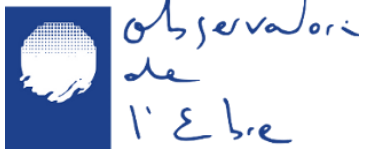
Access to OE DataCollections

Víctor Navas, Toni Segarra, David Altadill

Observatori de l'Ebre (OE)



Training for Partners #4, 12-13 September 2023, London

What was written in the proposal?

- ***Bottomside Thickness***

Models for the thickness and shape of the bottom-side of the F2 layer, B0 and B1 respectively, for quiet conditions. The models have been validated and they are used by the IRI model as the recommended option. (Altadill et al. 2009; Bilitza et al. 2014).

B0B1_qModel (https://esc.pithia.eu/data-collections/DataCollection_OE_B0B1_qModel/)

- ***F-peak height***

Model for the density peak height, hmF2, for quiet conditions. The model has been validated and used by the IRI as the recommended option. (Altadill et al. 2013; Bilitza et al. 2017).

hmF2_qModel (https://esc.pithia.eu/data-collections/DataCollection_hmF2_qModel/)

- ***Equatorial Plasma Detection***

Equatorial Plasma Detection method (Blanch et al., 2018) is able to identify the occurrence of Equatorial Plasma Bubbles (EPBs) with data gathered from receivers of Global Navigation Satellite System (GNSS).

EPB_detectionTool (https://esc.pithia.eu/data-collections/DataCollection_OE_EPB_detectionTool/)

Bottomside Thickness (B0B1_qModel)

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B0B1_qModel

The B0B1 Model calculates the thickness B0 (km) and shape B1 (dimensionless) parameters of the F layer under quiet conditions on the basis of climatological models. By using the predicted smoothed sunspot number and the newest IGRF coefficients at any location distributed along the used range of latitudes (70N–70S). Model parameters can be computed either to reproduce already observed values or to perform predictions until December 2029.

Interact

Interaction Method	Description	Data Format	Link
Direct Link to Data Collection	The B0B1 Model calculates the thickness B0 (km) and shape B1 (dimensionless) parameters of the F layer under quiet conditions on the basis of climatological models.	application/json (click the link to show information on this ontology term)	Open B0B1_qModel API in new tab
API	The B0B1 Model calculates the thickness B0 (km) and shape B1 (dimensionless) parameters of the F layer under quiet conditions on the basis of climatological models.	N/A	Open API Interface in new tab

Identifier Properties

Local ID	DataCollection_OE_B0B1_qModel
Namespace	oe
Version	1
Created	Thursday 20th April 2023, 12:00:00
Last Modified	Thursday 20th April 2023, 12:00:00

Two access methods:

- external API
- integrated API

Bottomside Thickness (B0B1_qModel)

External API

B0B1qModel API 0.1.0 OAS3

/thickness_API/openapi.json

B0B1 qModel API

Endpoints

You will be able to run the B0B1 quiet Model (B0B1qModel) to obtain B0 and B1 coefficients.

- **Generate csv files**
  - Time series file for a given year: month, hour, latitude, longitude, B0 (km), B1 (dimensionless)
  - Heatmap snapshot file for a given year, month an hour at a specified spatial window: month, hour, latitude, longitude, B0 (km), B1 (dimensionless)
- **Generate plots of B0 (km)**
  - Time series plot for a given year
  - Heatmap snapshot
  - Heatmap daily animation

Notes:

- Values of B1 are provided in data files but they are not shown in the plots.
- **Model validity**: The model is able to perform predictions until 2030 (not included).
- The International Geomagnetic Reference Field (IGRF) used in this model is valid until 2025 (included). Note that those predictions for years between 2026 and 2029 (both included) can be computed but IGRF values may be of reduced accuracy.

Servers: /thickness_API

Time series file B0B1qModel Returns a csv file for the monthly averages of the thickness model coefficients (B0,B1) at different hours

GET /B0B1qModel_time_series_file/ B0B1qModel Time Series File Response

Time series plot B0B1qModel Returns a plot for the monthly averages of the thickness model coefficient B0 (km)s at different hours

GET /B0B1qModel_time_series_plot/ B0B1qModel Time Series Plot

Heatmap snapshot file B0B1qModel Returns a csv file for different latitudes and longitudes of the monthly averaged Thickness model coefficients (B0,B1) at an hour for a certain spatial time window

GET /B0B1qModel_map_file/ B0B1qModel Map File

Heatmap snapshot B0B1qModel Returns a heatmap of the monthly averaged Thickness model B0 coefficient (km) at an hour for a certain spatial time window

GET /B0B1qModel_map/ B0B1qModel Map File

Heatmap daily animation B0B1qModel Returns an hourly animation of the monthly averaged monthly averaged Thickness model B0 coefficient (km) for a certain spatial time window. The execution may take a while. You can go for a coffee if you want.

GET /B0B1qModel_map_gif/ B0B1qModel Map Gif

Integrated API

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Interact with Data Collection via API

B0B1_qModel

B0B1qModel API

B0B1 qModel API

Endpoints

You will be able to run the B0B1 quiet Model (B0B1qModel) to obtain B0 and B1 coefficients.

