

3. Easy-to Use Tools

SciVisColor.org
ColorMoves

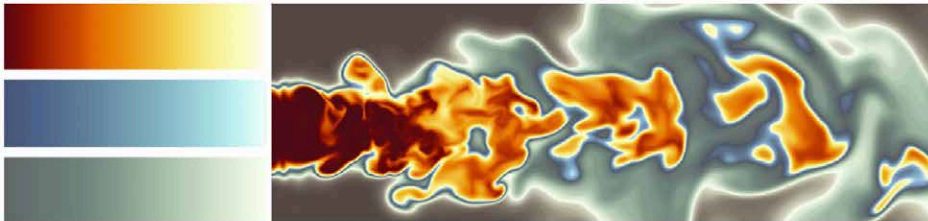
Quickly and easily creating colormaps
specific to your domain,
data distribution, task and audience

Francesca Samsel, UT Austin



SciVisColor.Org

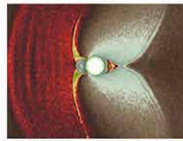
Sci Vis Color



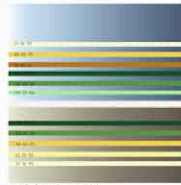
Colormaps, Color Tools and Color Strategies for Scientific Visualization



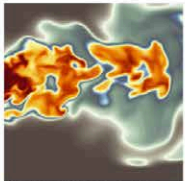
Color Maps



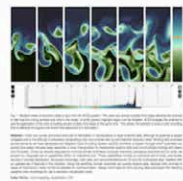
ColorMoves - ACES



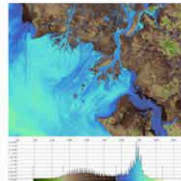
Color Sets



Color Strategies



Publications & Projects



ColorMoves
The Environment

Colormaps

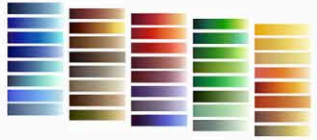
One size fits all will not serve you well.

Identifying or building the map tailored
to your data.

Colormaps sorted by luminance distribution
SciVisColor interface


Colormaps

Click on colormap type to see the range of maps available and to download documentation.




For use with Matplotlib:
Click here to download a script to convert our web files to a matplotlib format.
You will need to add the name of the colormap and that you would like to convert in line 23.
[Download Key Colormaps: \[zip\]](#)


[Color Scales](#)




[Divergent Colormaps](#)



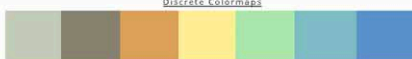
[Rainbow Alternatives](#)




[Structured Colormaps](#)




[Discrete Colormaps](#)




[3-Wave Colormaps](#)

