	27.5	33.0	19.3
d	18.3	29.8	29.4	32.7	27.3	28.1	23.0	12.0
e	11.9	29.4	25.8	15.2	11.2	21.0	11.9	13.4
f	12.3	21.3	12.9	-0.0	1.0	-4.6	5.7	4.0
g	8.5	15.2	5.8	7.9	5.7	7.6	12.8	8.1
g	30.1	21.2	11.4	13.4	8.4	11.3	22.6	26.2
f	31.4	25.1	18.5	13.9	16.9	20.5	24.5	28.8
e	30.5	36.3	30.5	18.5	20.8	21.1	27.6	28.6
d	27.4	38.9	27.8	22.2	22.6	2 2.2	28.5	32.4
Europe	17.1	25.8	18.3	16.4	15.3	17.7	20.7	17.4

fof2-corrected:

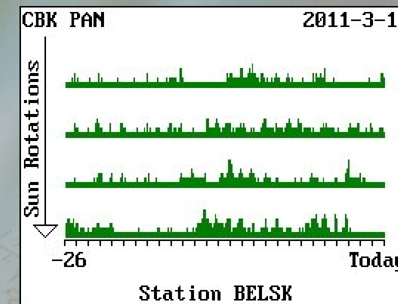
zone(lt)	3	6	9	12	15	18	21	24
c	-7.9	7.8	23.5	-107.7	-24.1	-19.9	-29.7	11.5
d	-4.1	-29.8	-	-	0.9	-2.5	0.1	2.1
e	-9.2	-8.9	7.9	4.5	16.4	-2.6	0.9	-12.9
f	7.0	8.3	-2.5	5.2	-1.1	-2.3	1.2	2.7
g	0.1	-0.9	1.9	4.7	7.6	-2.9	-11.2	2.1
g	-9.3	-22.7	-12.6	1.2	2.5	0.8	1.9	-12.4
f	-2.3	-12.0	-3 .0	1.2	3.1	-4.2	5.5	0.8
e	-7.6	-5.6	3.2	4.2	0.5	-0.8	7.0	3.3
d	4.6	-1.0	5.1	6.9	6.5	6.2	5.8	7.1
Europe	-5.0	-3.9	-6.1	-1.1	5.2	-4.3	-3.2	-3.6

muf(0)Europe: increased - day: 1.8 mhz, night: 0.9 mhz
absorption : no data
spread-F : no data
es : at high lat. to 6 h below 4 mhz
swf : quiet

forecast for 2014.3.19 (Wednesday)
---- Solar act. ----
Activity : low(2) to moderate(3)
Flares : 90 % class c, 35 % class m, 5 % class x, 0 % class p
---- magnetic act. ----
activity : low k=1-2
storm : -
---- ionosphere ----



En example illustrating of 3-hour magnetic index k for last 7 days continuously actualized.



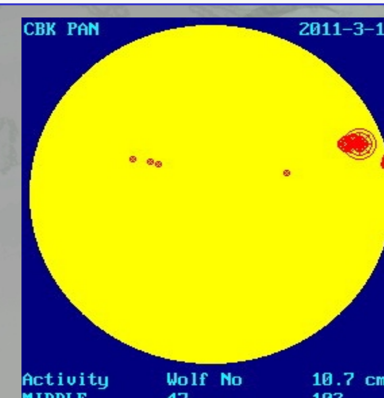
Data on terrestrial magnetic field activity are supplied by the Central Geophysical Observatory PAS in Belsk, Poland.

URSIGRAM WARSAW 140319
UFOFH 32507 40318 /0900 9107/ 0//// 1111/ 2128/
3//// 4114/ 5//// 6114/ 7//// 8085/ 9077/ 0067/
1055/ 2053/ 3049/ 0049/ 1//// 2049/ 3//// 4////
5071/ 6//// 7//// 8110/
UFESH 32507 40318 /0900 9//// 0035/ 1//// 2032/
3//// 4//// 5//// 6//// 7//// 8//// 9//// 0////
1//// 2//// 3//// 0//// 1//// 2//// 3//// 4////
5//// 6//// 7//// 8031/
UMUFH 32507 40318 /0900 9308/ 0//// 1295/ 2297/
3//// 4301/ 5//// 6311/ 7//// 8308/ 9312/ 0299/
1278/ 2277/ 3269/ 0269/ 1//// 2265/ 3//// 4////
5321/ 6/// 7//// 8327/

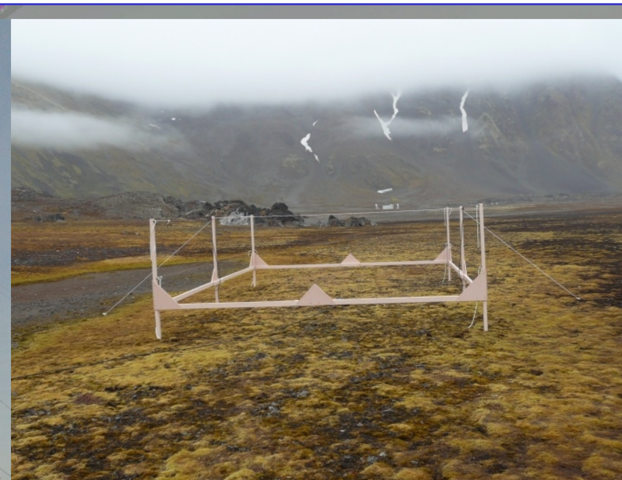
The data are generated by automatic scaling.
Individual ionograms are accessible at our web site http://rwc.cbk.waw.pl/iono/

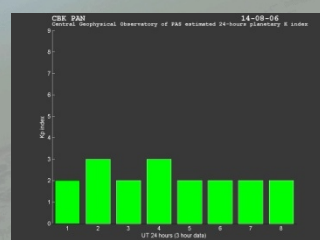
UMAGF 32505 40319 0930/ 18097 1/005 21222 31211

An example of image of solar activity prepared in RWC Warszawa on the basis on solar data from satellites .



Data from Polish observatories are also collected. Data on **terrestrial magnetic field** activity are supplied by the **Central Geophysical Observatory PAS in Belsk**, Poland and are available on the home page in near-real time as well as Warsaw and Hornsund ionosonde data.





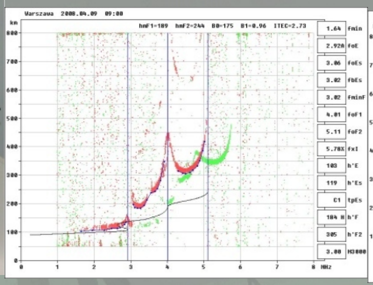
The RWC with cooperation with Geophysical Institute PAS provides data from polar region (**Polish Polar Station Hornsund**) – the **ionosonde** data are completed by **riometers** and **scintillation** measurements GISTM

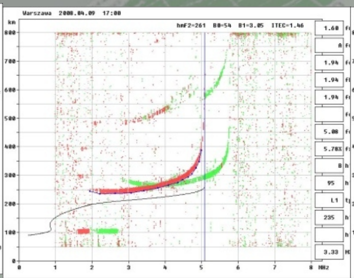
Regional Data

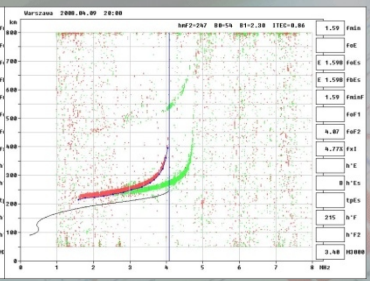
Ionospheric Sounding vertical and oblique & GPS Warsaw

Ionosonda data

Auxiliary parameters :
NmF2, hmF2, NmE, hmE and slant and vertical TEC



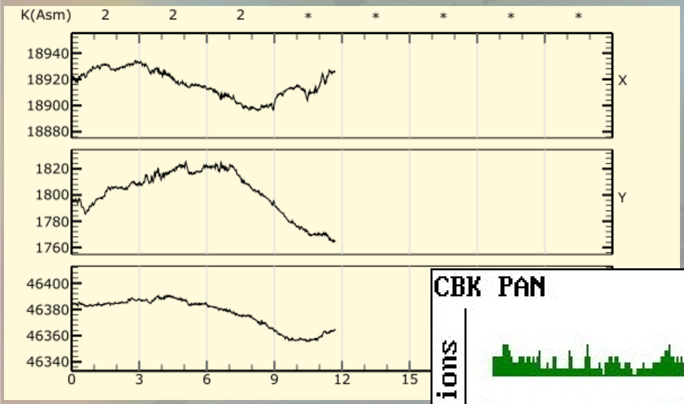


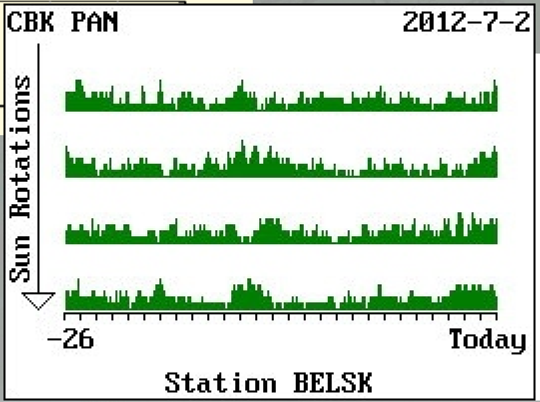


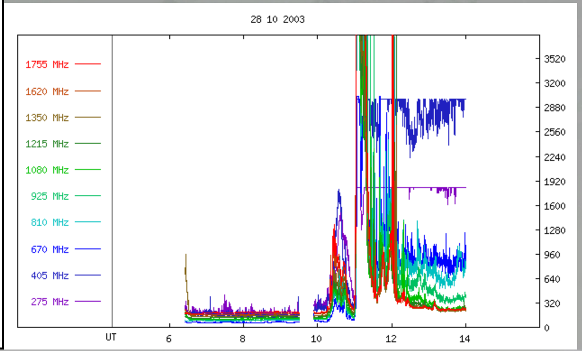
GPS data

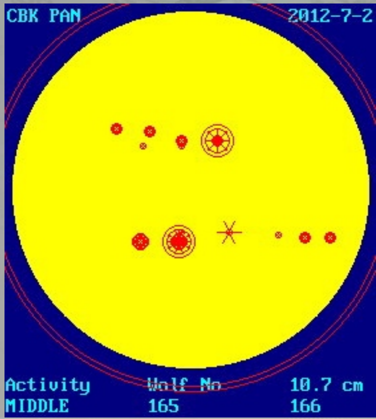
CBKA coord: (X=3654410.034, Y=1407752.520, Z=5017576.933),
Reference system: EUREF-89

Magnetic & solar activity on-line





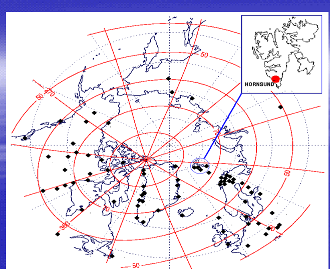




Hornsund station at Svalbard

Recordings

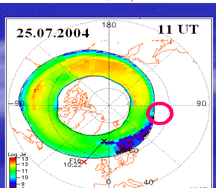
- ground level electric field measured by both: radioactive collector and field mill
- vertical air-earth current density measured by long wire antenna
- meteorological parameters - since 1998 automatic Vaisala station
- three components of geomagnetic field, aurora observations, ionosphere absorption by riometer



