

What's New in ParaView

DOECGF 2019

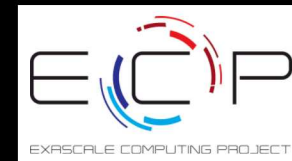
April 23 or 24, 2019

Kenneth Moreland Sandia National Laboratories
with lots of contributions from Cory Quammen and the ParaView Community

Acknowledgements



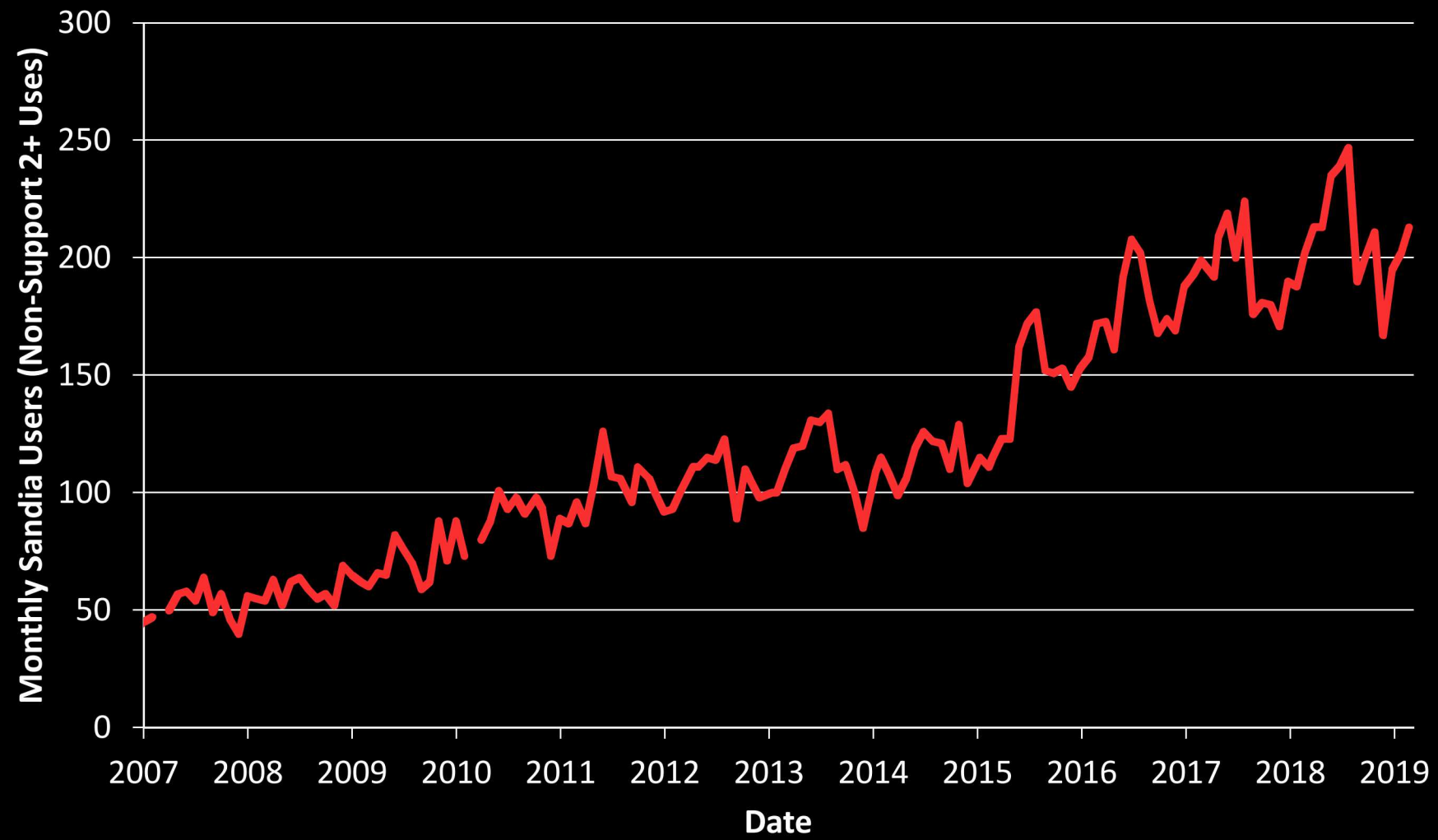
- This research was supported by the Exascale Computing Project (17-SC-20-SC), a collaborative effort of two U.S. Department of Energy organizations (Office of Science and the National Nuclear Security Administration) responsible for the planning and preparation of a capable exascale ecosystem, including software, applications, hardware, advanced system engineering, and early testbed platforms, in support of the nation's exascale computing imperative.
- Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.
- **Thanks to many, many partners in labs, universities, and industry.**



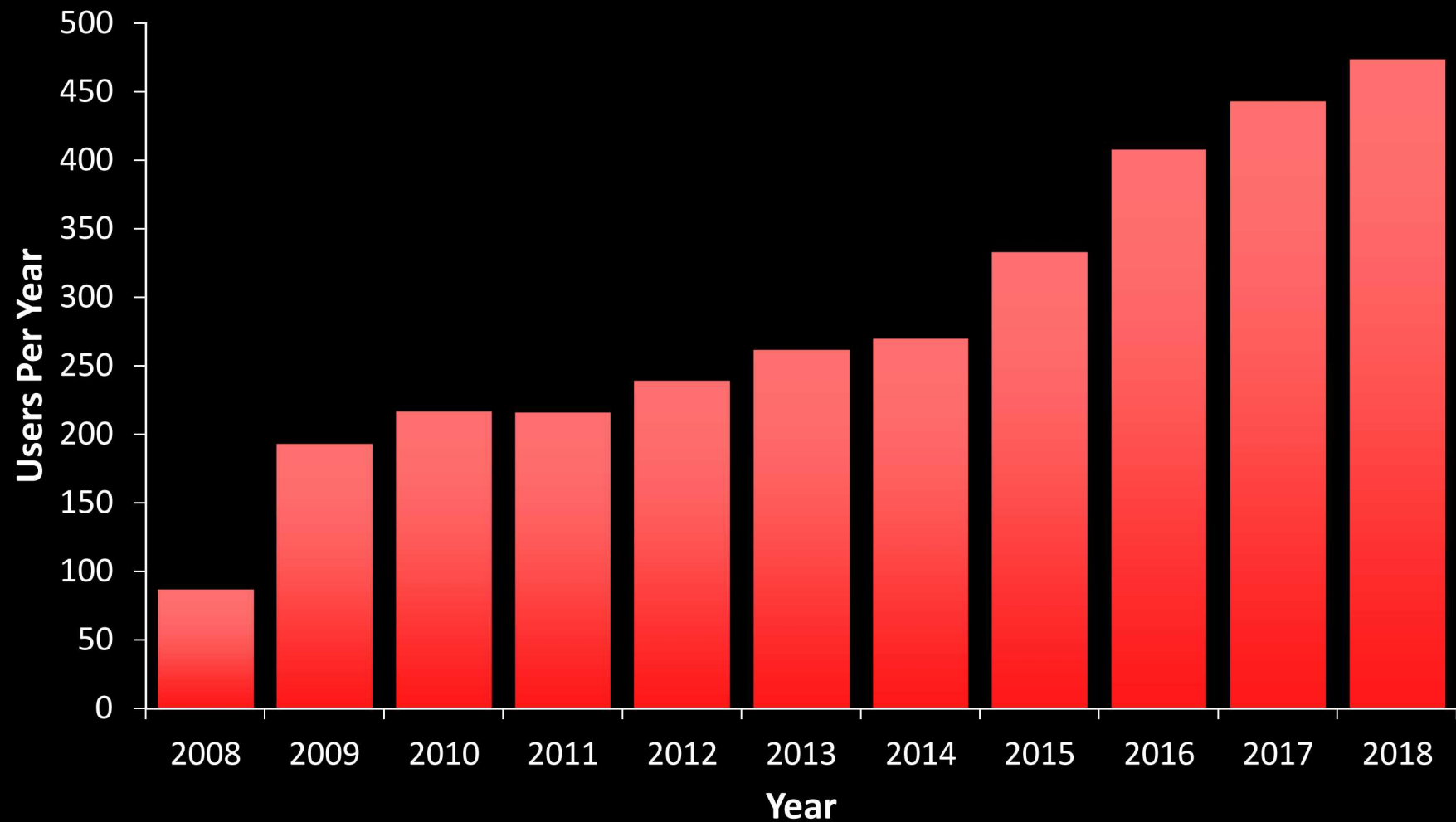
The Numbers

- Releases during the last 12 months: 5.5.1 (June 2018, 25 issues), 5.5.2 (June 2018, 6 issues), 5.6.0 (November 2018, 267 issues)
- Users at Sandia
 - ~195/month (DART metric: 2+ uses, non-support)
 - 443 total during 2017 (unclassified use only)
- Downloads from Kitware past year: > 151K
 - Counts button clicks on web form
 - Duplicate IP's removed
 - Includes binary and source packages. Not data nor plugins
- Total posts made to discourse the past year: 3794
 - This year switched from mailing list to discourse
 - First post made May 1, 2018

