

ESPAS, VWO, and VITMO

eScience projects to serve GIRO data



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The logo for the XIV International GIRO Forum (IGF 2014). It features the text "IGF 2014" in a large, blue, sans-serif font. The digit "0" is replaced by a blue and white globe showing the Americas. The background of the slide is a photograph of the Earth's horizon from space, with a bright sun or light source creating a lens flare effect on the right side.

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Glossary

- **eScience** = computationally intensive science that is carried out in highly distributed network environments
- **Virtual Observatory** = a collection of interoperating data archives and software tools which utilize the Internet to form a scientific research environment
- **ESPAS** = near Earth SPACe data infrastructure for eScience
- **VWO** = Virtual Wave Observatory
- **VITMO** = Virtual ITM Observatory
 - **ITM** = Ionosphere, Thermosphere, Mesosphere



JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

How does it work?

- We write down metadata descriptions
 - ESPAS: ISO O&M data model
 - VxO: SPASE data model
- Metadata points to our resources
 - Various level of detail, down to a single observation
- We receive requests for data and reply to them automatically
- Lots of work for us; plus need to speak 2 more languages

Near-Earth space data infrastructure for e-science

A platform to integrate heterogeneous data from earth's thermosphere, ionosphere, plasmasphere & magnetosphere

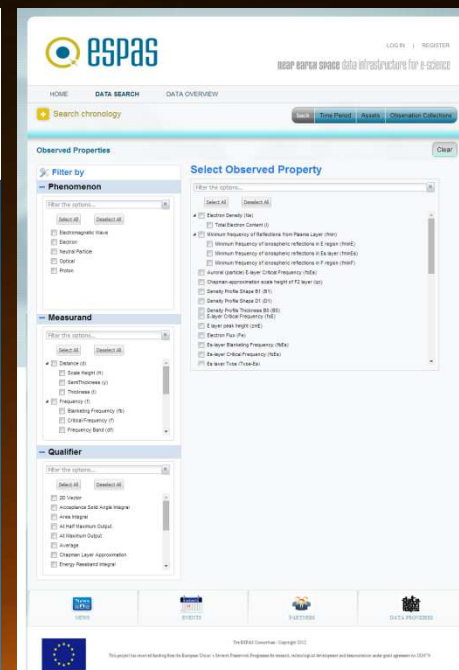
- Supports the systematic exploration of multipoint measurements from the near-Earth space through homogenised access to multi-instrument data
- Provides access to 40+ datasets from : Cluster, EISCAT, GIRO, DIAS, SWACI, CHAMP, SuperDARN, FPI, magnetometers INGV, SGO, DTU, IMAGE, TGO, IMAGE/RPI, ACE, SOHO, PROBA2, NOAA/POES, etc.
- Supports data visualization, search, statistics, modelling