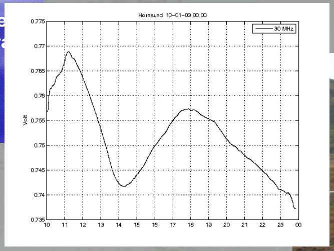
Atmospheric Electricity Arctic Station, Horsund

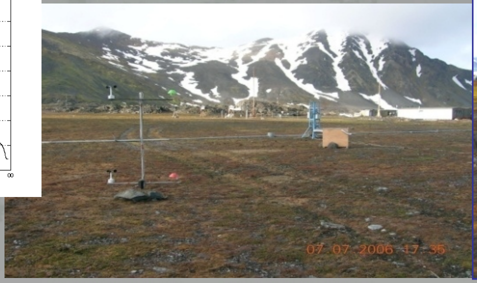
	LAT.	LONG.
GEOGRAPH.	77.00°	15.60°
GEOMAGNET.	74.02°	110.48°

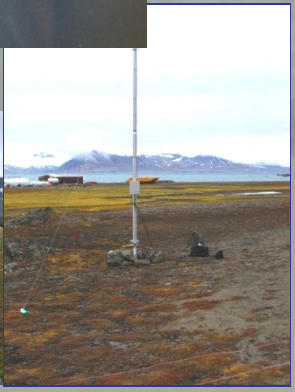
LOCAL MAGNETIC NOON ~ 09 UT



The position of the Hornsund station varies in relation to the projection of magnetosphere magnetic field lines; the station may be situated under the aurora oval or under the open geomagnetic field lines in polar cap regions







- GPS - Scintillations
- Ionosonde vertical and oblique sounding

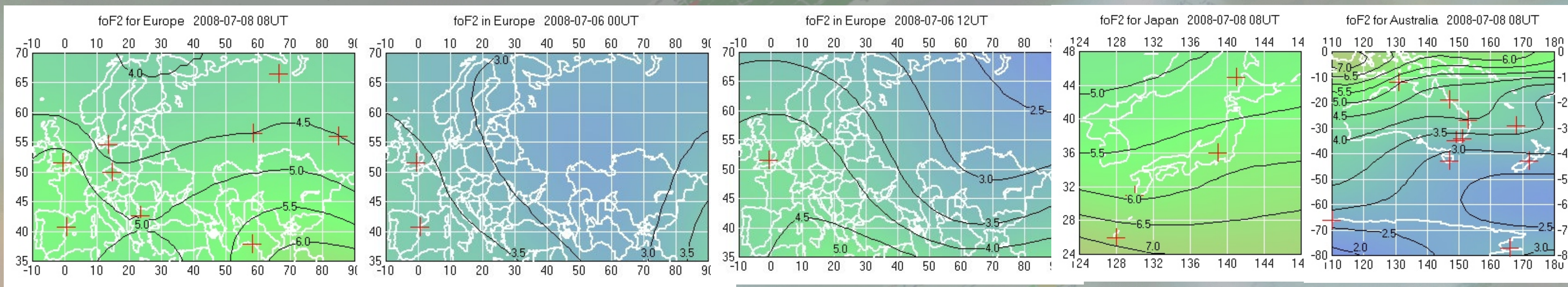
IDCE - Ionospheric Dispatch Centre in Europe

- IDCE allows to have convenient access to some recent ionospheric data from vertical sounders located mainly within European area as well as to data available in ISES network.

- IDCE offers also the catalogues of disturbed and quiet days, as well as the list of disturbed periods of few hours duration. The catalogues contain data since January 1997.

IDCE - Ionospheric Dispatch Centre in Europe

ftp://ftp.cbk.waw.pl/idce/

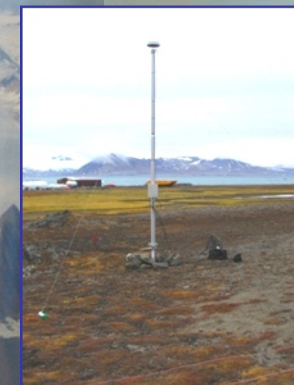


Quiet days and disturbances catalogues

Catalogue of disturbances

Station	Country	LAT	LON	Station	Country	LAT	LON	Station	Country	LAT	LON
Athens	Greece	N38	E24	Novosibirsk	Russia	N55	E82	Sodankyla	Finland	N67	E27
Dourbes	Belgium	N50	E05	St Petersburg	Russia	N55	E32	Sofia	Bulgaria	N43	E23
El Arenosillo	Spain	N37	W7	Podkamennaya	Russia	N60	E90	Sverdlovsk	Russia	N56	E59
Fairford	UK	N52	W2	Poitiers	France	N47	E0	Tashkent	Uzbekistan	N41	E70
Juliusruh	Germany	N55	E13	Pruhonice	Czech Rep.	N50	E15	Tortosa	Spain	N41	E0
Kiruna	Sweden	N68	E20	Rome	Italy	N42	E12	Tromso	Norway	N70	E19
Lannion	France	N49	W3	Rostov	Russia	N47	E40	Uppsala	Sweden	N60	E18
Lycksele	Sweden	N65	E19	San Vito	Italy	N41	E18	Warsaw	Poland	N52	E21
Magadan	Russia	N60	E151	Salekhard	Russia	N66	E66	XXXXXXXX	XXXXXXXX	XXX	XXX
Moscow	Russia	N55	E37	Slough	UK	N51	W1	XXXXXXXX	XXXXXXXX	XXX	XXX

Heliogeophysical Prediction Service Laboratory of the Space Research Centre is responsible for measurements of ionospheric characteristics.



Polish Polar Station in Hornsund (Svalbard)

Warsaw ionosonde mast.

Ionosonde VISRC2

SRC-PAS build ionosondes since the late nineties. Most of them are used within their own services. First ionosondes were almost fully analog. Currently we move to the third generation of ionosonde. They are based on high quality SDR to ensure high flexibility of solution. In basic version uses two crossed delta type antenna for both signal emission and reception. Allow doppler measurements as well in extended version direction measurements. Most of parameters like modulation, range, repetition time can be changed by software.

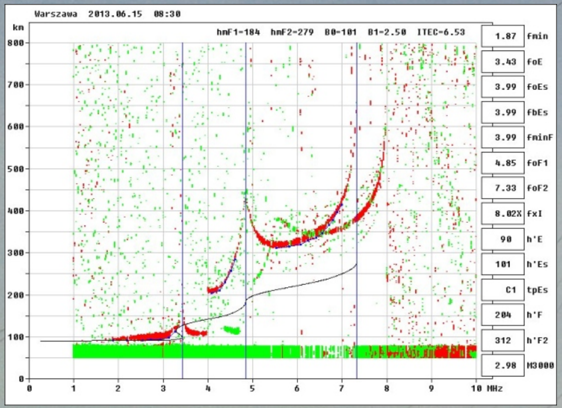
Parameters	
Peak Pulse Power	**500W**
Pulse width	**600us**
Frequency range	**1-20MHz**
Pulse Repetition Rate	**100Hz**
Ionogram Scan Time	**10-120**
Time Synchronization	**1us**
Receiver Bandwidth	**2x10MSPS,1x20SPS**

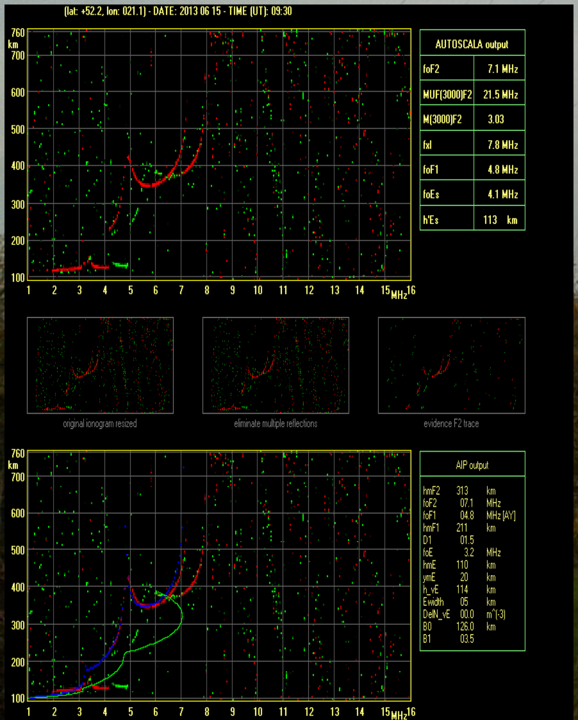
Ionosonde VISRC2

Military version of ionosonde constructed in SRC PAS in cooperation with Military Communication Works No 2 Joint Stock Company in Czernica

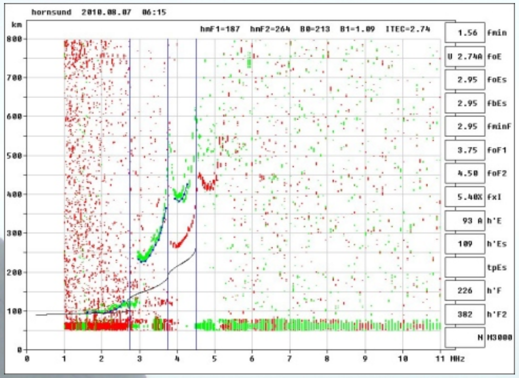
Ionosonde build in SRC PAS and operated by University of Warmia and Mazury in Olsztyn

