October 26-29, 2015
Waterford - Springfield, VA

Engineering Data Visualization Efforts for Engineered Resilient Systems

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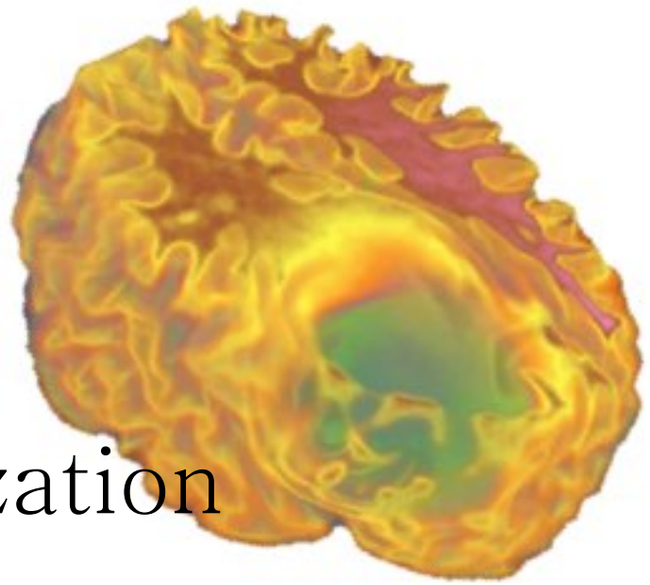
New Visualization?

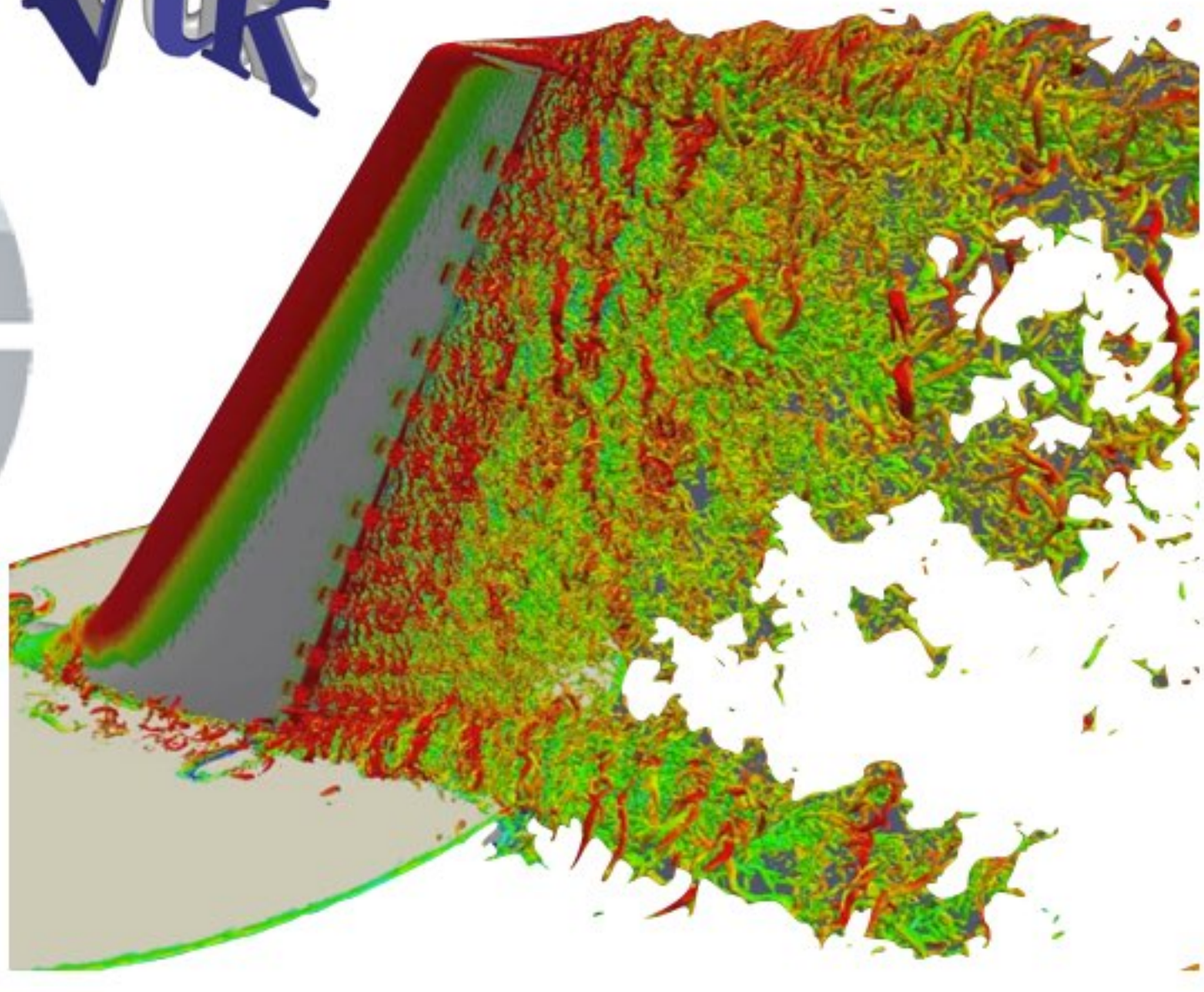
- Technology evolves
- Need to embrace today's communication media

Kitware



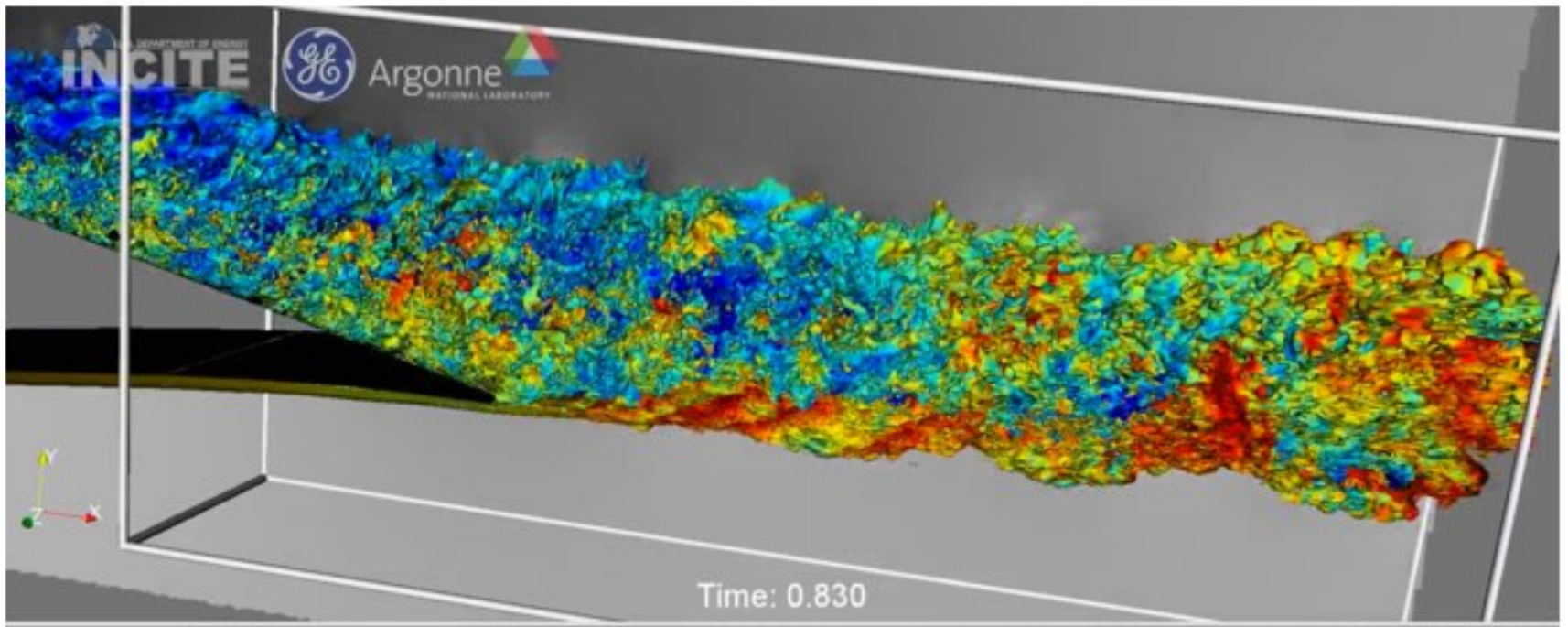
Great history of Open Source and Visualization

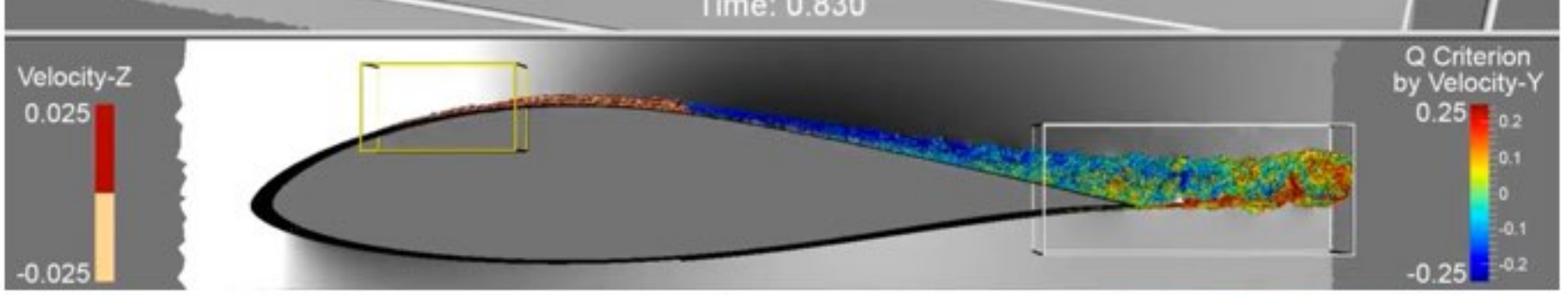
VTK

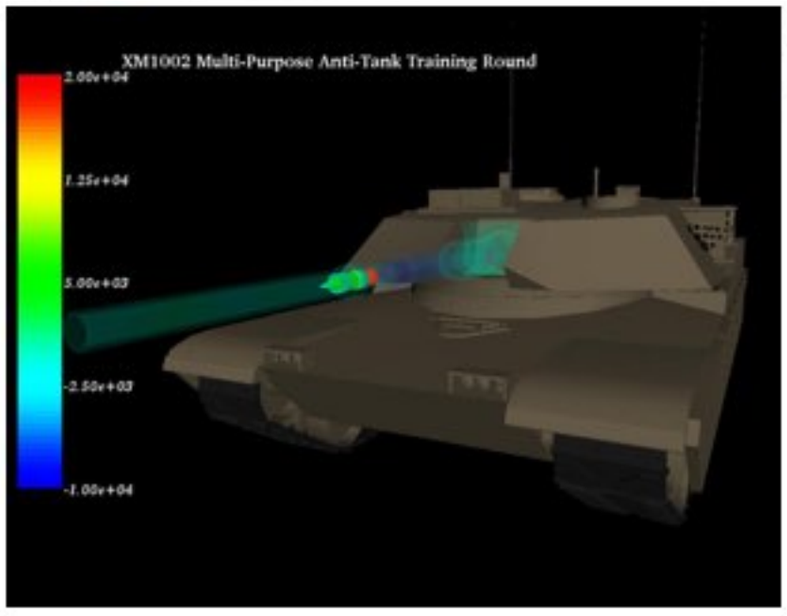


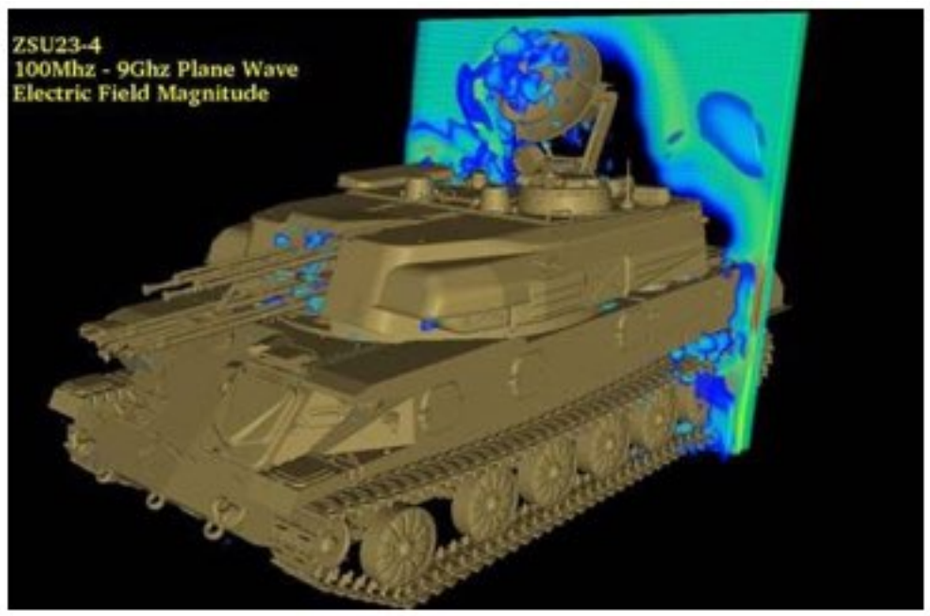
ParaView

ParaView









Berkeley Lab

Lawrence Livermore National Laboratory

INL Idaho National Laboratory

Argonne National Laboratory

Oak Ridge National Laboratory

Sandia National Laboratories

Los Alamos National Laboratory

ERS Engineered Resilient Systems Department of Defense

ARL

DOD HPC Department of Defense High Performance Computing Portal

- Trade-offs analytic platform
  - Look at millions of variations
  - Need to handle big data
  - Provides various analytic tools
- Web as communication media
  - Ease of access
  - Ease of delivery
  - Ease of use

Visualization on the Web?

