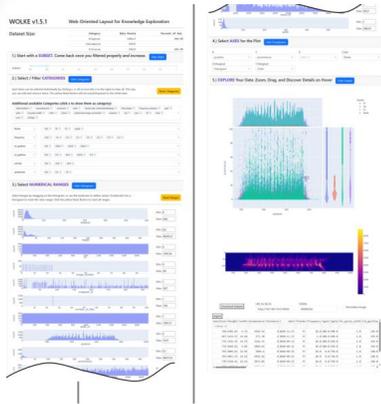


BLITZ ⚡ and WOLKE ☁

A lightweight framework for fast, scalable image data exploration

P. Mattern, R. Krieg, H. Höft, T. Gerling, M. Becker

Our Journey Today



An interactive web dashboard with Dash-Plotly for efficient metadata filtering and visualization.

WOLKE

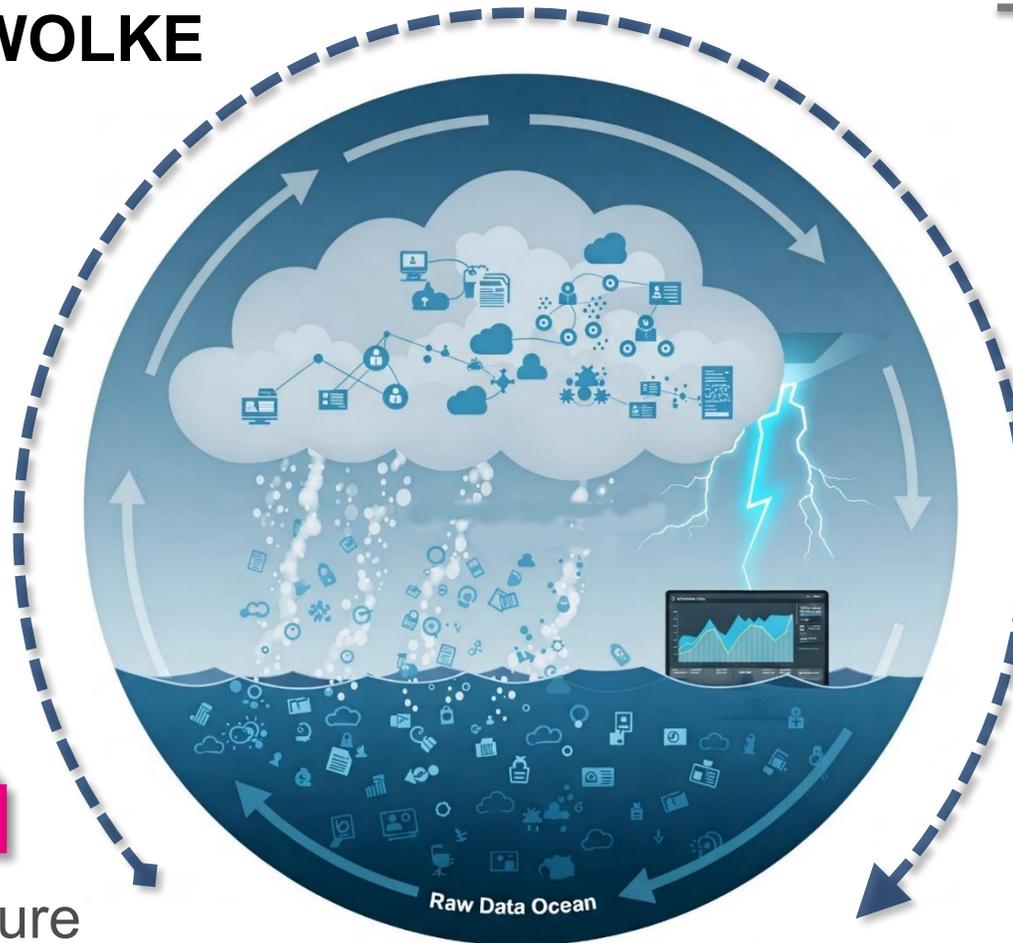
SQL DAMPF

Metadata generator, transforming folders into searchable databases.