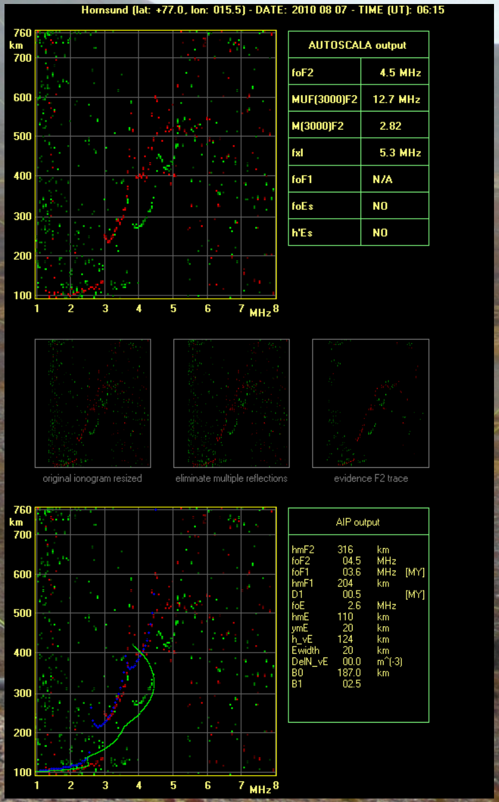
Warsaw ionosonde





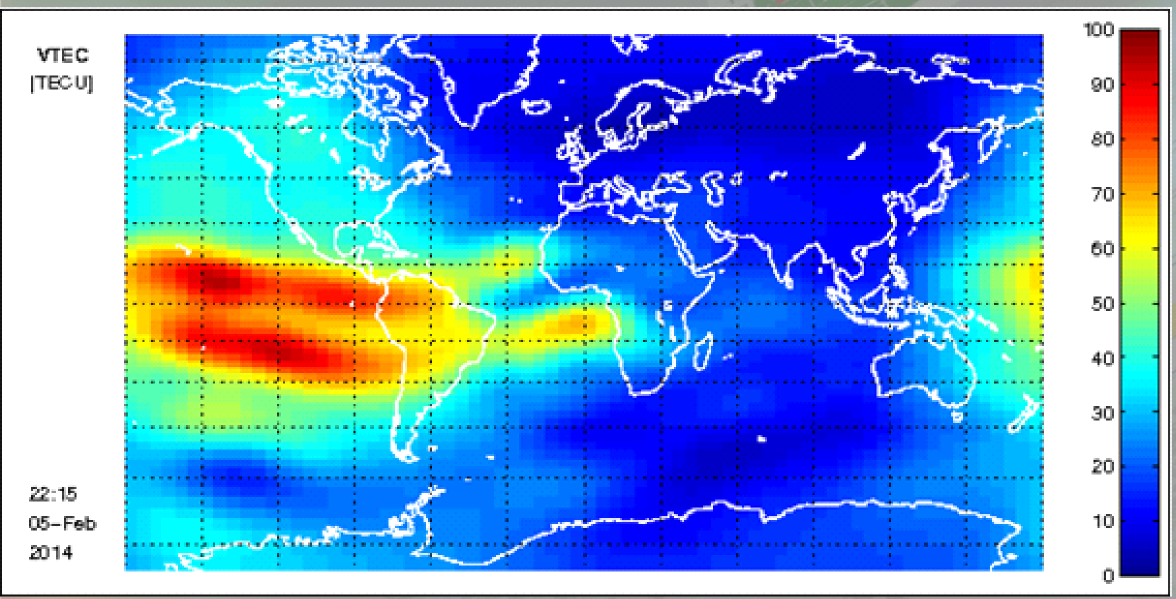
Hornsund


hornsund 2010.08.07 06:15
km
hmF1=187 hmF2=264 B0=213 B1=1.09 ITEC=2.74
MHz

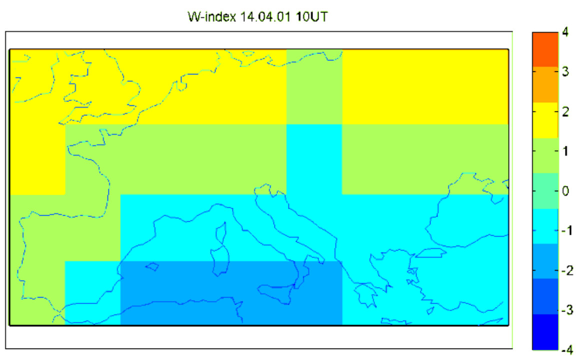

Hornsund (lat: +77.0, lon: 015.5) - DATE: 2010 08 07 - TIME (UT): 06:15
AUTOSCALA output
foF2 4.5 MHz
MUF(3000)F2 12.7 MHz
M(3000)F2 2.82
fxI 5.3 MHz
foF1 N/A
foEs NO
h'Es NO
original ionogram resized
eliminate multiple reflections
evidence F2 trace
AIP output
hmF2 316 km
foF2 04.5 MHz
foF1 03.6 MHz [MY]
hmF1 204 km
D1 00.5 [MY]
foE 2.6 MHz
hmE 110 km
ymE 20 km
h_vE 124 km
Ewidth 20 km
DelN_vE 00.0 m^(-3)
B0 187.0 km
B1 02.5

Modelling

Methods and algorithms linked directly to the radio-communication prediction and forecast domain are developed and continuously improved. The **fully operational real time Vertical Total Electron Content** monitoring software has been developed. The data source are selected from GNNS stations and EGNOS RIMS stations. The database was used for the new **global expanded version of W-index**, and for cloning missing ionospheric values like foF2 or M3000F2. The database can be used also for monitoring traveling ionospheric disturbances (TID), and prediction of TEC variations particularly in EGNOS boundaries.



The fully operational real time Vertical Total Electron Content monitoring software has been developed

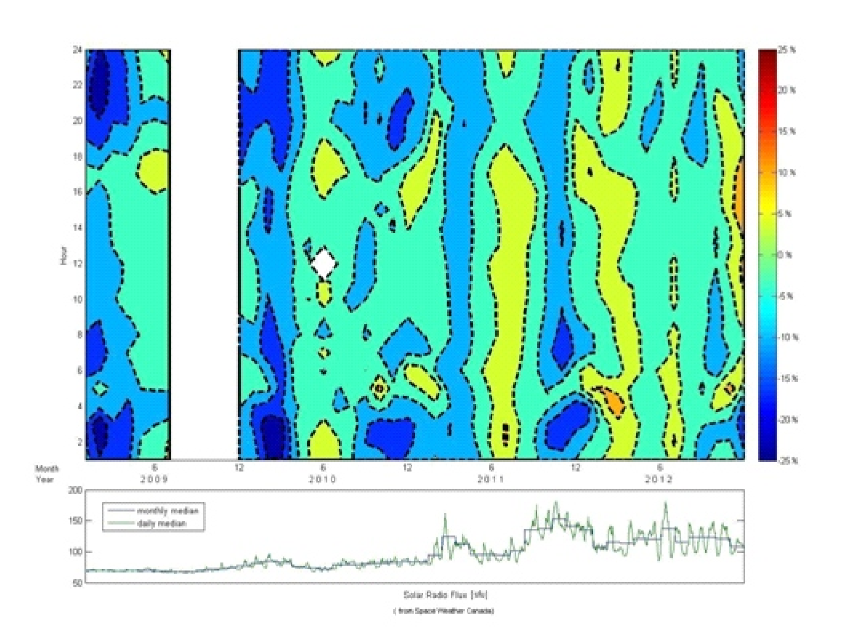


W_index map

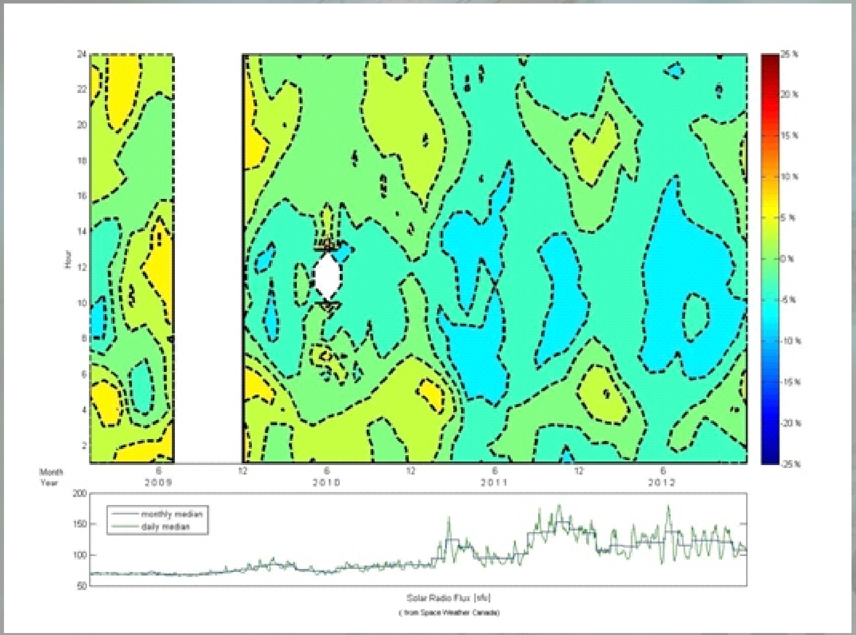
Modelling

The variability of ionospheric parameters: foF2, hmF2, M3000F2, B0, B1 for middle latitude over Warsaw were analysed. Selected data were modelled using International Reference Ionosphere **IRI 2012** model.

The results of the study will enable to use the IRI submodels **to prepare more accurate local** and global ionospheric maps in the event of lack of parameters, and the **more effective forecasts and predictions** of ionospheric conditions.



Differences between **foF2 monthly medians** obtained from Warsaw ionosonde and IRI 2012 model.



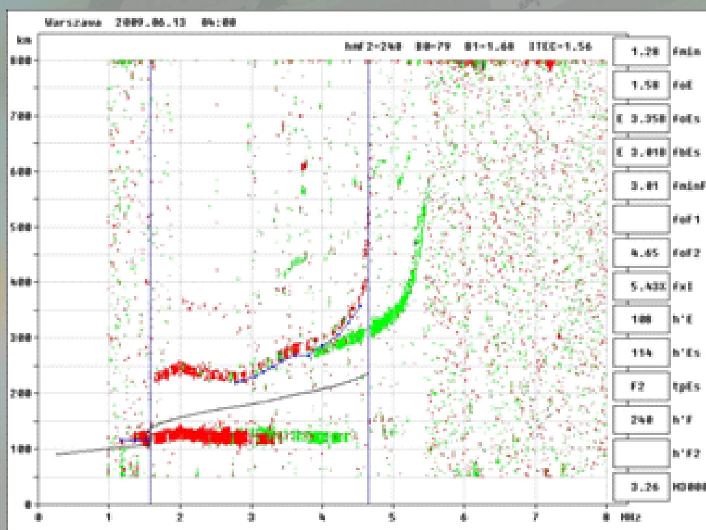
Differences between **hmF2 monthly medians** obtained from Warsaw ionosonde and IRI 2012 model.

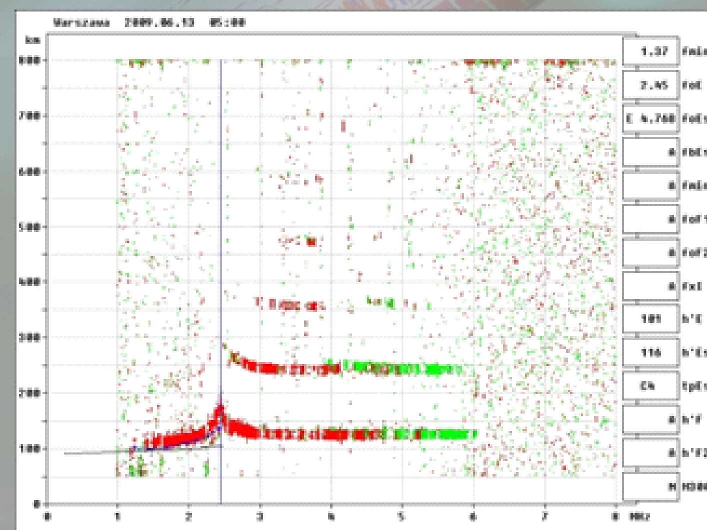
Modelling

The impact of various space weather phenomena are studied. The forecast of **sporadic E layer** occurring locally and sometimes nontransparent is **the crucial topic for radiocommunication**.