10k
SVG

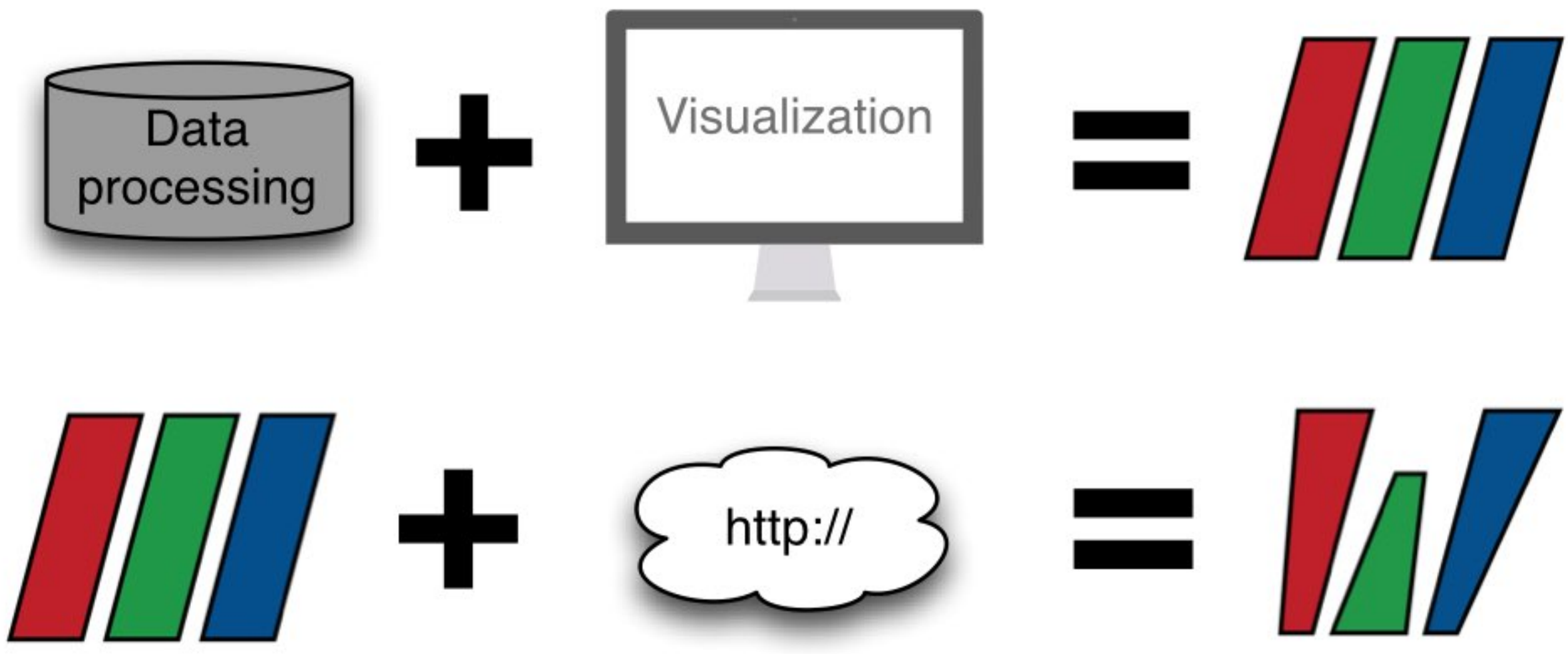
100k
Canvas

1M
WebGL

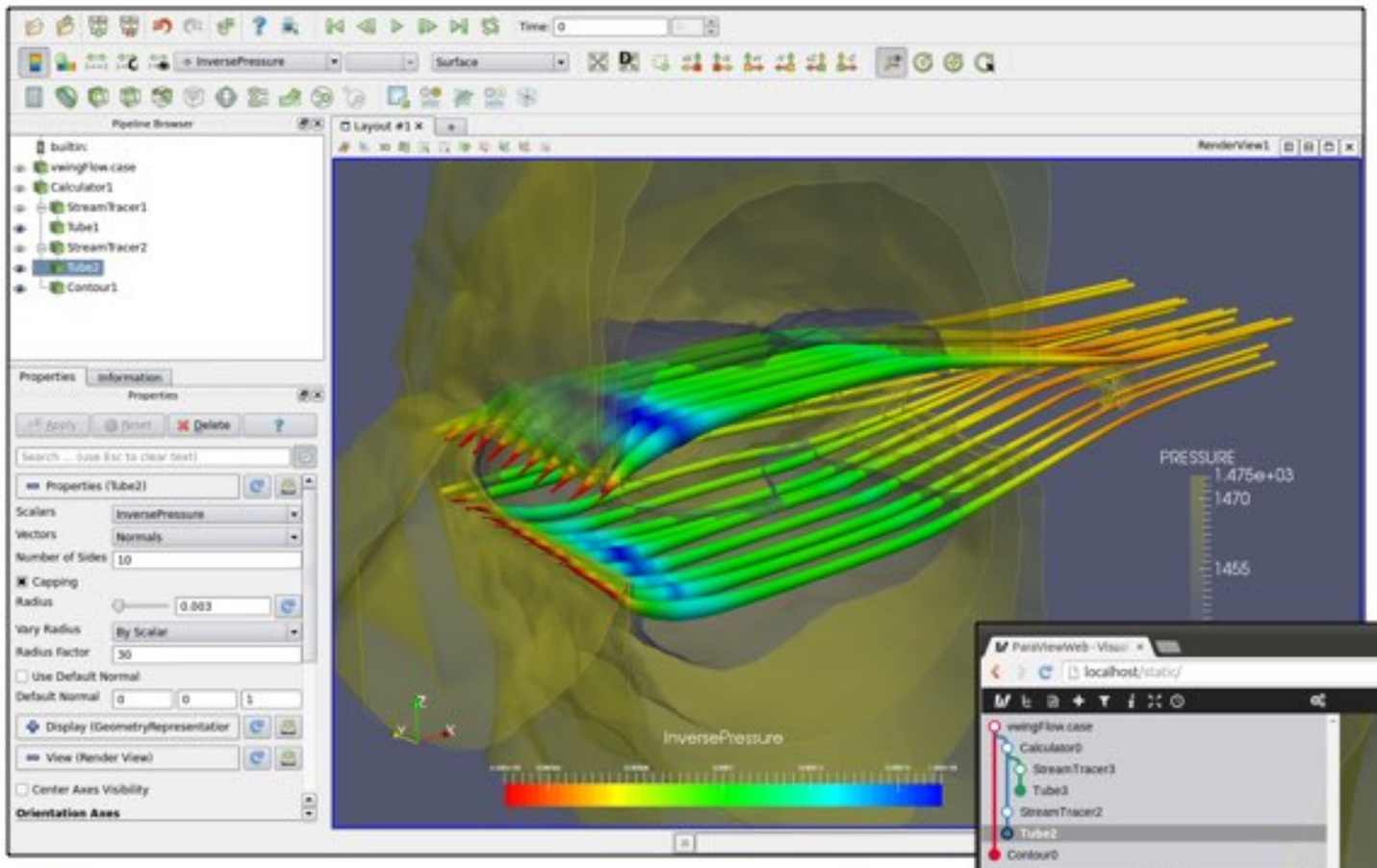
ParaViewWeb

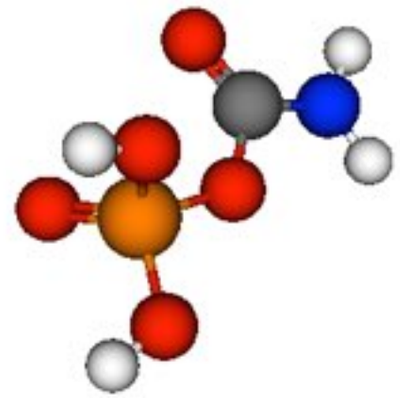
ParaViewWeb

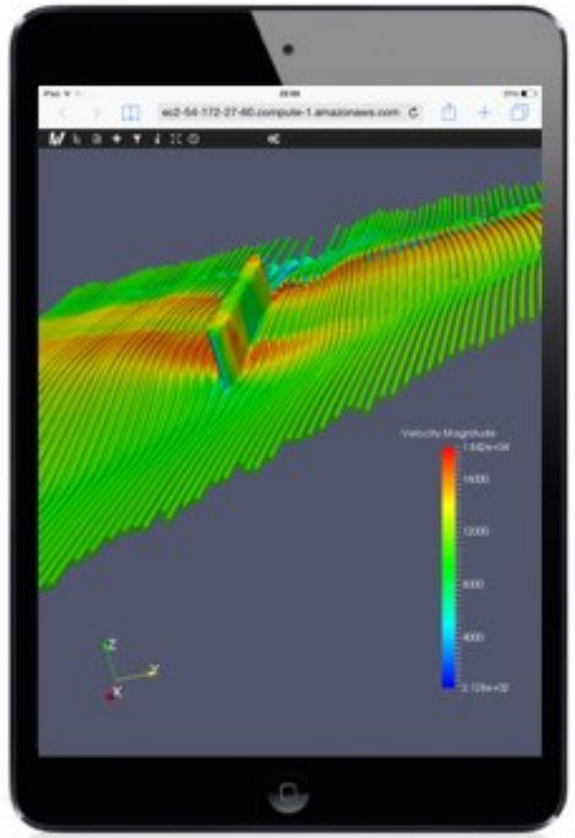
ParaViewWeb is ParaView but shaped to be driven and used within a Web environment.