- **Generate csv files**
  - Time series file for a given year: month, hour, latitude, longitude, B0 (km), B1 (dimensionless)
  - Heatmap snapshot file for a given year, month an hour at a specified spatial window: month, hour, latitude, longitude, B0 (km), B1 (dimensionless)
- **Generate plots of B0 (km)**
  - Time series plot for a given year
  - Heatmap snapshot
  - Heatmap daily animation

Notes:

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Search endpoint by nan

/Time series file B0B1qModel
Returns a csv file for the monthly averages of the thickness model coefficients (B0,B1) at different hours
Show/hide details

/Time series plot B0B1qModel
Returns a plot for the monthly averages of the thickness model coefficient B0 (km)s at different hours
Show/hide details

/Heatmap snapshot file B0B1qModel
Returns a csv file for different latitudes and longitudes of the monthly averaged Thickness model coefficients (B0,B1) at an hour for a certain spatial time window
Show/hide details

/Heatmap snapshot B0B1qModel
Returns a heatmap of the monthly averaged Thickness model B0 coefficient (km) at an hour for a certain spatial time window
Show/hide details

/Heatmap daily animation B0B1qModel
Returns an hourly animation of the monthly averaged monthly averaged Thickness model B0 coefficient (km) for a certain spatial time window. The execution may take a while. You can go for a coffee if you want.
Show/hide details

Bottomside Thickness (B0B1_qModel)

/Time series plot B0B1qModel

Returns a plot for the monthly averages of the thickness model coefficient B0 (km)s at different hours

Show/hide details

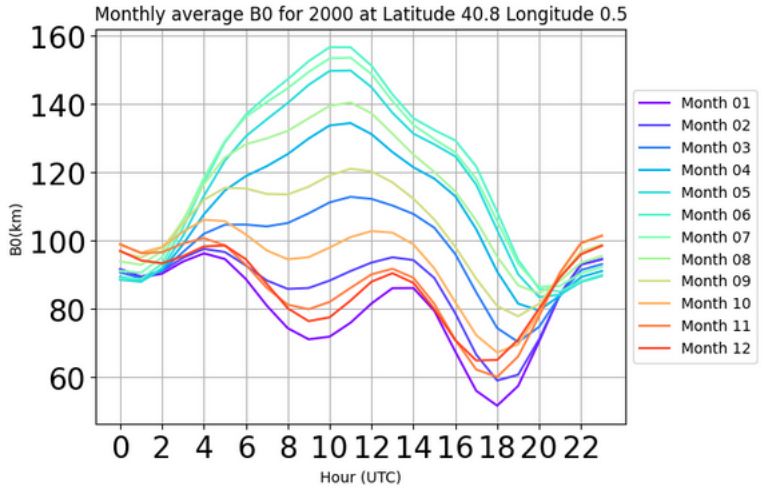
Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
latitude number (query)	Insert a latitude in range [-70,+70] 40.8
longitude number (query)	Insert a longitude in range [-180,+180] 0.5

Run /B0B1QMODEL_TIME_SERIES_PLOT/ Clear Outputs

Outputs



Model for the thickness (B0) and shape (B1) of the bottom-side of the F2 layer for **quiet conditions**.

Input: date, latitude and longitude

Output:

- Time series
  - csv file
  - Timeseries plot

/Time series file B0B1qModel

Returns a csv file for the monthly averages of the thickness model coefficients (B0,B1) at different hours

Show/hide details

Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
latitude number (query)	Insert a latitude in range [-70,+70] 40.8
longitude number (query)	Insert a longitude in range [-180,+180] 0.5

Run /B0B1QMODEL_TIME_SERIES_FILE/ Clear Outputs

Outputs

Download

month	hour (UTC)	lat (deg)	lon (deg)	b0 (km)	b1 (dimensionless)
1	0	40.8	0.5	91.63	2.67
1	1	40.8	0.5	89.25	2.58
1	2	40.8	0.5	90.36	2.61
1	3	40.8	0.5	93.91	2.73
1	4	40.8	0.5	96.31	2.91
1	5	40.8	0.5	94.66	3.09
1	6	40.8	0.5	88.80	3.21
1	7	40.8	0.5	81.02	3.20
1	8	40.8	0.5	74.39	3.07
1	9	40.8	0.5	71.13	2.82
1	10	40.8	0.5	71.91	2.51
1	11	40.8	0.5	75.99	2.21
1	12	40.8	0.5	81.63	1.98
1	13	40.8	0.5	86.12	1.89
1	14	40.8	0.5	86.15	1.95
1	15	40.8	0.5	79.49	2.16
1	16	40.8	0.5	67.54	2.47
1	17	40.8	0.5	56.04	2.81
1	18	40.8	0.5	51.69	3.10

Bottomside Thickness (B0B1_qModel)

/Heatmap snapshot B0B1qModel

Returns a heatmap of the monthly averaged Thickness model B0 coefficient (km) at an h