Image Folder Structure

Massive Amount of Raw Data

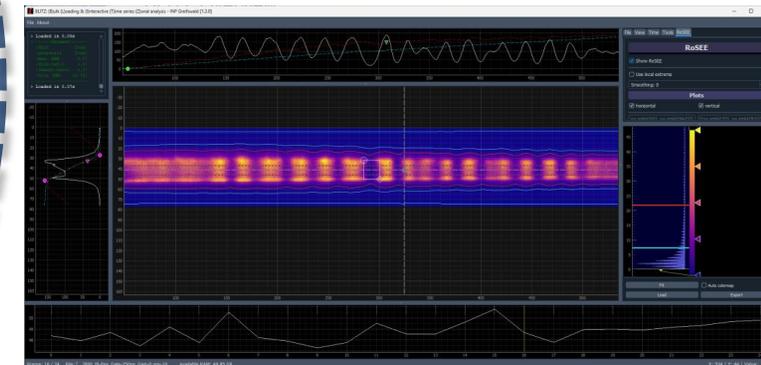


WETTER

A modular, adaptable image data framework.

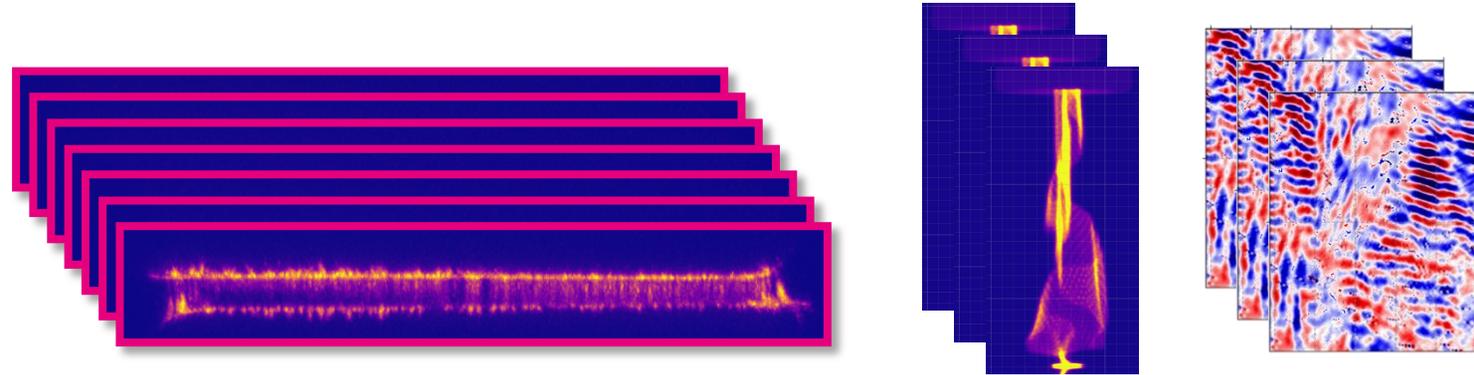
A matrix-based interactive image viewer for efficient large-scale image datasets.

BLITZ



We all know this problem... it's just toooooo many images

- From tens to billions of images
- In all shapes, colors, and formats



- From megabytes to terabytes — only IT is the limit
- Still often stored in folders, manually named and browsed



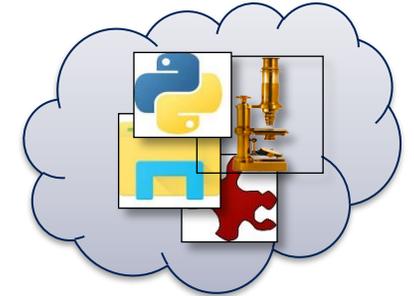
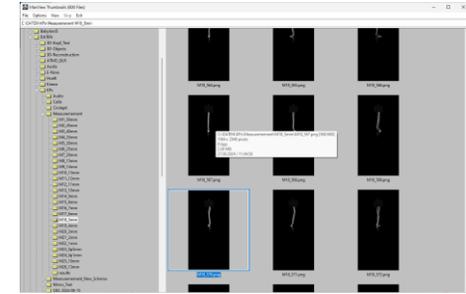
... and most of us still use:

- Standard image viewers
- File explorers
- Custom scripts



From Chaos to Insight – What’s really missing

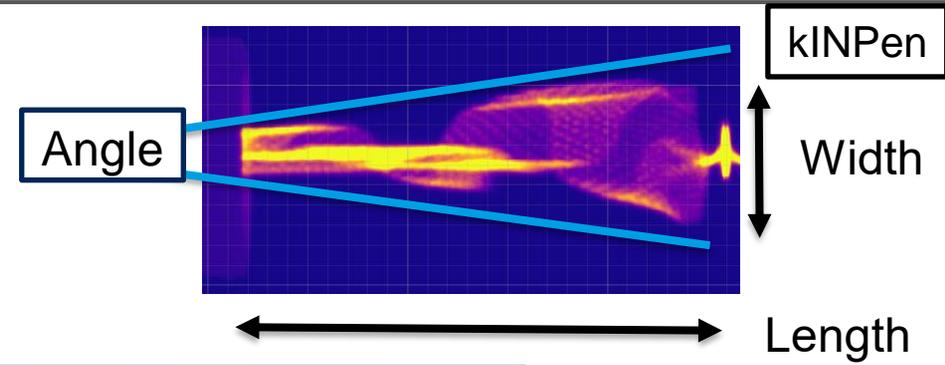
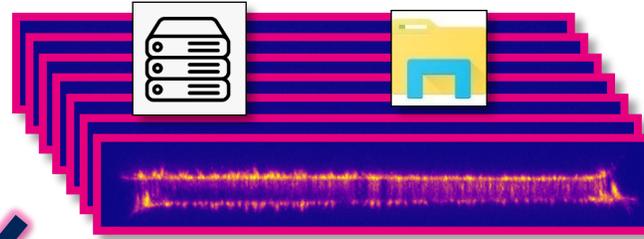
- **Missing preselection:**
Images are opened manually or in bulk. No way to prefilter.
- **Metadata chaos:**
Often incomplete, missing, or not connected to the image file.
- **No central visualization:**
Viewers, scripts, notebooks — but nothing unified.
- **No scaling beyond one set:**
Tools work for one dataset — but not for 30,000 files across 10 sets.



Each dataset is a small universe — containing tens of thousands of frames and multiple GBs of raw data.

DAMPF (Data Aggregation & Modular Processing Eramework)

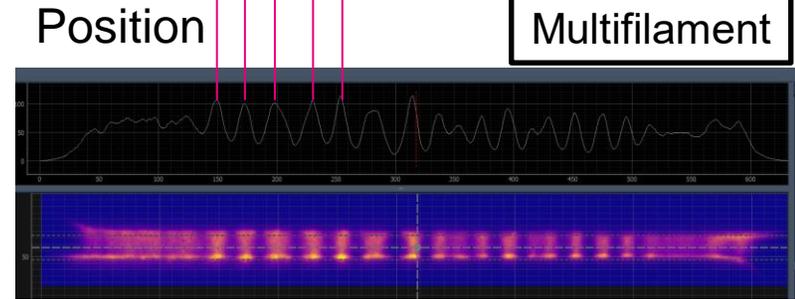
Image Folder Structure



Non- Domain Specific Metrics

- Min, Max, Mean Intensity
- Laplacian („Noise“)
- Self-similarity (auto-correlation)
- Date / Time

Domain Specific Metrics



Structured SQL Metadata“

Experimental Conditions:

- Voltage
- Current
- Gas Mixture
- ...

DAMPF: Metadata generator, transforming folders into searchable databases.

Subset and Filtering

1.) Start with a Subset:

2.) Filter Categories:

3.) Filter Numerical Ranges:

Dataset Size:

| Category | Data Points | Percent of Sub. |
|------------|-------------|-----------------|
| Original | 198127 | 500.0% |
| Subsampled | 39625 | - |
| Filtered | 39625 | 100.0% |

1.) Start with a **SUBSET**. Come back once you filtered properly and increase. [Hide Slider](#)



2.) Select / Filter **CATEGORIES** [Hide Categories](#)

Each items can be selected individually by clicking x, or all at once (the x to the right) to clear all. This way you can add and remove items. The yellow Reset Button will set everything back to the initial state. [Reset Categories](#)

Additional available Categories (click x to show them as category):

akkumulation x bounding_box x comment x date x einzel_oder_mehrfachentladung x final_shape x frequency_variation x gain x gate x hv_pulse_width x mfiic x o2env x performed_image_corrections x sequenz x set x sync x t0 x