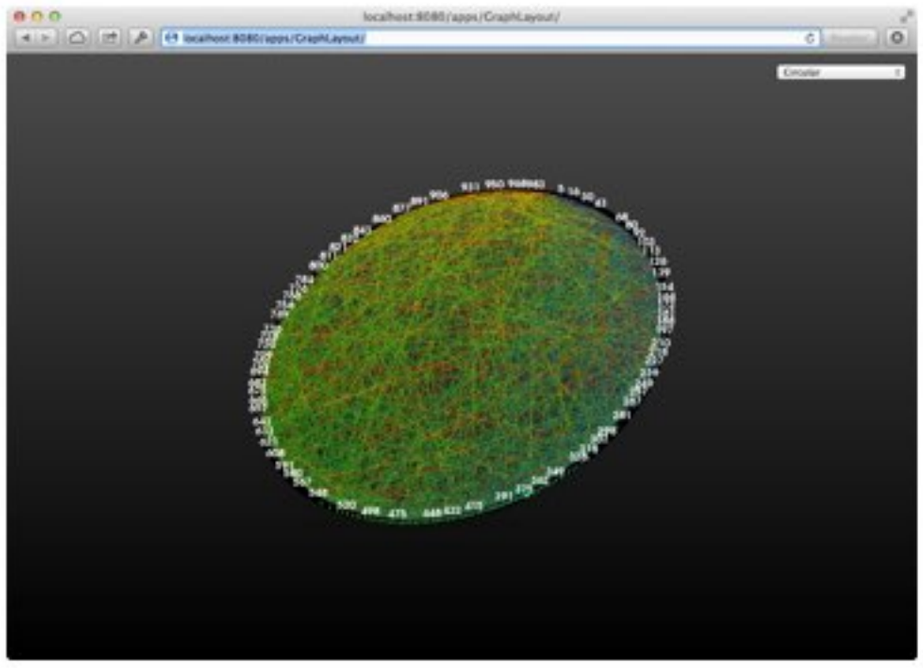


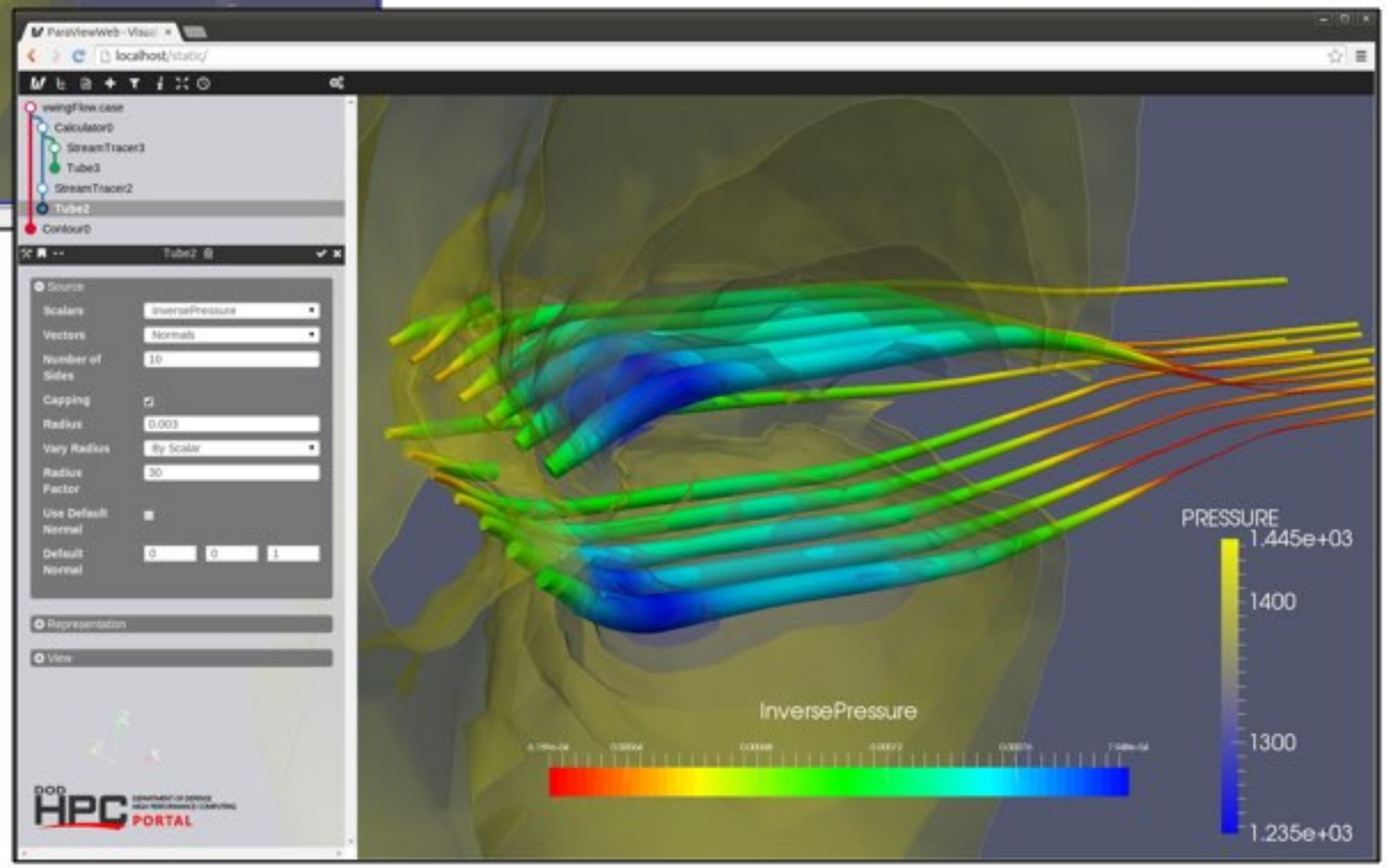
ParaViewWeb











Trade Studio

Experimental Simulation Design

Big data

Extract meaningful parameters to ease comparison

Aggregation

Weight, cost, speed...

Big data

Data extraction and filtering

Tonic Data Exportation

Tonic Data Visualization

ParaViewWeb visualization

ERS Toolset

Extract handful set of entry

Large Data Visualization

Experimental Simulation Design

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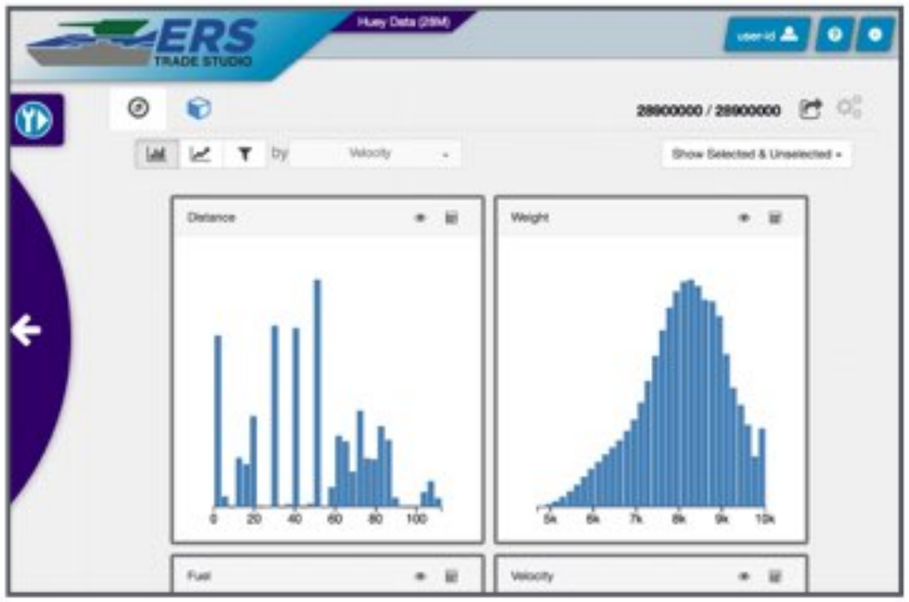
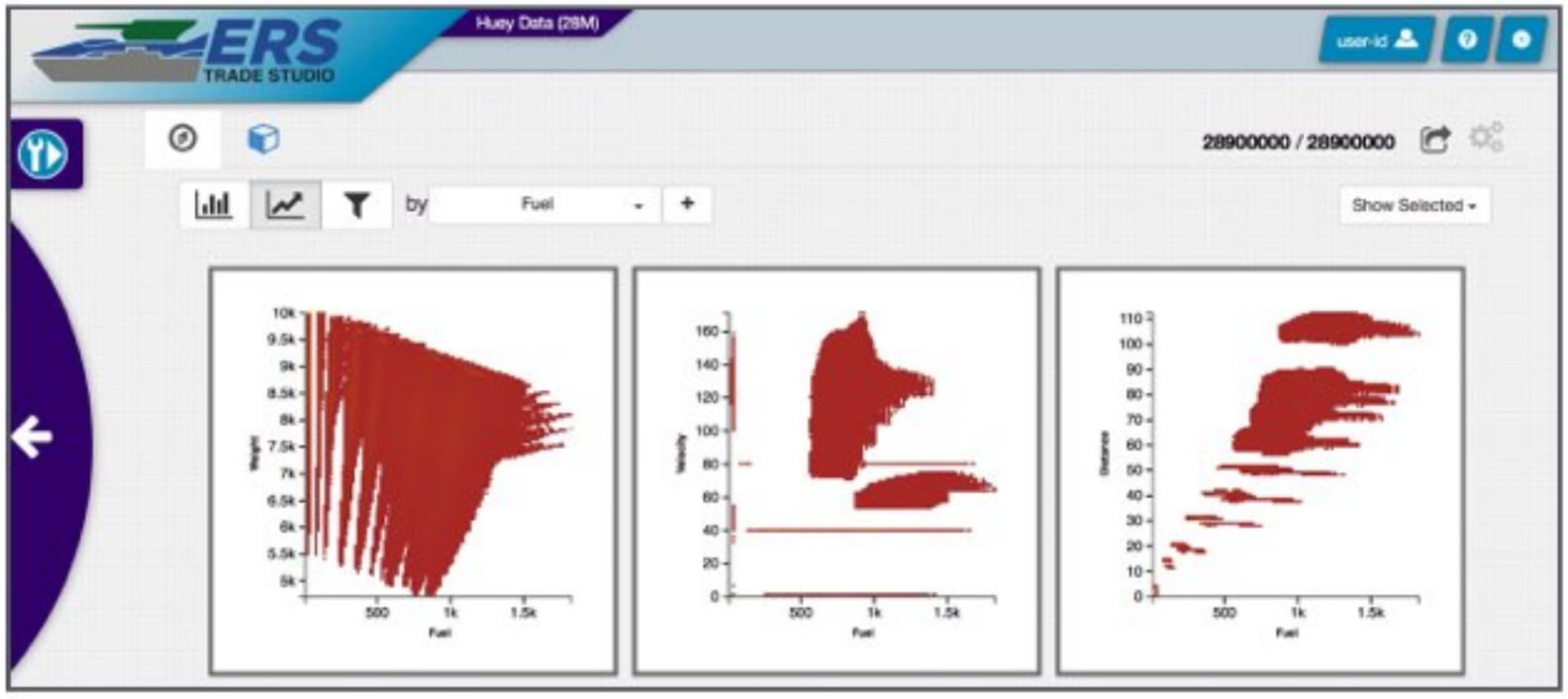
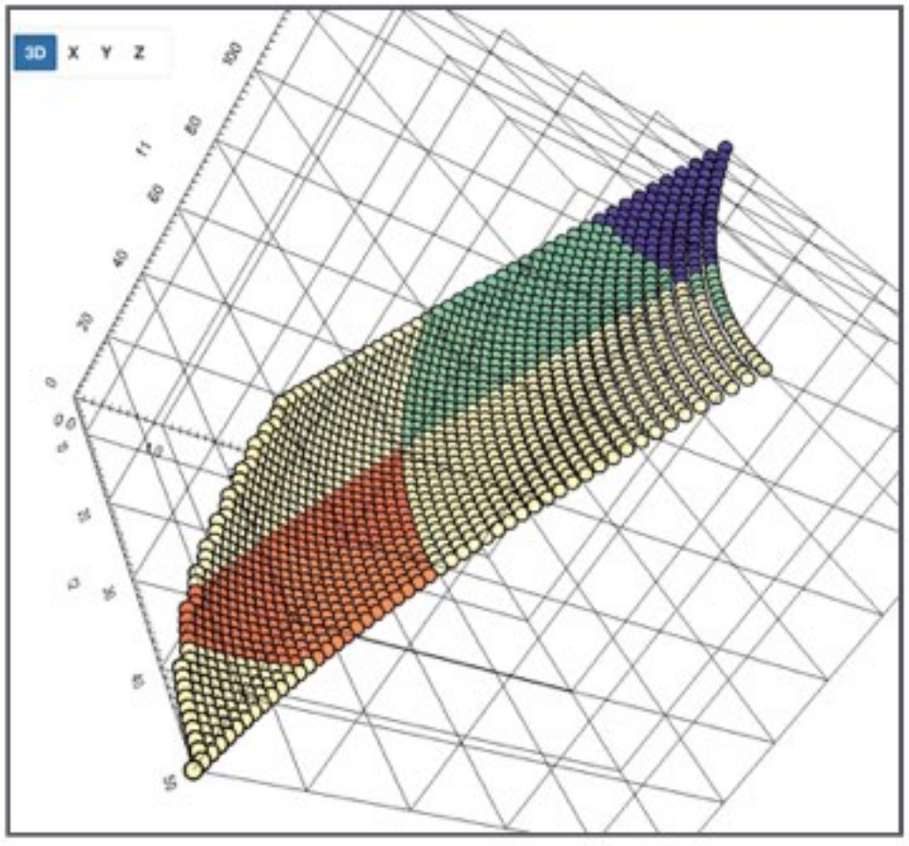
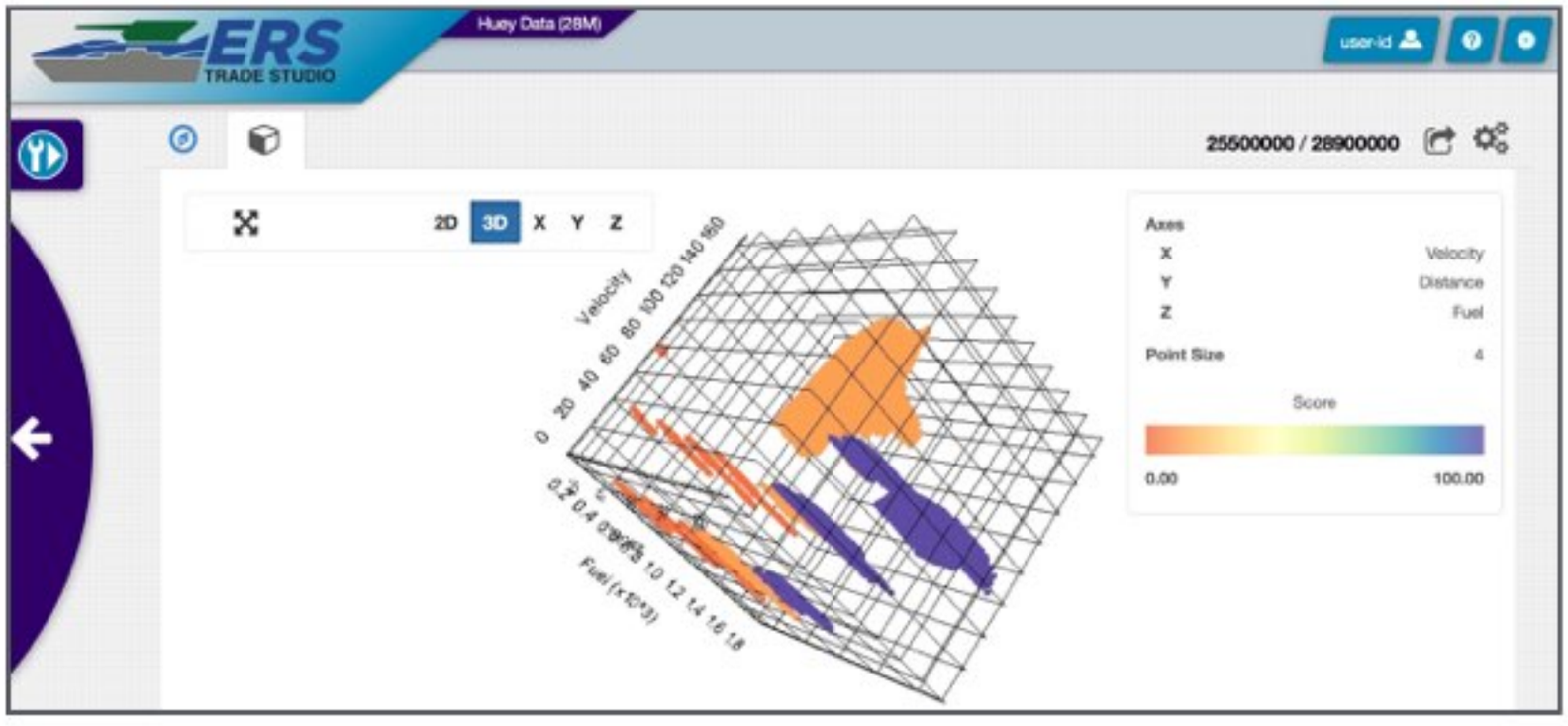
Tonic Data
Visualization