Show/hide details

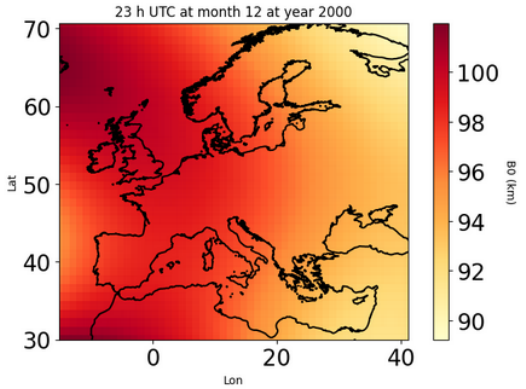
Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
month integer (query)	Insert a month in range [1,12] 12
hour integer (query)	Insert an hour in range [0,23] 23
lat_min number (query)	Insert a latitude in range [-70,+70] 30
lat_max number (query)	Insert a latitude in range [-70,+70] 70
lon_min number (query)	Insert a longitude in range [-180,+180] -15
lon_max number (query)	Insert a longitude in range [-180,+180] 40

Run /B0B1QMODEL_MAP/ Clear Outputs

Outputs



Input: date, latitude and longitude

Output:

- Maps
  - csv file
  - Heatmap snapshot

Input: date, latitude and longitude

Output:

- Heatmap daily animation (NOT SHOWN)

/Heatmap snapshot file B0B1qModel

Returns a csv file for different latitudes and longitudes of the monthly averaged

Show/hide details

Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
month integer (query)	Insert a month in range [1,12] 12
hour integer (query)	Insert an hour in range [0,23] 23
lat_min number (query)	Insert a latitude in range [-70,+70] 30
lat_max number (query)	Insert a latitude in range [-70,+70] 70
lon_min number (query)	Insert a longitude in range [-180,+180] -15
lon_max number (query)	Insert a longitude in range [-180,+180] 40