Sandia Monthly ParaView Usage



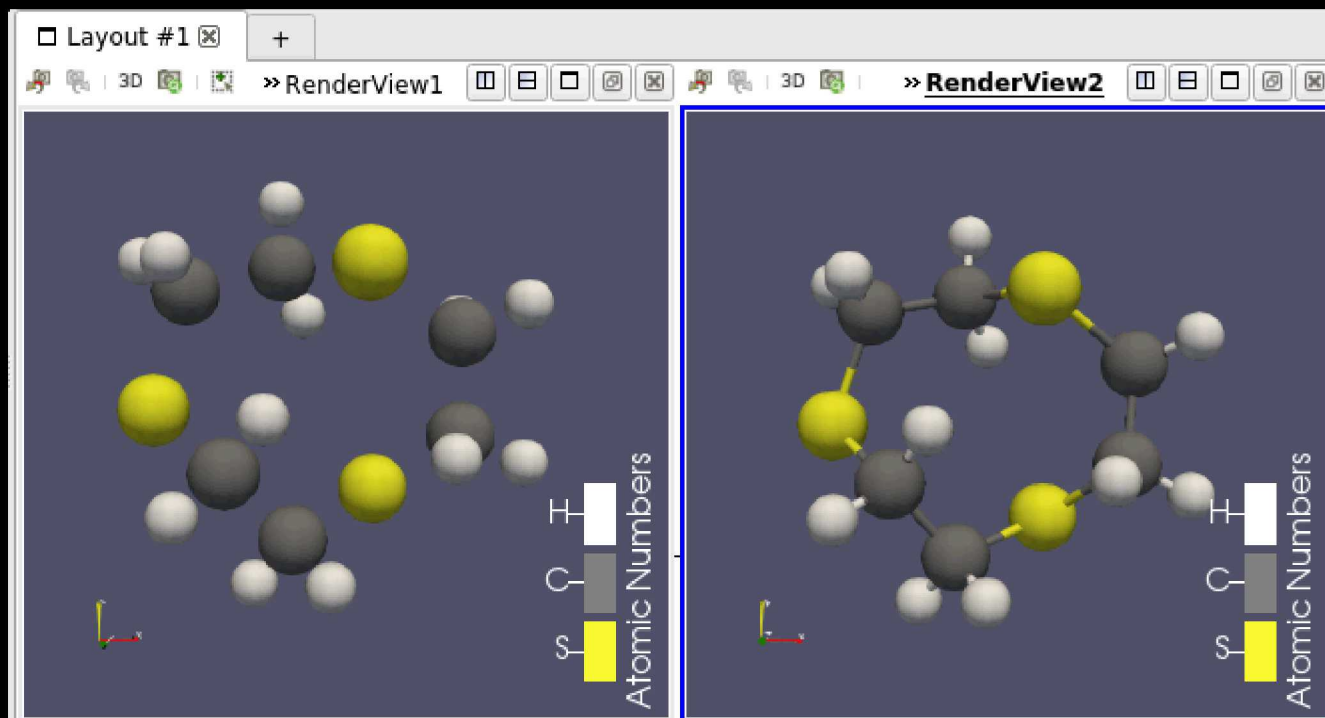
Sandia Yearly ParaView Usage



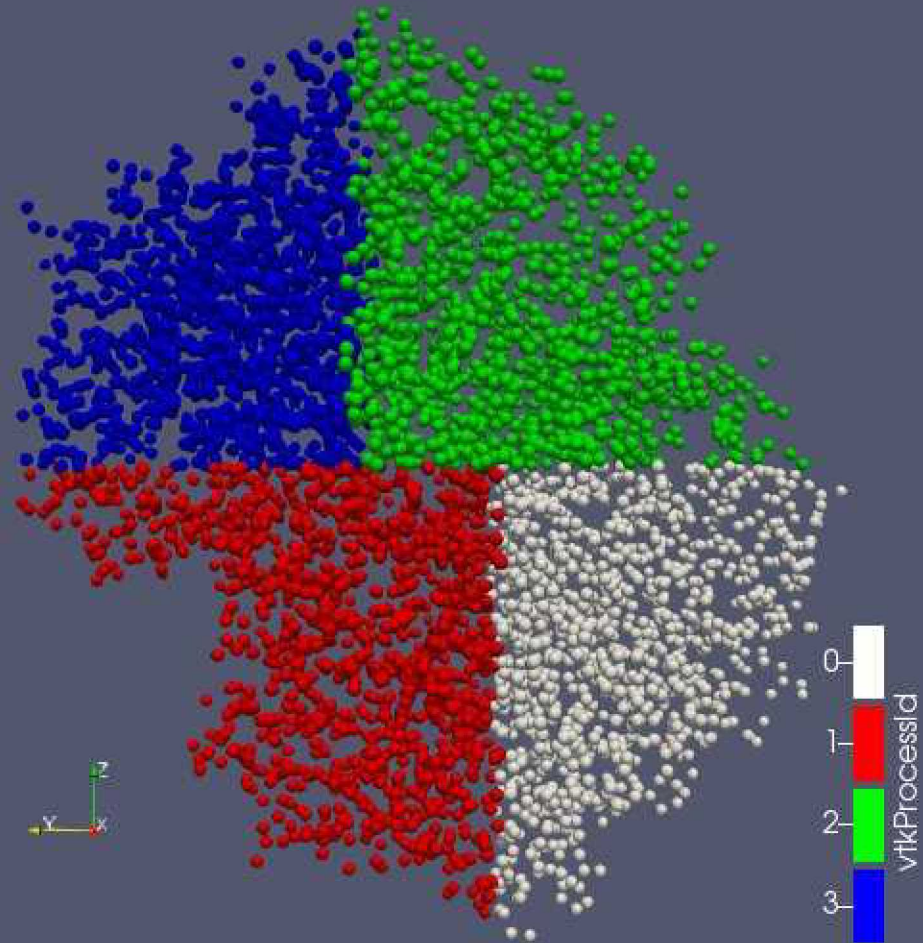
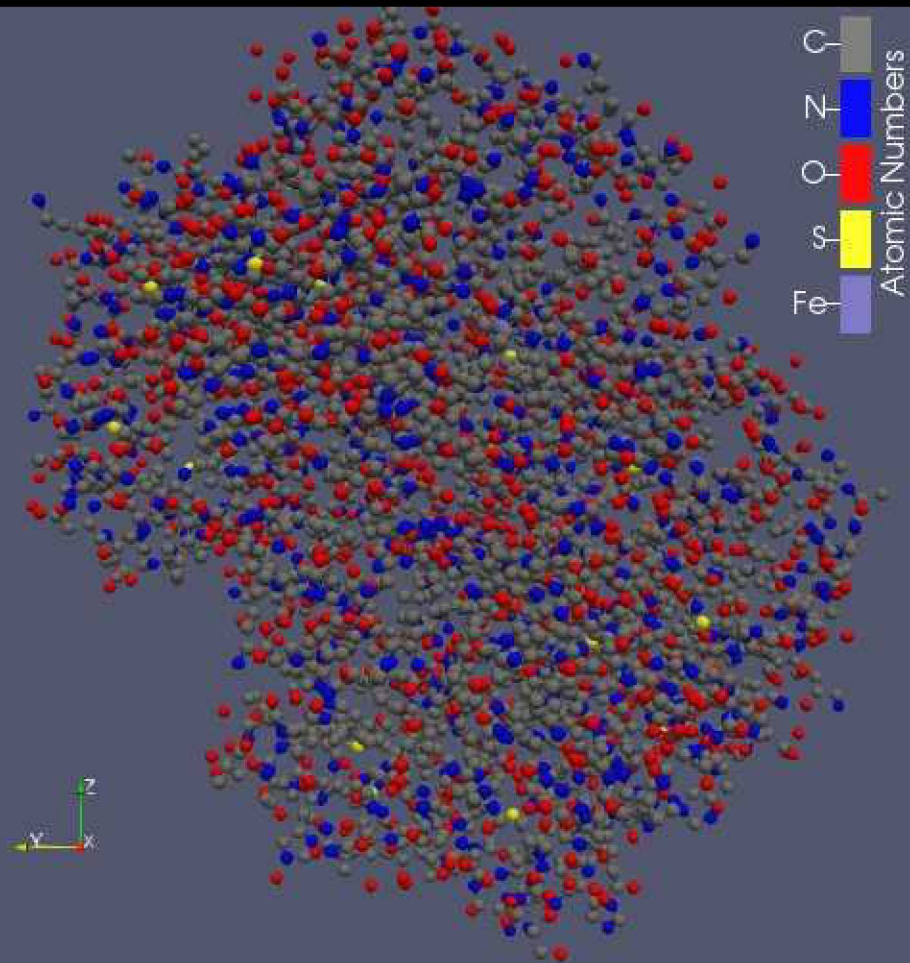
Filter Changes

Added Molecule Filters

- Simple bond perceiver (Compute Molecule Bonds)
- Convert from point set to Molecule data set (Convert Into Molecule)
- Convert from Molecule to Poly Data (Molecule To Lines)
- Merge molecule data (Append Molecule)