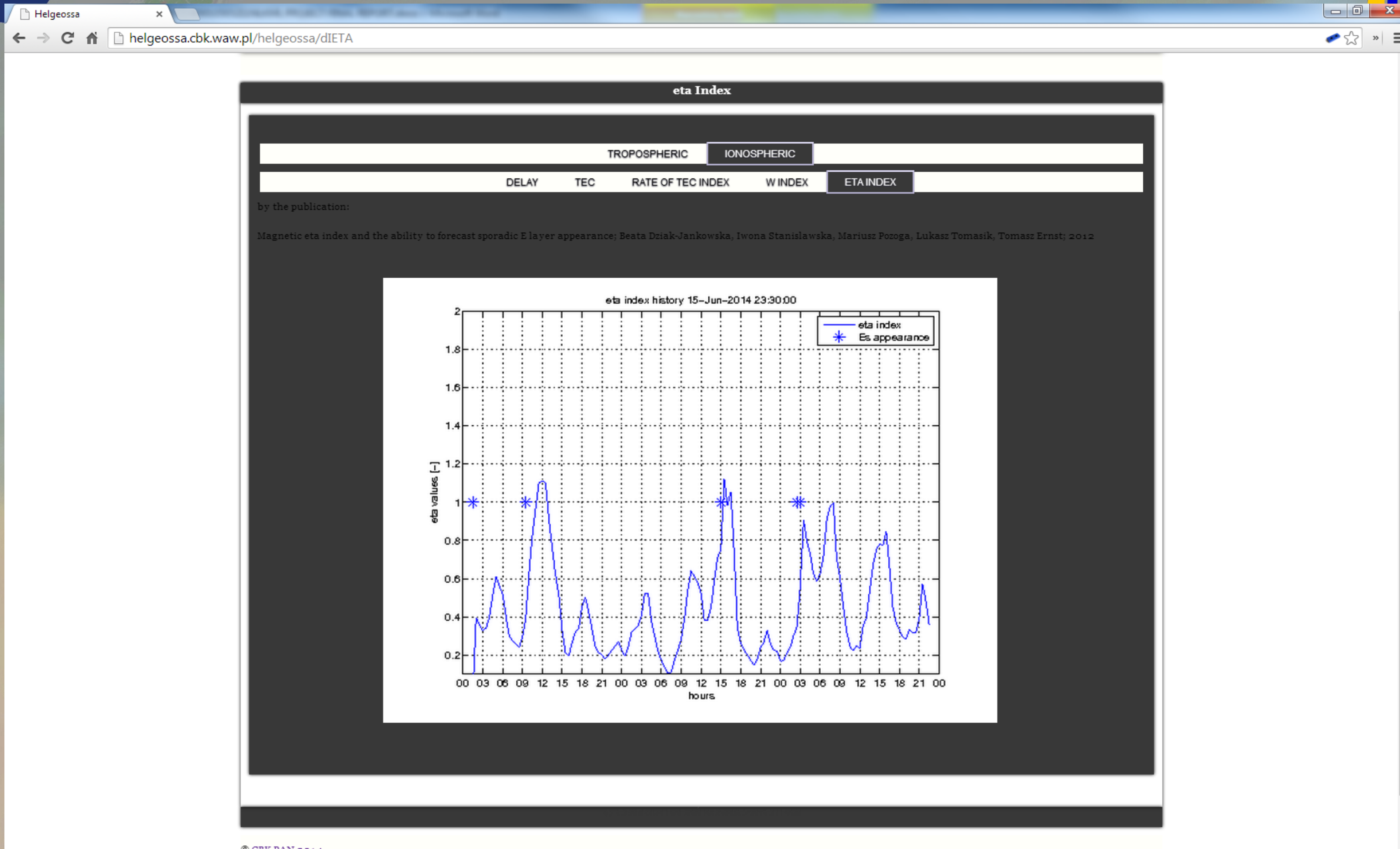
We propose the method of **forecasting sporadic E layer appearance**. This method is based on **magnetic data** and the changes of magnetic Eta parameter defined as the square root of a ratio of the energy of the external part of the vertical component to that of the horizontal components.

Sporadic E layer appearance occurs **1 - 2 hours after the increase of Eta value**.





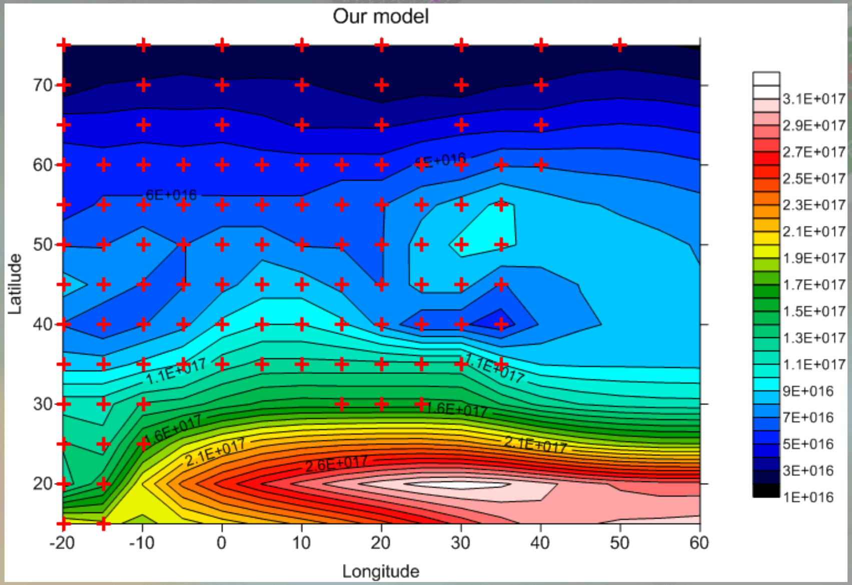
Examples of ionograms when sporadic E layer appears. First ionograms illustrates the situation when **eta index has maximum value** and the second ionogram shows the formed **blanketing sporadic E layer** 1 h after the maximum of eta index.

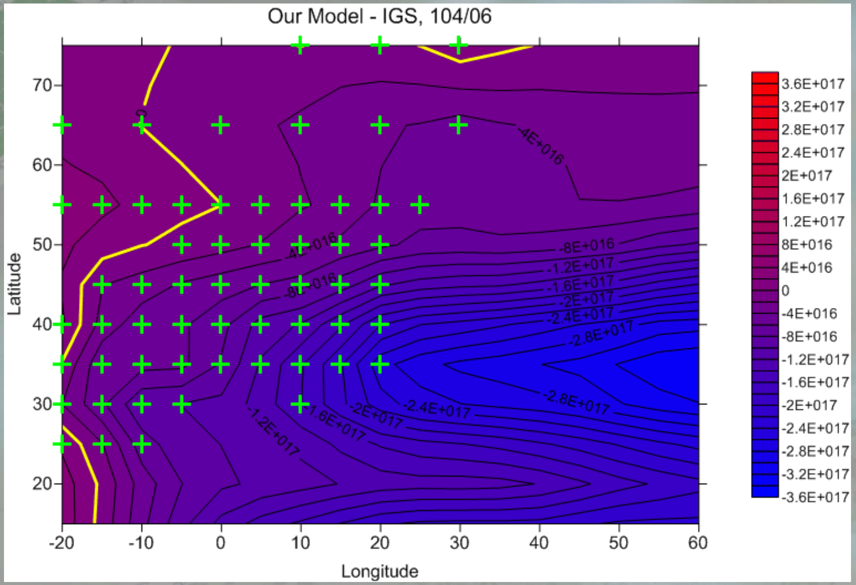


Real-time eta index calculated on the basis of 1 minute Belsk magnetic data. Asterisks show **the largest gradients** of eta index. Statistically after large gradient of eta index **within 2 h sporadic E layer appears.**

Iono and tropo modelling

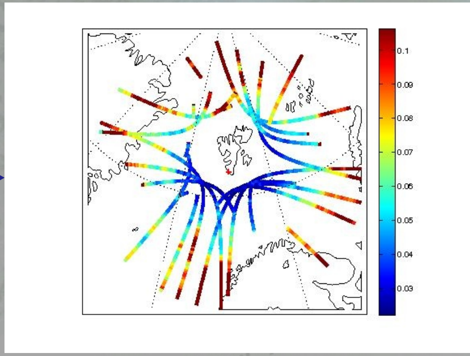
Model for GPS/Galileo/EGNOS





Model PLES; Stanisławska, I., G. Juchnikowski, R. Hanbaba, H. Rothkaehl, G. Sole, Z. Zbyszyński, 2000, COST 251 Recommended Instantaneous Mapping Model of Ionospheric Characteristics – PLES, Phys. Chem. Earth (C), Vol. 25, No. 4, 291-294.

Scintillations, model WAM (Wernik-Alfonsi-Materassi), A.W. Wernik, L. Alfonsi and M. Materassi, Radio Sci., 42 (1), RS1002, doi:10.1029/2006RS003512, 2007



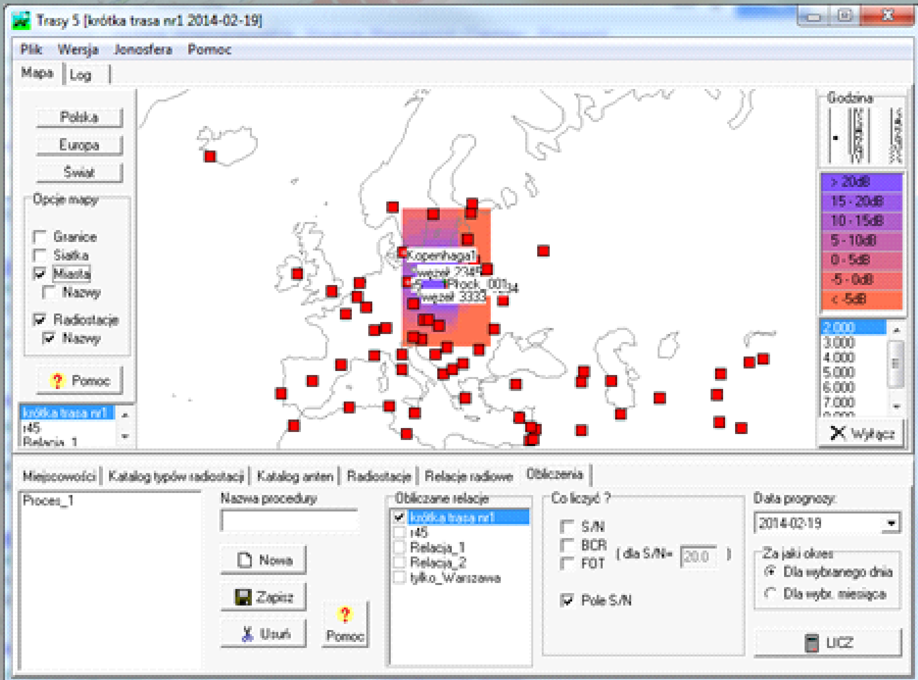
S4 index of scintillation

HF Communication

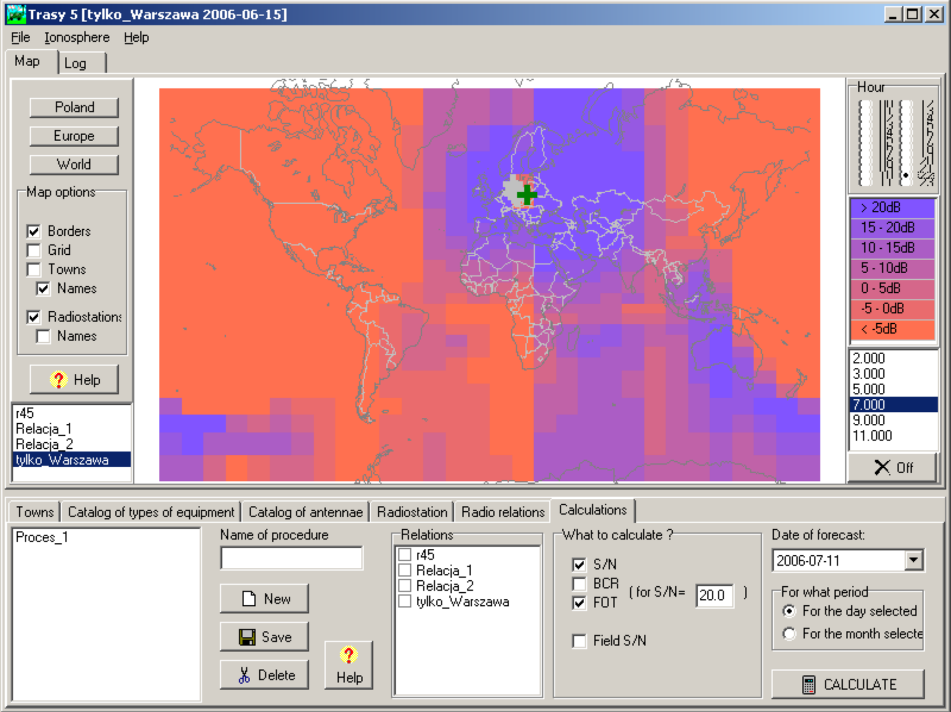
Space Research Centre **provides forecast service of HF radio signal intensity for the governmental and commercial** users. The work is carried out using software packages HELGEO and Ray-Route developed at SRC. The HELGEO is an automatic system of solar-geophysical data processing for analysis and forecast of solar-geophysical phenomena and the Ray-Route is a system of **forecasting of HF communications conditions**, including **signal to noise ratio at recommended frequencies**. It organises proper data base for operational data-driven models and runs the subroutines based on such models creating at the end a set of messages and files addressed to different users requirements.

