

ESPAS: Current functionalities of the Near-Earth space data infrastructure

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REAL-TIME-IRI TASK FORCE MEETING · 19 MAY





ESPAS Goals

- Integrated access to heterogeneous data on conditions in near-Earth space: ionised & neutral upper atmosphere, magnetosphere, ...
- Encourage more systematic exploration of multi-point measurements in this region - homogeneous interfaces to diverse data

Support for modelling:

- New models that advance our understanding
- Validation
- Data assimilation
- Extensible to new datasetsLink wider global community





Homogenised searches across repositories

Why?

- Rich set of observational techniques => diversity
- In-situ and remote sensing, moving platforms (spacecraft, rotating Earth, ...), global/regional products
- Diversity of terminology arising from range of communities and their history (developed since IGY in 1957)
- Scientific progress requires combination of diverse datasets!

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Underpinning concepts

To facilitate homogenised searches, ESPAS is:

- Developing comprehensive & flexible data model
- Supported by wide discussion on ontologies, vocabularies
- Developing standards for metadata in this domain
- Helping scientists to help users produce metadata!
- Ensuring system will be expandable

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Access to data, not just metadata

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- Scientists want the data, not just metadata
- Search uses metadata to locate data, and download "raw" files
- Now exploring access to specific parameters
 - Focus on time series
- Vital for search for satellites sensing
 - Location is part of dataset : maybe separate or embedded



Data not for publication, please contact the PI, (Non-PI) M, Hapgood at RAL Generated by HKDDC using SPDE/NSSDC CDAWlib on Wed Jan 15 15:47:53 201-











ESPAS model – key principles

The Data Model is built **strictly** and **entirely** on ISO 19100 series **geographic information standards**, particularly the ISO 19156 Observations and Measurements (O&M) standard.

- A process is often an instrument or sensor but may be a process chain, human observer, an algorithm, a computation or simulator. Therefore, a process may consist of more than one component.
- A CompositionProcess represents processes consisting of more than one component. A component shall be either of acquisition or computation type.



Linked resources – using the web as infrastructure





ESPAS registered data overview (ongoing)

Data registered through Instruments (acquisitions)

- ACE Magnetometer
- Athens Digisonde
- DTU Space fluxgate magnetometer
- EISCAT Kiruna Receiver
- EISCAT Sodankylä Receive
- EISCAT Svalbard Dynasonde
- EISCAT Svalbard Radar
- EISCAT Tromsø Dynasonde
- EISCAT Tromsø UHF Radar
- EISCAT Tromsø VHF Radar
- CHAMP Fluxgate Magnetometer
- GNSS Receivers
- CHAMP GPS Receiver TRSR-2
- IAP on board DEMETER
- Ionosonde Juliusruh
- Ionosonde Tromsø

- ISIS 1 Topside Sounder
- ISIS 2 Topside Sounder
- ISL (Langmuir probe) on board DEMETER
- MEPED energetic particle instrument onboard METOP-02 NOAA/POES
- MEPED energetic particle instruments onboard NOAA-06, NOAA-07, NOAA-08, NOAA-10, NOAA-12, NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA19
- CHAMP Overhauser Magnetometer
- Sodankylä Ionosonde (SO166)
- UCL FPI Keops Green Line
- UCL FPI Keops Red Line
- UCL FPI Sodankyla Red Line
- UCL FPI Svalbard Red and Green Lines
- WHISPER Instrument Onboard Cluster1
- WHISPER Instrument Onboard Cluster2
- WHISPER Instrument Onboard Cluster3
- WHISPER Instrument Onboard Cluster4



ESPAS registered data overview (ongoing)

Registered data resulted from computer codes/models (Computations)

- ARTIST
- CCIR F peak model
- DIAS Ne3D
- EDAM (Electron Density Assimilation Model)
- IRI (International Reference Ionosphere)
- Lockwood Formula
- Scintillation Processor
- SIRM (Simplified Ionosphere Regional Model)
- SIRMUP (Simplified Ionosphere Regional Model Real Time Updated)
- Slab Thickness Processor
- SO166 Ionobrowse manual scaling software
- SO166 Realtime FM Chirp CW ionogram conversion
- TEC Map Processor
- URSI F peak model