Large Data Visualization

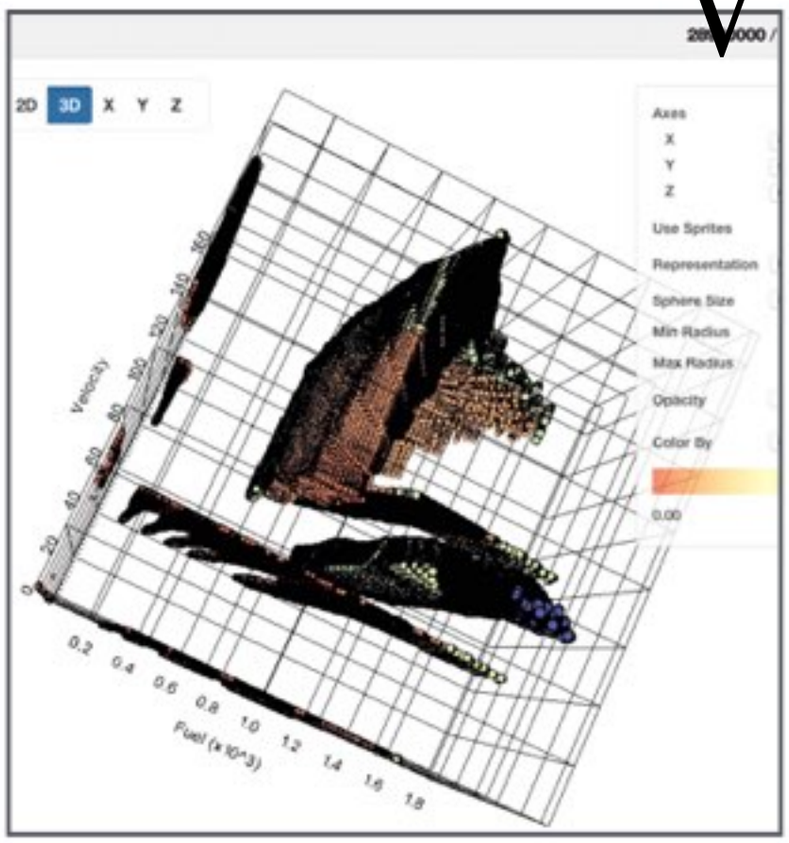


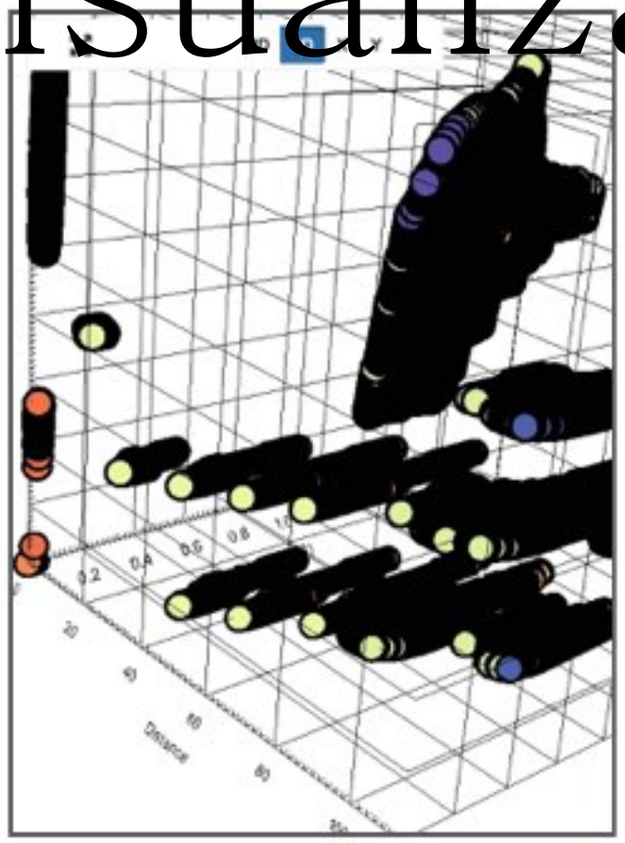


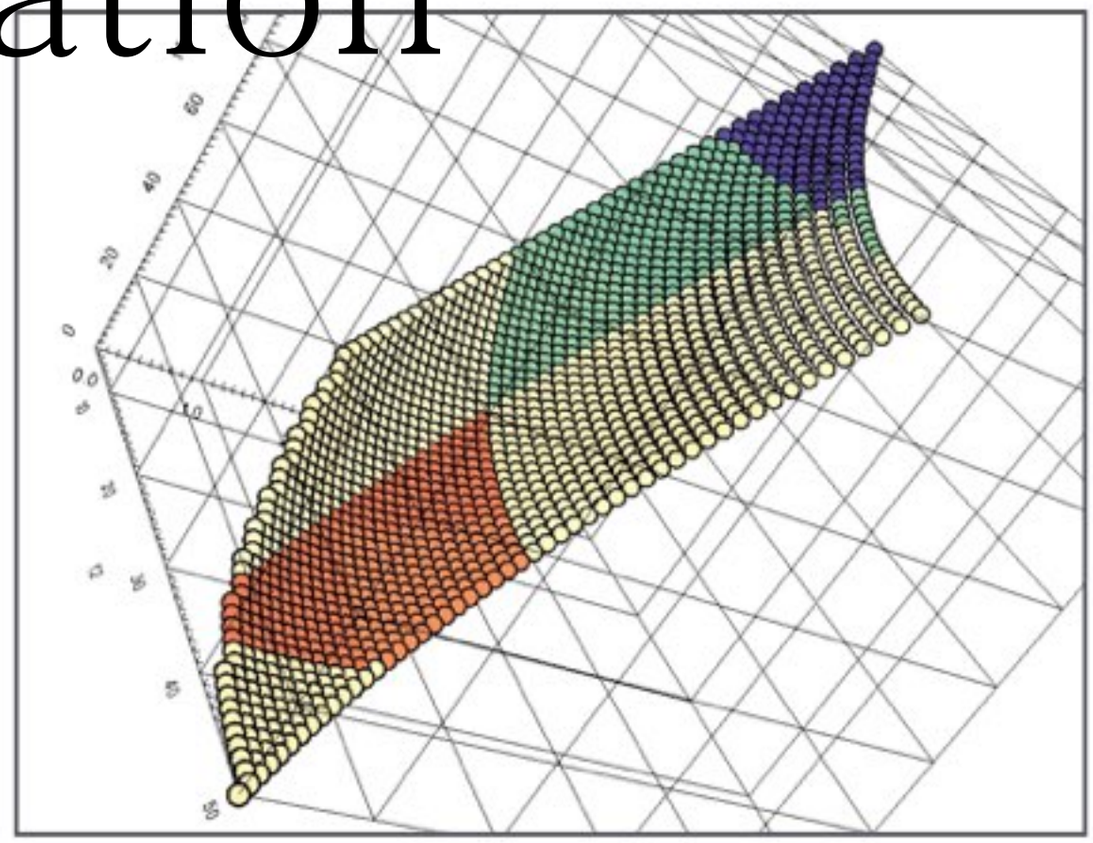


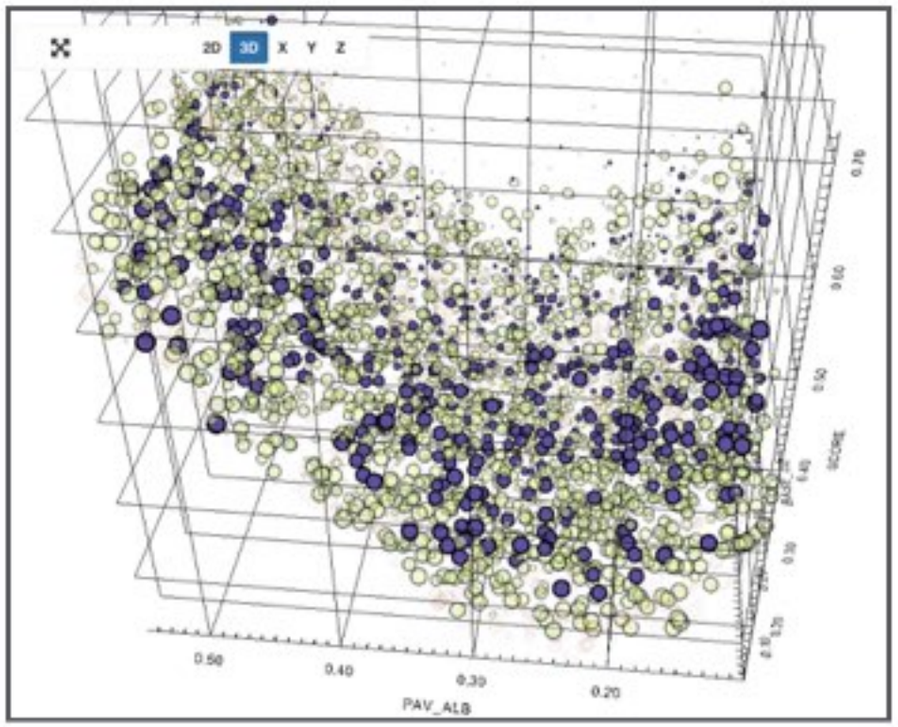


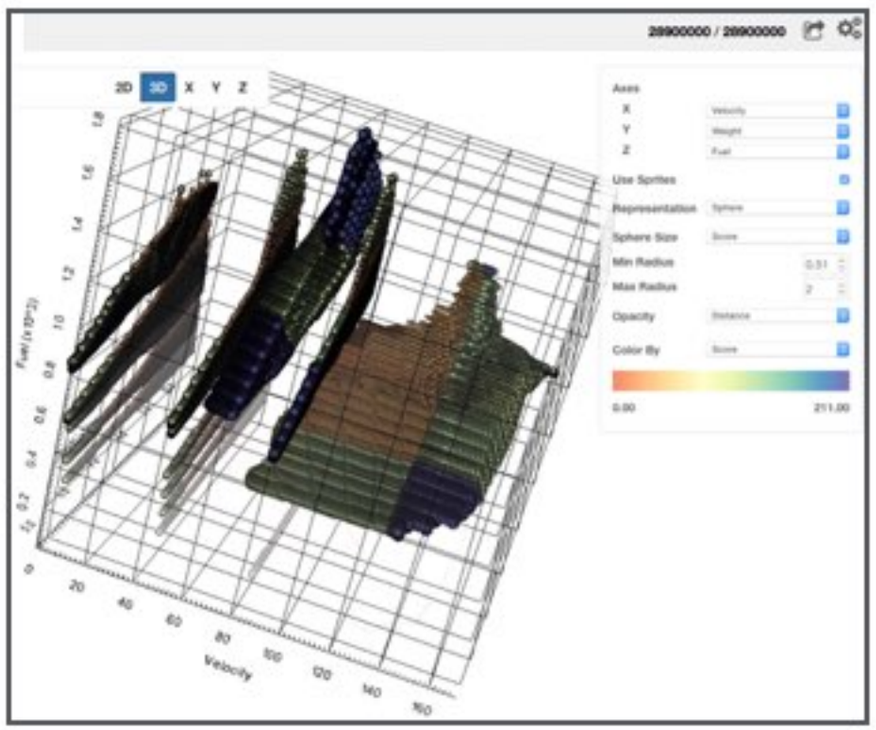
Large Data Visualization