texp x uvar x voltage x

flanke x NA x SF x FF x beide x

frequency x 10.0 x 1.0 x 0.5 x 0.1 x 5.0 x 2.0 x 7.0 x 0.2 x

n2_gasflow x NA x 299.0 x 240.0 x 294.0 x

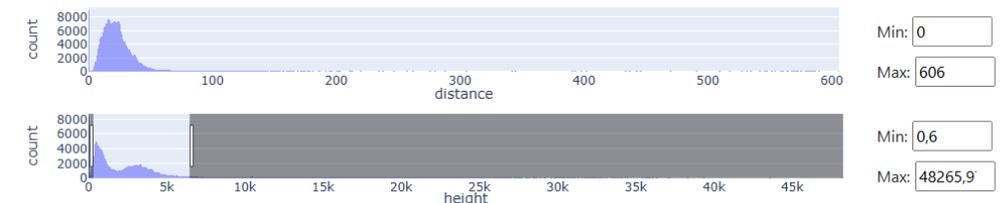
o2_gasflow x NA x 0.3 x 60.0 x 603.0 x 6.0 x

schritte x NA x 25.0 x 50.0 x

spaltbreite x NA x 0.5 x 1.0 x

3.) Select **NUMERICAL RANGES** [Hide Histograms](#)

Select Ranges by dragging on the histogram, or use the textboxes to define values. Doubleclick into a histogram to reset the value range. Click the yellow Reset Button to reset all ranges. [Reset Ranges](#)



Visual Data Exploration

4.) Select Plot Axis:

4.) Select **AXES** for the Plot

Hide Dropdowns

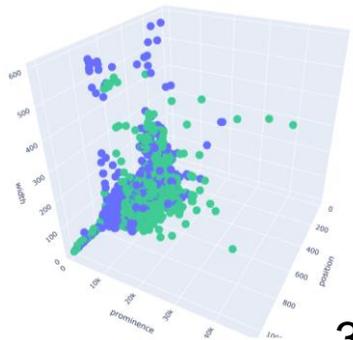
X: position | Y: distance | Z: Select Z | Color: flanke

X Marginal: Histogram | Y Marginal: Violin

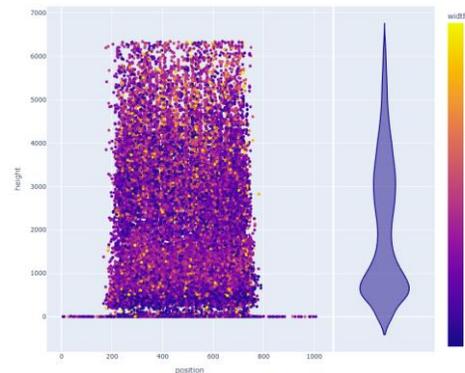
5.) **EXPLORE** Your Data: Zoom, Drag, and Discover Details on Hover

Hide Graphs

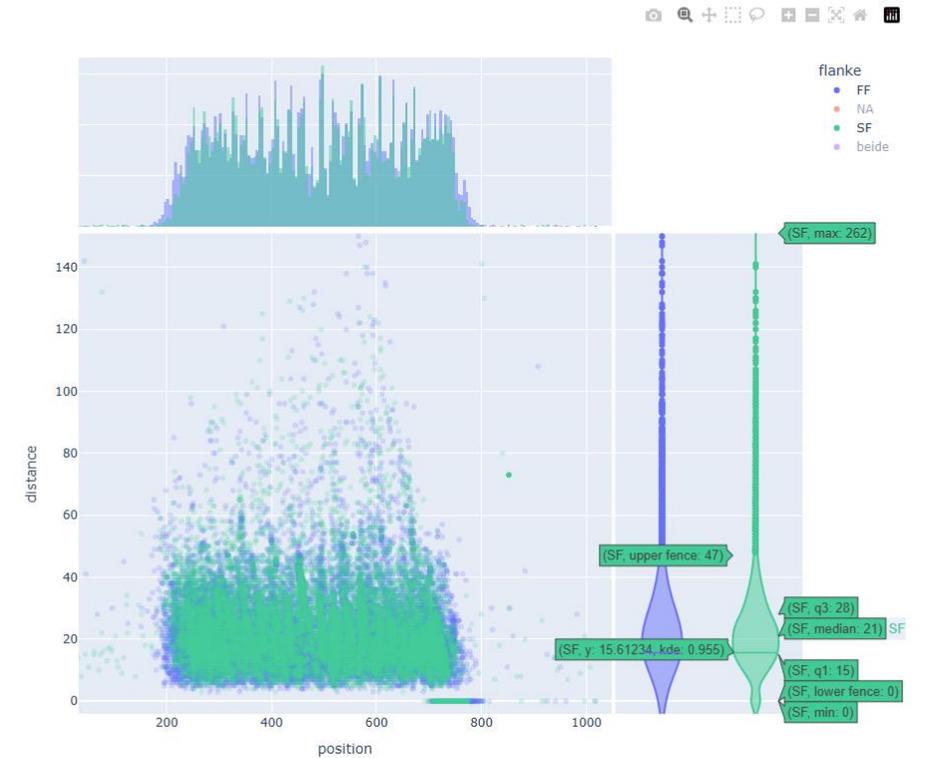
5.) Explore Your Data Visually:



3D Scatter

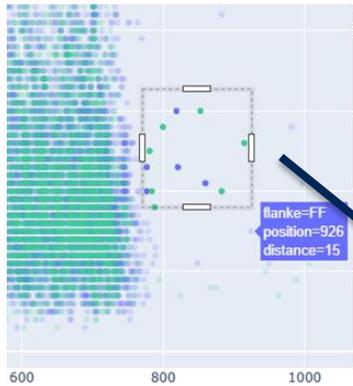


Continous
Colorscale

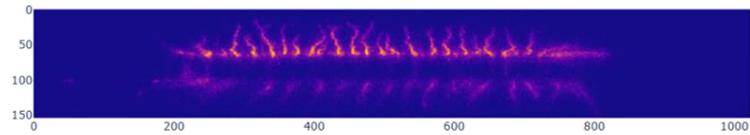


From filtered metadata to deep image analysis — seamlessly.

Select



Inspect



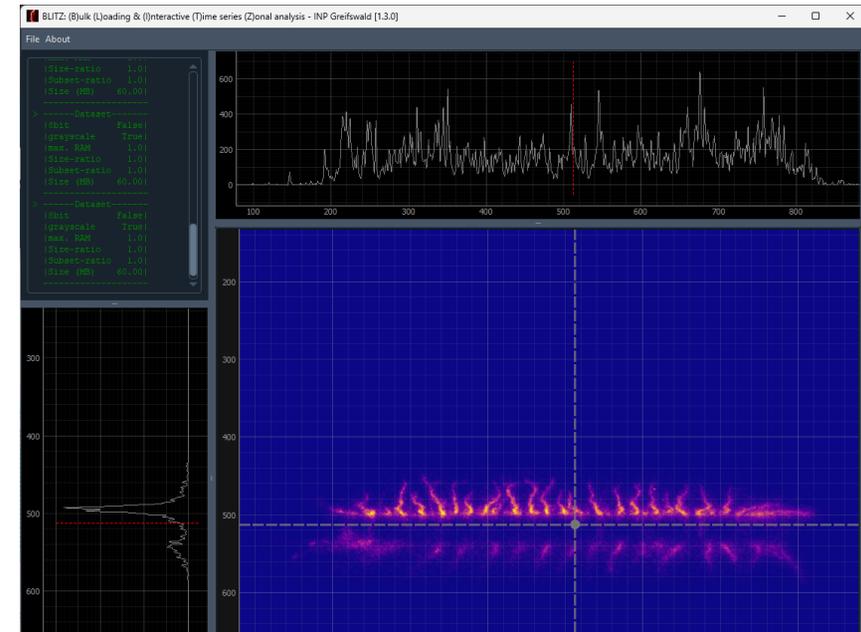
URL for BLITZ: TOKEN:

Normalize Image

| filter | d | position | height | width | prominence | distance | date | flanke | frequency | gain | gate | hv_pulse_width | n2_gasflc |
|--------|---------|----------|---------|-------|------------|----------|------|--------|-----------|------|------|----------------|-----------|
| 669 | 3077.64 | 5.73 | 868.91 | 18 | 2020-08-13 | FF | 10.0 | 200.0 | 250.0 | 50.0 | 299. | | |
| 331 | 2326.88 | 13.02 | 2253.48 | 40 | 2020-08-25 | FF | 10.0 | 0.0 | 250.0 | 1.0 | 240. | | |
| 854 | 2.02 | 4.95 | 0.24 | 30 | 2021-01-13 | FF | 10.0 | 200.0 | 2.0 | 1.0 | 299. | | |
| 778 | 929.48 | 3.46 | 32.51 | 20 | 2021-07-14 | FF | 10.0 | 200.0 | 250.0 | 0.2 | 299. | | |
| 778 | 723.83 | 4.74 | 21.58 | 23 | 2021-07-14 | FF | 10.0 | 200.0 | 250.0 | 0.2 | 299. | | |
| 524 | 903.93 | 22.43 | 836.69 | 32 | 2020-08-25 | FF | 10.0 | 200.0 | 750.0 | 50.0 | 240. | | |
| 362 | 2357.59 | 8.26 | 1876.06 | 16 | 2020-08-25 | FF | 10.0 | 200.0 | 750.0 | 10.0 | 240. | | |

LIVE Link

WOLKE ↔ BLITZ



WOLKE provides filtered data via HTTP as *.npy arrays, which can be instantly opened in BLITZ — or integrated into your own analysis framework.

