



STAX project:

Data processing and viewing software

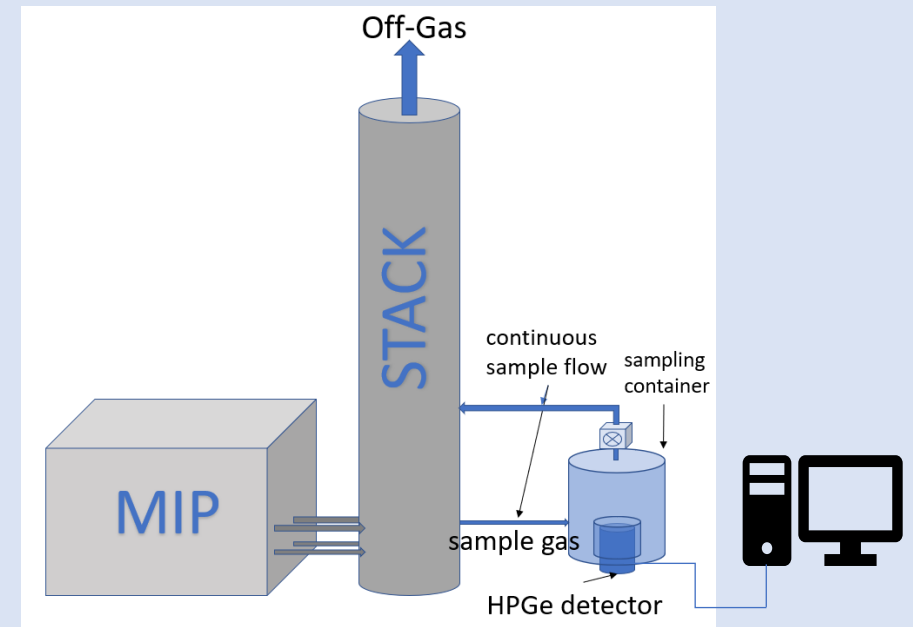
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STAX overview

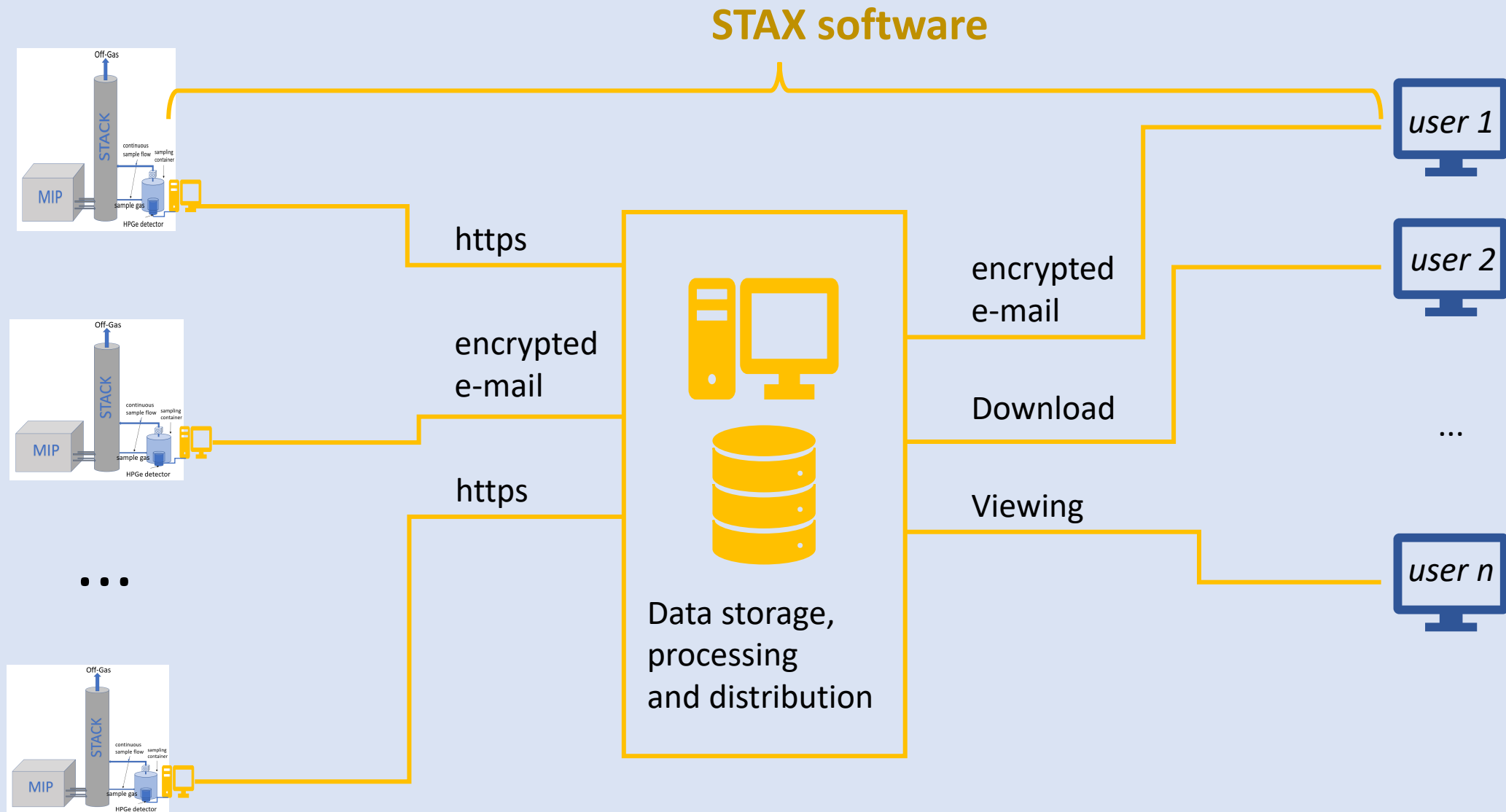
- The STAX (Source Term Analysis of Xenon) is an experimental network to detect and quantify radionuclide emissions from medical isotope production (MIP) facilities