Run /B0B1QMODEL_MAP_FILE/ Clear Outputs

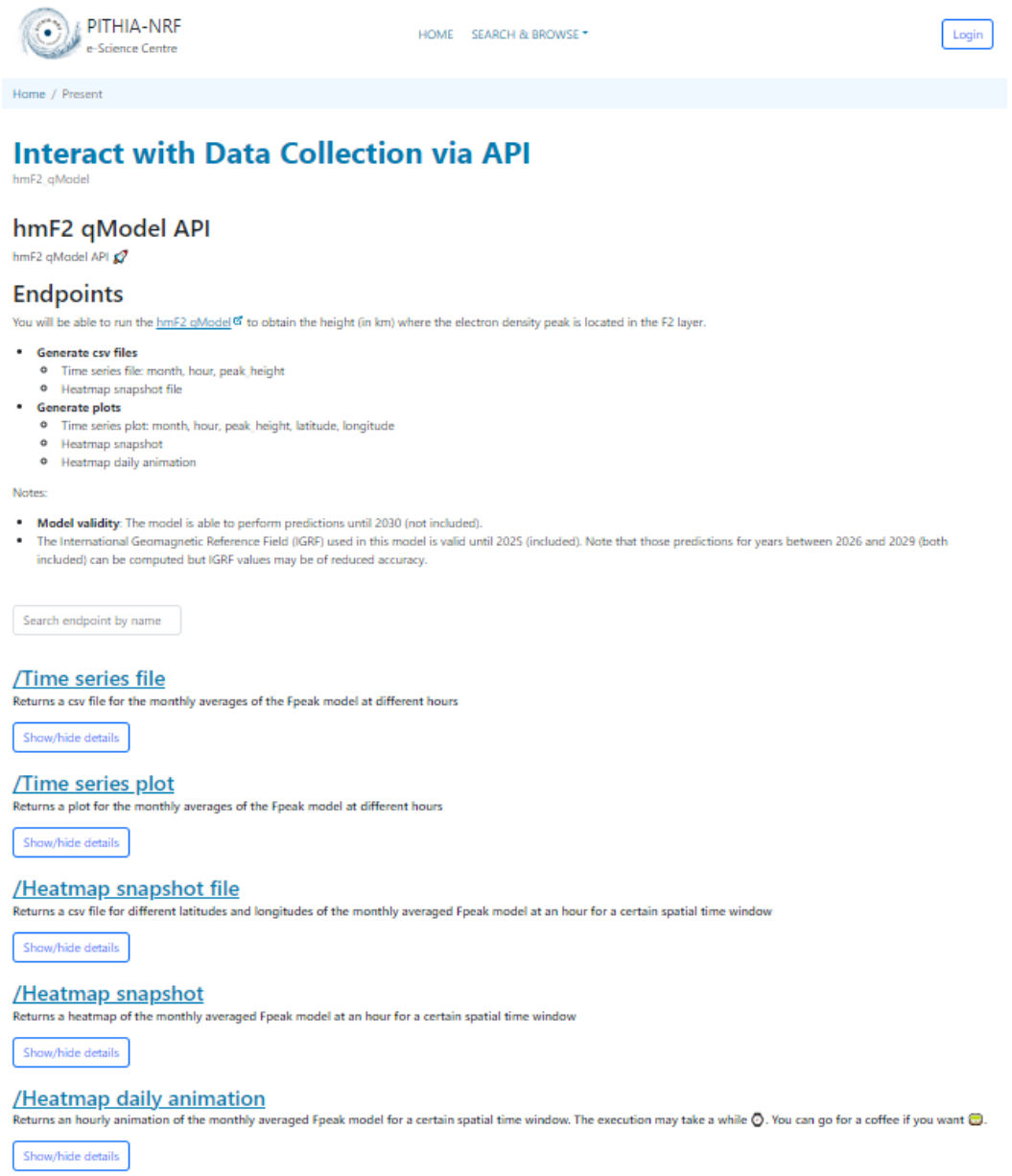
Outputs

Download

month	hour (UTC)	lat (deg)	lon (deg)	b0 (km)	b1 (dimensionless)
12	23	30.0	-15.0	101.72	3.58
12	23	30.0	-13.9	101.77	3.58
12	23	30.0	-12.8	101.79	3.57
12	23	30.0	-11.7	101.79	3.57
12	23	30.0	-10.6	101.75	3.56
12	23	30.0	-9.5	101.70	3.56
12	23	30.0	-8.4	101.61	3.55
12	23	30.0	-7.3	101.51	3.55
12	23	30.0	-6.2	101.38	3.54
12	23	30.0	-5.1	101.22	3.53
12	23	30.0	-4.0	101.05	3.53
12	23	30.0	-2.9	100.85	3.52
12	23	30.0	-1.8	100.63	3.51
12	23	30.0	-0.7	100.40	3.50
12	23	30.0	0.4	100.15	3.50
12	23	30.0	1.5	99.88	3.49
12	23	30.0	2.6	99.60	3.48

F-peak height (hmF2_qModel)

- Model for the density peak height, hmF2, for **quiet conditions.**
- Also, two access methods, external and integrated API
- Outputs of the model
  - Timeseries
    - csv file
    - Timeseries plot
  - Heatmap snapshots
    - csv file
    - Plot maps
  - Daily heatmap animation



F-peak height (hmF2_qModel)

/Time series plot

Returns a plot for the monthly averages of the Fpeak model at different hours

Show/hide details

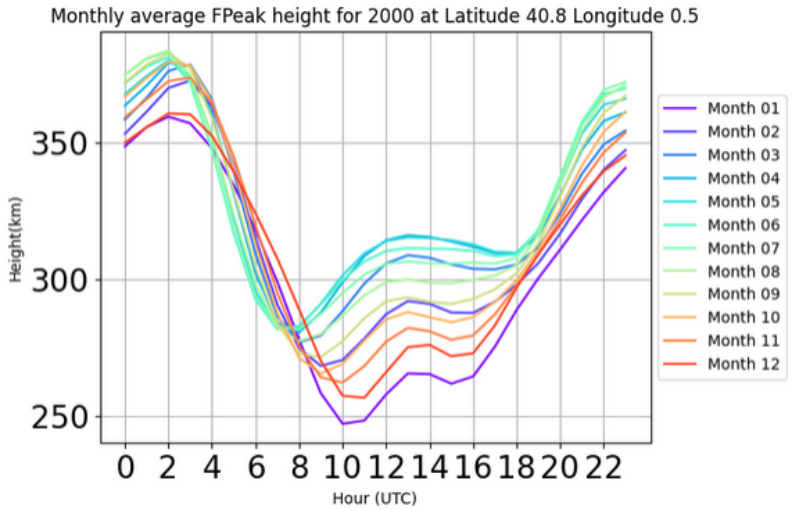
Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030) 2000
latitude number (query)	Insert a latitude in range [-70,+70] 40.8
longitude number (query)	Insert a longitude in range [-180,+180] 0.5

Run /HMF2_TIME_SERIES_PLOT/ Clear Outputs

Outputs



Input: date, latitude and longitude

Output:

- Time series
  - csv file
  - Timeseries plot

/Time series file

Returns a csv file for the monthly averages of the Fpeak model at different hours

Show/hide details

Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030) 2000
latitude number (query)	Insert a latitude in range [-70,+70] 40.8
longitude number (query)	Insert a longitude in range [-180,+180] 0.5

Run /HMF2_TIME_SERIES_FILE/ Clear Outputs

Outputs

Download

month	hour (UTC)	lat (deg)	lon (deg)	fpeak (km)
1	0	40.8	0.5	348.68
1	1	40.8	0.5	355.79
1	2	40.8	0.5	359.57
1	3	40.8	0.5	357.09
1	4	40.8	0.5	348.01
1	5	40.8	0.5	334.44
1	6	40.8	0.5	318.13
1	7	40.8	0.5	299.12
1	8	40.8	0.5	277.90
1	9	40.8	0.5	258.34
1	10	40.8	0.5	247.14

F-peak height (hmF2_qModel)

/Heatmap snapshot

Returns a heatmap of the monthly averaged Fpeak model at an hour for a certain spatial time window

