

STAX (Source Term Analysis of Xenon) Data viewing software



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INTRODUCTION

STAX is an experimental network to measure emissions of Xenon isotopes from medical isotope production facilities and other nuclear facilities. This poster gives an overview on access and viewing mechanisms for STAX data

METHODS/DATA

The web-based STAX user interface offers a variety of data viewing perspectives such as operational status, state-of-health data, time-series and isotopic ratios charts for Xenon releases and charts on estimated impact at IMS (International Monitoring System) stations. Data can also be downloaded for further processing

RESULTS

Through a combination of measured Xenon releases from medical isotope facilities or nuclear reactors, and data from atmospheric transport simulations, concentrations at IMS stations caused by these emissions are estimated

CONCLUSION

Software has been developed that allows users to access and view data from STAX measurement systems and to view also the impact of emissions on IMS systems

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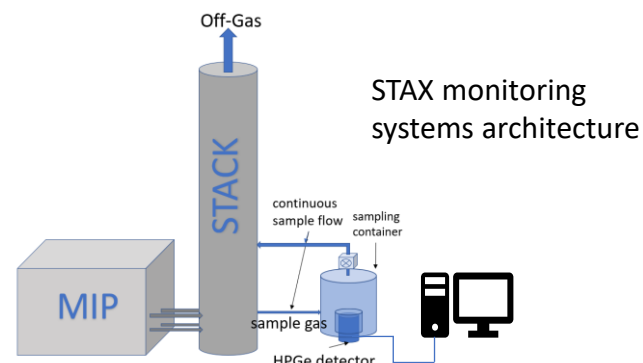
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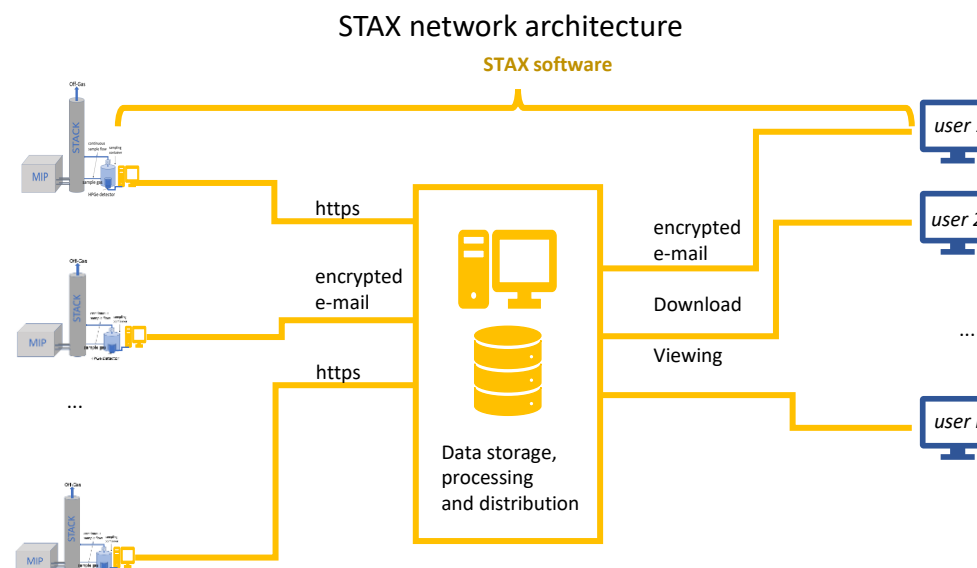
STAX network configuration

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

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



- Each STAX system measures a sample every 15 minutes. 96 samples are produced daily per station and data are transferred via secure email or https to a central data processing server.



Objectives

- Secure data transmission and controlled data access



- Data sent from monitoring facilities to data server via authenticated and encrypted e-mail messages or https
- Data only accessible to authorized users and access is given per facility, so that a user only has access to their assigned facilities
- Facility operators can set delays for sending of data, in order to allow for reviewing of data prior to distribution

- Easy and versatile data access options for users



- Data are accessible via email, direct download (bash script) or can be viewed through the STAX GUI

- Provide a data viewing interface for users



- A suite of charts is available to view emission data time series, isotopic ratios charts, impact charts, spectra and network status

- Provide a first estimation of the impact of emissions at IMS stations



- Based on forward or optionally backward Atmospheric Transport Model (ATM) data, impact of emissions on concentrations at IMS stations is calculated