- Measurement is performed at the stack of MIPs using high resolution gamma spectroscopy detection systems (HPGe detectors)



- Data are transferred via secure email or https to a central data processing server

STAX network configuration



STAX data software

- Software has been developed to manage STAX processes from data back-end to front-end:

Data retrieval and
formatting

Data transmission
and distribution

Data processing and
storage

Network monitoring

Data analysis and
visualization

- Access is limited to authorized users only
- For each facility, access is given individually for each user

Data access control

- Access can be set facility specific for each user

The screenshot displays a user management interface. At the top is a blue header with the word 'Users' and a help icon. Below the header is a search bar with plus, minus, and search icons. A table lists user details with columns for Username, First Name, Last Name, Email, and various 'Receive' options (ATS, CSV, PHD, SOH, ALERT), along with Role, Enabled status, and creation/update dates. Below the table is a pagination control showing 'Page 4 of 4' and 'Displaying 31 - 40 of 40'. At the bottom, there are three panels: 'Owned Facilities', 'Assigned Facilities', and 'Available Facilities'. The 'Assigned Facilities' panel shows two entries: 'AUS02/ANSTO' (Australia) and 'BES01/Stack building' (Belgium). The 'Available Facilities' panel shows three entries: 'SES03/Forsmark F1', 'SES04/Forsmark F2', and 'SES05/Forsmark F3' (Sweden).

Username ↑	First Name	Last Name	Email	Receive ATS	Receive CSV	Receive PHD	Receive SOH	Receive ALERT	Role	Enabled	Created at	Updated at
auer	Matthias	Auer	matthias.auer.mail@...	No	No	No	No	No	Simple user	Yes	04/05/2022 14:46:57	12/05/2022 08:52:52

Owned Facilities: ? Assigned Facilities: ? Available Facilities: ?

Assigned Facilities:

- 06-12-2021: **AUS02/ANSTO** AUSTRALIA (-34.05087, 150.97886)
- 28-10-2021: **BES01/Stack building** BELGIUM (50.45131, 4.53155)

Available Facilities:

- 08-04-2022: **SES03/Forsmark F1** SWEDEN (60.40265, 18.1752833333333)
- 08-04-2022: **SES04/Forsmark F2** SWEDEN (60.4038333333333, 18.1734333333333)
- 08-04-2022: **SES05/Forsmark F3** SWEDEN (60.40535, 18.1608166666667)

- Facility owners can set delays for sending messages to allow for data review before sending

STAX data access options

- Data viewing via a web browser-based user interface



- Data forwarding via e-mail

```
▼ Detectors [1]
  ▼ 0 {5}
    Code : 13002941
    Manufacturer : Canberra
    ► Calibrations [1]
    ▼ Samples [92]
      ► 0 {4}
      ▼ 1 {4}
        SampleId : SM02202205010015
        ▼ Collection {7}
          ► CollectionPeriod {2}
          ► SampleSize {3}
```

- Data download via get_STAX_data (bash script)

```
BEGIN STX1.0
MSG_TYPE DATA
MSG_ID 856022299608988634 AUS02
DATA_TYPE SAMPLEPHD
#Header 3
AUS02 AUS02_001 P Marinelli FULL
SM02202205010010
AUS02_001-2022/05/01-01:00 AUS02_001-201.
2022/05/01 01:21:02
#Collection
2022/05/01 01:00:00.0 2022/05/01 01:15:00.0 0
#Acquisition
2022/05/01 01:00:00.0 900.000 896.436
#Sample
-999 -999
#Calibration
2022/04/20 04:06:46.0
#g_Energy
17.361800 67.000 0.000
25.158800 97.000 0.000
46.990400 181.000 0.000
69.341800 267.000 0.000
96.371400 371.000 0.000
107.807000 415.000 0.000
201.371000 775.000 0.000
309.229500 1190.000 0.000
```

STAX data types

R e s u l t s

Spectrum (PHD) files (optional)

High resolution gamma spectrum in STAX1.0 format

(similar to IMS2.0 format)

Automatic Time Series (ATS) Data

Daily summary file in json format:

- Sample data
- Measurement results
- Analysis results

S u p p l e m e n t a r y D a t a

State-of-Health (SoH) Data

Data on status of system operation:

- Temperature
- Pressures
- Power data
- ...

Alerts

Alert messages sent from the station

STAX - SRS

Atmospheric Transport Modeling results:

Source receptor sensitivity data that link emitting facilities to IMS stations

STAX data viewing software overview

STAX station information and data can be viewed on staxdata.net:

- Released activity from the stack
- Isotopic ratios
- Impact of releases on IMS stations
- Raw spectra
- Station status

staxdata.net: access to data files

The screenshot shows a web browser window with the URL `staxdata.net/#msg/list`. The page title is "Received files". On the left, there is a dark sidebar with navigation options: Received (selected), Facilities, Dashboard, Data Charts, SOH Charts, Maintenance, Resources, a user profile for "auer", and Logout. The main content area displays a table of received files with the following columns: Name, Type, Message ID, Processed, Station, Error, Created at, and Updated at. The table contains 18 rows of data, all with "Processed" status set to "Yes". The "Created at" and "Updated at" columns show timestamps from December 5, 2022. At the bottom of the page, there is a pagination control showing "Page 1 of 12450" and a status message "Displaying 1 - 25 of 311240".