Point Distribution Filter



Revised Glyph Filter

Old Controls

Active Attributes

Scalars  RTData

Vectors  None

Orientation

☒ Orient

Scaling

Scale Mode  scalar

Scale Factor  0.2  

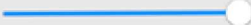
New Controls

Orientation

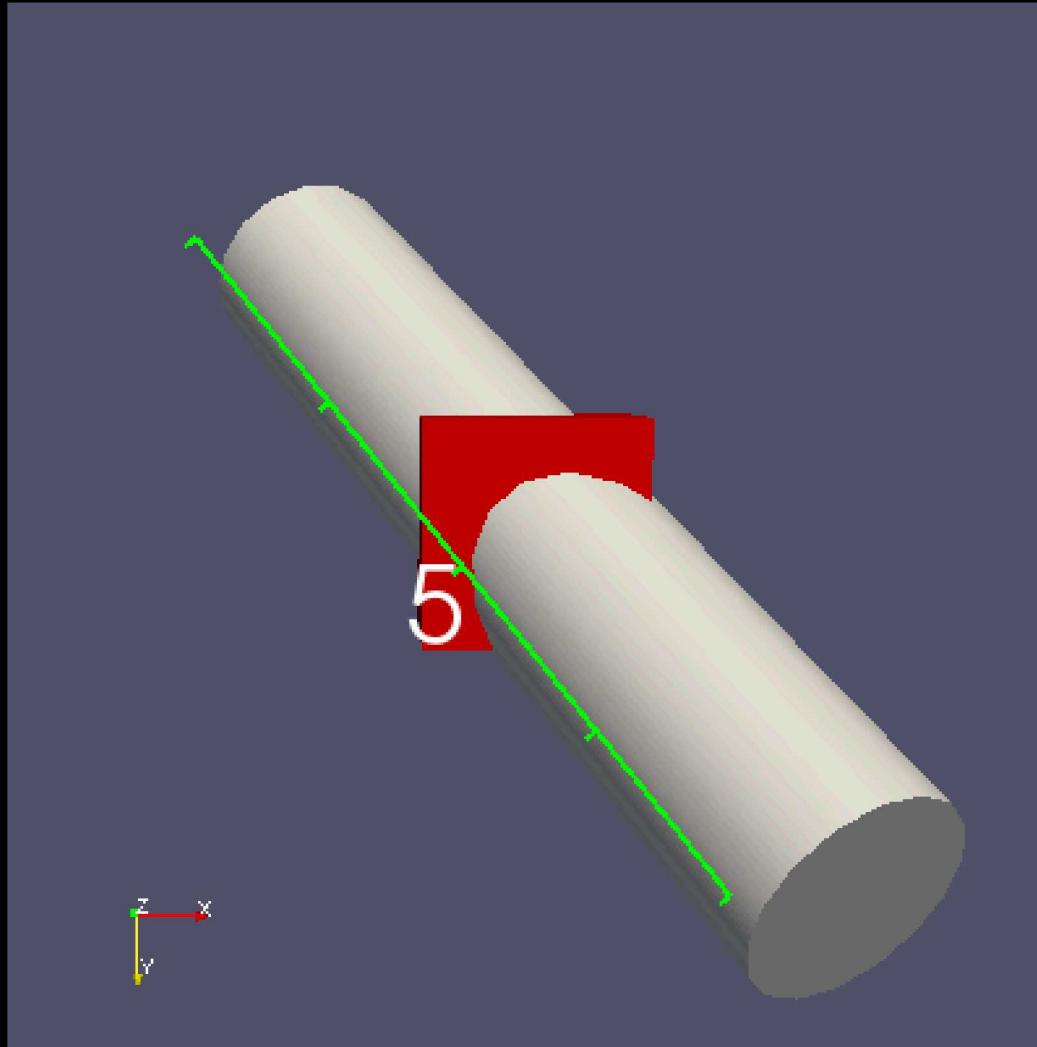
Orientation Array  No orientation array 

Scale

Scale Array  RTData

Scale Factor  2.0000e-01  

Bounding Ruler on Oriented Bounding Box



Readers, writers, and sources

Expanded .series case file

```
{  
  "file-series-version" : "1.0",  
  "files" : [  
    { "name" : "foo1.vtk", "time" : 0 },  
    { "name" : "foo2.vtk", "time" : 5.5 },  
    { "name" : "foo3.vtk", "time" : 11.2 }  
  ]  
}
```

- Convert a group of files into a time series
- Specify time stamps
- JSON format
- Supports: vtm, vtmb, vthb, vth, vtp, vtt, vtu, vti, vtk, vts, vtr, pvtp, pvtu, pvtt, pvti, pvts, pvtr, pvtk, ply, stl

New Readers and Writers

Readers

- SEG-Y
- MotionFX CFG
- Gmsh (plugin)
- Wavefront OBJ

Writers

- Wavefront OBJ
- CGNS

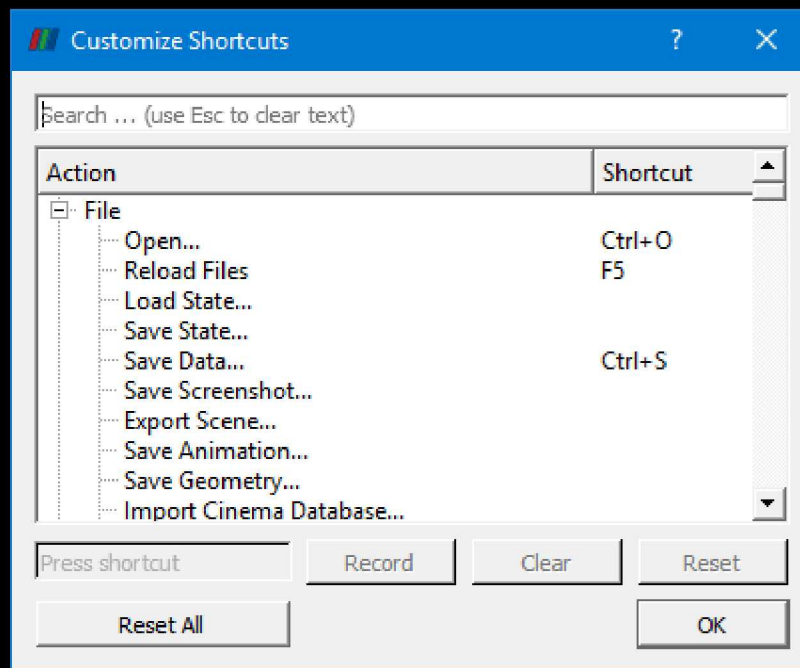
Live Programmable Source

- A new version of a programmable source that allows the Python scripts to update when new data are available
- Example: when getting data from a stream, can cause an update when new data come in

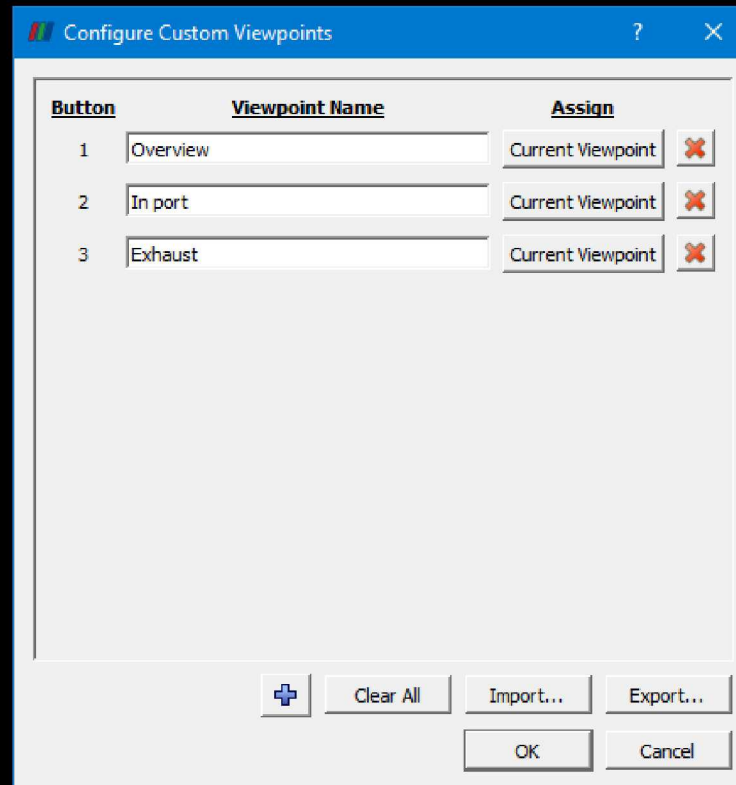
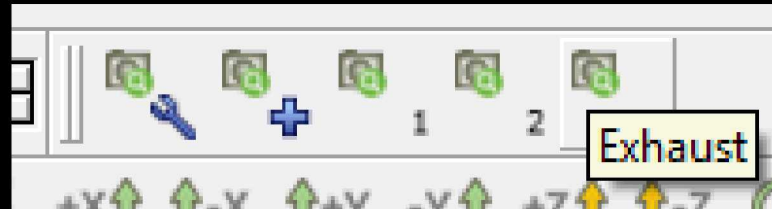
Interface Improvements

Customizable Shortcuts

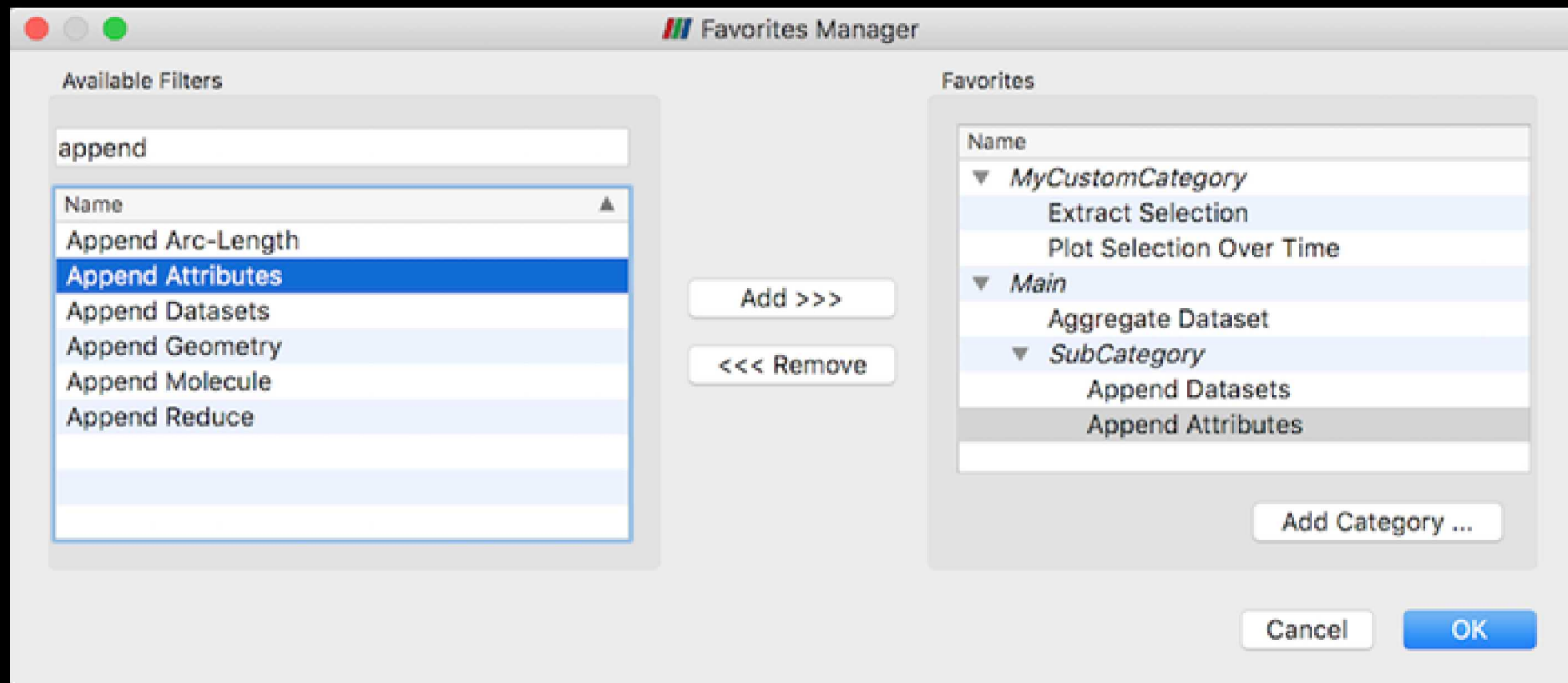
Tools → Customize Shortcuts...