BLITZ (Bulk Loading & Interactive Time-series Zonal analysis)

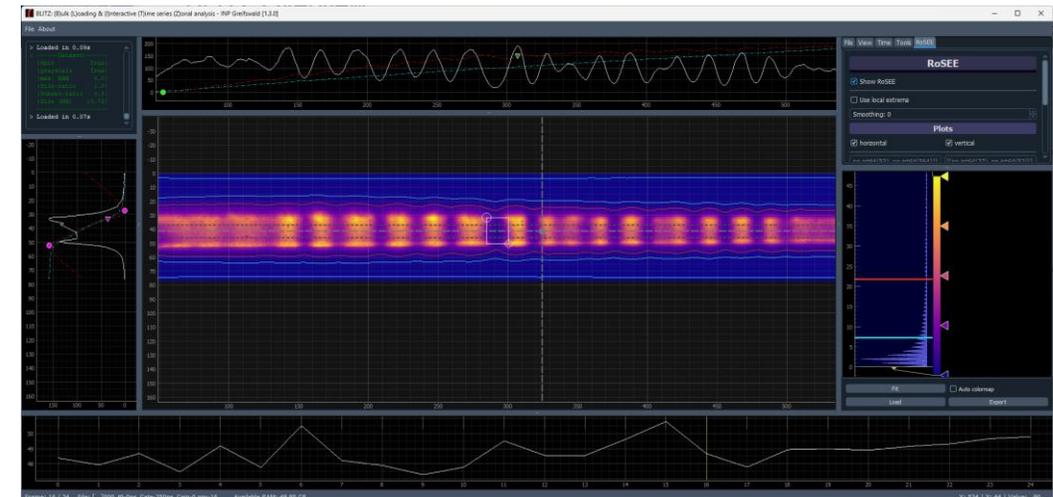
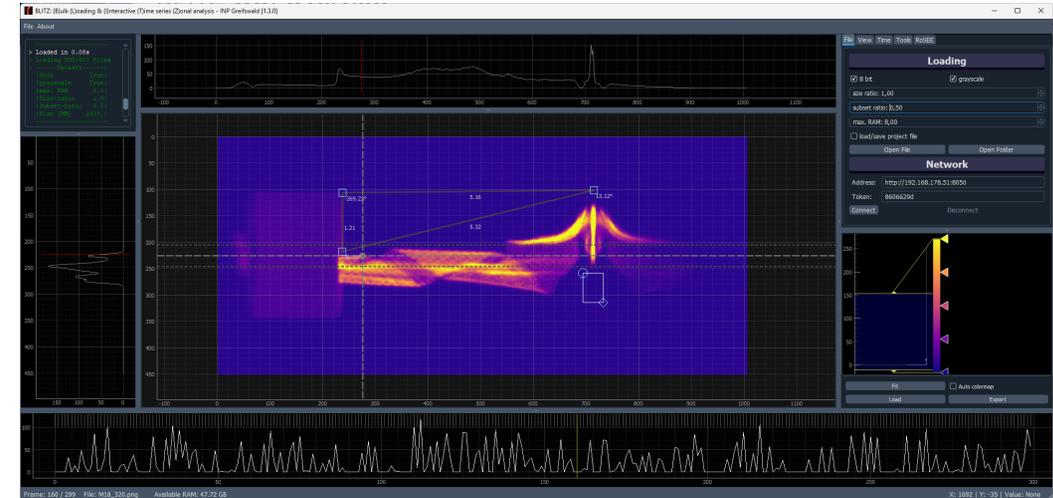
Definition and Purpose:

- Matrix-based interactive image viewer
- Designed for efficient large-scale image datasets

Key Features:

- Loads 21,000 images (25 GB) in 35 seconds
- Interactive tools: measure, profile, explore ROIs
- Drag & Drop support for quick dataset loading

From loading to insight – in under a second.