Name	Type	Message ID	Processed	Station	Error	Created at ↓	Updated at
BES01_18659_PHD_202...	PHD	18659	Yes	BES01		12/05/2022 12:52:48	12/05/2022 12:52:49
AUS02_85602229960898...	PHD	856022299608989885	Yes	AUS02		12/05/2022 12:37:48	12/05/2022 12:37:49
AUS02_85602229960898...	SOH	856022299608989884	Yes	AUS02		12/05/2022 12:22:48	12/05/2022 12:24:46
AUS02_85602229960898...	PHD	856022299608989883	Yes	AUS02		12/05/2022 12:22:48	12/05/2022 12:23:59
BES01_18658_SOH_202...	SOH	18658	Yes	BES01		12/05/2022 12:22:48	12/05/2022 12:23:59
BES01_18657_PHD_202...	PHD	18657	Yes	BES01		12/05/2022 12:22:48	12/05/2022 12:23:24
BES01_18656_PHD_202...	PHD	18656	Yes	BES01		12/05/2022 12:22:48	12/05/2022 12:22:49
AUS02_85602229960898...	PHD	856022299608989882	Yes	AUS02		12/05/2022 12:07:48	12/05/2022 12:07:49
AUS02_85602229960898...	PHD	856022299608989881	Yes	AUS02		12/05/2022 11:52:48	12/05/2022 11:53:58
BES01_18655_PHD_202...	PHD	18655	Yes	BES01		12/05/2022 11:52:48	12/05/2022 11:53:24
BES01_18654_PHD_202...	PHD	18654	Yes	BES01		12/05/2022 11:52:48	12/05/2022 11:52:49
AUS02_85602229960898...	PHD	856022299608989880	Yes	AUS02		12/05/2022 11:37:48	12/05/2022 11:37:49
AUS02_85602229960898...	PHD	856022299608989879	Yes	AUS02		12/05/2022 11:22:48	12/05/2022 11:23:58
BES01_18653_PHD_202...	PHD	18653	Yes	BES01		12/05/2022 11:22:48	12/05/2022 11:23:24
BES01_18652_PHD_202...	PHD	18652	Yes	BES01		12/05/2022 11:22:48	12/05/2022 11:22:49
AUS02_85602229960898...	PHD	856022299608989878	Yes	AUS02		12/05/2022 11:07:48	12/05/2022 11:07:49
AUS02_85602229960898...	PHD	856022299608989877	Yes	AUS02		12/05/2022 10:52:48	12/05/2022 10:53:24