Show/hide details

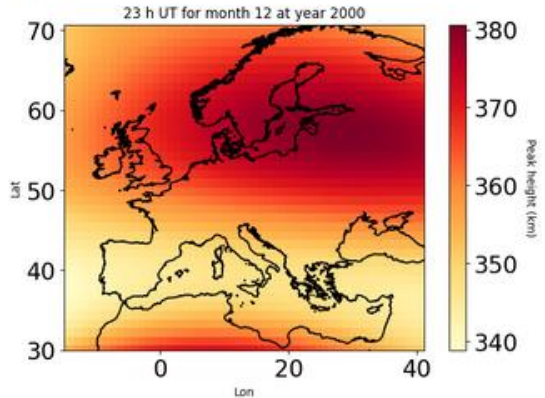
Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
month integer (query)	Insert a month in range [1,12] 12
hour integer (query)	Insert an hour in range [0,23] 23
lat_min number (query)	Insert a latitude in range [-70,+70] 30
lat_max number (query)	Insert a latitude in range [-70,+70] 70
lon_min number (query)	Insert a longitude in range [-180,+180] -15
lon_max number (query)	Insert a longitude in range [-180,+180] 40

Run /HMF2_MAP/ Clear Outputs

Outputs



Input: date, latitude and longitude

Output:

- Maps
  - csv file
  - Heatmap snapshot

Input: date, latitude and longitude

Output:

- Heatmap daily animation (NOT SHOWN)

/Heatmap snapshot file

Returns a csv file for different latitudes and longitudes of the

Show/hide details

Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [1900,2030] 2000
month integer (query)	Insert a month in range [1,12] 12
hour integer (query)	Insert an hour in range [0,23] 23
lat_min number (query)	Insert a latitude in range [-70,+70] 30
lat_max number (query)	Insert a latitude in range [-70,+70] 70
lon_min number (query)	Insert a longitude in range [-180,+180] -15
lon_max number (query)	Insert a longitude in range [-180,+180] 40