ESPAS User Interface is accessible through

<http://www.espas-fp7.eu>

Next ESPAS release: in October 2013

Final ESPAS release: in April 2015

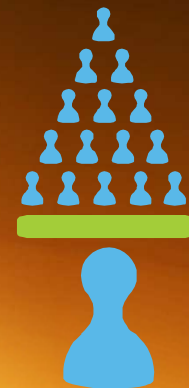
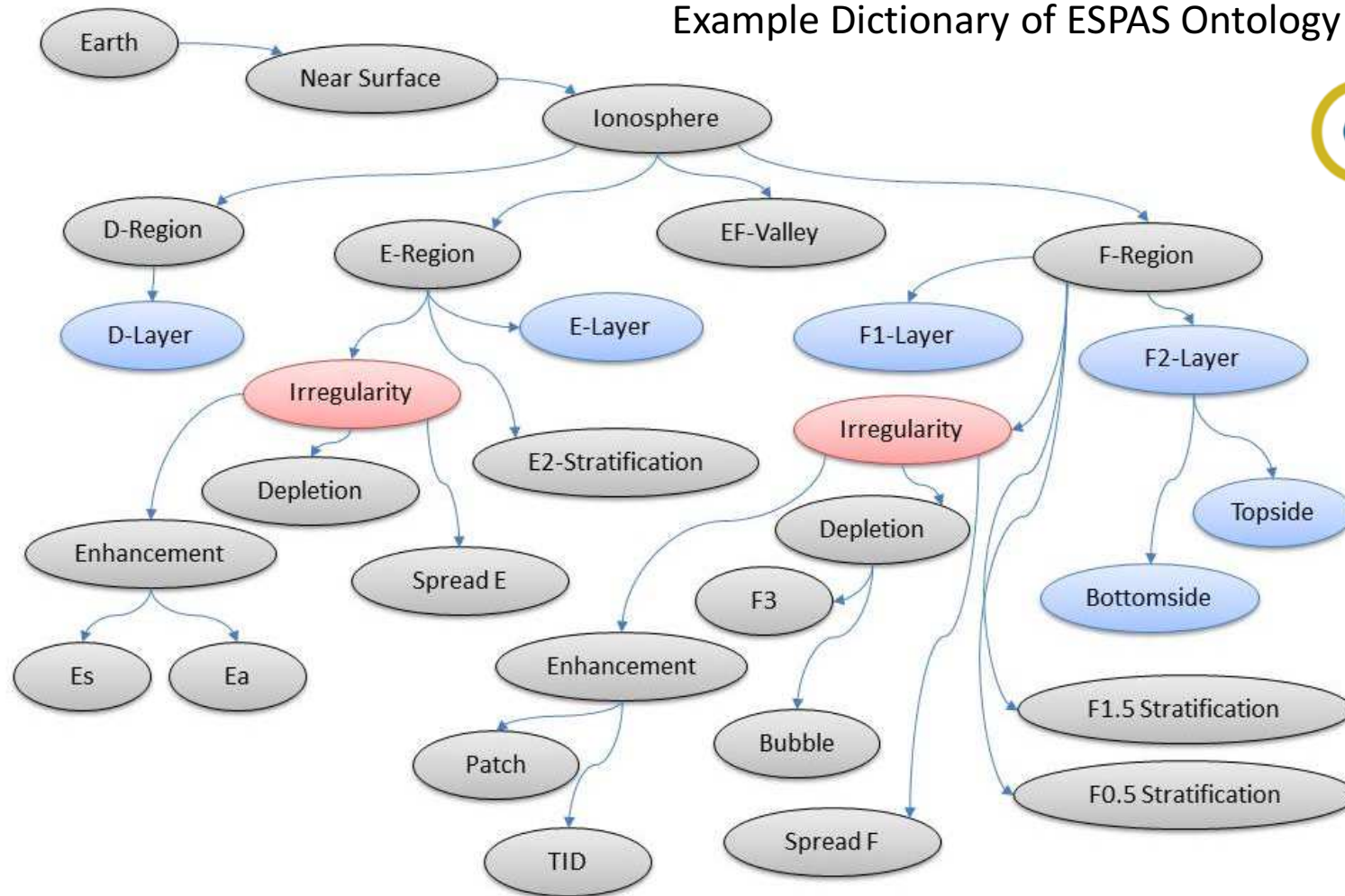