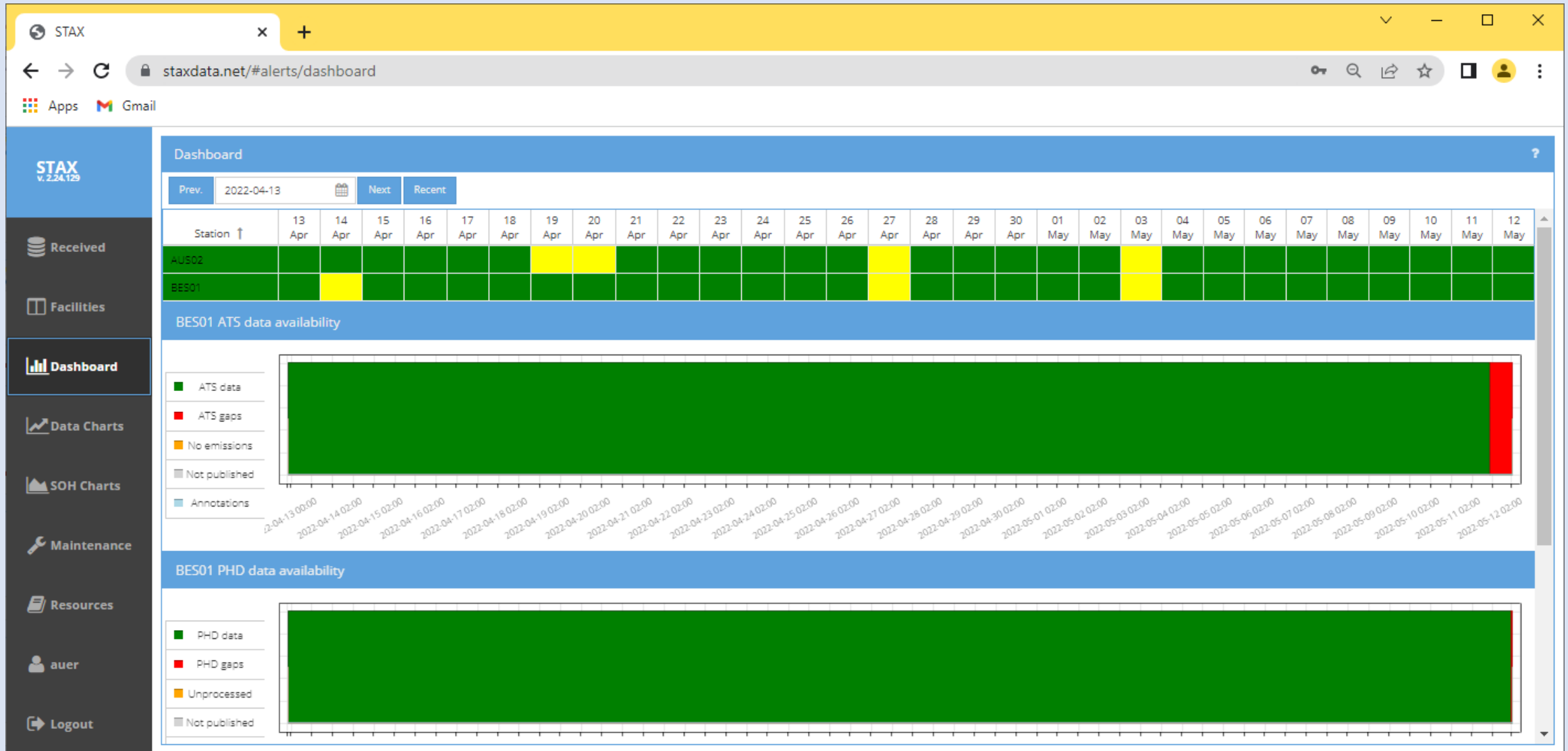
staxdata.net: station overview

The screenshot shows a web browser window with the URL `staxdata.net/#facilities/list`. The page title is "STAX v. 2.24.129". The left sidebar contains navigation links: Received, Facilities (selected), Dashboard, Data Charts, SOH Charts, Maintenance, Resources, auser, and Logout. The main content area displays a table titled "Facilities" with the following data:

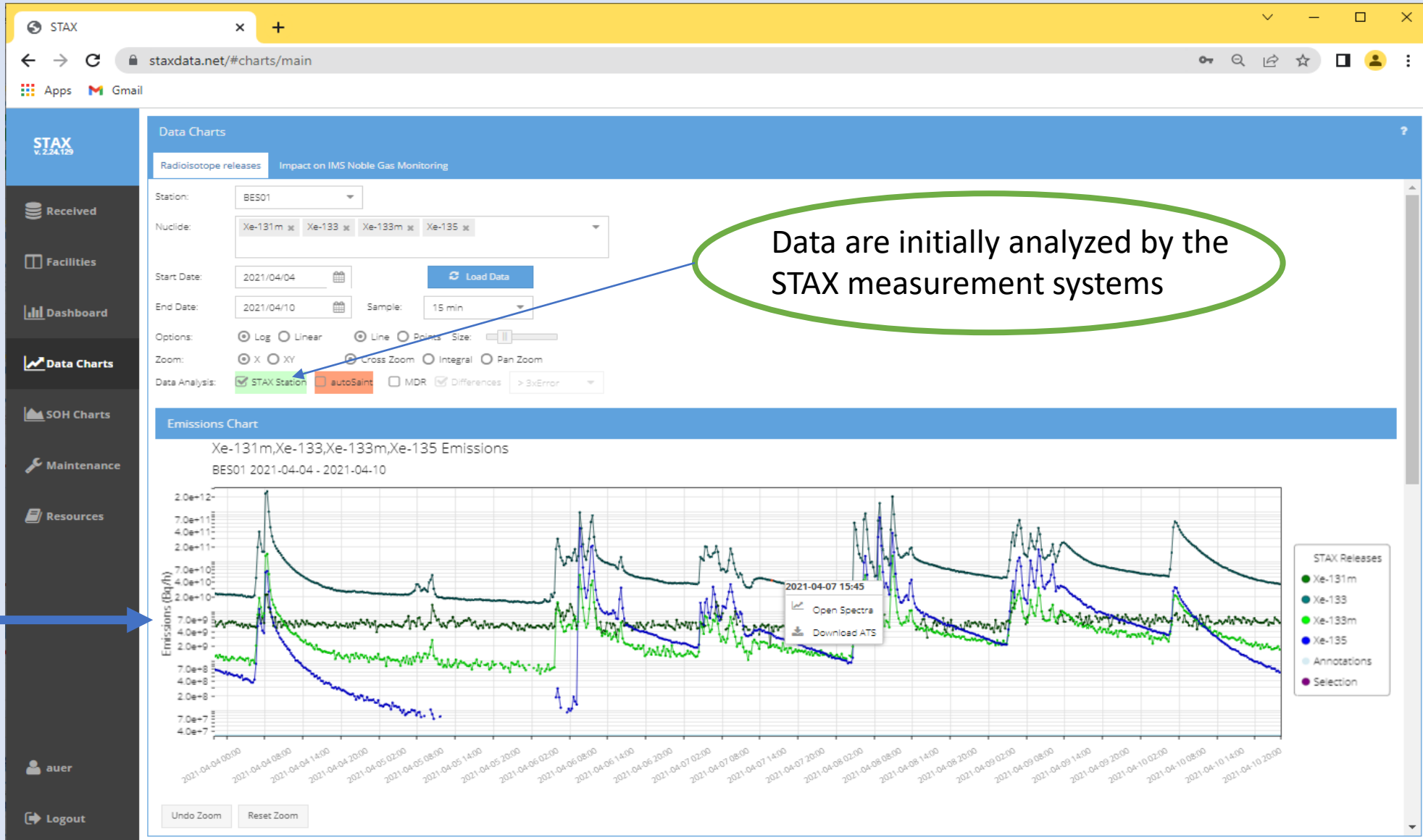
Code ↑	Network	Type	Site	Alternate N...	Country	Latitude	Longitude	Altitude	Stack Height	Publish del...	Emitter Type	Description	Realtime D...	Collection	Created at	Updated at
AUS02	STAXMON	HPGe	ANSTO	ANSTO	AUSTRALIA	-34.05087	150.97886	0	0	Immediately	MIP		Yes	900	14/08/2019 ...	06/12/2021 ...
BES01	STAXMON	HPGe	Stack building	Stack building	BELGIUM	50.45131	4.53155	175	0	Immediately	MIP		Yes	900	22/10/2019 ...	28/10/2021 ...

At the bottom of the page, there is a pagination control showing "Page 1 of 1" and a status message "Displaying 1 - 9 of 9".