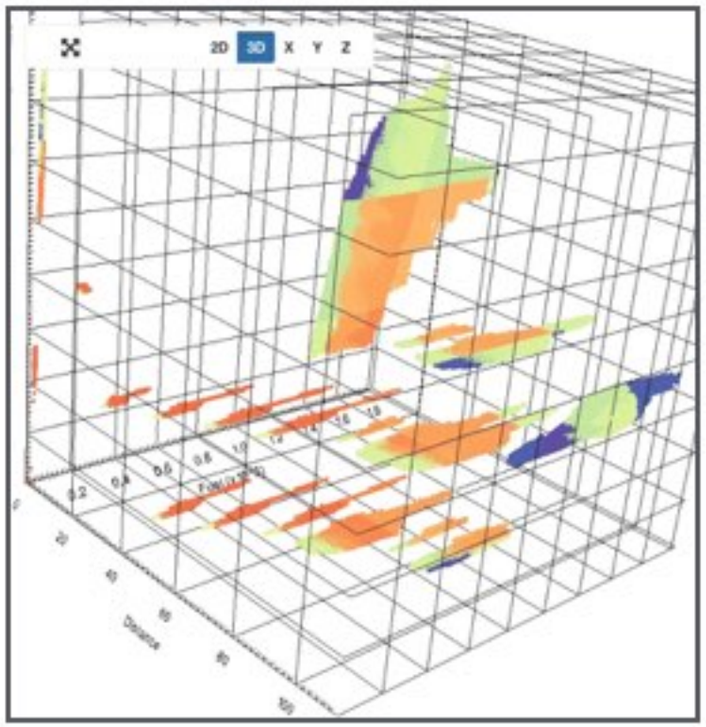






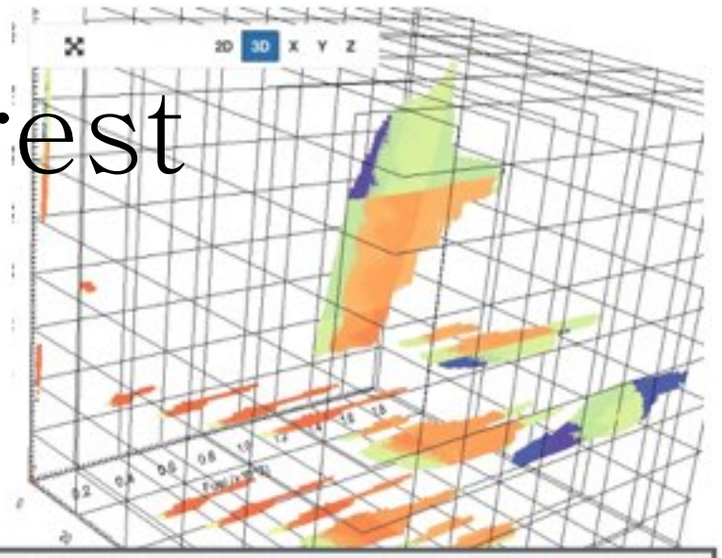


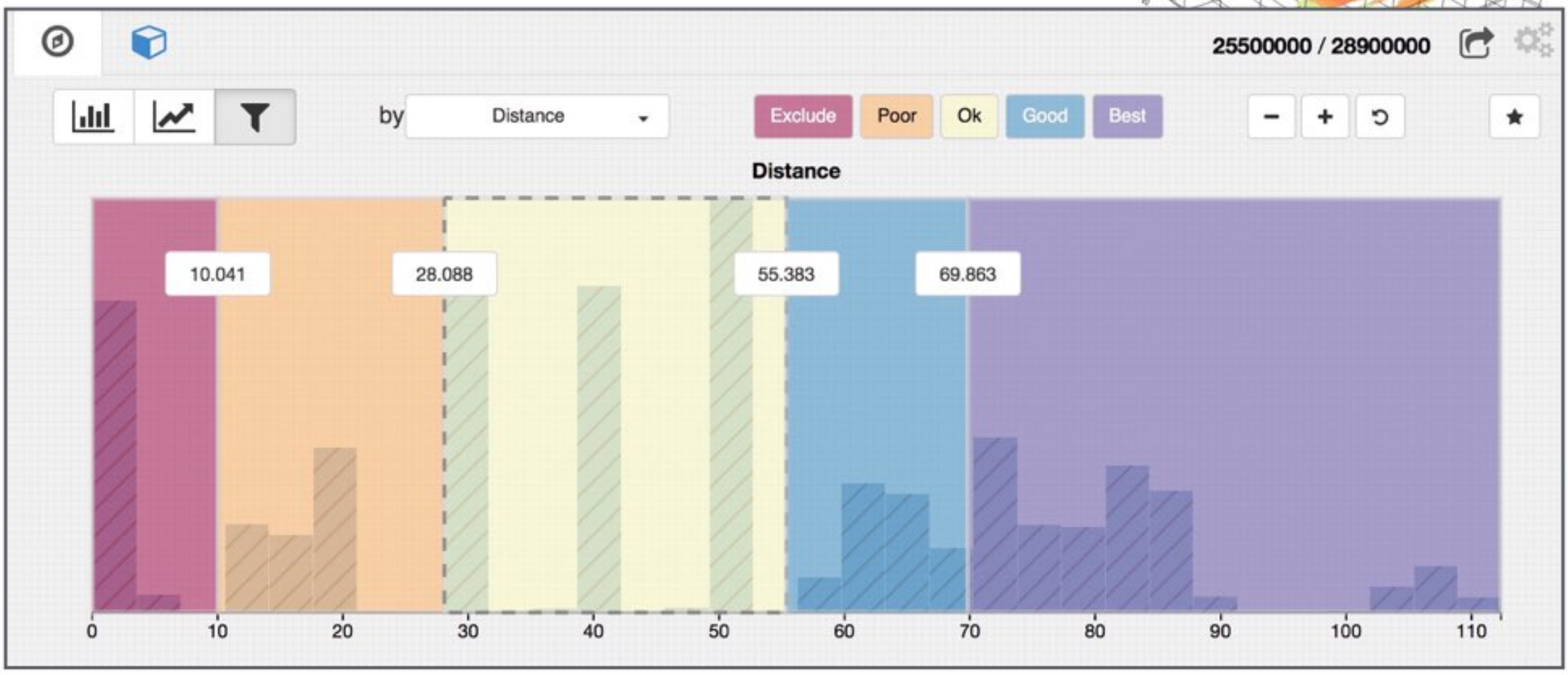




Data filtering and extraction

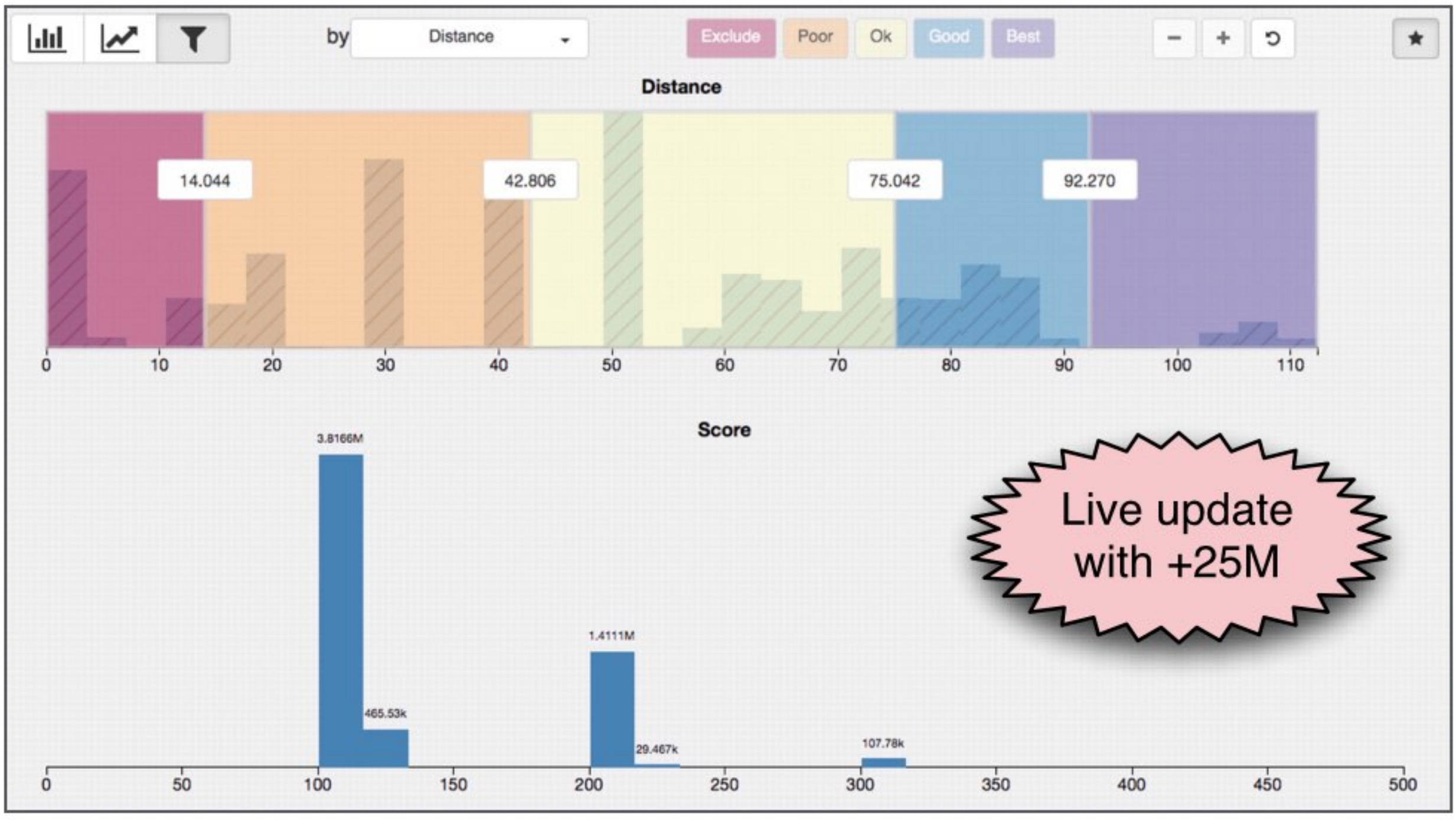
- A way to express your interest
  - Parameter annotation
  - Score generation