BLITZ (Bulk Loading & Interactive Time-series Zonal analysis)

Log

Single Line
Vert. Intensity
Profile

Timeline

File and RAM info

Cursor info

MEAN Horz. Intensity Profile
(with thickness)

ROI
Measurements

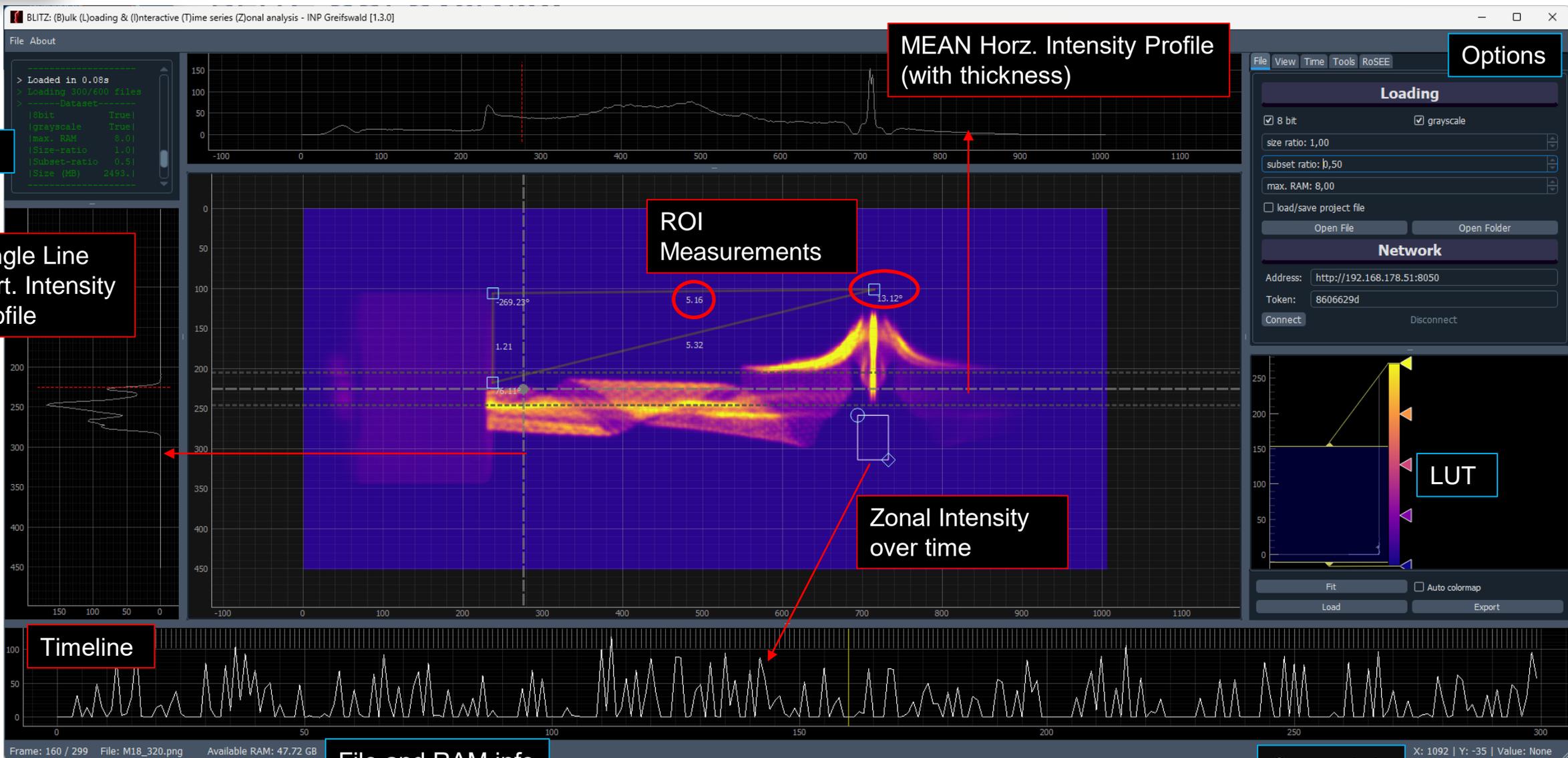
Zonal Intensity
over time

Options

Loading

Network

LUT



From Folder to Insight: Your Workflow with DAMPF, WOLKE & BLITZ

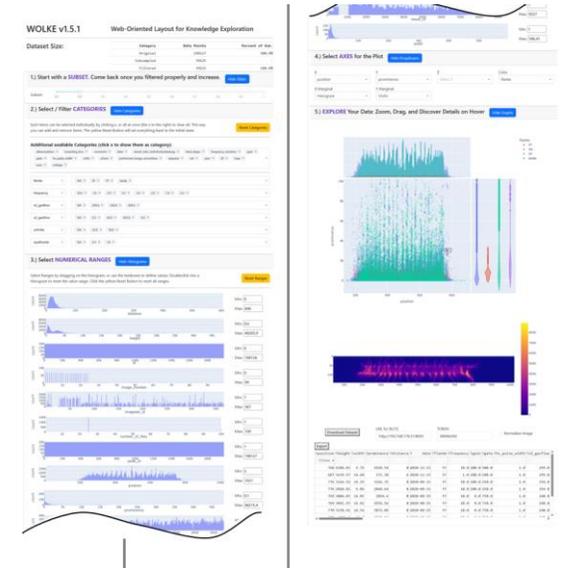
Keep your image data in folders
...just like you're used to!



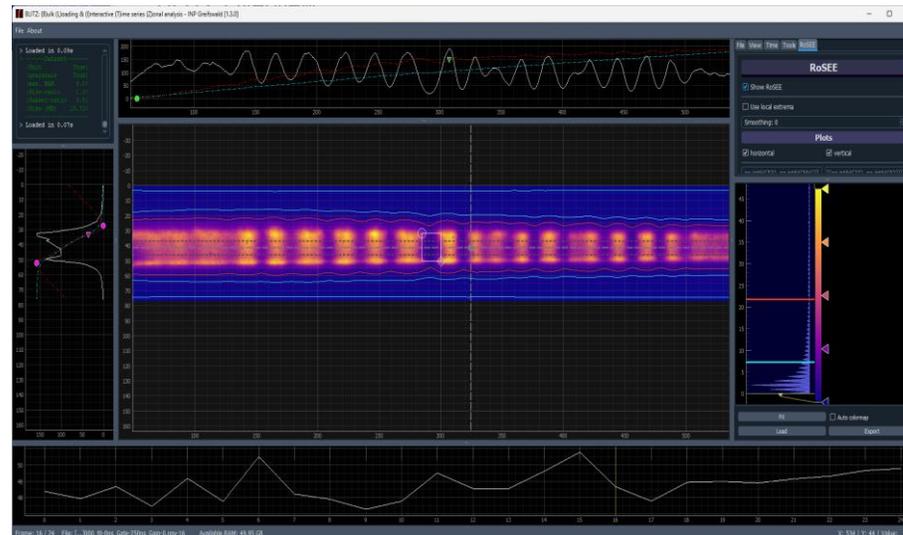