Run /HMF2_MAP_FILE/ Clear Outputs

Outputs

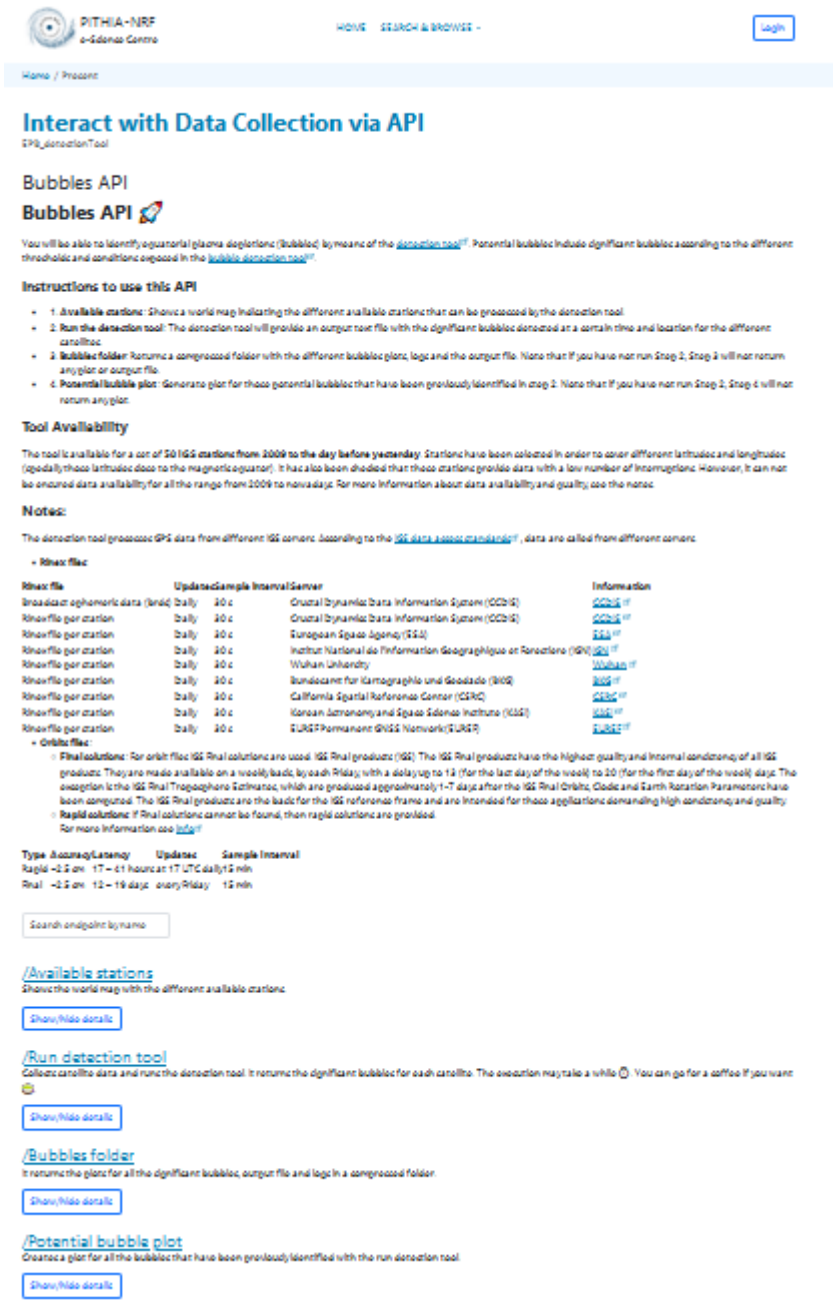
Download

month	hour (UTC)	lat (deg)	lon (deg)	fpeak (km)
12	23	30.0	-15.0	353.53
12	23	30.0	-13.9	355.14
12	23	30.0	-12.8	356.70
12	23	30.0	-11.7	358.21
12	23	30.0	-10.6	359.65
12	23	30.0	-9.5	361.03
12	23	30.0	-8.4	362.34

Equatorial Plasma Detection (EPB_detectionTool)

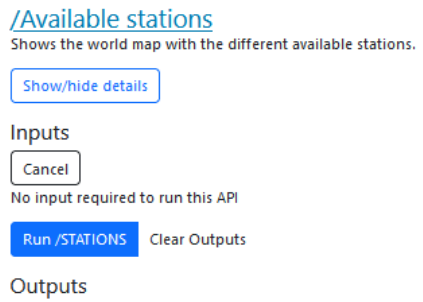
- Equatorial Plasma Detection method is able to identify the occurrence of Equatorial Plasma Bubbles (EPBs) with data gathered from receivers of Global Navigation Satellite System (GNSS).

- Also, two access methods, external and integrated API



Equatorial Plasma Detection (EPB_detectionTool)

- First endpoint stations
  - Returns a ma **stations fron day before y**
- Issue with the map in the int



Equatorial Plasma Detection (EPB_detectionTool)

- Second endpoint: detection tool
  - Collects satellite data for a single station
  - Returns the significant bubbles for each satellite
  - Could take some time

/Run detection tool

Collects satellite data and runs the detection tool. It returns the significant bubbles for each satellite. The execution may take a while. You can go for a coffee if you want.

Show/hide details

Inputs

Cancel

Name	Description
year integer (query)	Insert a year in range [2009,2023] 2023
doy integer (query)	Insert a day of the year in range [1,366] 50
station string (query)	Insert a station in the list glps