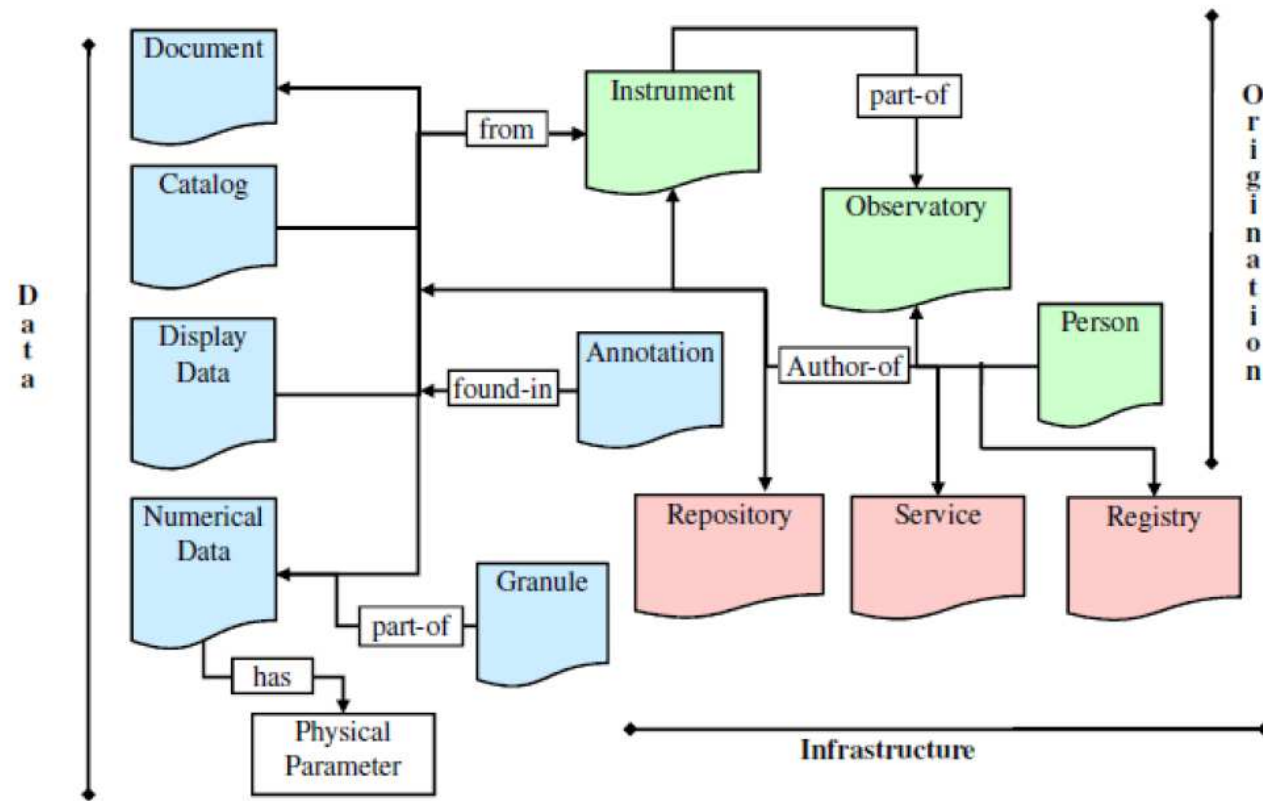
International Organization for Standardization

ISO O&M Data Model

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Example Dictionary of ESPAS Ontology





VWO
and
VITMO:
based on
SPASE
model

No dictionaries for physical parameters



NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION


+ NASA Portal

+ HOME

+ ABOUT VWO

+ DOCUMENTS

+ NEWS



Virtual Wave Observatory

- QUERY

+ TUTORIALS

+ EDUCATION

+ ANNOTATION

+ EVENTS

+ RESOURCES

+ Home

VWO Query Builder

Data Source Selection

Magnetospheric State

Location

Keywords

TIME: Reset

2000-01-01T00:00:00.000Z

2000-01-02T23:59:59.999Z

SOURCES: Reset

of Observatories: 1

of Instruments: 1

of Products: 1

View Sources

INSTRUMENT SETTINGS:

GIRO

Location: (MHJ45) MILLSTONE HILL

Characteristics: F2 layer critical frequency

VWO Query Builder

version: 3.0

Instrument: GIRO Collapse

Product: Ionogram-derived Ionospheric Characteristics (1 return)

Date/Time: -

Data File: (MHJ45) MILLSTONE HILL

VWO mated to GIRO

Fast Chars on the Web

Data Product

GIRO Ionospheric Sounder

Doppler Skymap Plots

Ionogram Plots

Ionogram-derived Ionospheric Characteristics

Hide Active Instrument Attributes

IMAGE

ISIS1

ISIS2

GIRO

Location:

(LM42B) LEARMONTH

(LV12P) LOUISVALE

(MU12K) MADIMBO

(MHJ45) MILLSTONE HILL

Characteristics:

one or more of the following

F2 layer critical frequency

F1 layer critical frequency

E layer critical frequency

NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION + NASA Portal

+ HOME + ABOUT VWO + DOCUMENTS + NEWS

Virtual Wave Observatory

- QUERY + TUTORIALS + EDUCATION + ANNOTATION + EVENTS + RESOURCES

+ Home

VWO Query Builder version: 3.0

Instrument: GIRO Collapse

Product: GIRO Ionogram Plots (192 returns)