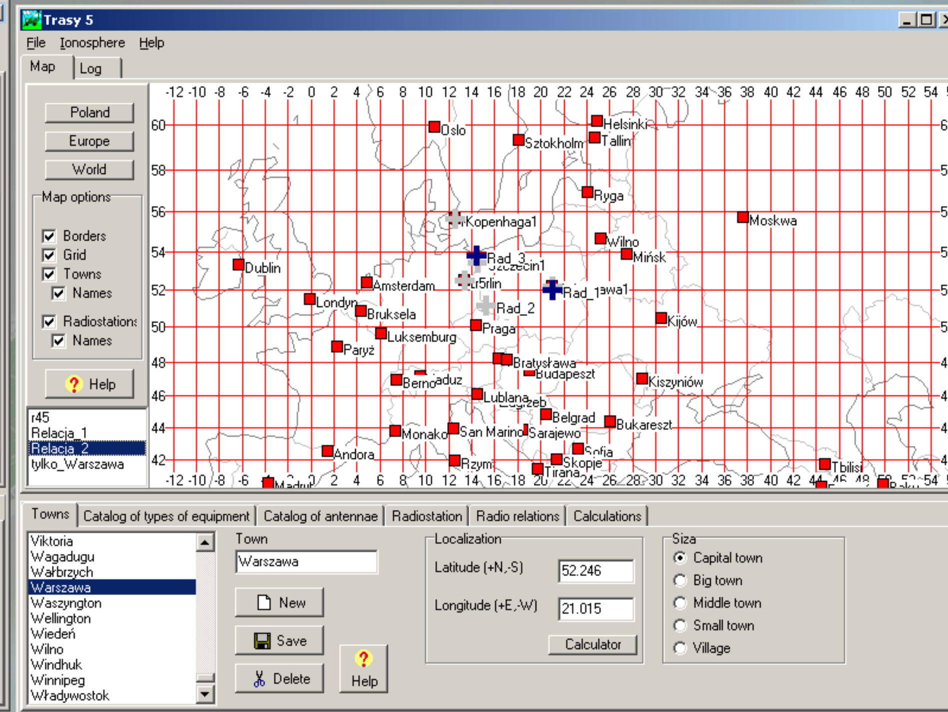
Prognoza S/N dla kierunku radiowego "siec1" na dzień 07-06-2012

MUF:	5	5	5	5	6	6	6	8	8	8	8	9	12	12	8	8	8	8	8	8	8	7	6	5
LUF:	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
GMT:	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
f.[MHz]	S/N [dB]																							
2.000:	74	73	73	69	43	20	5	-	-	-	-	-	-	-	-	-	-	-	10	17	37	36	39	38
3.000:	71	71	71	67	47	40	20	9	-	-	-	-	-	-	-	-3	-	8	14	20	36	36	38	38
5.000:	62	61	59	59	47	43	39	35	11	-2	-4	-5	0	2	16	20	12	16	20	24	35	35	37	37
6.340:	49	47	29	44	42	41	33	36	16	14	13	13	12	13	21	24	17	21	24	27	36	36	36	31
7.000:	37	33	6	30	34	35	25	36	18	15	15	14	14	16	23	26	17	23	26	28	37	36	32	22
10.000:	-	-	-	-	-	-	-	5	8	12	15	15	23	22	17	0	-	2	19	27	31	4	-	-
12.000:	-	-	-	-	-	-	-	-	-	-5	0	2	12	8	-6	-	-	-	-8	7	8	-	-	-
15.000:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.000:	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.000:	-3	-4	-4	-4	-8	-	-	-	-	-	-	-	-7	-7	-7	-6	-2	-1	0	0	0	0	2	2

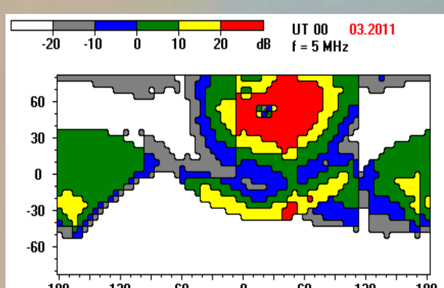


New features of the latest version of Ray-Route software: automation of operator tasks and the ability of radio propagation calculating for aviation.

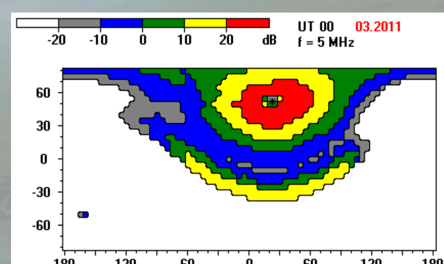




Software ray-route calculating radio propagation conditions



S/N RATIO for 1 kW transmiter for Ionospheric Radiopaths FROM WARSAW



S/N RATIO for 1 kW transmiter for Ionospheric Radiopaths TO WARSAW

```
 01   02   03   04   05   06   07   08   09   10   11   12     LUF  MUF MUF(K=5) SWF MUF   2.0   3.0   4.0   5.0   6.0   7.0   8.0 MHz
                                                                                S/K   S/K   S/K   S/K   S/K   S/K   S/K   S/K
UT +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ LT
00 -                   +                          - 02 0.4   5.4 F2          29/60 28/60 28/60 29/60 30/60 25/60 11/60
01 -                  +                           - 03 0.4   5.4 F2          28/60 27/60 29/60 28/60 29/60 24/60  8/60
02 -                   +                          - 04 0.4   5.6 F2          29/59 27/59 30/28 29/59 29/59 26/59 14/59
03 -                     +                        - 05 0.6   6.0 F2          26/59  9/28 22/59 26/59 26/59 26/59 20/59  6/59
04 - *                     +                      - 06 1.1   6.5 F2          24/60        3/28 19/60 23/60 25/60 23/60 14/60
05 -   *                    +                     - 07 1.4   6.9 F2          22/60             11/60 17/60 21/60 22/60 16/60
06 -    *                    +                    - 08 1.6   7.1 F2          19/61              4/61 11/61 16/61 19/61 16/61
07 -    *                     +                   - 09 1.8   7.3 F2          16/61                    6/61 12/61 16/61 15/61
08 -     *                     +                  - 10 1.9   7.4 F2          14/61                    2/61  8/61 13/61 14/61
09 -     *                     +                  - 11 2.0   7.4 F2          12/61                          6/61 11/61 12/61
10 -     *                    +                   - 12 2.0   7.2 F2          11/61                          5/61 10/61 11/61
11 -     *                    +                   - 13 2.0   7.2 F2          10/61                          5/61 10/61  9/61
12 -     *                   +                    - 14 2.0   7.1 F2          10/61                          6/61 10/61  8/61
13 -     *                   +                    - 15 1.9   6.9 F2          11/61                    1/61  8/61 11/61  9/61
14 -    *                   +                     - 16 1.8   6.8 F2          14/61                    5/61 11/61 14/61 11/61
15 -    *                    +                    - 17 1.7   6.9 F2          18/61              3/61 10/61 15/61 18/61 15/61
16 -   *                      +                   - 18 1.5   7.1 F2          20/60              8/60 14/60 18/60 20/60 17/60
17 -  *                       +                   - 19 1.2   7.3 F2          23/58             15/58 20/58 22/58 23/58 22/58
18 -*                          +                  - 20 0.7   7.5 F2          27/57  4/28 19/57 23/57 24/57 25/57 26/57 26/57
19 -                           +                  - 21 0.6   7.4 F2          29/57 19/28 27/57 27/57 28/57 28/57 29/57 28/57
20 -                         +                    - 22 0.5   7.0 F2          29/57 26/57 28/57 27/57 28/57 29/57 29/57 25/57
21 -                       +                      - 23 0.4   6.5 F2          29/58 26/58 26/58 27/58 28/58 29/58 27/58 18/58
22 -                     +                        - 00 0.4   6.0 F2          30/58 28/58 28/58 29/58 30/58 30/58 24/58  9/58
23 -                    +                         - 01 0.4   5.7 F2          30/59 28/59 28/59 29/59 30/59 28/59 17/59
UT +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ LT
    01  02  03  04  05  06  07  08  09  10  11  12     LUF  MUF MUF(K=5) SWF MUF   2.0   3.0   4.0   5.0   6.0   7.0   8.0 MHz
```

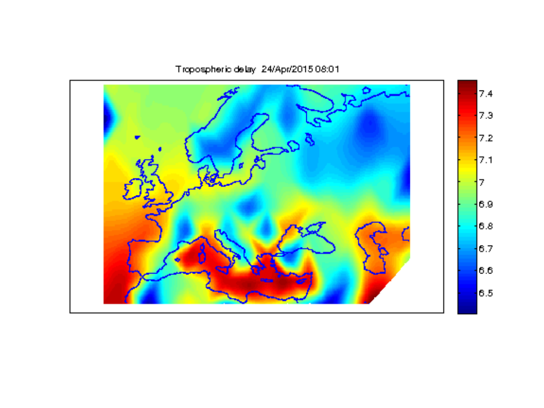
An example of the monthly forecast of HF radio propagation conditions for Poland.

In the frame of national, European or ESA grants new applications are performed.