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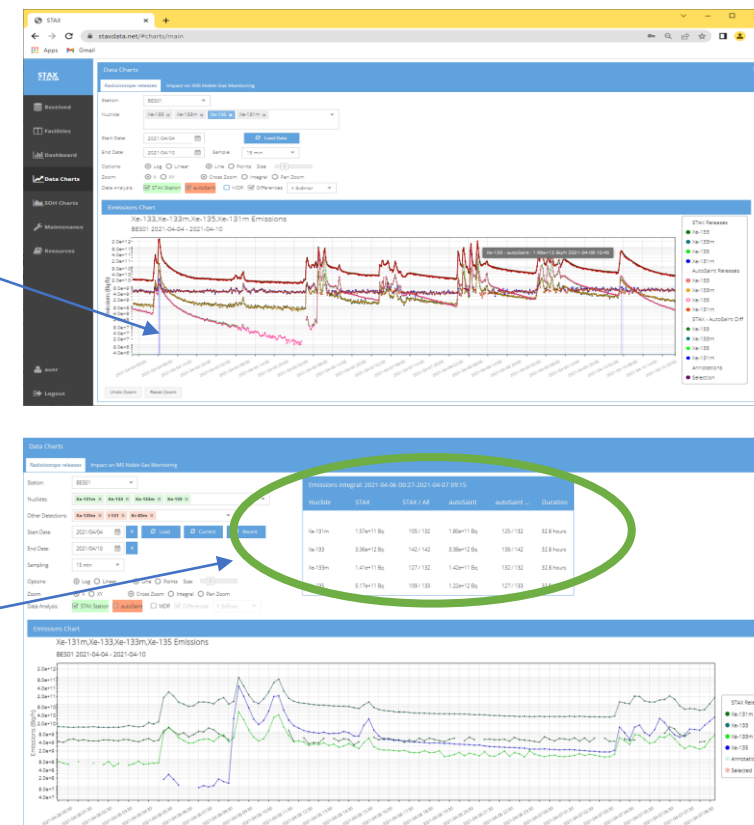
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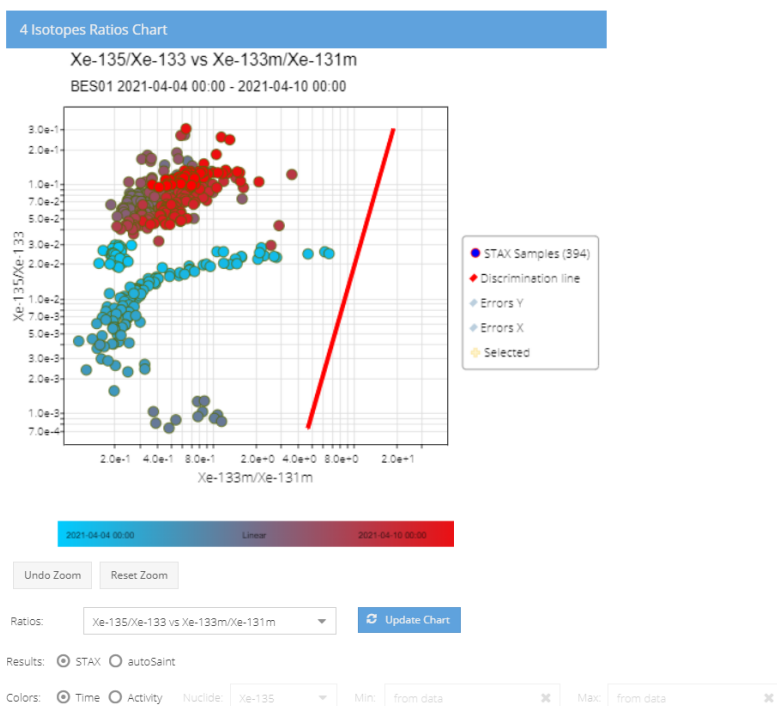
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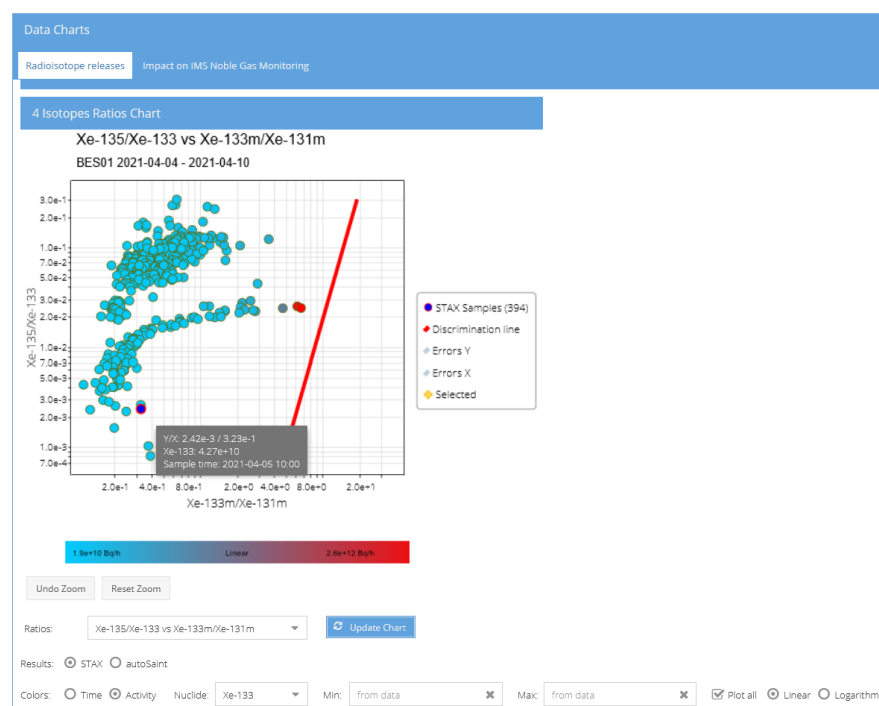
Data viewing – isotopic ratios chart