Date/Time: 2000.01.01/00:00:00.000
Data File: 2000.01.01 (001) 00:00:00.000 SL [MHJ45]

Date/Time: 2000.01.01/00:15:00.000
Data File: 2000.01.01 (001) 00:15:00.000 SL [MHJ45]

Date/Time: 2000.01.01/00:30:00.000
Data File: 2000.01.01 (001) 00:30:00.000 SL [MHJ45]

Date/Time: 2000.01.01/00:45:00.000
Data File: 2000.01.01 (001) 00:45:00.000 SL [MHJ45]

Date/Time: 2000.01.01/01:00:01.000
Data File: 2000.01.01 (001) 01:00:01.000 SL [MHJ45]

Date/Time: 2000.01.01/01:15:00.000
Data File: 2000.01.01 (001) 01:15:00.000 SL [MHJ45]

Date/Time: 2000.01.01/01:30:00.000
Data File: 2000.01.01 (001) 01:30:00.000 SL [MHJ45]

Date/Time: 2000.01.01/01:45:00.000
Data File: 2000.01.01 (001) 01:45:00.000 SL [MHJ45]

Date/Time: 2000.01.01/02:00:00.000
Data File: 2000.01.01 (001) 02:00:00.000 SL [MHJ45]

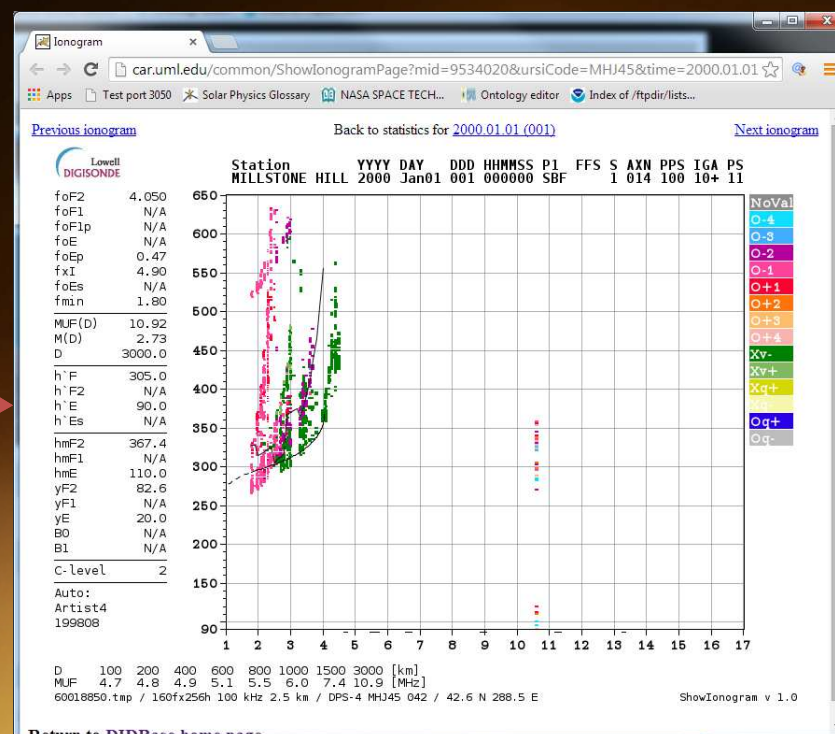
Date/Time: 2000.01.01/02:15:00.000
Data File: 2000.01.01 (001) 02:15:00.000 SL [MHJ45]

TIME: Reset
2000-01-01T00:00:00.000Z
2000-01-02T23:59:59.999Z

SOURCES: Reset
of Observatories: 1
of Instruments: 1
of Products: 1
View Sources

INSTRUMENT SETTINGS:
GIRO
Location: (MHJ45) MILLSTONE HILL
Characteristics: F2 layer critical frequency

VWO mated to GIRO Ionogram Display








Query Summary

Preview & Selection

Select the Products you wish to Preview or Download

Preview the search result products that match your VITMO Query and select the ones you wish to download.



Click on the expand ,  and selection ,  icons and checkboxes to expand, preview, or select the search results you wish to download.

0 of 1 search results are selected.