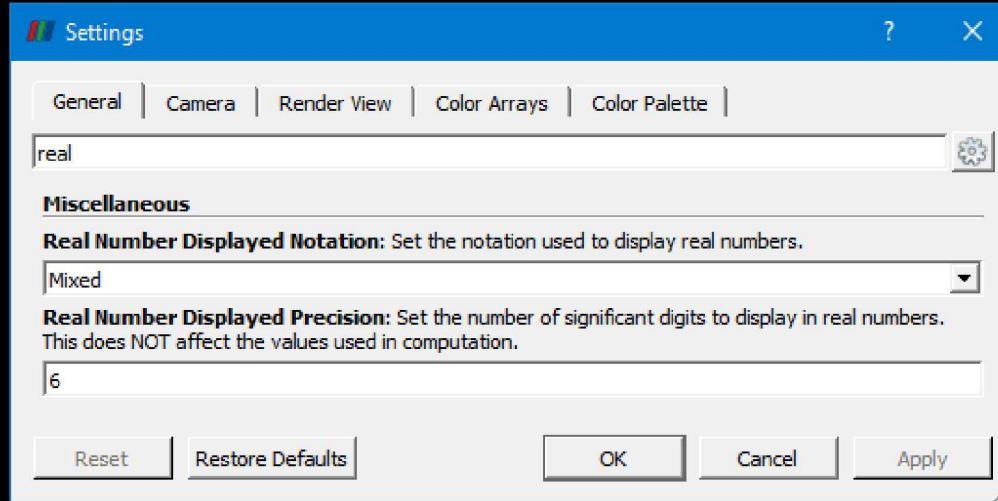
Custom Viewpoints Toolbar



Favorites for Filters



Number Display Options



Settings

General | Camera | Render View | Color Arrays | Color Palette

real

Miscellaneous

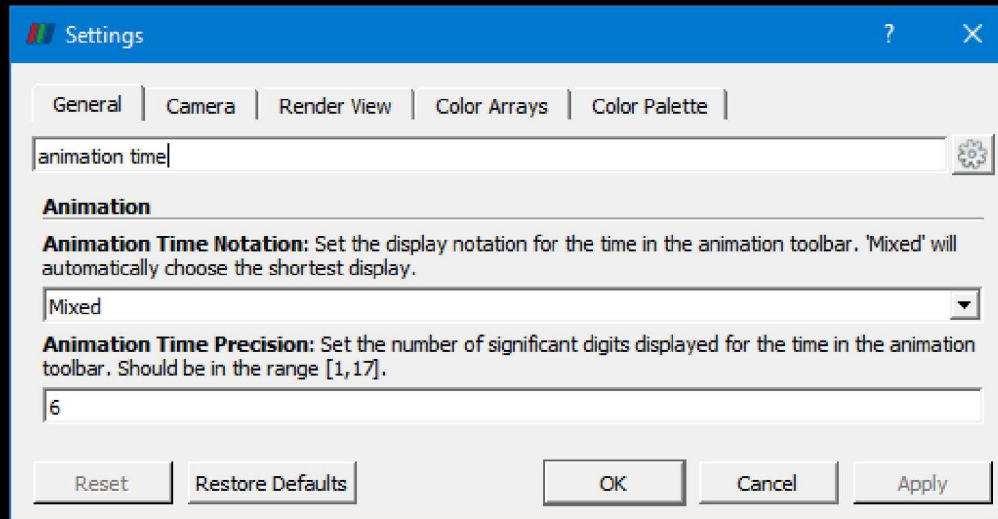
Real Number Displayed Notation: Set the notation used to display real numbers.

Mixed

Real Number Displayed Precision: Set the number of significant digits to display in real numbers. This does NOT affect the values used in computation.

6

Reset Restore Defaults OK Cancel Apply



Settings

General | Camera | Render View | Color Arrays | Color Palette

animation time

Animation

Animation Time Notation: Set the display notation for the time in the animation toolbar. 'Mixed' will automatically choose the shortest display.

Mixed

Animation Time Precision: Set the number of significant digits displayed for the time in the animation toolbar. Should be in the range [1, 17].

6

Reset Restore Defaults OK Cancel Apply

Fast, Precise Time Selection

The screenshot displays a video player interface with a top toolbar and a 'Time Inspector' panel below it.

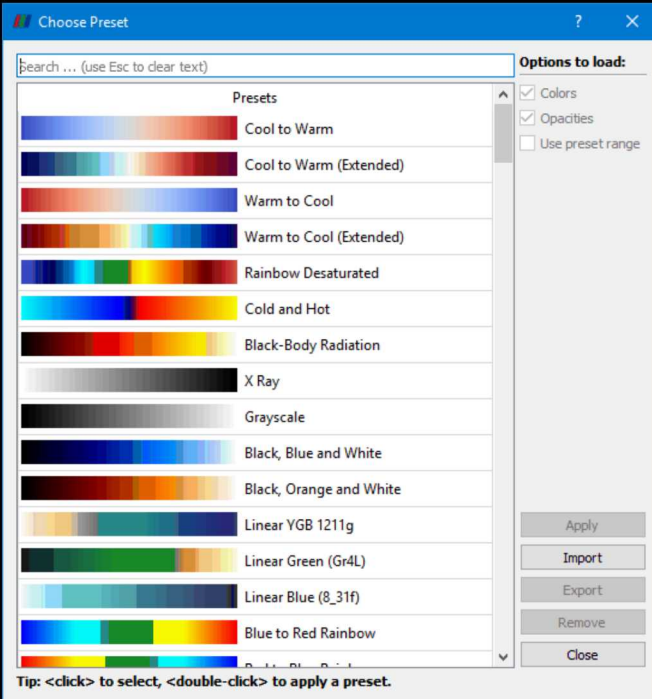
Top Toolbar: Contains playback controls (play, pause, stop, reset) and a time selection menu. The menu is open, showing three time values: 1000.0001, 1000.0002 (highlighted in blue), and 1000.0003. To the right of the menu is a numeric input field showing '0' with a '(max is 2)' label, and a set of directional arrows (+X, -X, +Y) and a 3D coordinate icon.

Time Inspector Panel: Features a title bar with zoom controls, a set of playback controls, and a time selection interface. The time selection interface includes a 'Time:' label, a dropdown menu showing '1000', a radio button, and a numeric input field showing '0' with a '(max is 2)' label. Below this is a table with three columns: 'Time', '1000.0001', '1000.0002', and '1000.0003'. The first column contains a checked checkbox and the filename 'mts.pvd'. A blue horizontal line with a vertical marker is positioned across the table, indicating the current time selection.

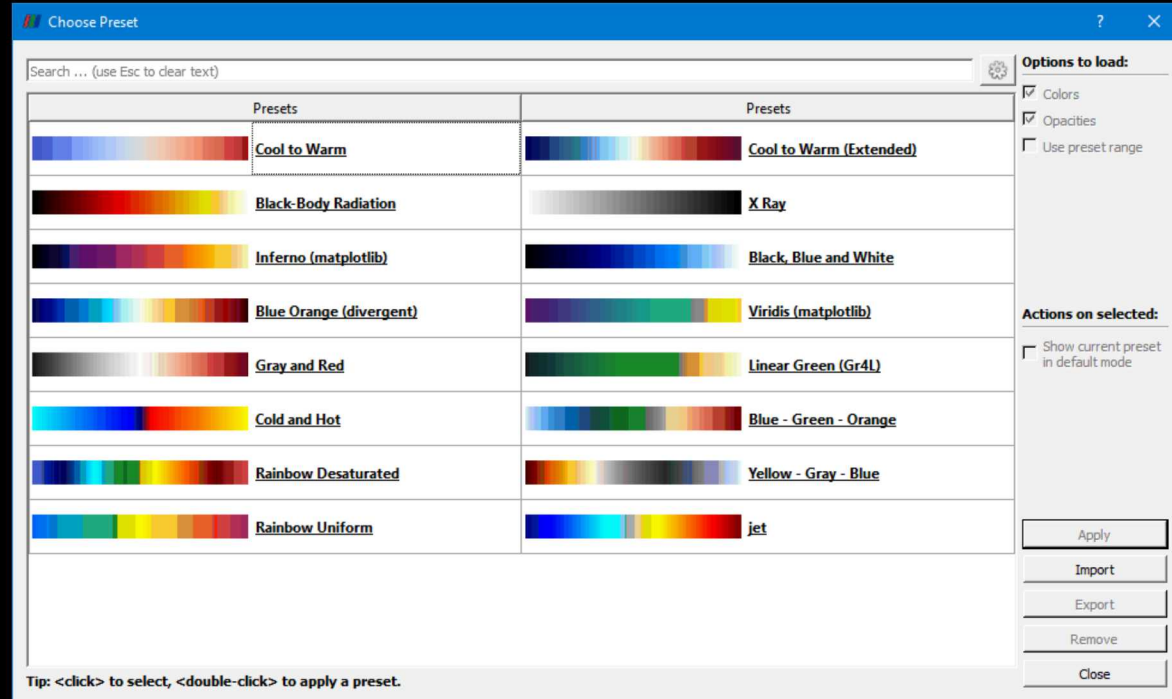
Bottom Left: A dark blue rectangular area displays the text 'no 49 fps'.