Run /BUBBLES_RUN_DETECTION_TOOL/ Clear Outputs

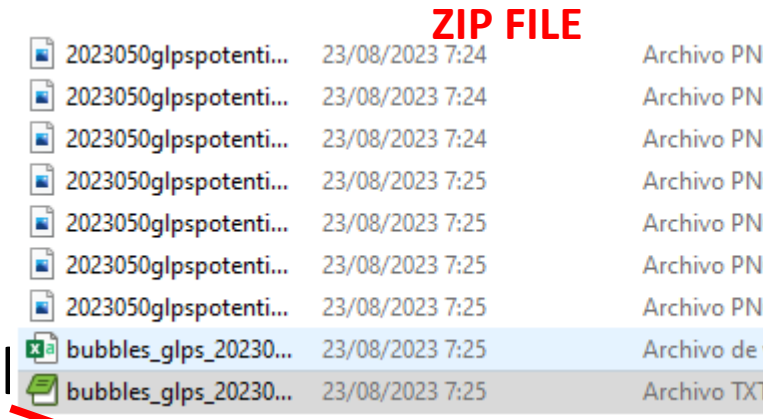
Outputs

Download

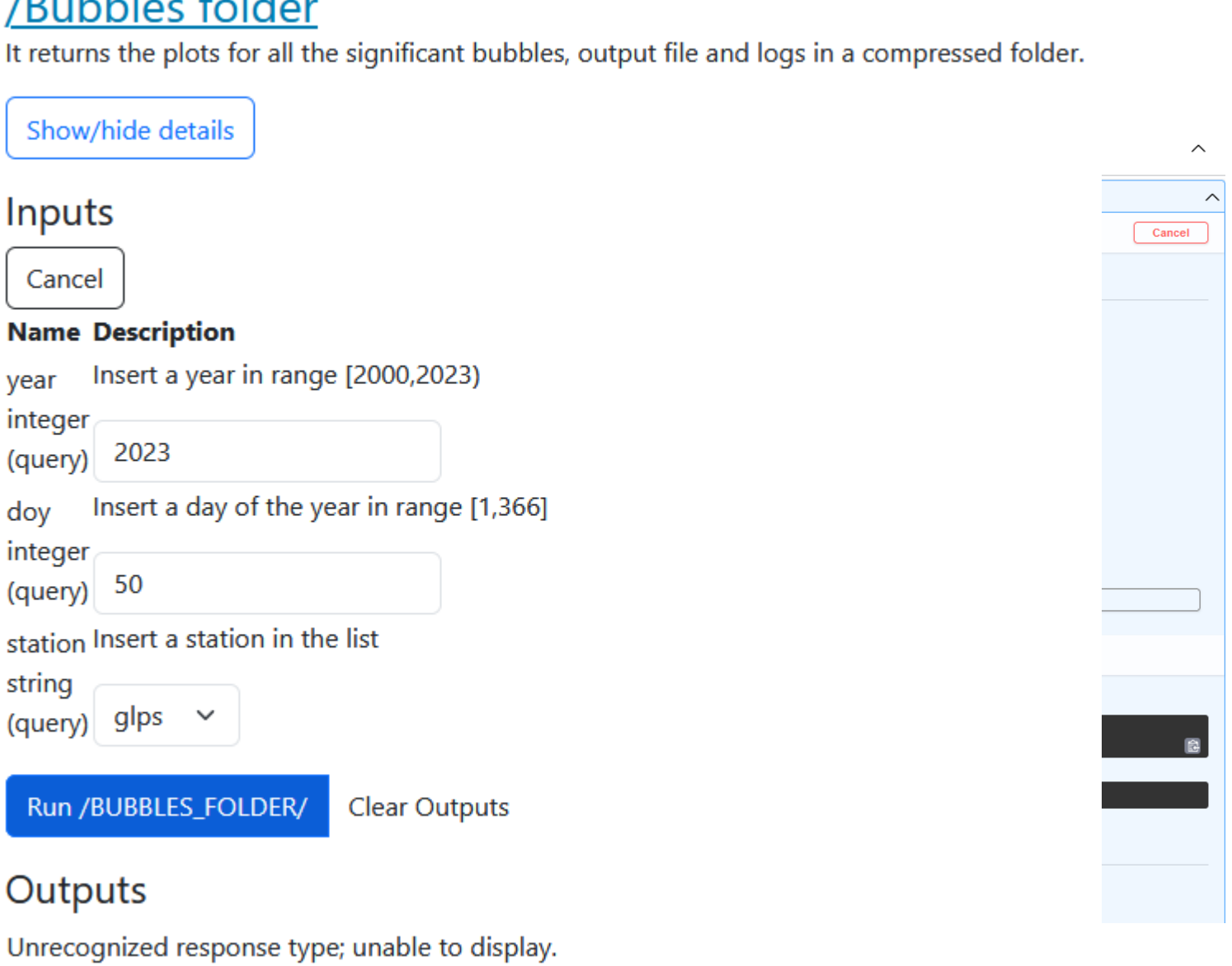
```
*** 7 BUBBLES DETECTED at STATION glps LAT -0.738 LON -90.304***

 ********************************************** Significant BUBBLE 1 **********************************************

 PRN =  12
 t0 (s) =  9450  s
 tf (s) =  16050  s
 duration =  110.0  min
 depth_MAX =  -51.067300514800486  TECU

  Time (s)  Depth (TECU)     Lat      Lon
     9450      0.024805  0.0043 -91.7742
     9480      0.013462 -0.0100 -91.7722
     9510     -0.026229 -0.0242 -91.7703
     9540     -0.078368 -0.0384 -91.7683
     9570     -0.127454 -0.0526 -91.7664
     9600     -0.157189 -0.0667 -91.7645
     9630     -0.189172 -0.0808 -91.7626
     9660     -0.235203 -0.0949 -91.7607
     9690     -0.278481 -0.1090 -91.7589
     9720     -0.330508 -0.1230 -91.7570
     9750     -0.394683 -0.1370 -91.7552
```