Group Results by: ☒ Name ☐ Region ☐ Parameter

Restrict Results to: ☒ All Results ☐ Data ☐ Summary Images

Search Results    

 GIRO     (1 product, 0 files selected)

  GIRO: GIRO Ionospheric Data (GIRO)     (0 files selected)

  GIRO [\[expand...\]](#)

Download Summary

Download Zip File Contents

The product files that have been selected for download.

No Search Results Selected.

 [Edit VITMO Query](#)

 [Start Over](#)

Generate results for the following user defined parameter(s):



URSI Station Code:

- ☒ foF2 The ordinary wave critical frequency of the highest stratification in the F region (foF2)
- ☐ hF2 The minimum virtual height of the ordinary wave trace for the highest stable stratification in the F region (hF2)
- ☒ foF1 The ordinary wave F1 critical frequency (foF1)
- ☐ hF The minimum virtual height of the ordinary wave trace taken as a whole (hF)
- ☐ foE The ordinary wave critical frequency of the lowest thick layer which causes a discontinuity (foE)
- ☐ foEa The critical frequency of night time auroral E layer (foEa)
- ☐ hF The minimum virtual height of the normal E layer trace (hF)

Query Summary

Preview & Selection

Select the Products you wish to Preview or Download

Preview the search result products that match your VITMO Query and select the ones you wish to download.

1 of 3 search results are selected. (Estimated 377B selected for download)

Group Results by: ☒ Name ☐ Region ☐ Parameter

Restrict Results to: ☒ All Results ☐ Data ☐ Summary Images

Search Results ☒ ☒ ☒ ☒

☒ GIRO ☒ ☒ ☒ (1 product, 1 file selected)

☒ GIRO: GIRO Ionospheric Data (GIRO) ☒ ☒ ☒ (1 file selected)

☐ GIRO [expand...]

☒ 2011 DOY 297 00:00:00 to 298 00:00:00 [C1] ☒ ☒ (1 of 2)

☒ 2011_DOY_297-[00].txt

☐ Remote Web App Invocation 00 - 2011 DOY 298 00:00:00

Download Summary

Download Zip File Contents

The product files that have been selected for download.

To download these selections to your computer as a single zip file, click the Download Selections button below...

• GIRO

• GIRO Ionospheric Data

Selection Overview

Preview Search Results as they are selected (Images, URLs, and timeseries plots & tables) and monitor temporal, regional, & result type coverages in the overall selection set.

PREVIEW OVERVIEW TIMELINE

GIRO Ionospheric Data

```
# Global Ionospheric Radio Observatory
# GIRO Tabulated Ionospheric Characteristics, Version 1.0 Revision B
# Generated by DIBGetValues on 2014-05-09T18:34:20.086Z
#
# Location: GEO 52.4N 104.3E, URSI-Code IR352 IRKUTSK
# Instrument: Ionosonde, Model: DPS-4
#
# Query for measurement intervals of time:
# 2011-10-24T00:00:00.085Z - 2011-10-24T23:59:59.085Z
#
# Data Selection:
# CS is Autoscaling Confidence Score (from 0 to 100, 999 if manual scaling, -1 if unknown)
# foF2 [MHz] - F2 layer critical frequency
# foF1 [MHz] - F1 layer critical frequency
# foE [MHz] - E layer critical frequency
# hF2 [km] - Minimum virtual height of F2 trace
# zhalfNm [km] - The true height at half the maximum density in the F2-layer
#
```

[2011_DOY_297-\[00\].txt](#)

[Available]

What good is it?

- We place our data into the framework of major eScience projects
 - Greater visibility
 - Additional tools (conjunctions, context search, content search)
 - Potential for great science

Coincidences and Conjunctions

- Scientists like to mix-and-match data from various observatories and instruments
 - eScience is the right environment
- Coincidence: matching by time; conjunction: matching by location
 - Collaborative experiments!
 - Auroral E ionization study
 - RPI+GIRO, COSMIC+GIRO, UV+GIRO, etc.
- What we REALLY need is matching by interesting features
 - We must learn how to answer questions “Do you see anything outstanding at this time?”
 - More about this during presentation “Intelligent Archive Technologies”

Dalu

감사합니다

Gracias Danke Ευχαριστίες

THANK YOU

Obrigado

Köszönöm

Tack Grazie Спасибо Dank 谢谢 Merci ありがとう

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