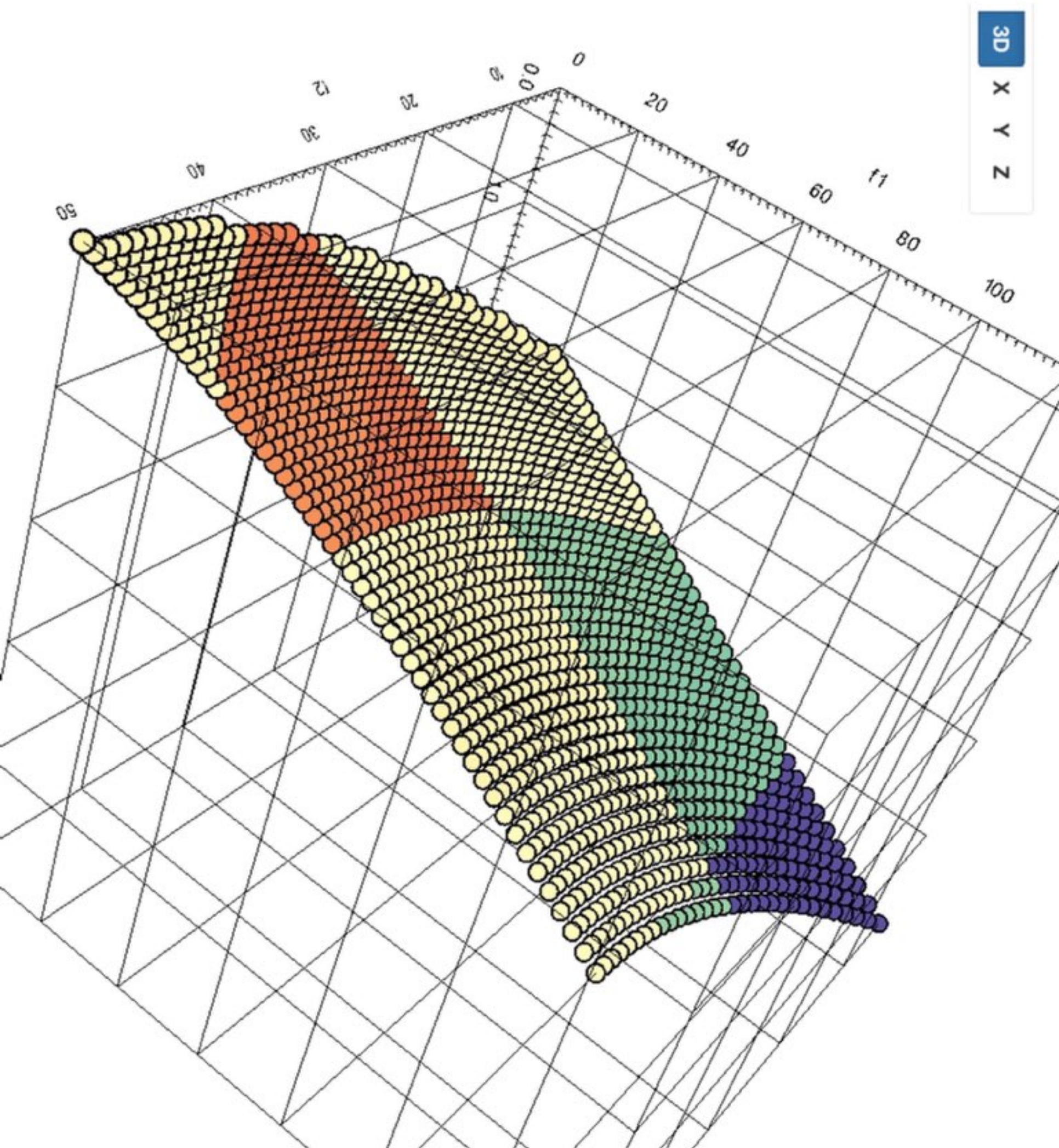


Data filtering and extraction

- Score distribution



Region tagging



Data extraction

- Reached manageable data size
  - Other tools and visualizations
  - Fine grained data analysis
  - Further drill down
- Other tools

Reach a set of solutions

Interested to look back?

Looking at the original data

Tonic Data Visualization

Experimental
Simulation
Design

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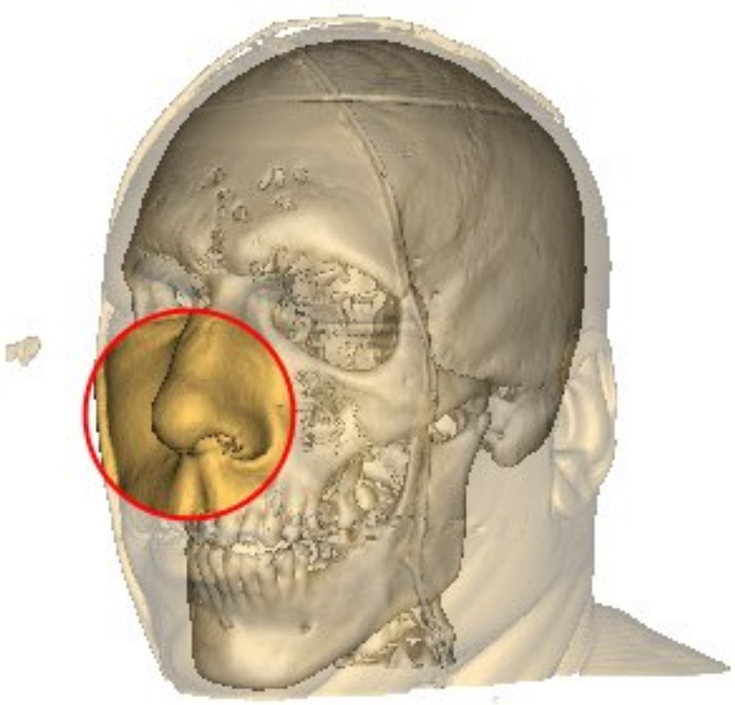
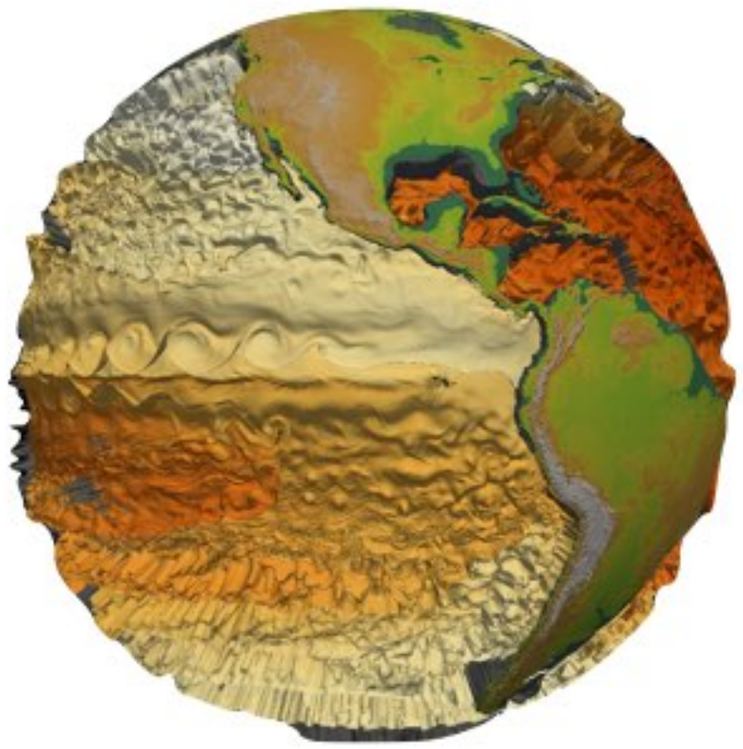
Tonic & ArcticViewer

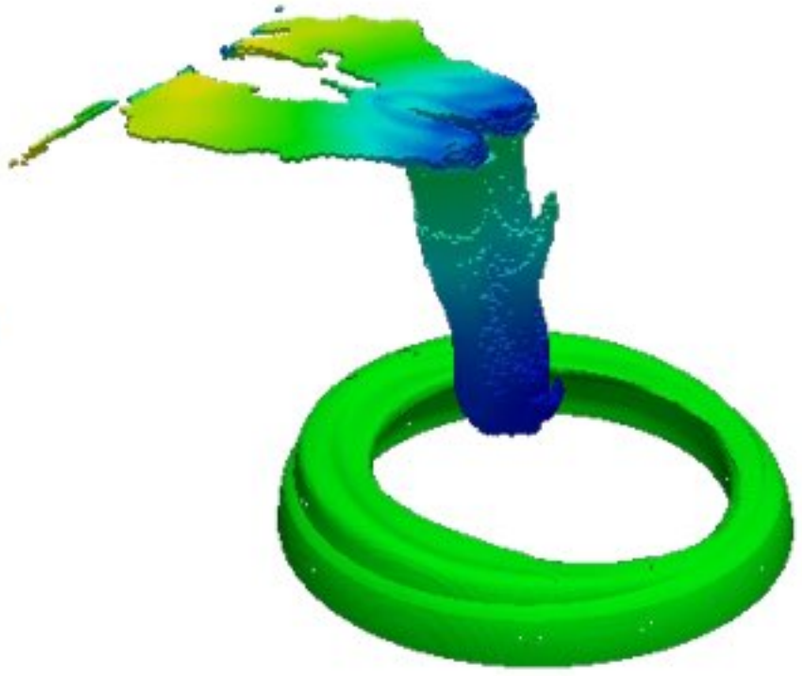
- Tool for reducing original data size to produce interactive 3D visualization

- Extract rendering information for deferred Web rendering (composition, coloring, alpha blending…)