Better Organized Color Maps

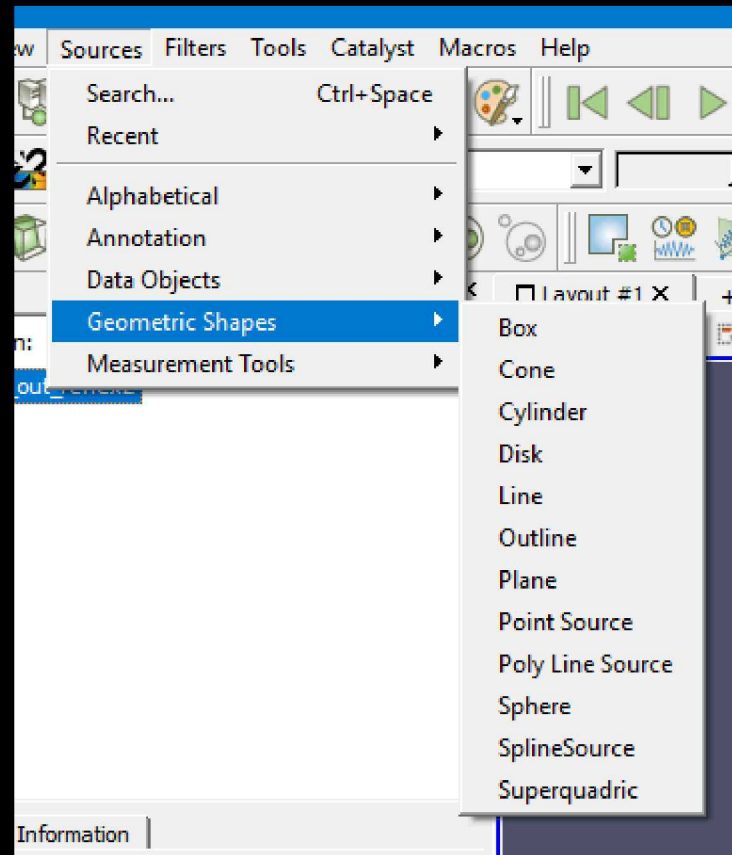
Old Preset Chooser



New Preset Chooser



Source Generators Grouped by Category

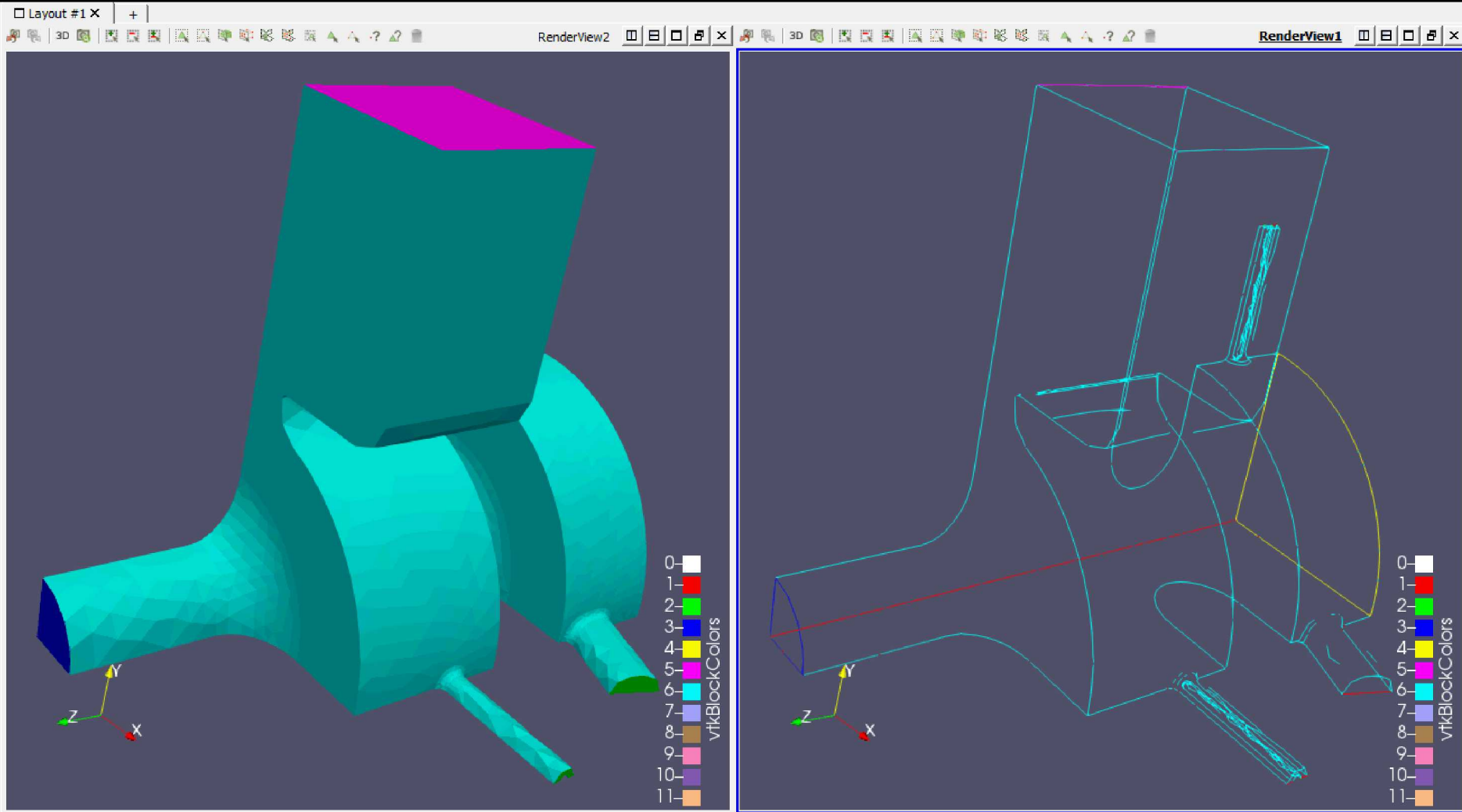


zSpace Support



Rendering Enhancements

Feature Edges Representation



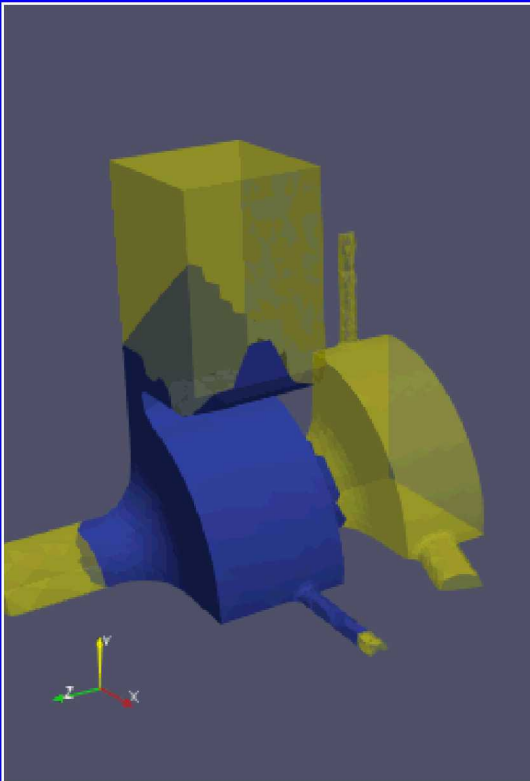
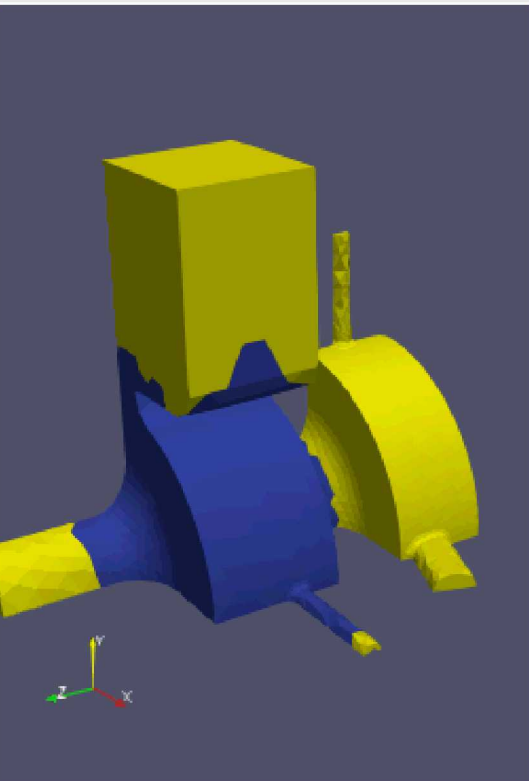
NaN Color Opacity

Layout #1

+

RenderView1

RenderView2



Color Map Editor

Search ... (use Esc to clear text)

Array Name: bfield

Data:

☐ Use log scale when mapping data to colors

☐ Enable opacity mapping for surfaces

☐ Use log scale when mapping data to opacity

Color Mapping Parameters

Color Space: Diverging

☒ Nan Color

Nan Opacity: 0.400000

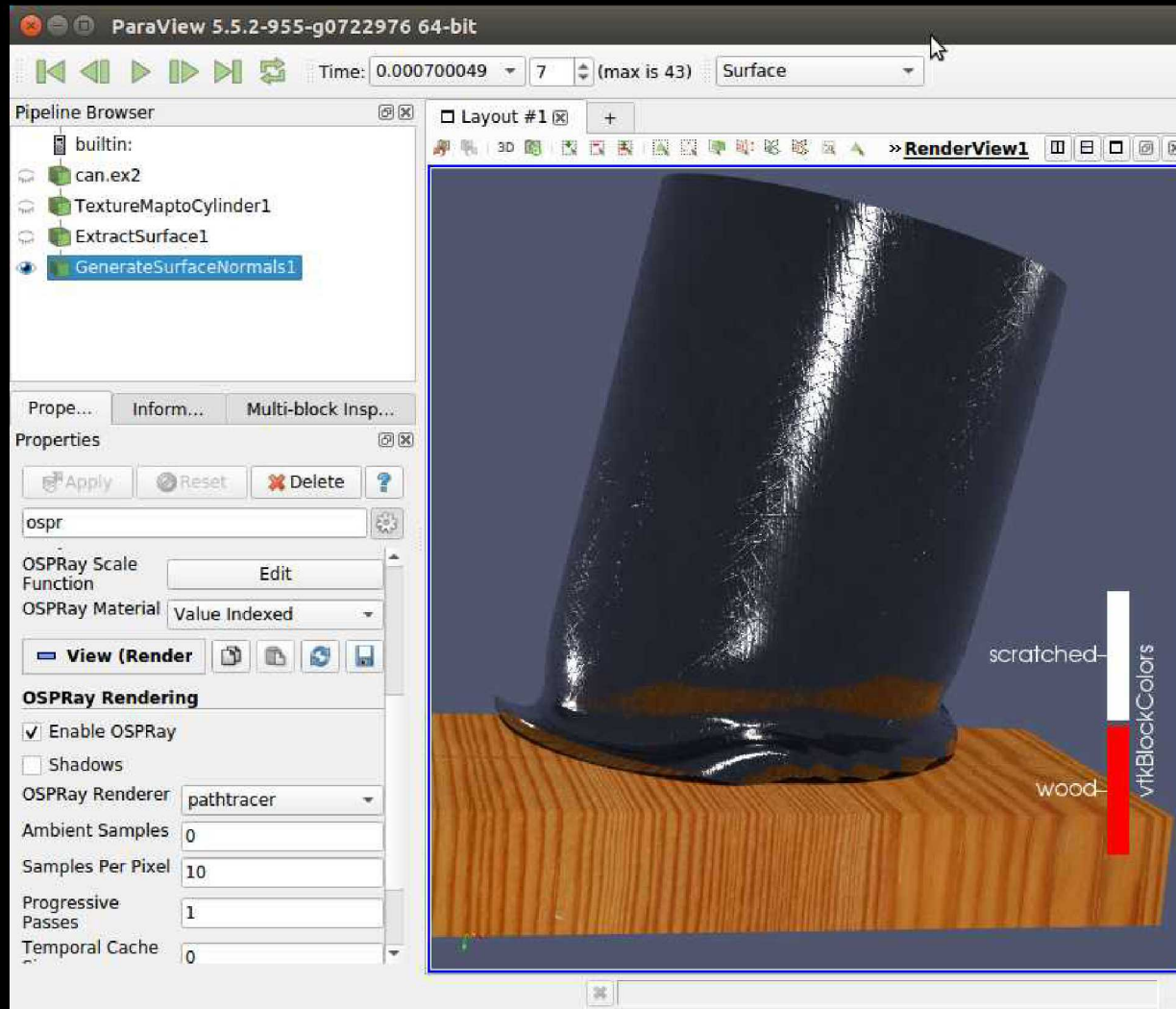
Color Discretization

☒ Discretize

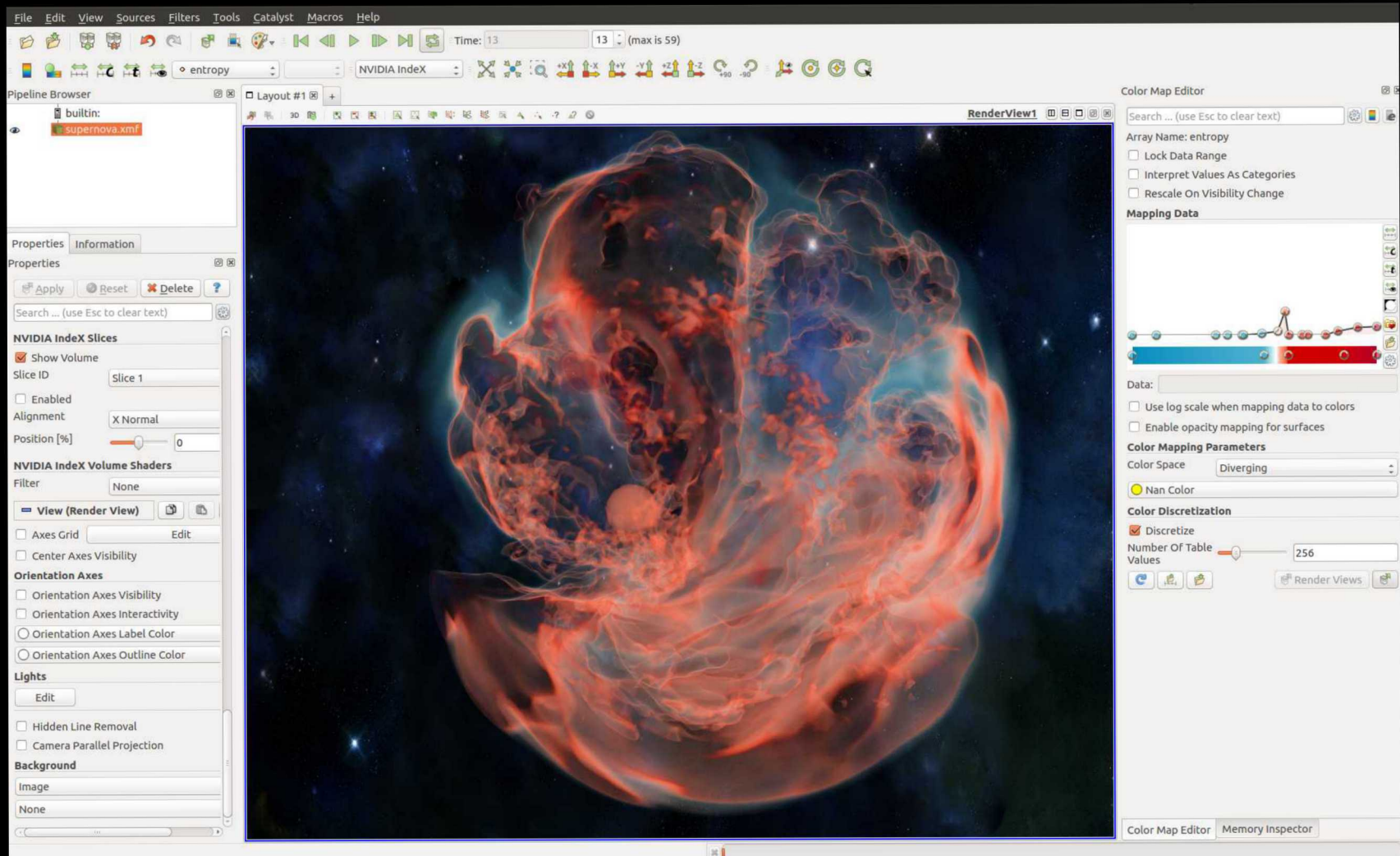
Number Of Table Values: 256

Render Views

OSPRay Version Update



Updated Index Plugin

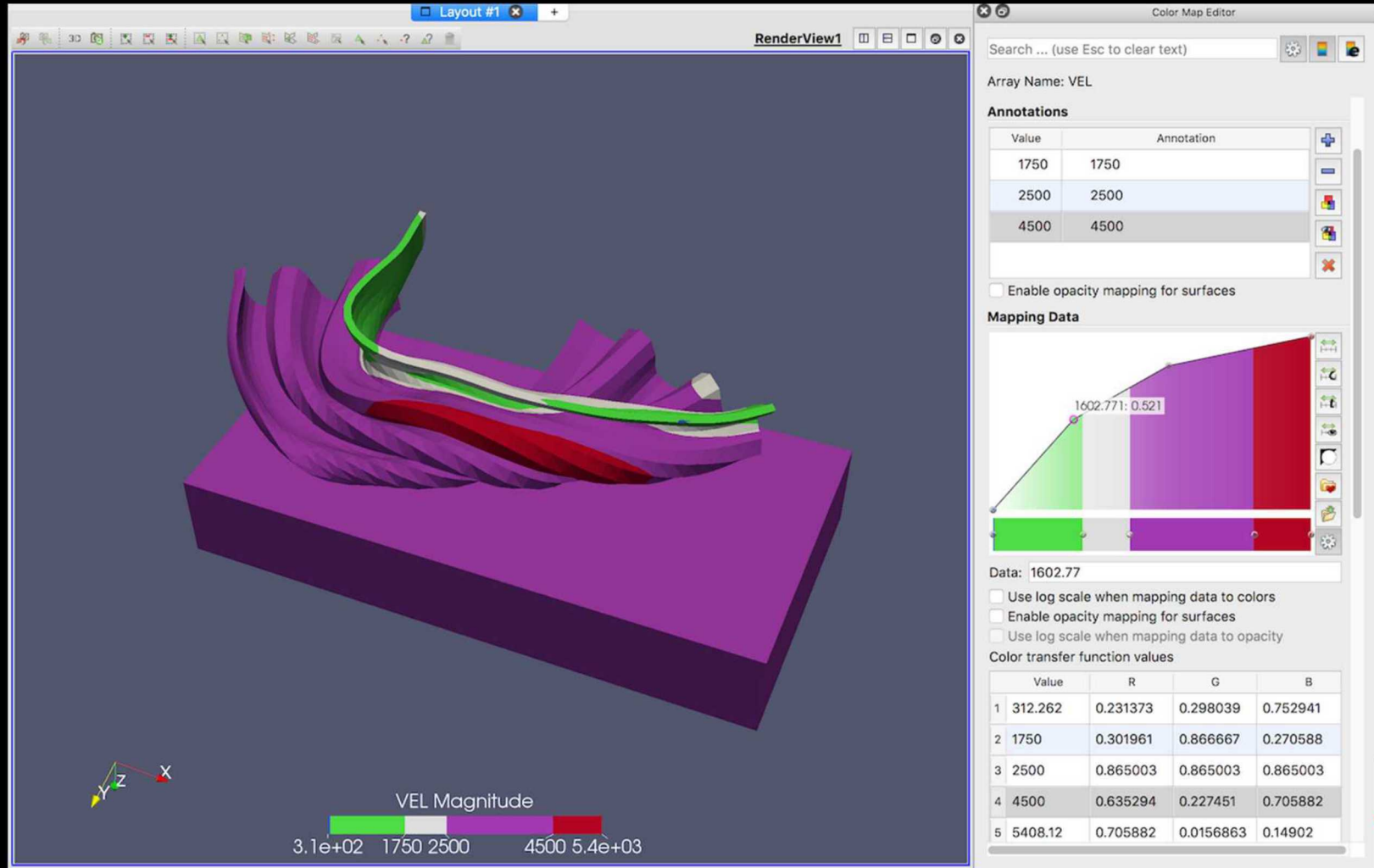


Lots More Features/Fixes

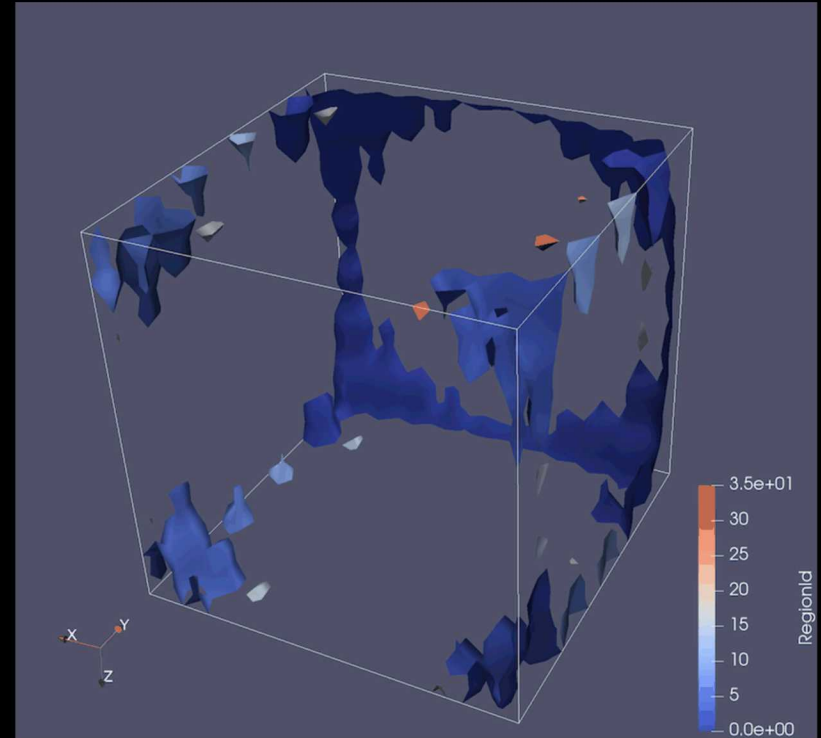
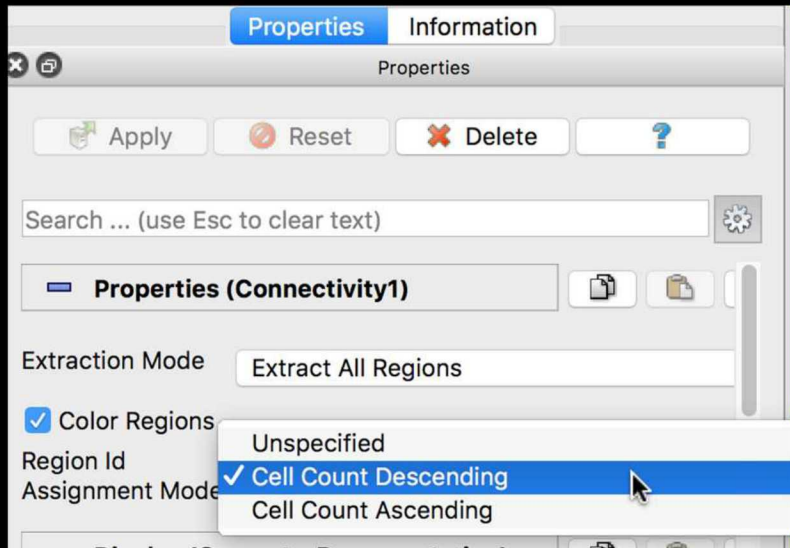
- <https://blog.kitware.com/paraview-5-5-1-release-notes/>
- <https://blog.kitware.com/paraview-5-5-2-release-notes/>