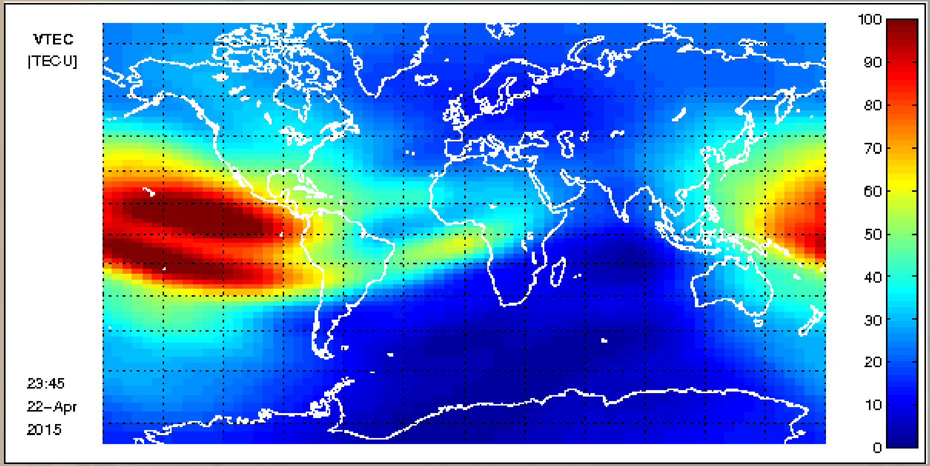
Adjusted Matrix of monitoring &prediction of selected Space Weather Elements - contribution to ESA Architecture of Space Situation Awareness (SSA)

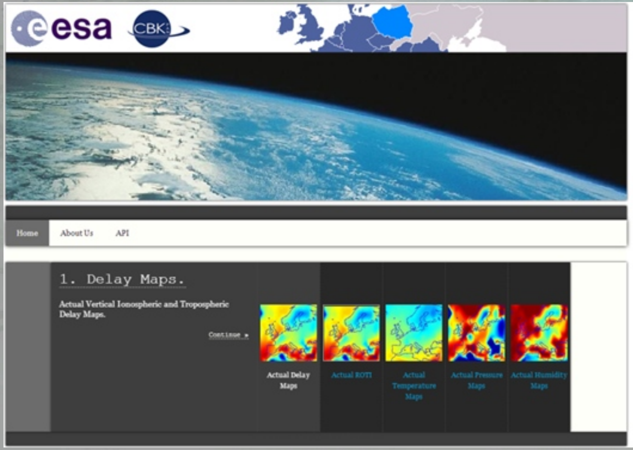
SSA Propagation Package Elements

- Tropospheric Element WP1
- Ionospheric Element WP2
- Identified specific developed products and linked to SSA Customer Requirements WP3



Sample map of the hypothetical vertical **tropospheric delay** error [cm] defined as difference between HelgeoSSA and EGNOS correction.





TROPOSPHERIC | IONOSPHERIC

DELAY | TEC | RATE OF TEC INDEX | W INDEX | ETA INDEX

Executed project

PECS *Adjusted Matrix of monitoring & prediction of selected Space Weather Elements – contribution to ESA Architecture of Space Situation Awareness* (SSA)

Objectives:
Improvement of trans-ionospheric and HF communication signal to guarantee optimal real time and predicted radio-communication conditions.

Topic has been divided into 3 tasks.
1. Mitigation of adverse atmospheric circumstances
2. Mitigation of adverse ionospheric circumstances
3. SSA package development

http://helgeossa.cbk.waw.pl/helgeossa/MAIN.htm

Adjusted Matrix of monitoring &prediction of selected Space Weather Elements - contribution to ESA Architecture of Space Situation Awareness (SSA)

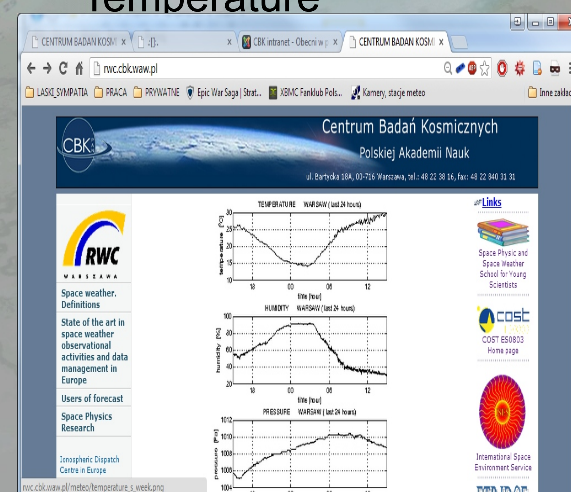
SSA Propagation Package Elements

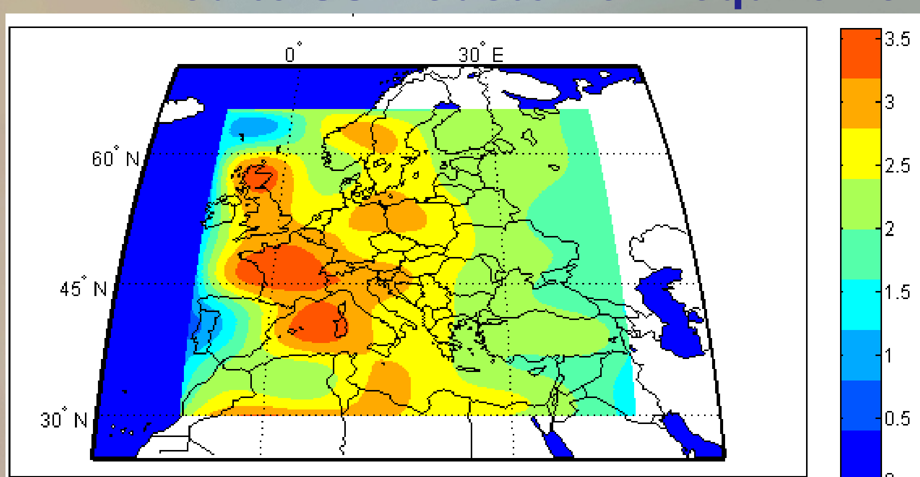
- **Tropospheric Element WP1**
- **Ionospheric Element WP2**
- **Identified specific developed products and linked to SSA Customer Requirements WP3**

Tropospheric characteristic database was created for tropospheric corrections on the basis of global (Eumetsat) and local circumstances.

Data source: Local meteo station

- Pressure
- Rain rate
- Total humidity
- Temperature





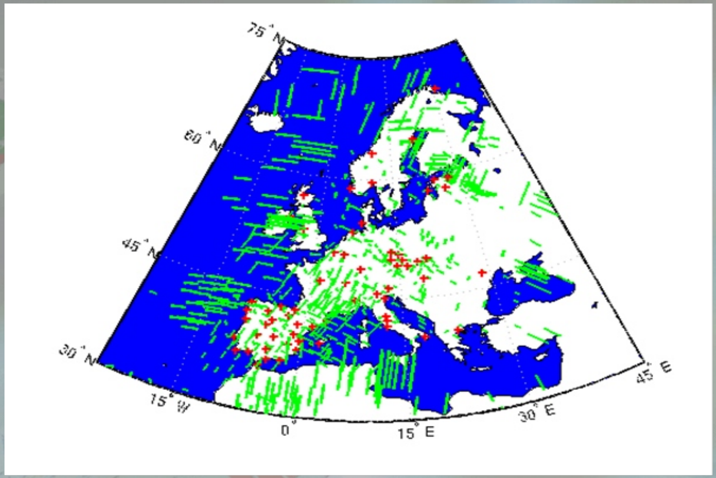
Sample Total attenuation map

TEC data elaboration and justification by means of ionsondes

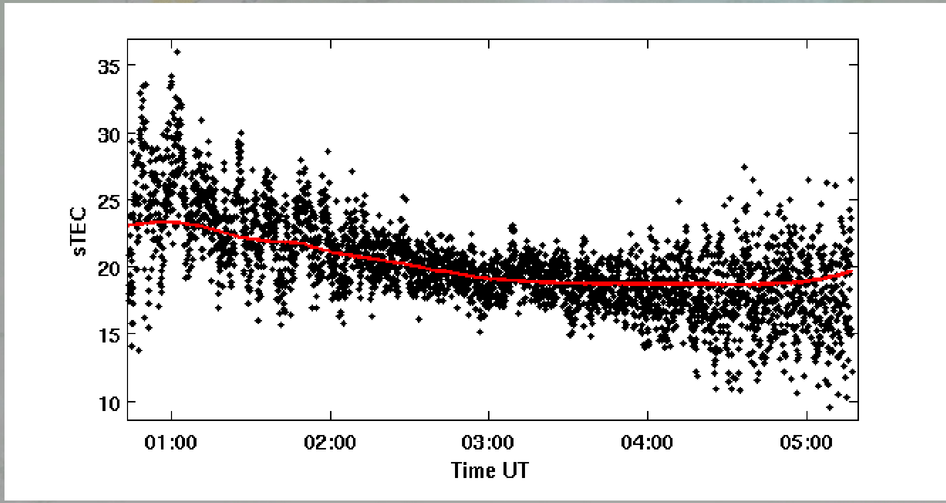
Slant TEC computation

To determine the slant TEC the pseudo range code measurement and carrier phase measurements on L1 and L2 frequency were used.

In order to increase the accuracy of measurements the carrier phase measurements were used. Figure shows an example of slant TEC computed from pseudo-range and phase carrier measurement.

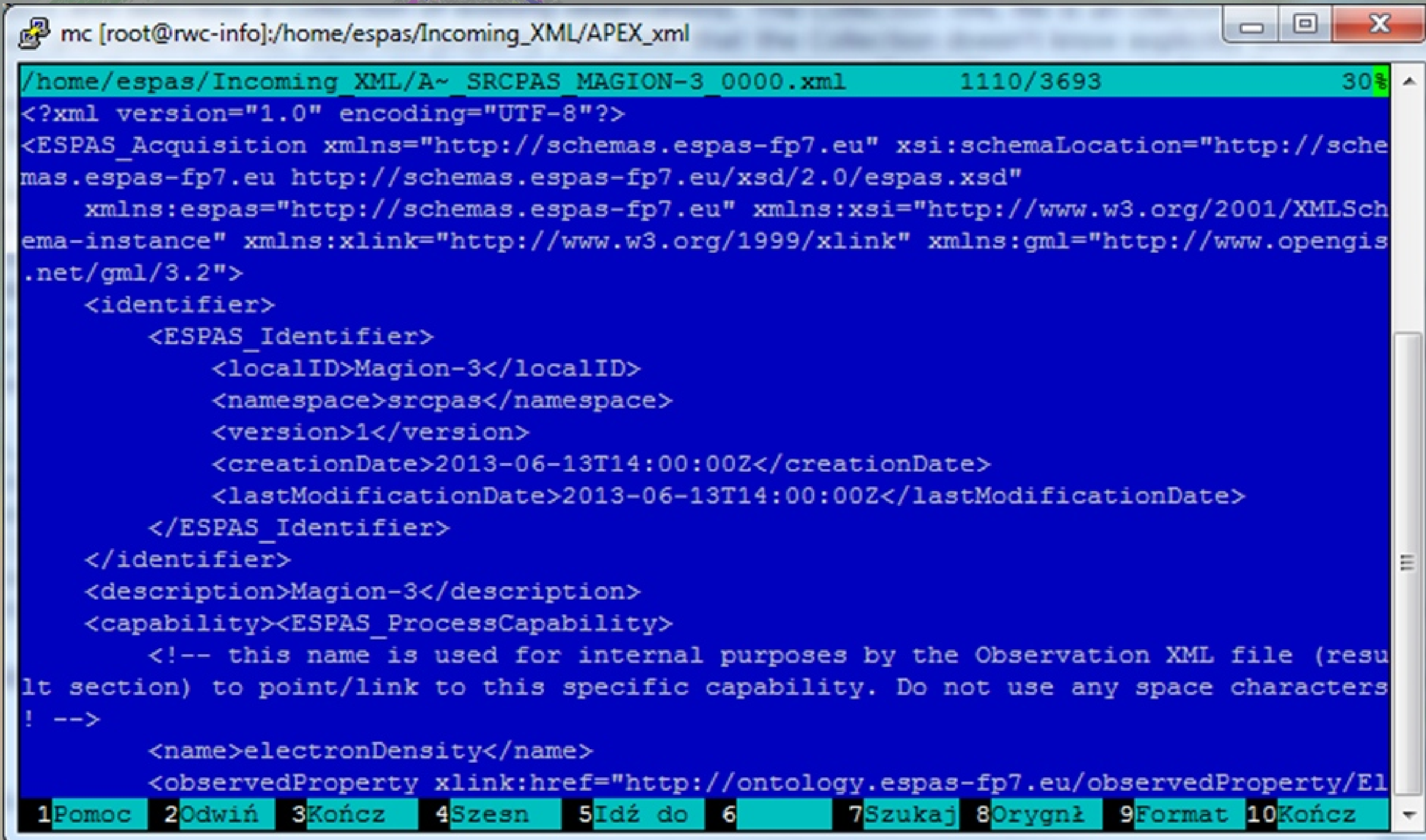


An example of pierce points position for 15 minutes. Model of ionosphere at the height of 350 km.