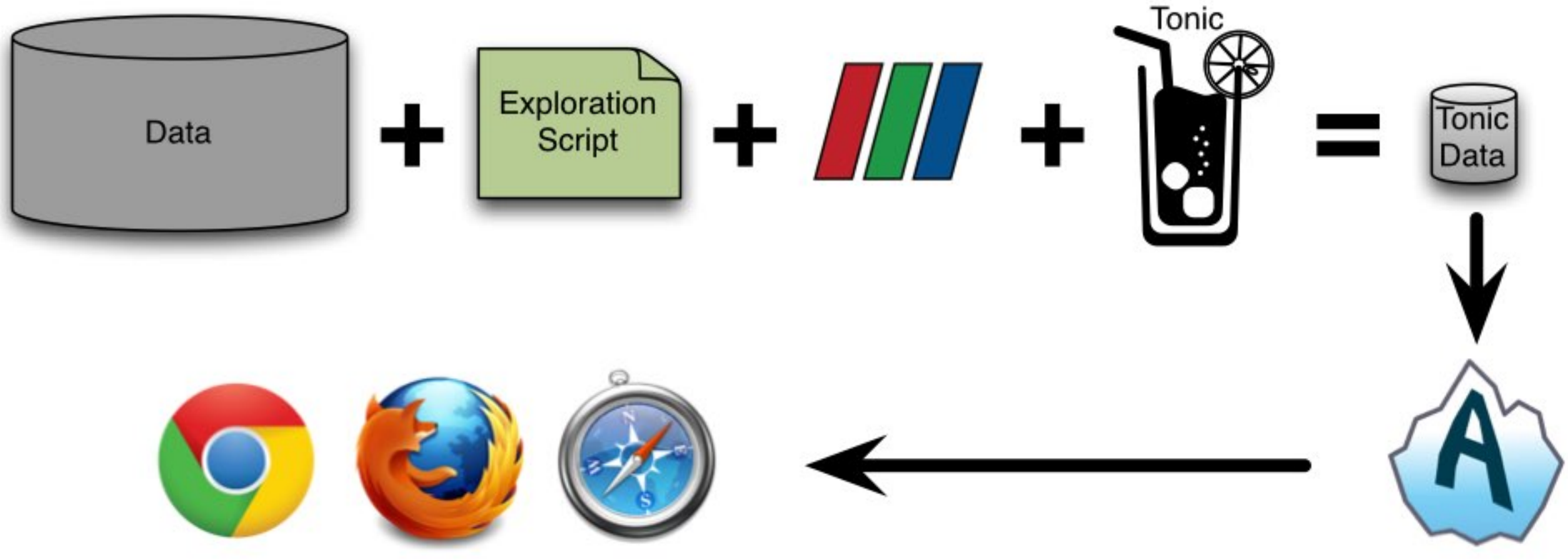
- Visualization designed for the web



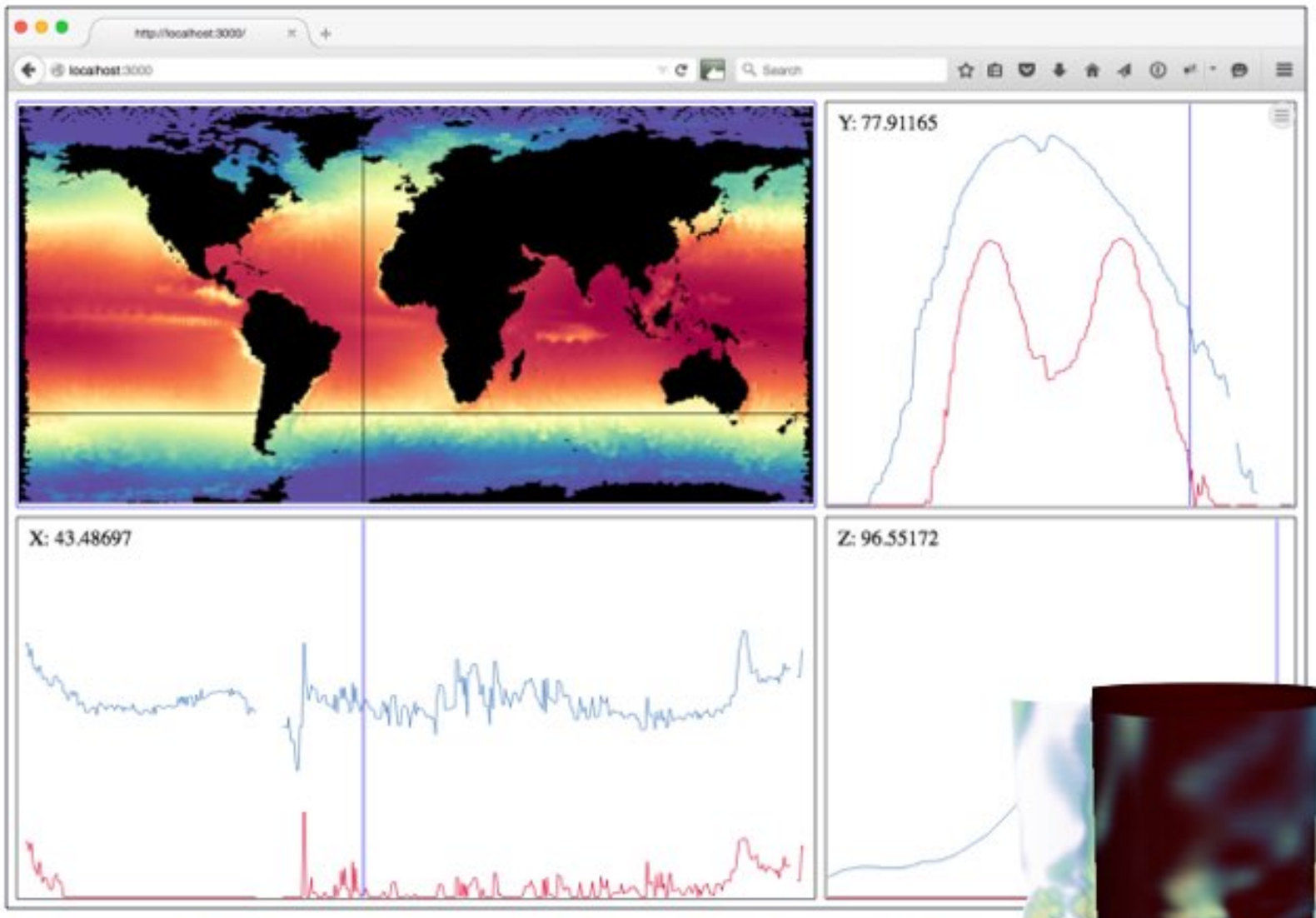


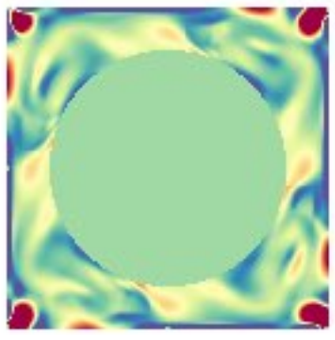


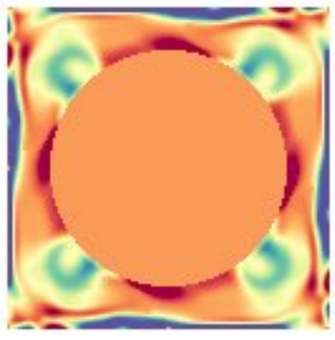
Tonic & rctic Viewer

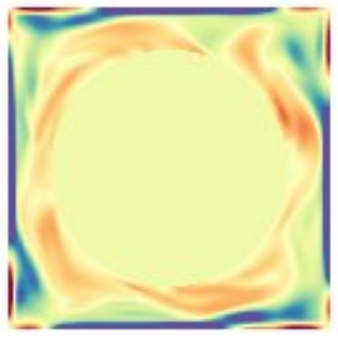


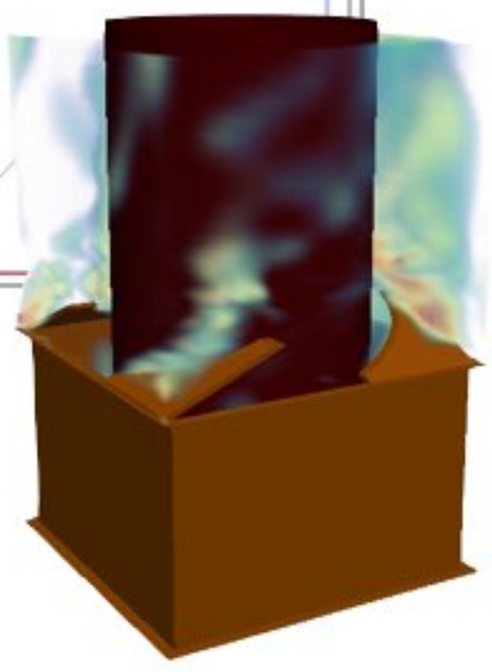
ArcticViewer - Demo

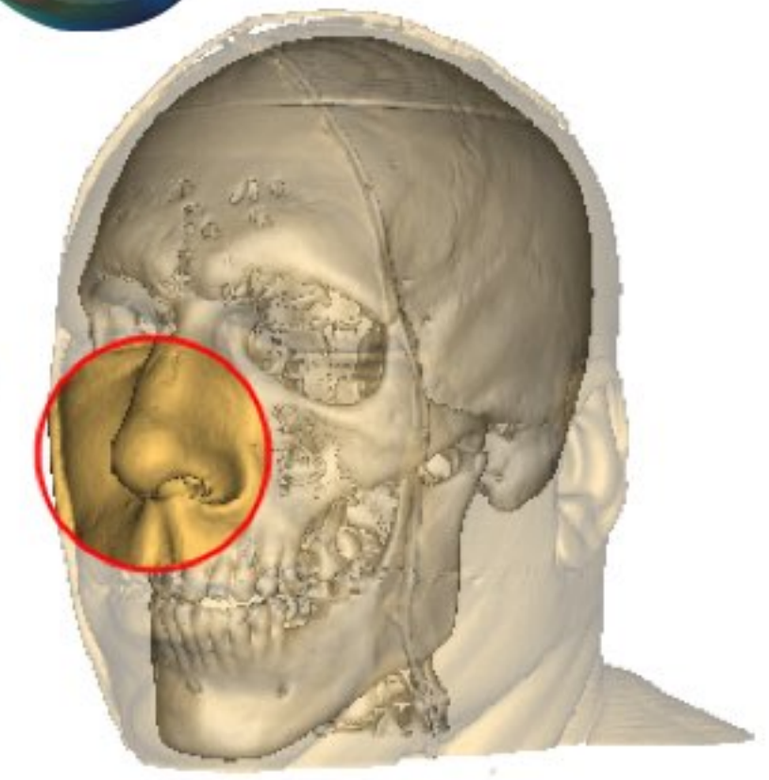












Conclusion

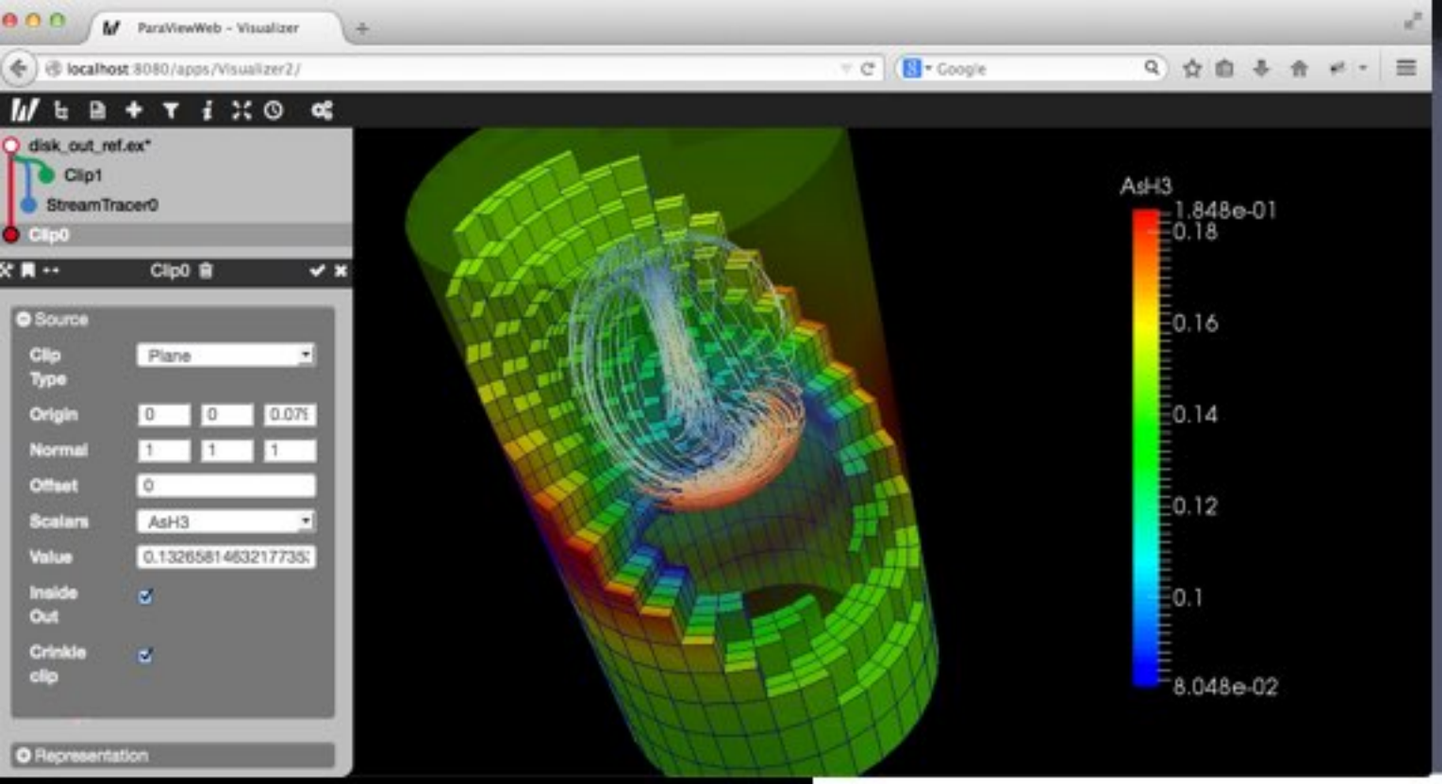
- ERS – Large Data Visualization and Analysis system
  - Enabling Big Data (+ 25M) for driving data analysis and visualization