- <https://blog.kitware.com/paraview-5-6-0-release-notes/>

ParaView 5.7 Preview

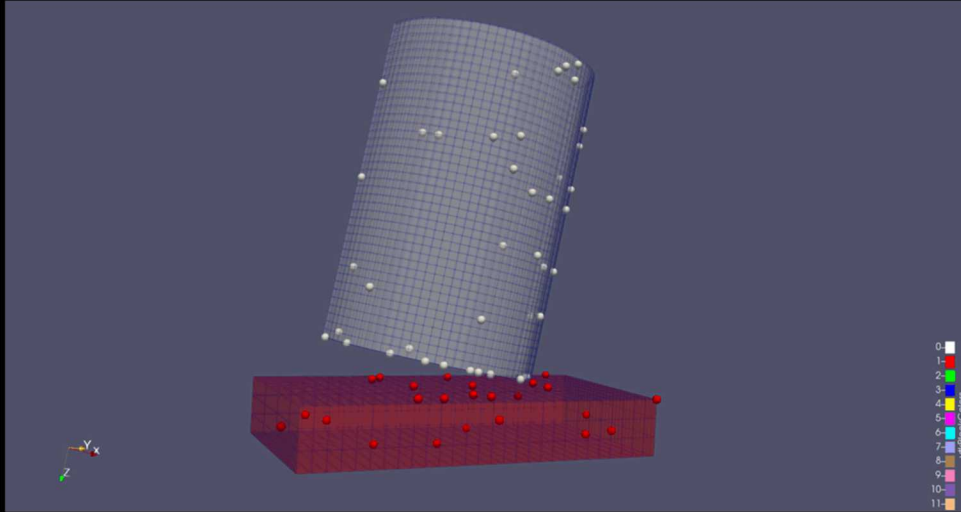
New Color Space - Step



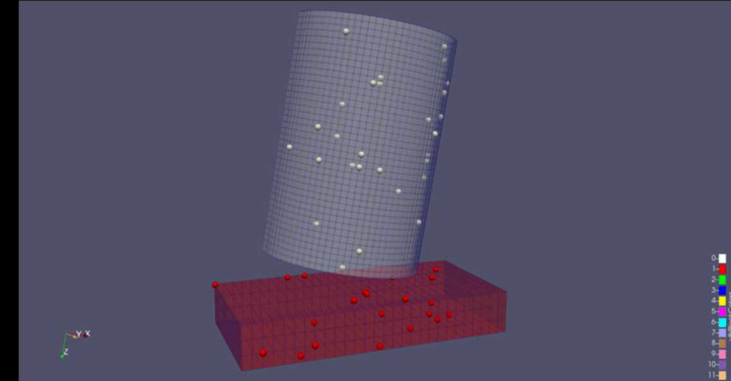
Connectivity Filter - Sort Region ID Mode



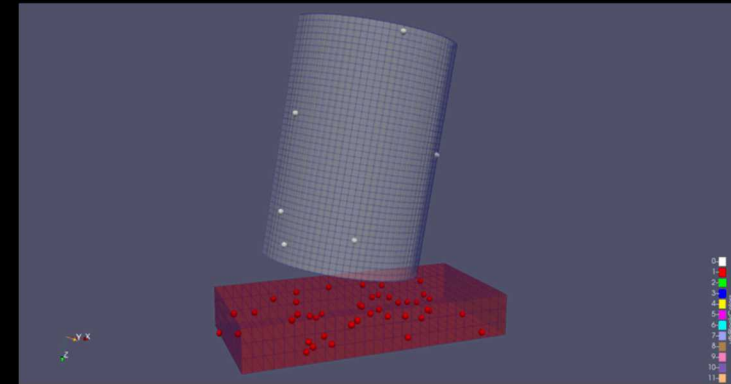
Area/Volume Weighted Glyph Sampling



Uniform Spatial Distribution
(snaps random point in bounds
to point in mesh)

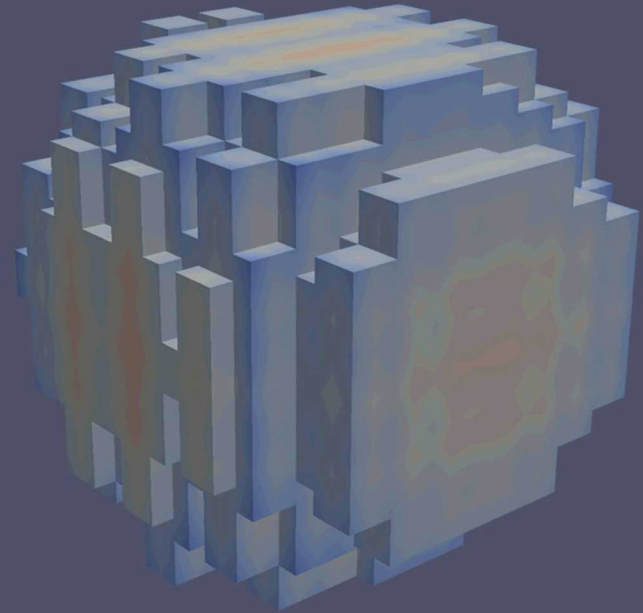
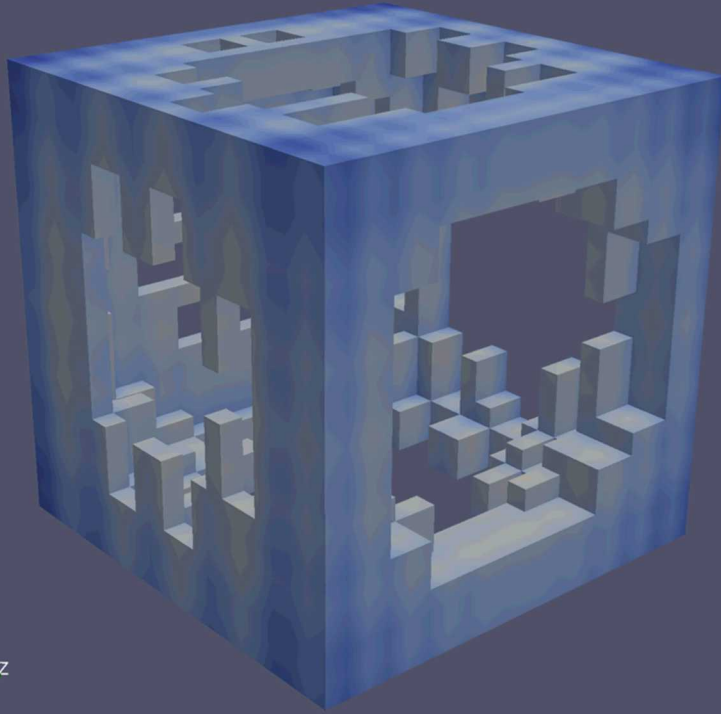


Surface area weighted

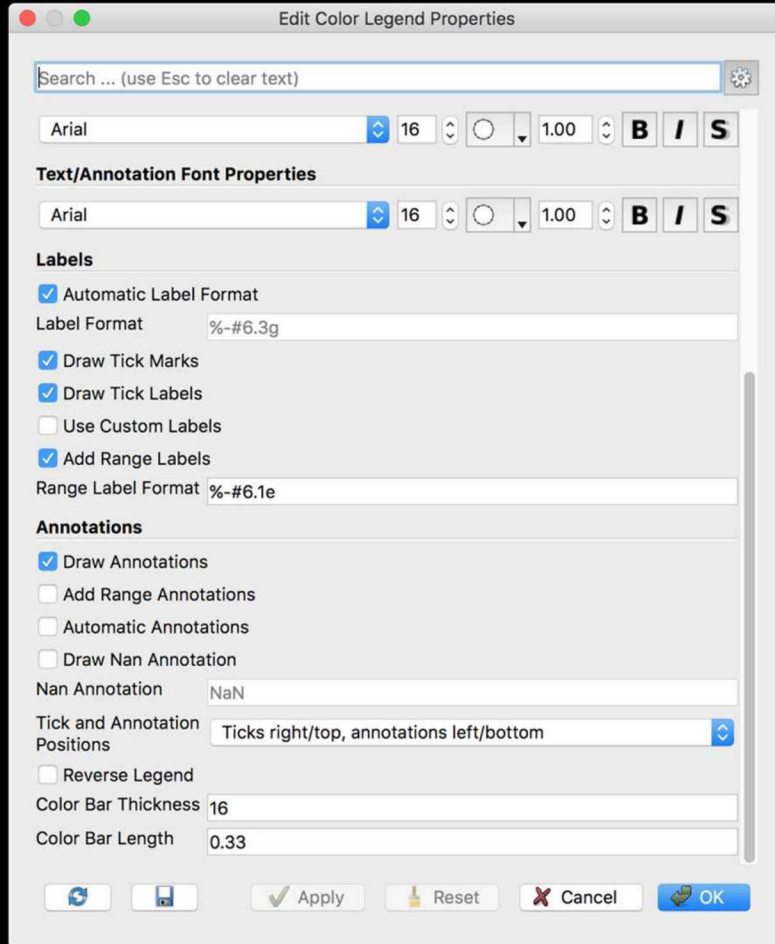


Volume weighted

Threshold filter - Invert option



Property groups included in search



Search ... (use Esc to clear text)