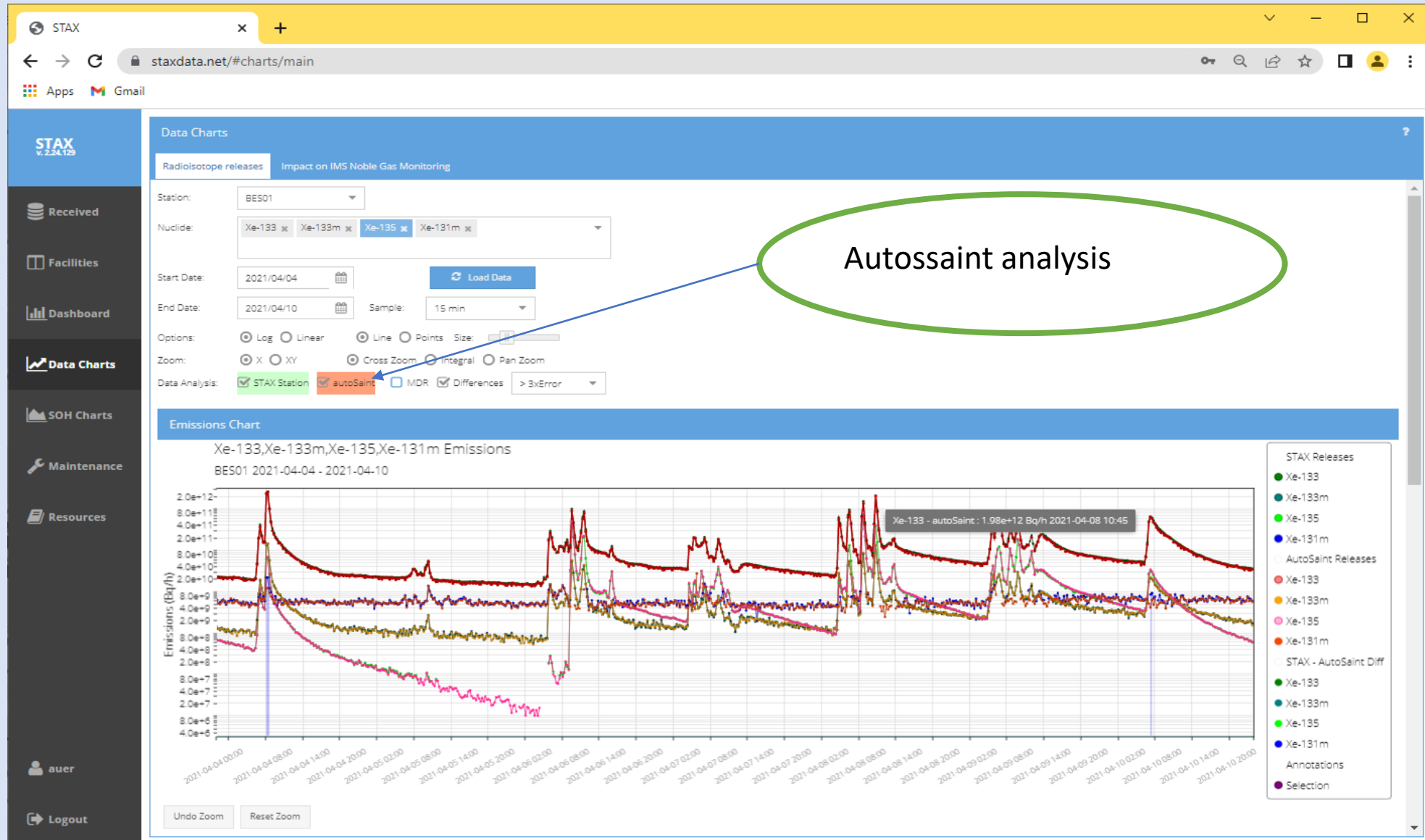
staxdata.net: station status dashboard



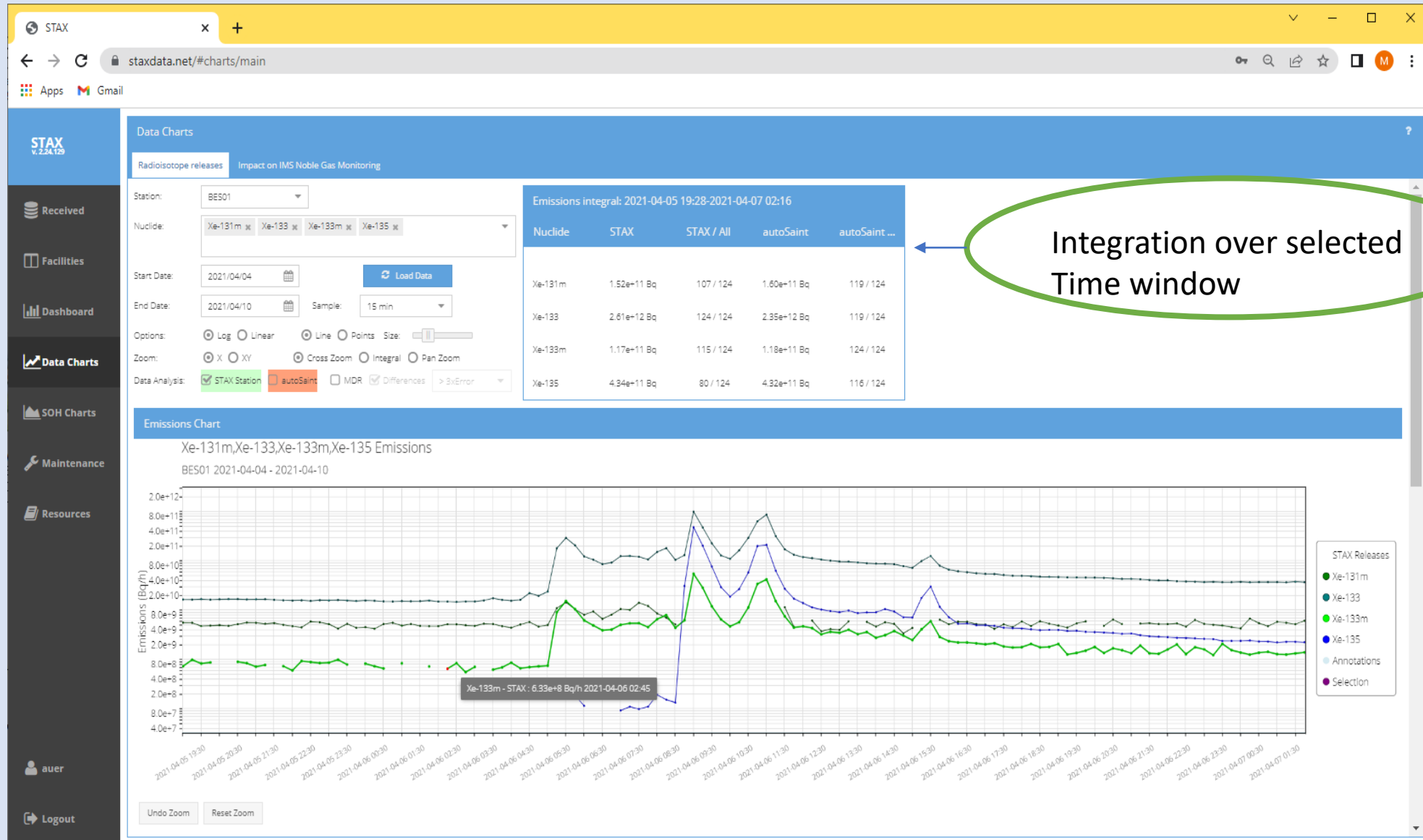