Slant TEC without bias reduction

Sample ESPAS XML File



mc [root@rwc-info]:/home/espas/Incoming_XML/APEX_xml

/home/espas/Incoming_XML/A~_SRCPAS_MAGION-3_0000.xml 1110/3693 30%


```
<?xml version="1.0" encoding="UTF-8"?>
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mas.espas-fp7.eu http://schemas.espas-fp7.eu/xsd/2.0/espas.xsd"
    xmlns:espas="http://schemas.espas-fp7.eu" xmlns:xsi="http://www.w3.org/2001/XMLSch
ema-instance" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:gml="http://www.opengis
.net/gml/3.2">
    <identifier>
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    </identifier>
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    <capability><ESPAS_ProcessCapability>
        <!-- this name is used for internal purposes by the Observation XML file (resu
lt section) to point/link to this specific capability. Do not use any space characters
! -->
        <name>electronDensity</name>
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```


1Pomoc 2Odwiń 3Kończ 4Szesn 5Idź do 6 7Szukaj 8Orygnł 9Format 10Kończ

In ESPAS project data providers generates XML metadata files that describe their data. Data Provider is going to capture its datasets based on ESPAS Data Model.

Current projects

EGEP ID71 – Galileo 2nd Generation Space Segment Study Phase A/B1 ESA ITT No. AO/1-7591/13/NL/IA

SRC PAS leads two workpackages A-2ADAH and B-2ADAH

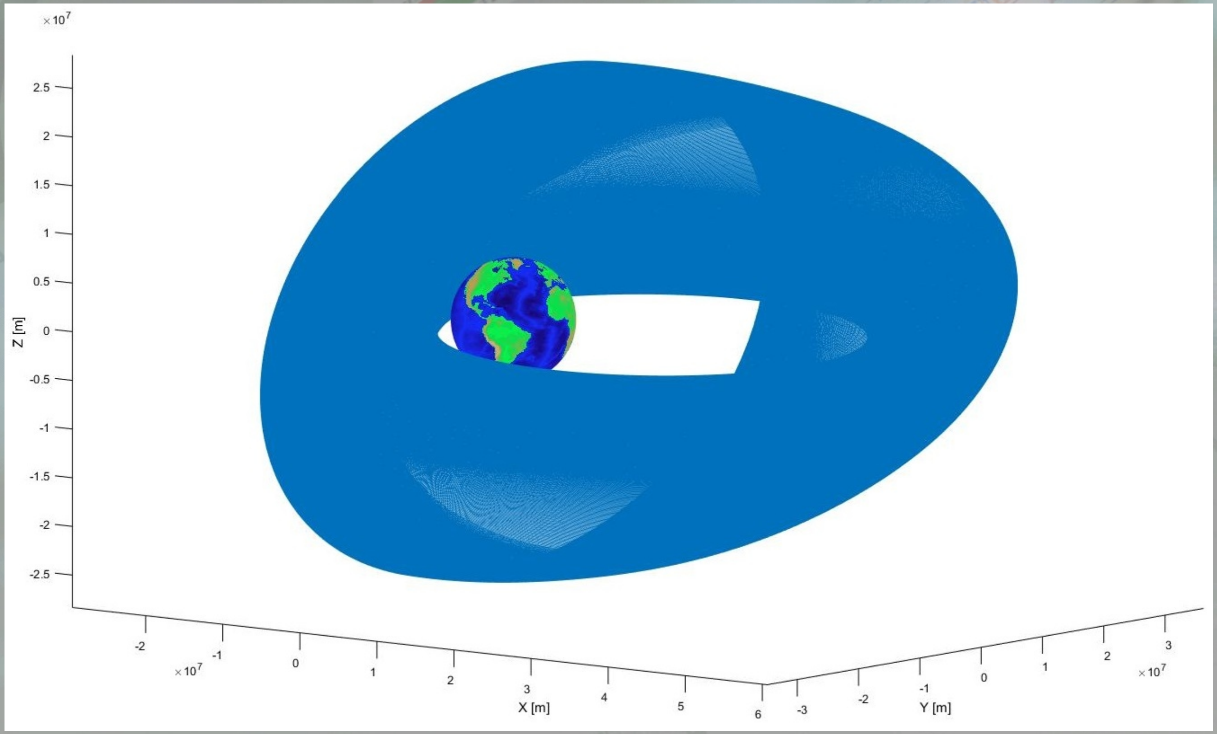
Objectives:
Evaluate space environment in Galileo-2G transfer orbit and operational orbits
Preliminarily evaluate for different transfer orbit options and operational orbits:

- Total ionizing dose
- Non-ionizing dose

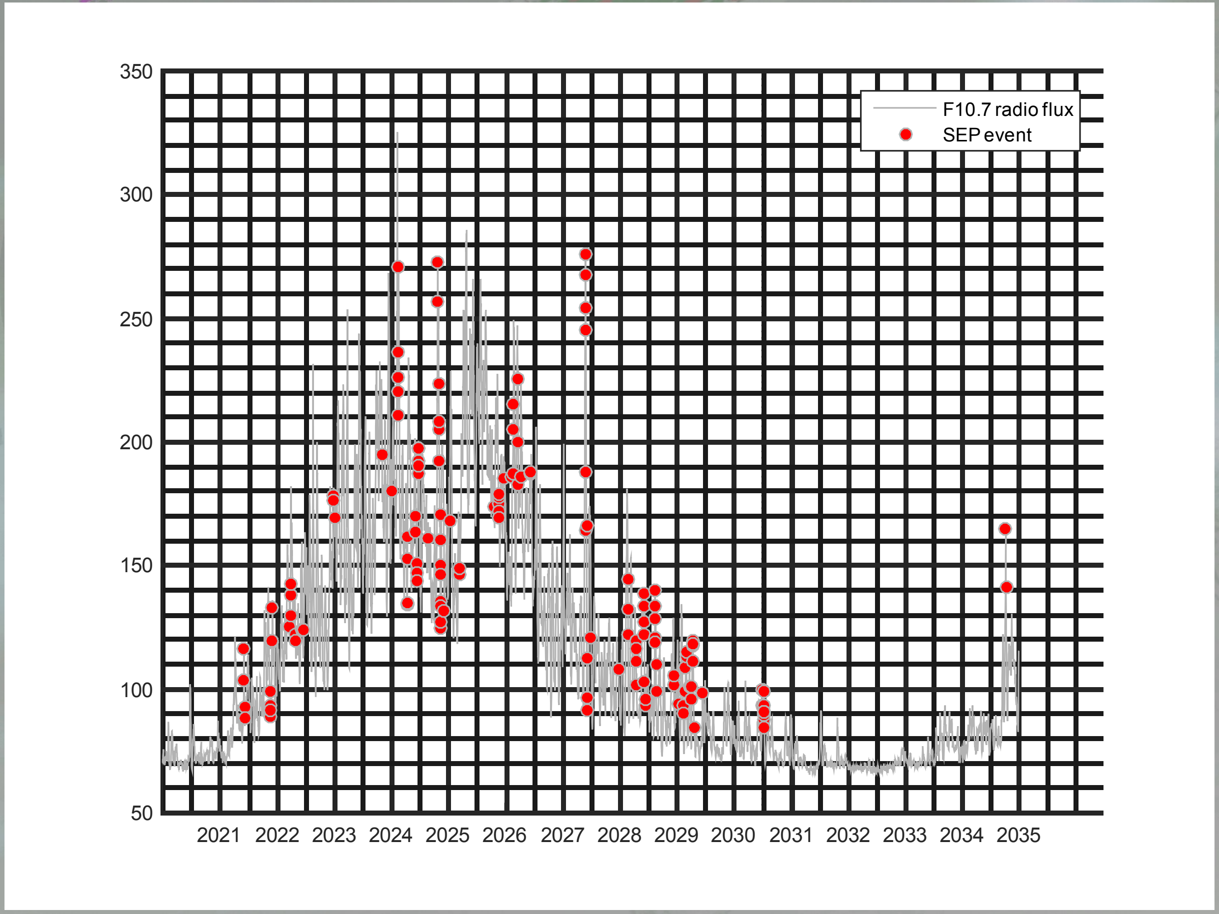
Support to satellite engineering in finding measures to mitigate the effects of space environment