Support the development of valueadded services

Why is this needed? Users need:

- Physical parameters derived from raw data via models
- Validation of models
- Upgrade of models
- Fundamental basis for future services



HOW TO ACCESS THE ESPAS PLATFORM

ESPAS project http://www.espas-fp7.eu

The ESPAS demonstrator (Release 2) is currently available at:

http://dl121.madgik.di.uoa.gr:8080/espas/Uoa_espas_g ui.html

The "Data Search" page is the gateway for making queries using the Time, the Assets the Observed **Property and the Observation Collections**. The Search is implemented using dynamic workflows, which means that the user can start from any of the search criteria, choose any of the remaining criteria as next step and submit the query at any step.



http://dl121.madgik.di.uoa.gr:8080/espas/Uoa espas gui.html



LOG IN | REGISTER

near earch space data infrastructure for e-science

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Search for foF2 parameters available from all possible sources (acquisitions and model-outputs)





Search Results

Please use the filters on the left to narrow down the results. To download ALL the data displayed in this page click the "All Data Products" button.

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Project

European Digital Upper Atmosphere Server (279)

Region of Space

Ionosphere (283)

Platform

National Observatory of Athens (279)

Observation Collection

Athens Digisonde SAO files (autoscaled) (133) DIAS daily f-plots of fmin,foF2 from Athens Digisonde (2) DIAS Ionograms from Athens Digisonde (144) IRI foF2 grids - CCIR F peak model (2) IRI foF2 grids - URSI F peak model (2)

Observation Year

2012 (83)

2013 (200)

Number of Observations : 283

All Data Products

Observation Collections

Athens Digisonde SAO files (autoscaled) (19523 measurements grouped by 133 observations)

DIAS daily f-plots of fmin, foF2 from Athens Digisonde (240 measurements grouped by 2 observations)

Downloads

DIAS lonograms from Athens Digisonde (18266 measurements grouped by 144 observations)

IRI foF2 grids - CCIR F peak model (288 measurements grouped by 2 observations)

IRI foF2 grids - URSI F peak model (288 measurements grouped by 2 observations) Need to login first!



Download a zip file and extract files:

Name	Date modified	Туре	Size
foF2globalIRI-CCIR-2012-11-12-00-00.txt	09/05/2014 11:32	TXT File	448 KB
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IRI2012 Model Results

```
Required input parameters
Year=2012,Month=11,Day=12,Hour=00,Minutes=00
Time_type = Universal
Coordinate_type = Geographic
Longitude = from 0 to 360 (step 1) (left to right column)
Latitude = from -90 to 90 (step 1) (bottom to top row)
```

Optional input parameters: Sunspot number (Rz12) = not specified F10.7 radio flux (daily) = not specified F10.7 radio flux (81-day) = not specified Ionospheric index(IG12) =not specified Upper limit for Electron content = not specified F peak model = CCIR Ne Topside = NeQuick foF2 Storm model = off Bottomside Thickness = ABT-2009 F1 occurrence probability = Scotto-1997 no L foE Storm model = off D-Region Ne = IRI-95Topside Te = TBT-2012Ion Composition = RBV10/TTS03 A value of -1 indicates that the parameter is not available for the specified range

FoF2 VALUES

IRI input parameters and output file format

ESPAS provides <u>global grids of foF2 (IRI-2012)</u> with 1 deg resolution in latitude and longitude and time resolution 1 hour.

<u>Settings</u> Fpeak Model : URSI, CCIR foF2 Storm model: Off foE storm model: Off

Datasets for selected time intervals are currently registered in the central platform. Generation of datasets for additional intervals and IRI parameters is ongoing. Your recommendations are welcome! Please send us an email at: <u>belehaki@noa.gr</u>