staxdata.net: release values



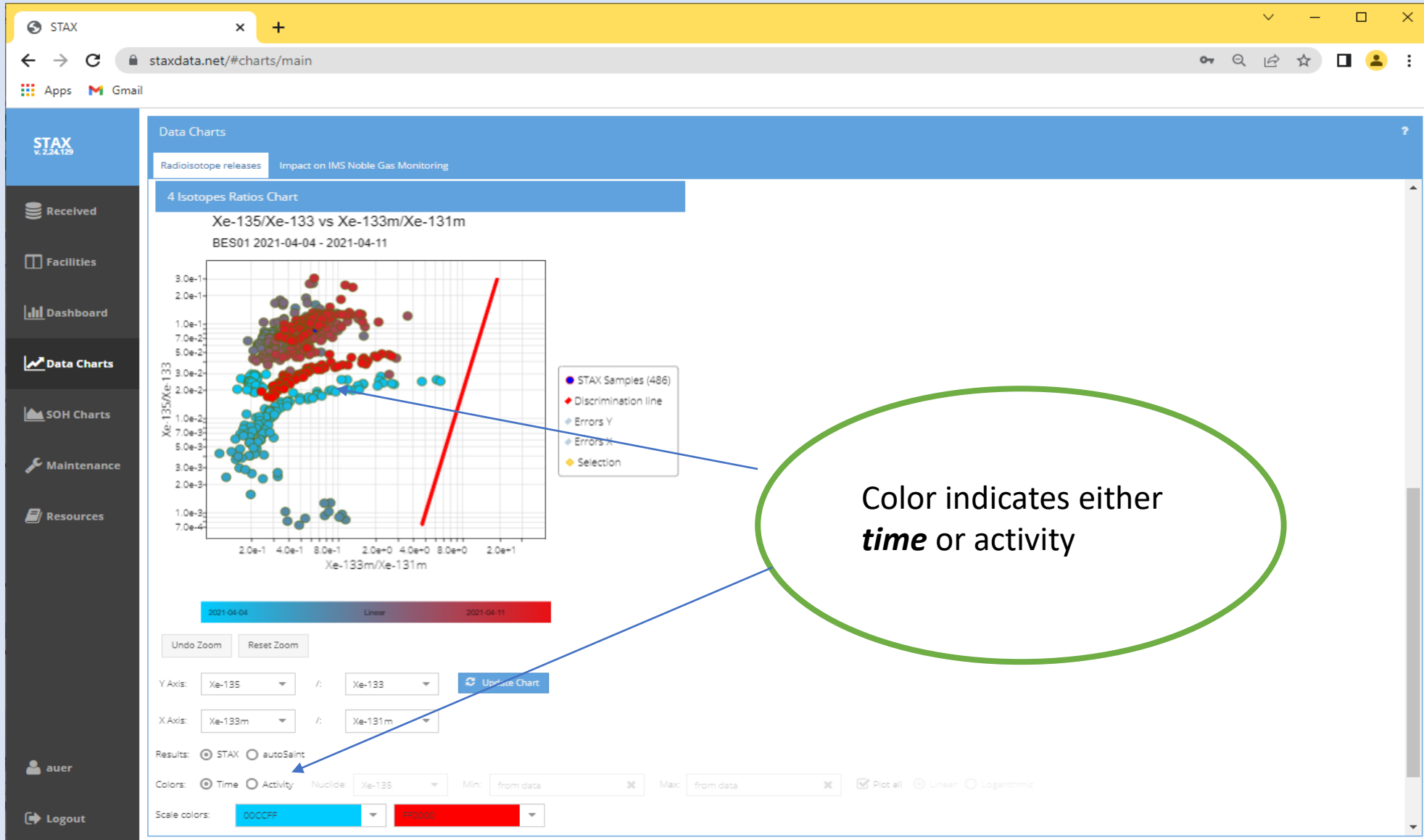
staxdata.net: parallel automated analysis for quality assurance