An example:

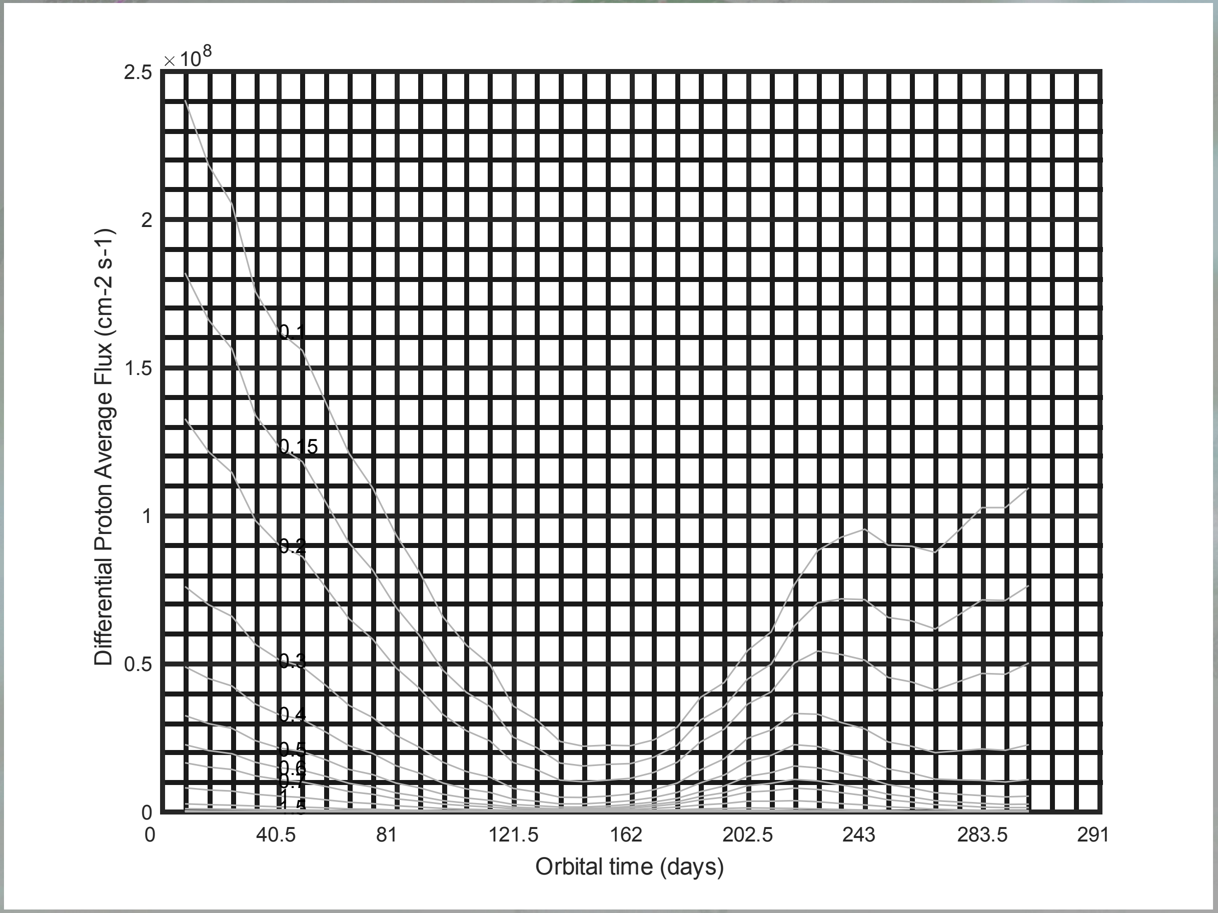
The goal of the mission is an injection of the satellite to the final operational MEO orbit.
Mission will proceed: from a 1 year transfer stage from GTO to MEO orbit, final operational 12 years MEO orbit and 2 months of de-orbiting.



Implemented for the evaluation of worst case scenario 2020-2035, 23th Solar Cycle with observed SEP events



Evolution of energies [MeV] of differential proton average flux spectra for GTO transfer + MEO scenario, starting at 01.01.2024.



Current projects

SSA Programme P2-SWE-I
Space Weather Expert Service Centres Definition and Development
ESA ITT No. AO/1-7699/13/D/MRP

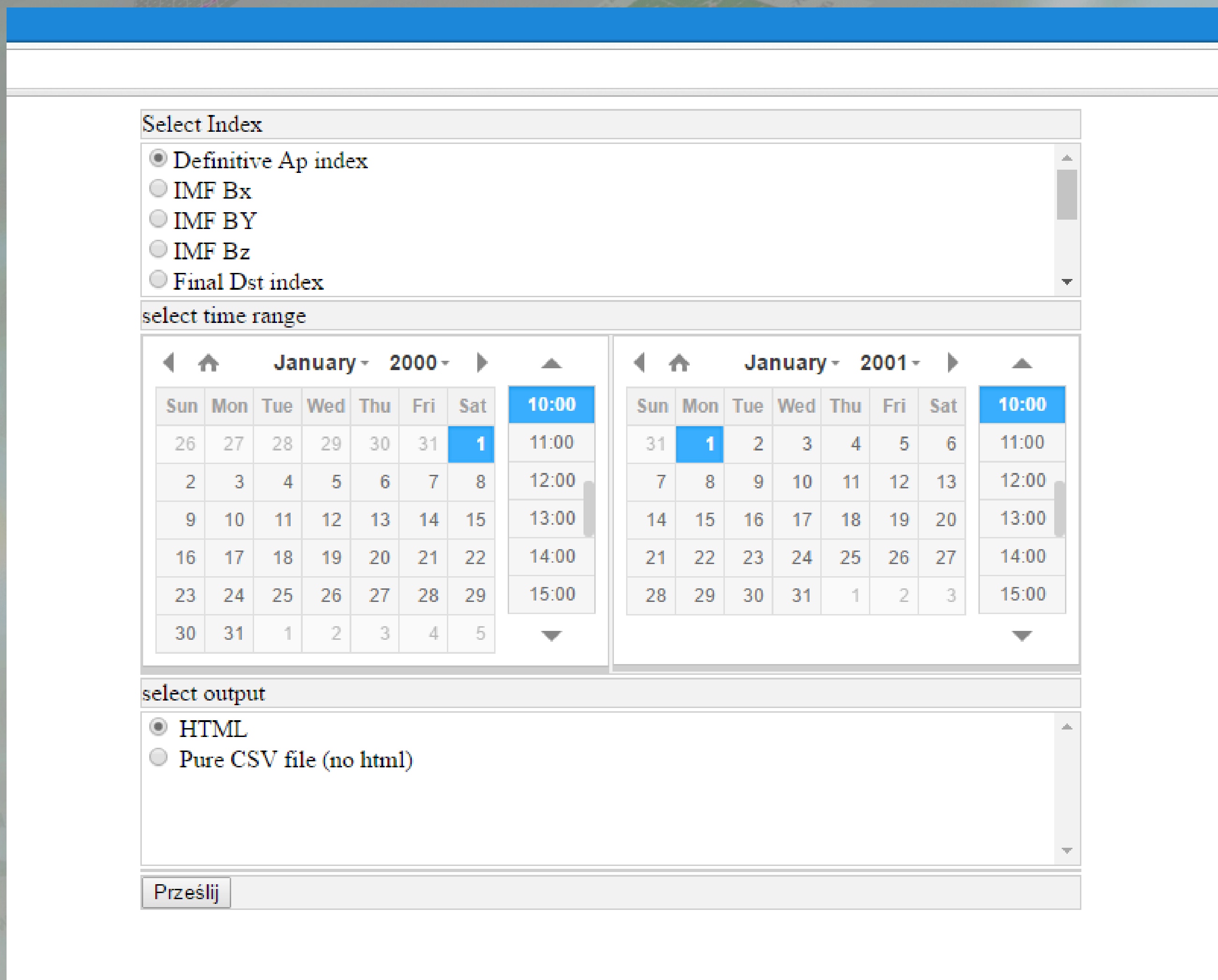
SRC PAS leads workpackage 4240 –Ionospheric Weather ESC – Establishment of SST/arv

Objectives:

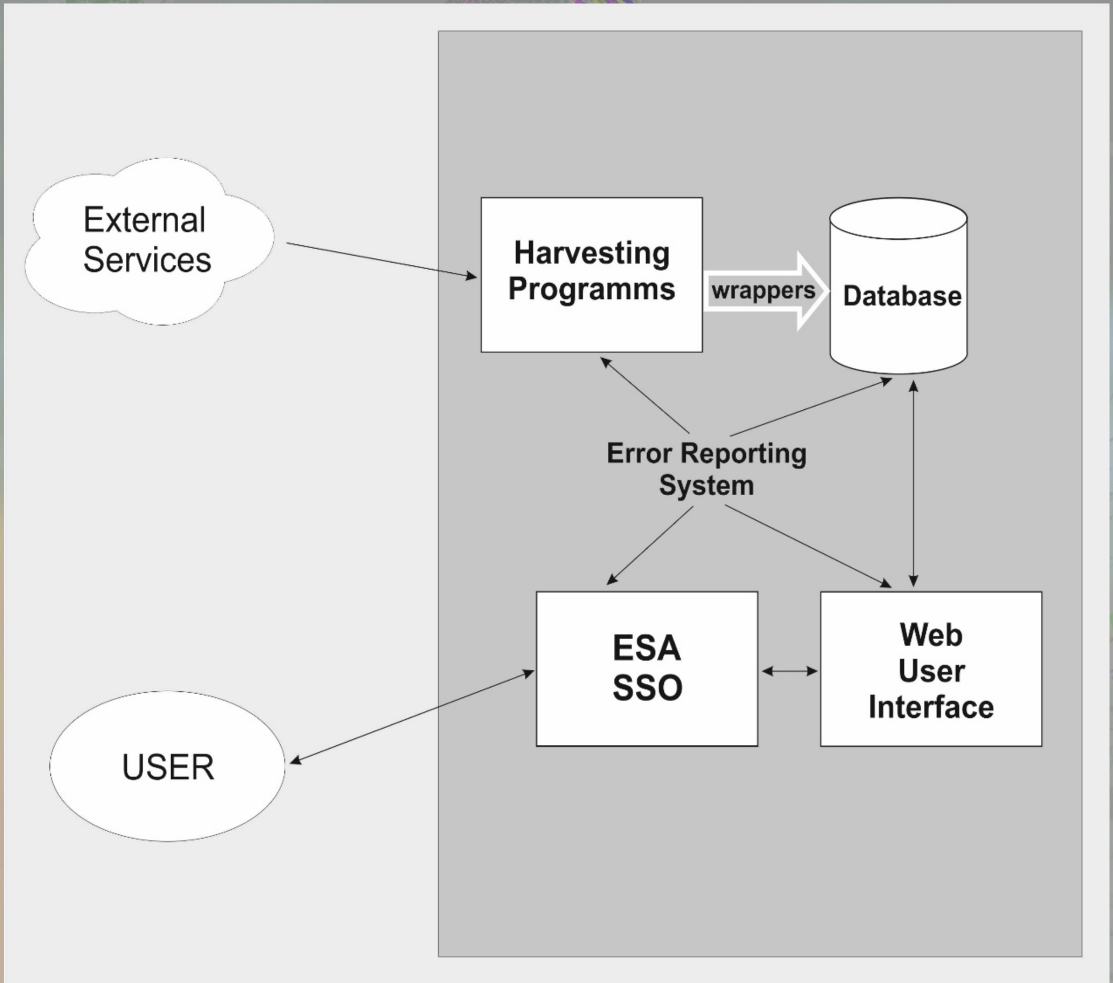
Establishment of the SST/arv service in the ESC Ionospheric Weather

Creation of database of past values of solar and geomagnetic data indices relevant to drag calculation

SST/arv Web User Interface



Overview of the SST/arv platform

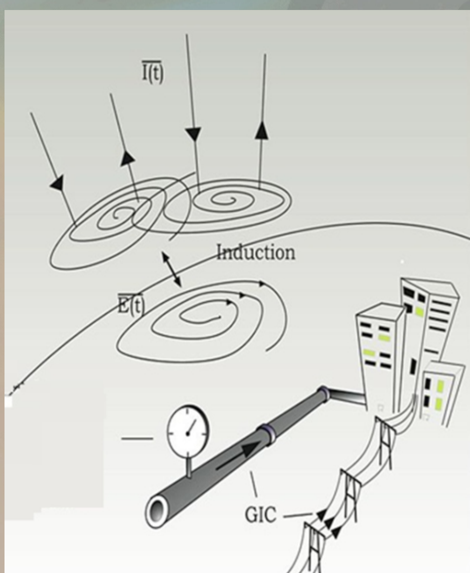


The main advantages of SST/arv platform are:

- The archive data are still available even if the original service is down
- SST/arv database is easy to explore
- SST/arv uses only http transfer and queries and is easy to replicate it using curl technology

Conference organized by Government Centre for Security

On 21st June 2011 meeting SRC PAS, Government Centre for Security and PSE Operator S.A had present plans for building own service for forecasting Geomagnetically Induced Currents.



CBK PAN

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OF POLISH RADIO AND THE COPERNICUS SCIENCE CENTRE

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