- Isotopic ratios charts can be viewed with any isotope combination selected by the user
- Color scheme can be selected to illustrate either temporal evolution of the ratio or to indicate the release value for a selected isotope

Display by evolution in time



Display by emission strength



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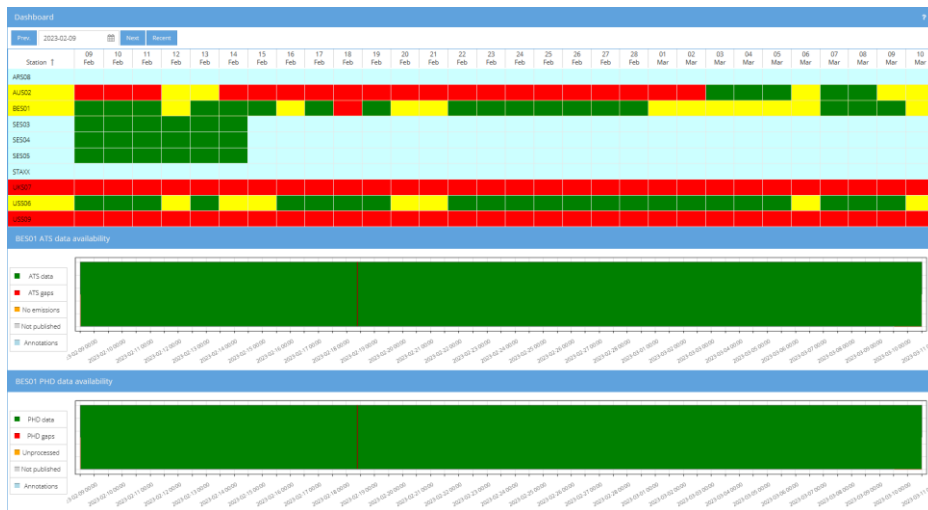


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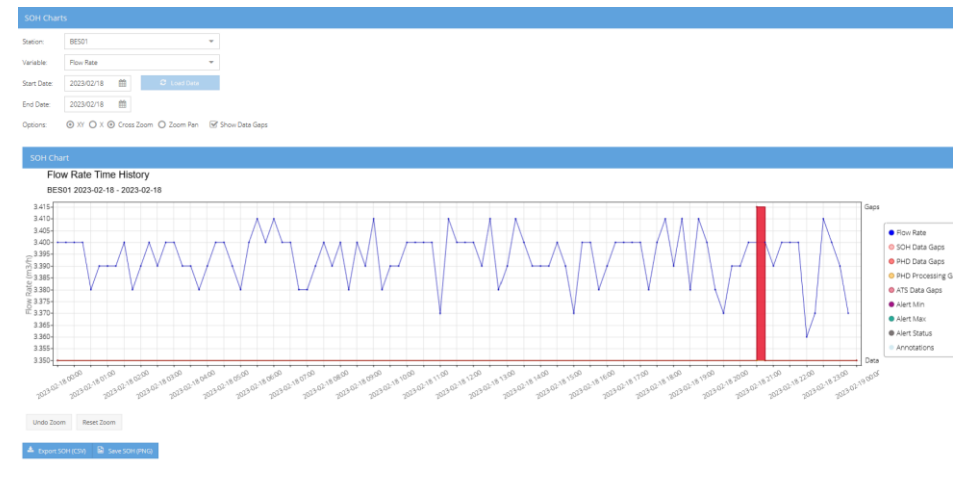
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Data viewing – Facilities operational status