Equatorial Plasma Detection (EP

- Third endpoint: bubbles folder

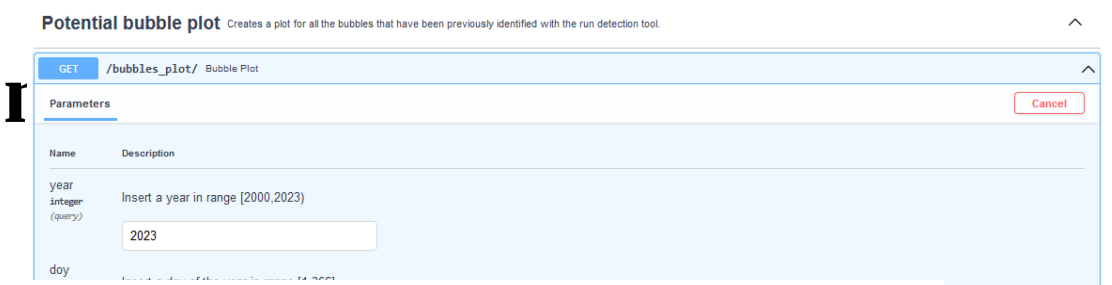


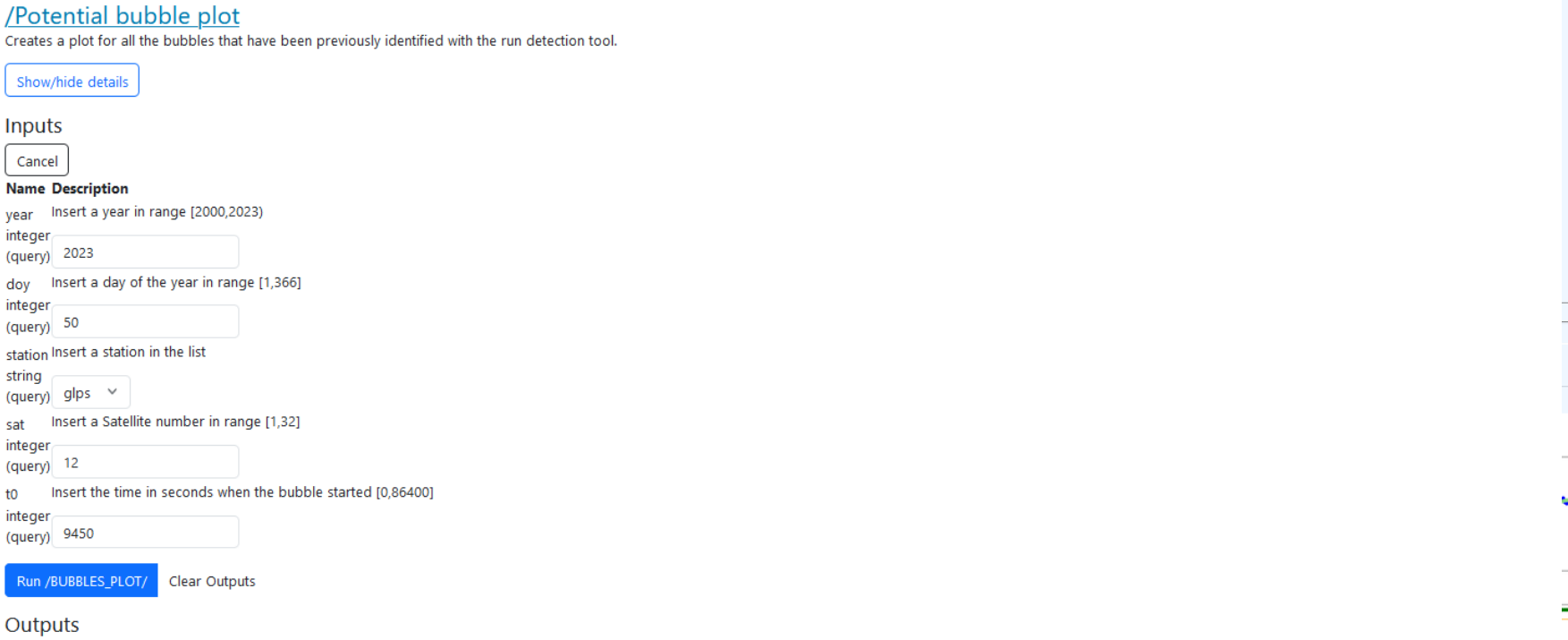
- I
API:
  - Unrecognized zip file

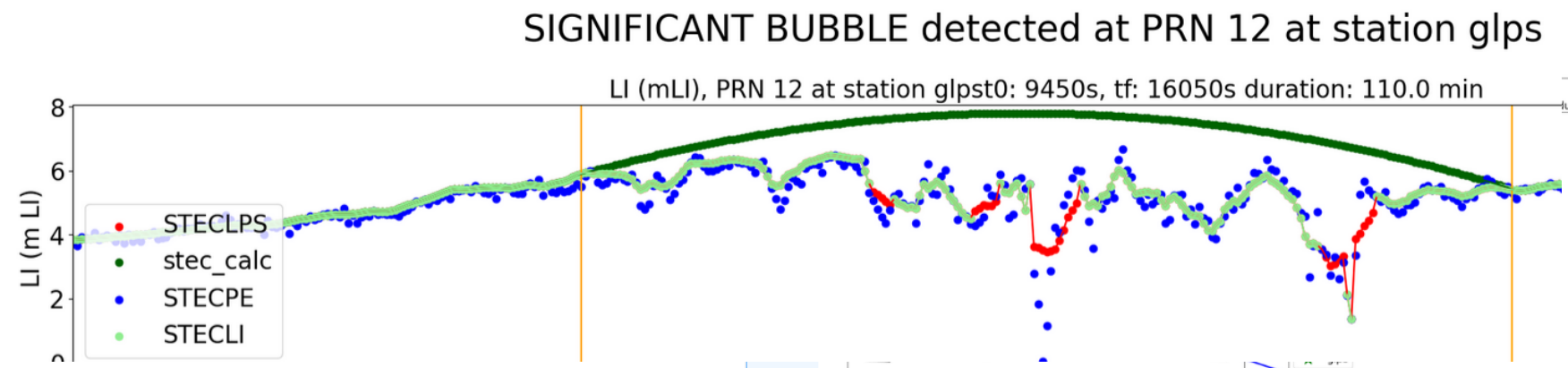


Equatorial Plasma Detection (EPB_detectionTool)

- Fourth endp
  - Input: sate from the se
  - Returns plo STEC, the p and the tra
- Issue with th the integrate







Conclusions

- B0B1_qModel and hmF2_qModel ready to keep only the integrated API
- EPB_detectionTool integrated API needs to be improved:
  - Figure size
  - Zip format

- How to deal with a large number of demands in the API?

Thank you for your attention!

WEB: https://www.pithia-nrf.eu

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