Arial 16 1.00 B I S

Text/Annotation Font Properties

Arial 16 1.00 B I S

Labels

☒ Automatic Label Format

Label Format

☒ Draw Tick Marks

☒ Draw Tick Labels

☐ Use Custom Labels

☒ Add Range Labels

Range Label Format

Annotations

☒ Draw Annotations

☐ Add Range Annotations

☐ Automatic Annotations

☐ Draw Nan Annotation

Nan Annotation

Tick and Annotation Positions

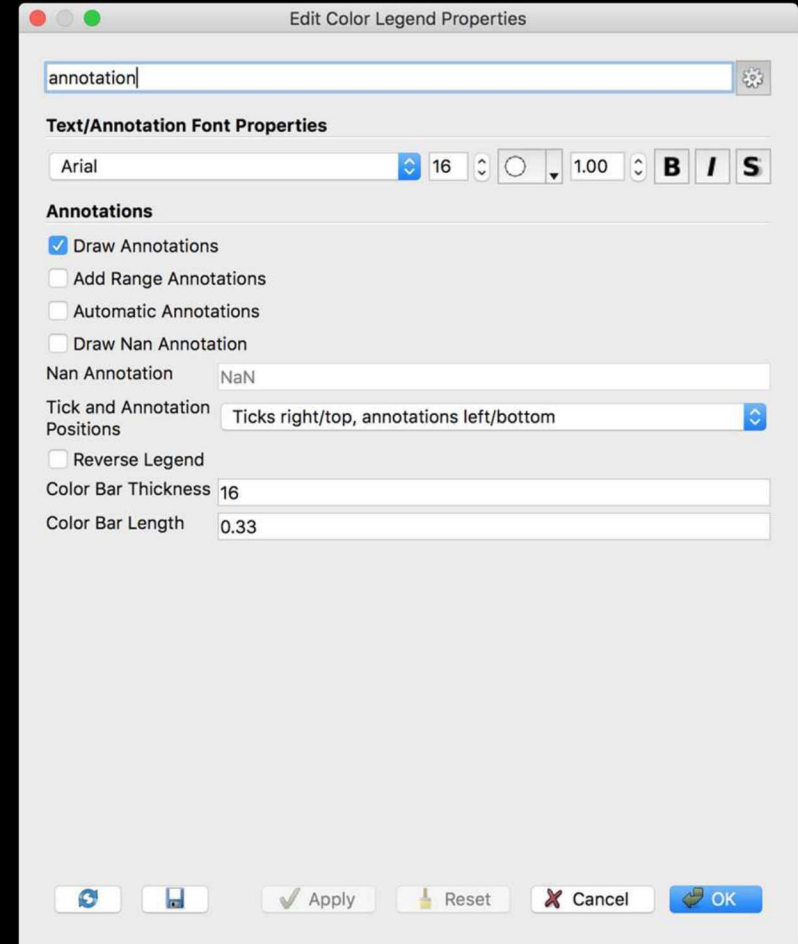
☐ Reverse Legend

Color Bar Thickness

Color Bar Length

Full list



annotation

Arial 16 1.00 B I S

Text/Annotation Font Properties

Arial 16 1.00 B I S

Annotations

☒ Draw Annotations

☐ Add Range Annotations

☐ Automatic Annotations

☐ Draw Nan Annotation

Nan Annotation

Tick and Annotation Positions

☐ Reverse Legend

Color Bar Thickness

Color Bar Length

Filtered list

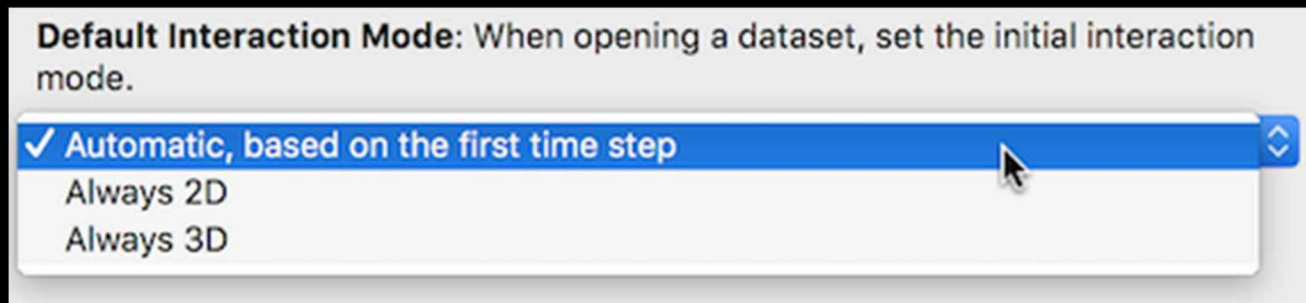
Spreadsheet view: multicomponent array display

Showing Sphere1 ▾ Attribute: Point Data ▾ Precision: 6      										
Point ID		Normals				Normals_Magnitude	Points			Points_Magnitude
0	0	0	0	1	1	0	0	0.5	0.5	
1	1	0	0	-1	1	0	0	-0.5	0.5	
2	2	0.433884	0	0.900969	1	0.216942	0	0.450484	0.5	
3	3	0.781832	0	0.62349	1	0.390916	0	0.311745	0.5	
4	4	0.974928	0	0.222521	1	0.487464	0	0.11126	0.5	
5	5	0.974928	0	-0.222521	1	0.487464	0	-0.11126	0.5	
6	6	0.781832	0	-0.62349	1	0.390916	0	-0.311745	0.5	
7	7	0.433884	0	-0.900969	1	0.216942	0	-0.450484	0.5	
8	8	0.306802	0.306802	0.900969	1	0.153401	0.153401	0.450484	0.5	
9	9	0.552838	0.552838	0.62349	1	0.276419	0.276419	0.311745	0.5	
10	10	0.689378	0.689378	0.222521	1	0.344689	0.344689	0.11126	0.5	
11	11	0.689378	0.689378	-0.222521	1	0.344689	0.344689	-0.11126	0.5	
12	12	0.552838	0.552838	-0.62349	1	0.276419	0.276419	-0.311745	0.5	
13	13	0.306802	0.306802	-0.900969	1	0.153401	0.153401	-0.450484	0.5	
14	14	2.65677e-17	0.433884	0.900969	1	1.32839e-17	0.216942	0.450484	0.5	
15	15	4.78734e-17	0.781832	0.62349	1	2.39367e-17	0.390916	0.311745	0.5	
16	16	5.96971e-17	0.974928	0.222521	1	2.98486e-17	0.487464	0.11126	0.5	

- Supports sorting by any component
- Magnitude shown as a separate column

Default Interaction Mode

- Previous behavior: camera interaction set to 2D if data was flat in a dimension in the first loaded timestep, 3D otherwise
- New behavior: governed by a Render View setting



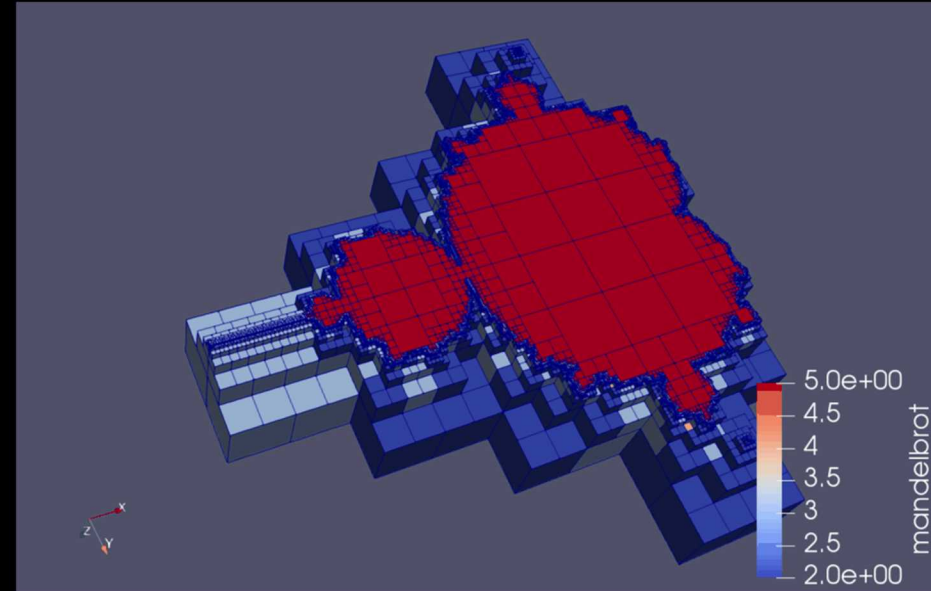
Simpler connection configuration for SSH

```
<Servers>
  <Server name="SimpleSshServer"
    configuration=""
    resource="cs://127.0.0.1:11111">
    <CommandStartup>
      <SSHCommand exec="/home/login/pv/startpvserver.sh"
        timeout="0" delay="5">
        <SSHConfig user="login">
          <Terminal/>
        </SSHConfig>
      <Arguments>
        <Argument value="$PV_SERVER_PORT$"/>
      </Arguments>
    </SSHCommand>
  </CommandStartup>
</Server>
</Servers>
```

HyperTreeGrid++

Code cleanup and optimize

- Dataobject instead of dataset, preserves intended memory benefit of compact representation
 - 6x faster and 17x smaller in first test
- Refactored vtk XML reader and writer (.htg), piece per grid to better support distributed memory parallel operations
- Synch VTK w/ CEA's source

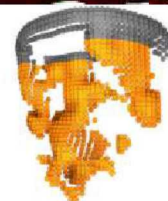




LD AV

2019

**The 9th IEEE Symposium on Large
Data Analysis and Visualization**
in conjunction with IEEE VIS 2019,
Vancouver, BC, Canada, October 21, 2019



Abstracts Due: June 17

Papers Due: June 24