Augment metadata
with DAMPF
(and store in SQL)



Filter and preselect
using WOLKE

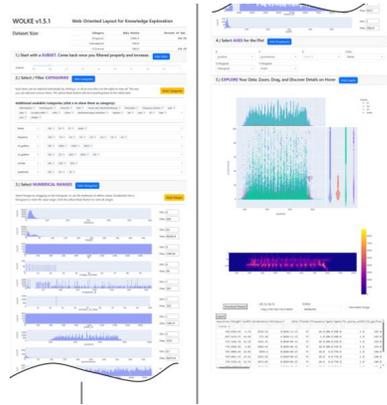


Shortcut:
Preview directly with BLITZ
(Drag & Drop sneak peek)



Synchronize LIVE
filtered sets with BLITZ
for detailed inspection

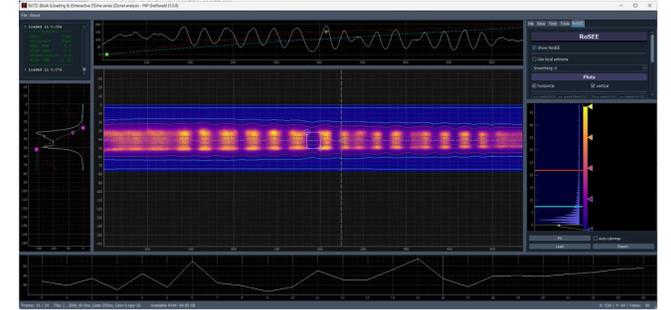
Outlook: WETTER Framework



WOLKE



DAMPF



BLITZ

Your Contribution?



HAGEL Get rid of heavy outliers

SCHNEE Solidify trustworthy data

NEBEL Reveal Patterns in the fog of data

REGEN Gather new Data by learning from the old