A dashboard view provides an overview of the operational status (data availability) for all facilities



Detailed SoH data can be viewed to diagnose issues at facilities and for data quality control



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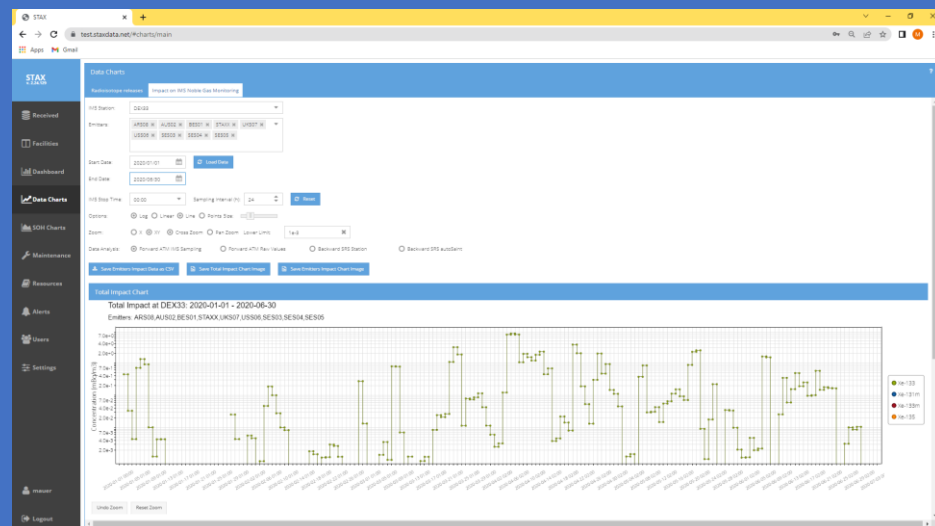
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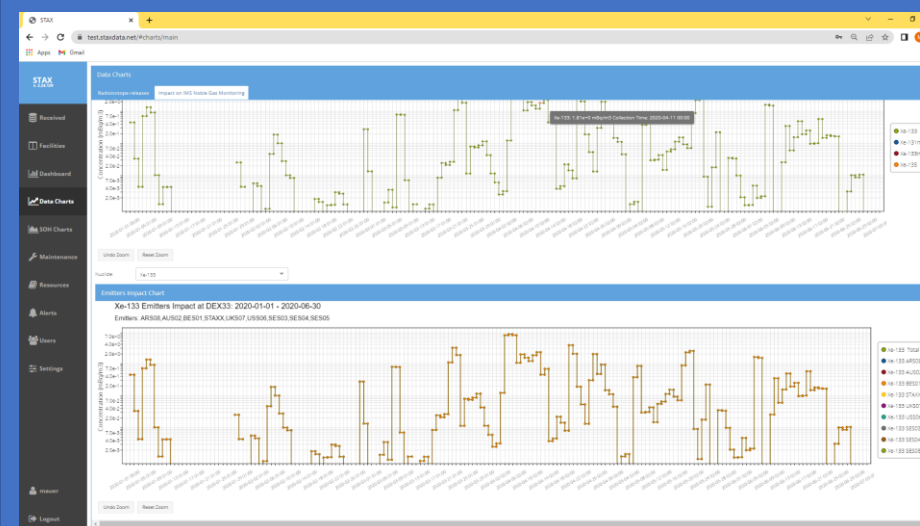
IMS Station concentration simulations

- The impact of emission values on each IMS site is calculated based on atmospheric transport model (ATM) data, either in forward or backward transport mode
- Forward modelling is based on hysplit calculations
- For backward modelling, source receptor sensitivity (SRS) values calculated by ATM models can be used to estimate IMS concentrations
- Concentrations are shown in time resolution of IMS station sampling times and are synchronized with sampling start/stop times

Total impact chart: displays the concentration based on the sum of all measured STAX emissions