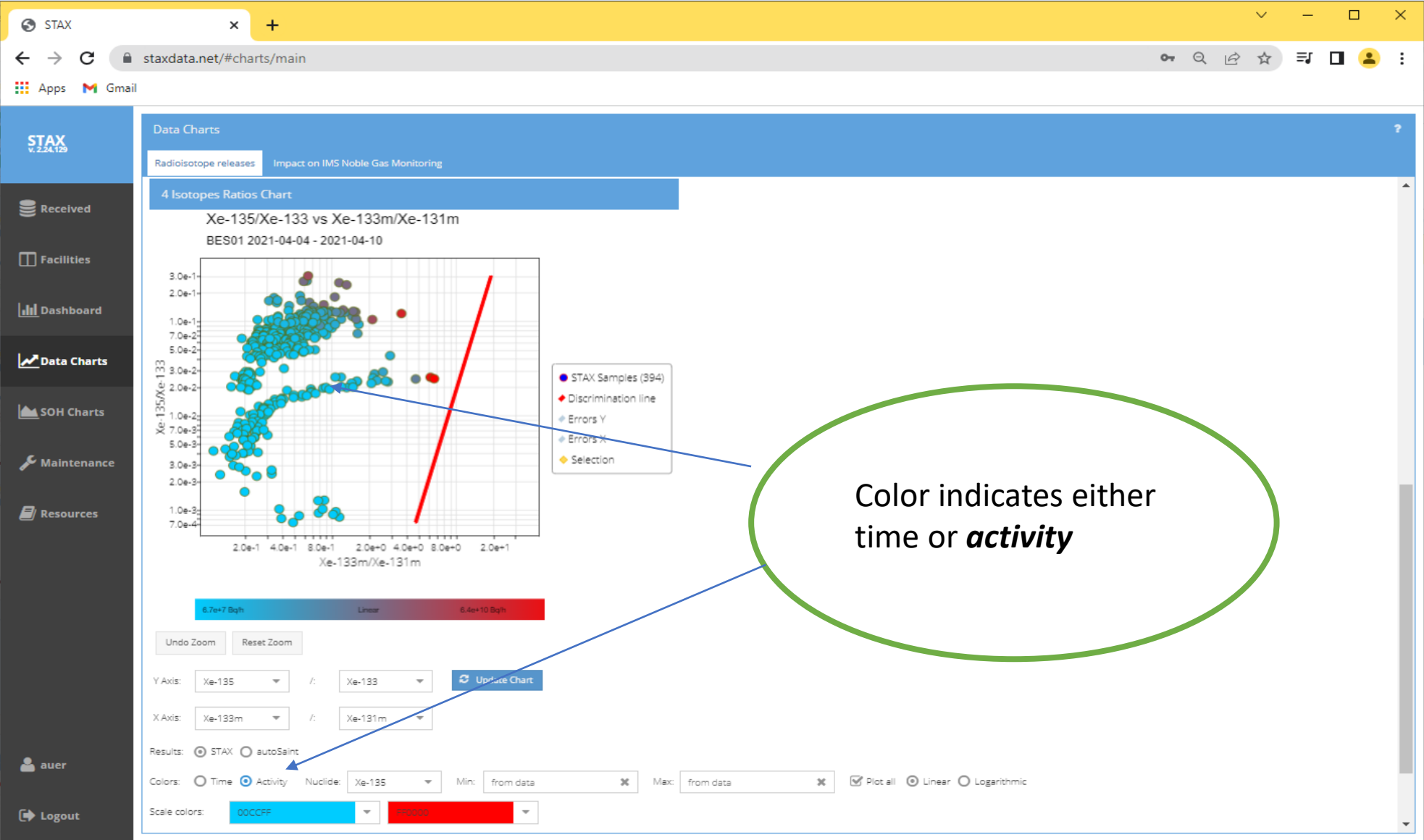
staxdata.net: release values



staxdata.net: isotopic ratios



staxdata.net: isotopic ratios



staxdata.net: ATM simulated concentrations at IMS stations

STAX v.2.24.129

test.staxdata.net/#charts/main

Radioisotope release impact on IMS Noble Gas Monitoring

IMS Station: **DEX33**

Emitters: ARS08 X AUS02 X BES01 X STAXX X UKS07 X
USS06 X SES03 X SES04 X SES05 X

Start Date: 2020/01/01 Load Data

End Date: 2020/06/30

IMS Stop Time: 00:00 Sampling Interval (h): 24 Reset

Options: Log Linear Line Points Size: [Slider]

Zoom: X XY Cross Zoom Pan Zoom Lower Limit: 1e-3

Data Analysis: Forward ATM IMS Sampling Forward ATM Raw Values Backward SRS Station Backward SRS autoSaint

Save Emitters Impact Data as CSV Save Total Impact Chart Image Save Emitters Impact Chart Image

Total Impact Chart

Total Impact at DEX33: 2020-01-01 - 2020-06-30
Emitters: ARS08,AUS02,BES01,STAXX,UKS07,USS06,SES03,SES04,SES05

Concentration (mBq/m³)