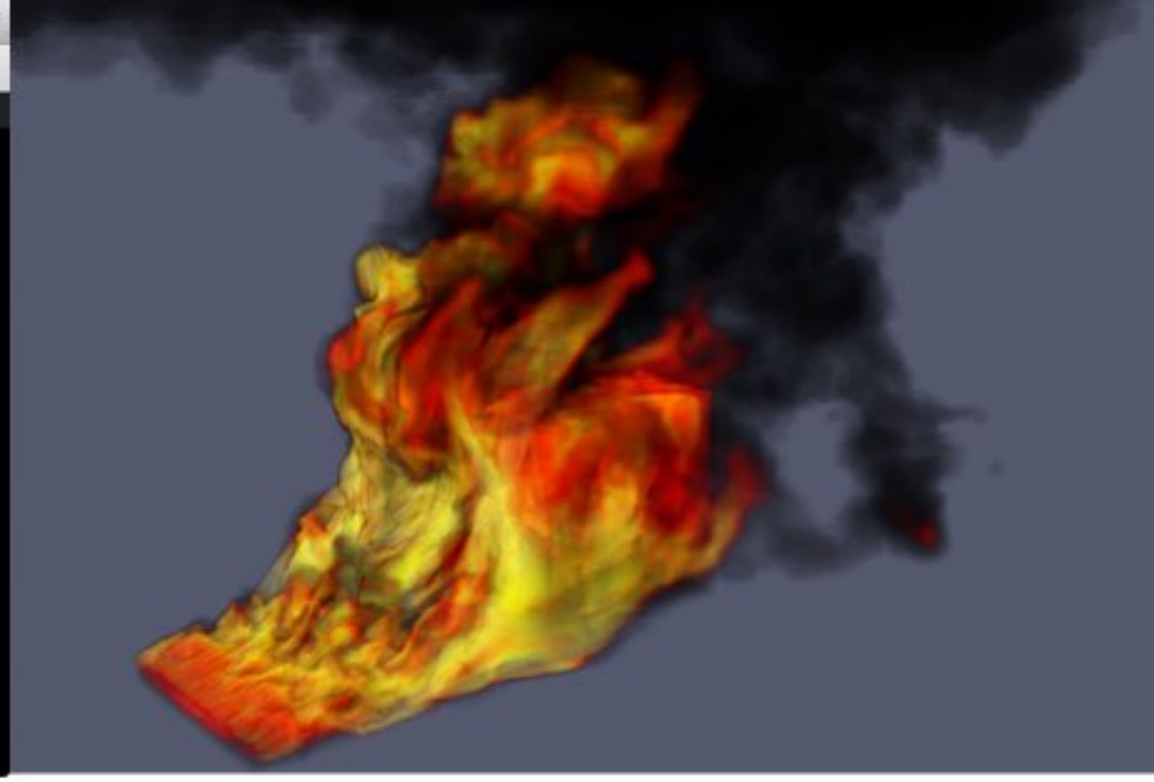
- ParaViewWeb a good fit for big data
  - Framework for data processing and visualization

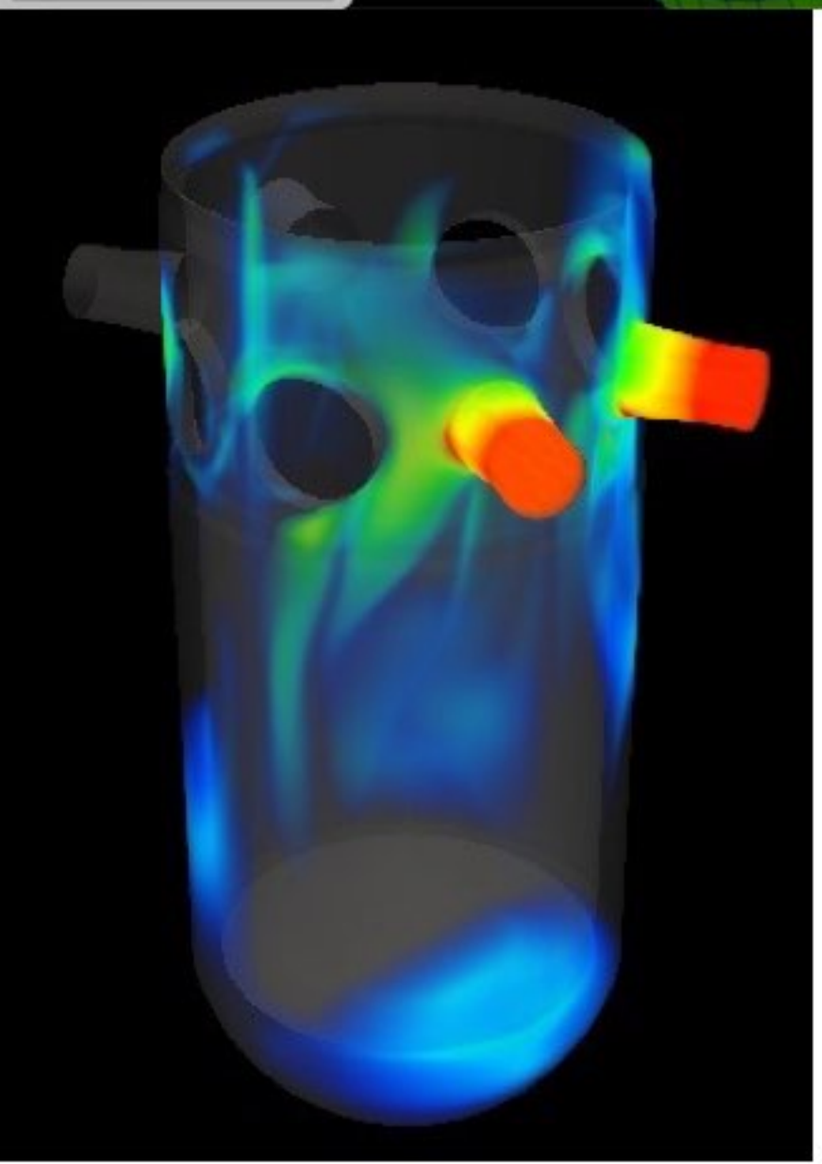
- Tonic & ArcticViewer
  - Another approach for interactive web visualization

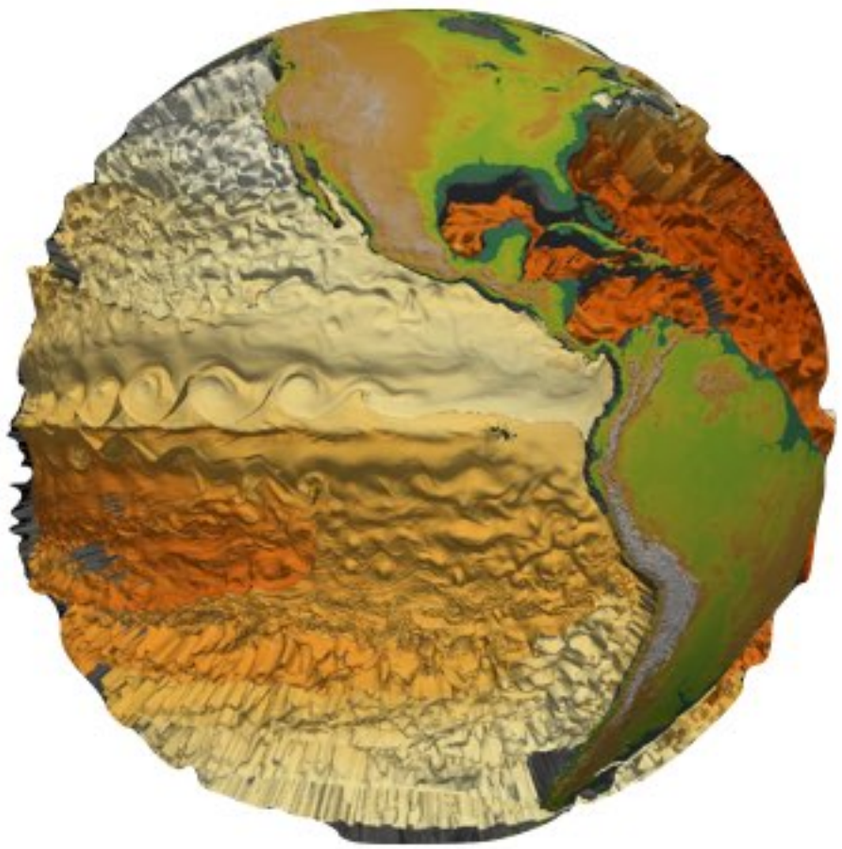
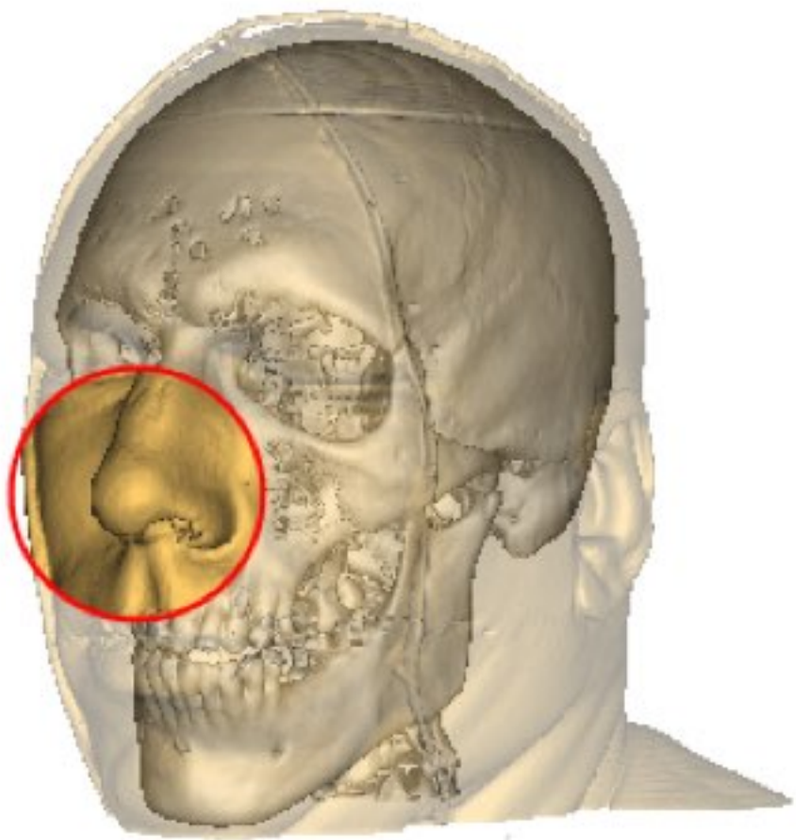
ENGINEERED RESILIENT SYSTEMS
DEPARTMENT OF DEFENSE

National Defense Industrial Association







Questions?

sebastien.jourdain@kitware.com