Emitters impact chart: displays concentrations caused by individual emitters



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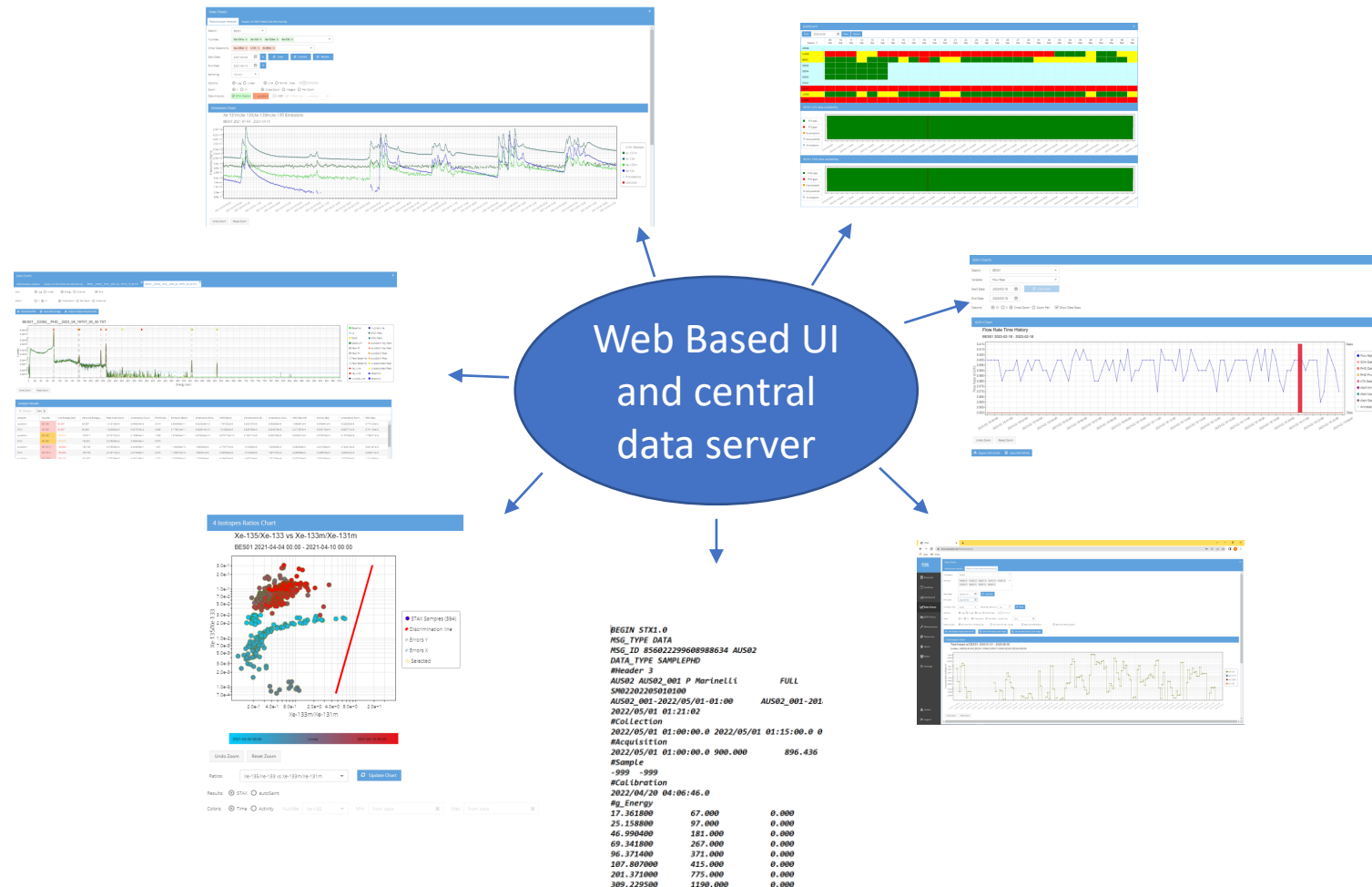
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- A central data server and web-based user interface has been developed to provide access to all data of the STAX network either via interactive charts for data viewing or by various download options



Doll, C., Auer, M., Friese, J., Bowyer, T., Burnett, J., Deconninck, B., Maurissen, N., Metz, L., Schrom, B., 2022. First STAX detector installation at the national institute for radioelements (IRE). J. Environ. Radioact. 255, 107036 <https://doi.org/10.1016/j.jenvrad.2022.107036>.

Metz, L., Bowyer, T., Burnett, J., Dion, M., Eslinger, P., Friese, J., Doll, C., McIntyre, J., Schrom, B., 2022. Source Term Analysis of Xenon (STAX): an effort focused on differentiating man-made isotope production from nuclear explosions via stack monitoring. J. Environ. Radioact. 255, 107037 <https://doi.org/10.1016/j.jenvrad.2022.107037>.



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