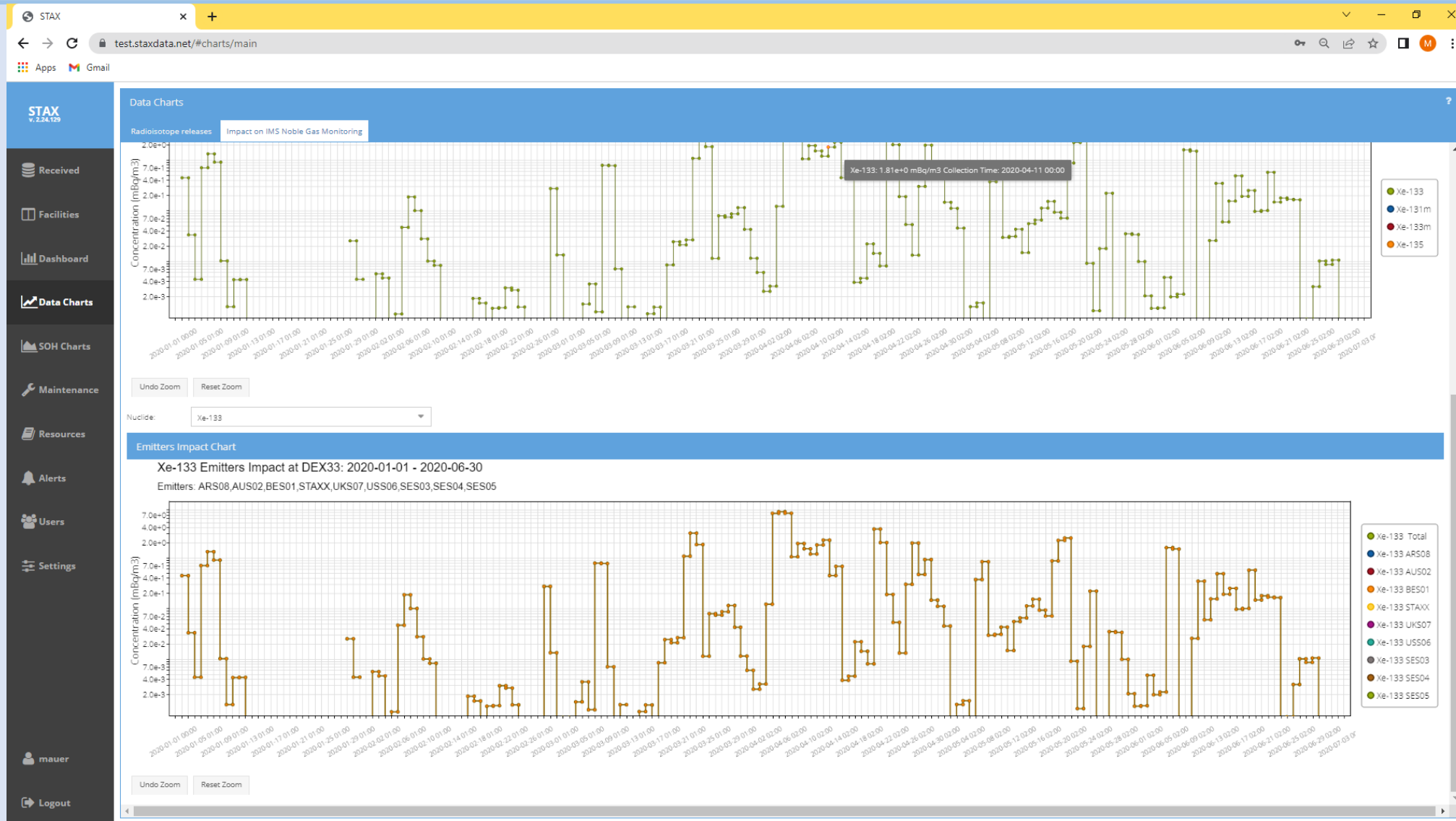
Legend: ● Xe-133 ● Xe-131m ● Xe-133m ● Xe-135

Undo Zoom Reset Zoom

mauer Logout

Two Options:
Forward transport modeling
Backward transport modeling

staxdata.net: IMS concentrations simulation: per emitter



staxdata.net: maintenance log

STAX v. 2.24.129

Received

Facilities

Dashboard

Data Charts

SOH Charts

Maintenance

Resources

auer

Logout

Maintenance

Annotations

Station Code	Annotation Name	Annotation Text	Start	End	User	Created at ↓	Updated at
AUS02	AWS switch over	Station Transition to AWS	17/10/2021 08:46:00	21/10/2021 08:46:00	mrizescu	19/11/2021 14:48:53	19/11/2021 14:48:53
BES01	AWS switch over	Station switched to AWS	20/10/2021 08:45:00		mrizescu	19/11/2021 14:45:24	19/11/2021 14:45:24
AUS02	Server changeover	Lost 2 days of data during ...	18/10/2021 08:39:00	20/10/2021 08:39:00	jfriese	29/10/2021 15:39:44	29/10/2021 15:39:44
BES01	Power outage	Power outage caused dete...	26/09/2021 15:40:00	11/10/2021 15:40:00	jfriese	07/10/2021 22:40:18	07/10/2021 22:40:18
AUS02	AWS migration	Server moved from stax.ist...	01/10/2021 10:17:00		mrizescu	01/10/2021 15:17:04	01/10/2021 15:17:04
BES01	AWS migration	Server moved from stax.ist...	01/10/2021 10:16:00		mrizescu	01/10/2021 15:16:37	01/10/2021 15:16:37

Page 1 of 1

Displaying 1 - 10 of 10

Notifications

Stations	Subject	Message Text	Error	User	Created at
AUS02,BES01	Maintenance Alert	Notice of Scheduled Maintenance - Pl...		mrizescu	21/01/2022 14:38:36
BES01	Maintenance Alert	Power outage at IRE over the weeken...		jfriese	25/03/2022 16:58:41
BES01,AUS02	Maintenance Alert	Notice of Scheduled Maintenance on ...		mrizescu	31/03/2022 14:18:35
BES01,AUS02	Maintenance Alert	Notice for STAX email subscribers - N...		mrizescu	26/04/2022 13:46:12
BES01,AUS02	Maintenance Alert	Notice of Scheduled Maintenance on ...		mrizescu	10/05/2022 15:00:18

Page 1 of 1

Displaying 1 - 5 of 5

Questions ?