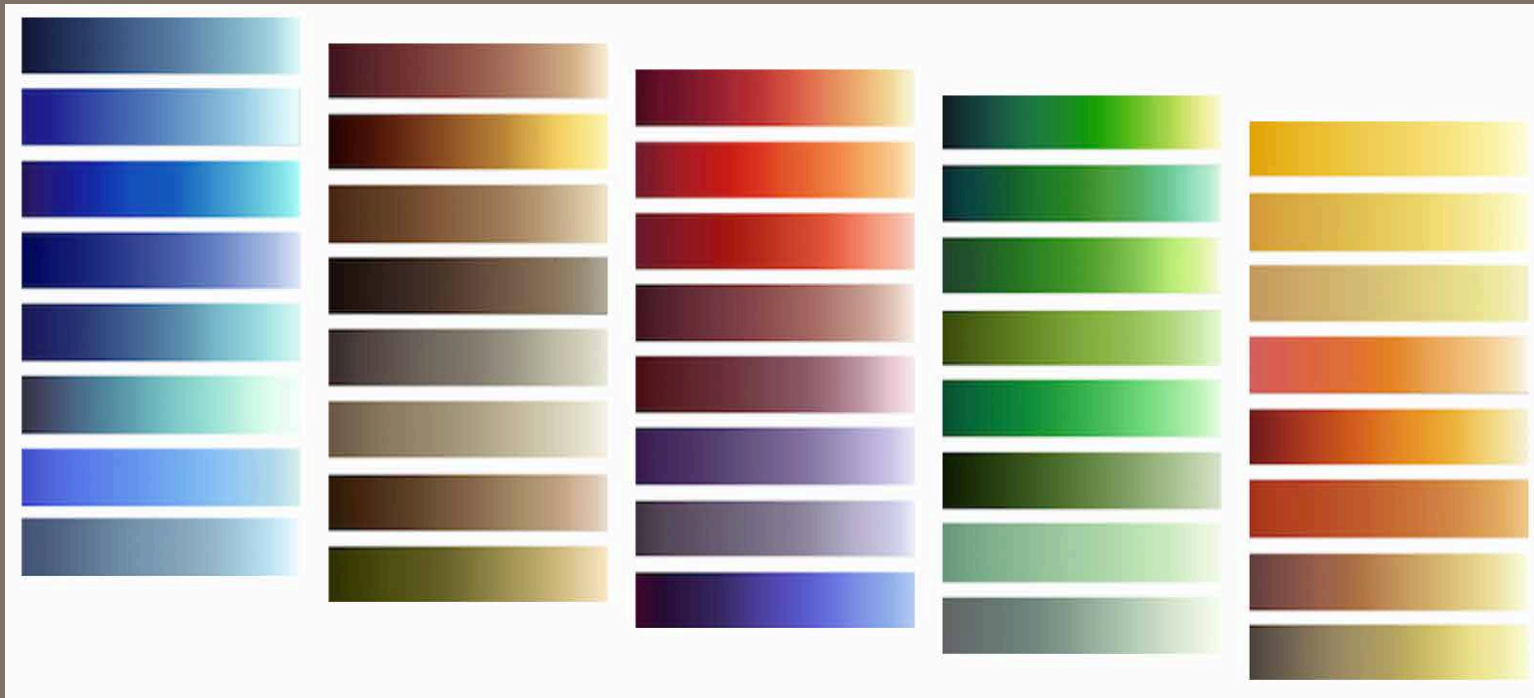


[4-Wave Colormaps](#)



[5-Wave Colormaps](#)





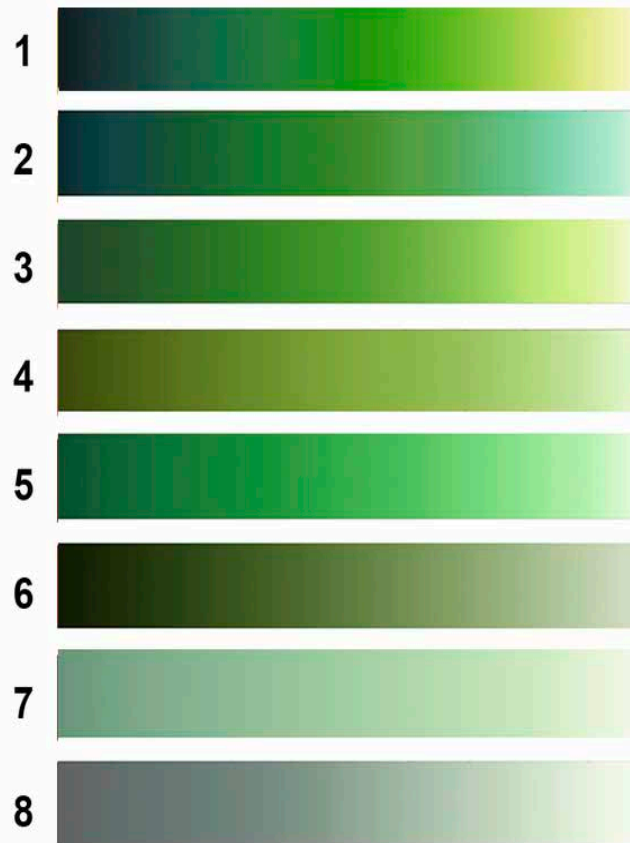
The Building Blocks, linear color scales for building data aligned maps.

Characteristics of color scale

1. Saturated, full value range, wide hue range
2. Similar to #1 but blue in the low value
3. Mid-range hue span, saturated, almost full value range
4. Narrow hue range (yellow- green) combines well with other scales
5. Bright, clear, single value, simple scale
6. Darker value range, single hue
7. Light value range, single hue, good for contrast but not detail.
8. Muted light value gray-green

Green Color Scales

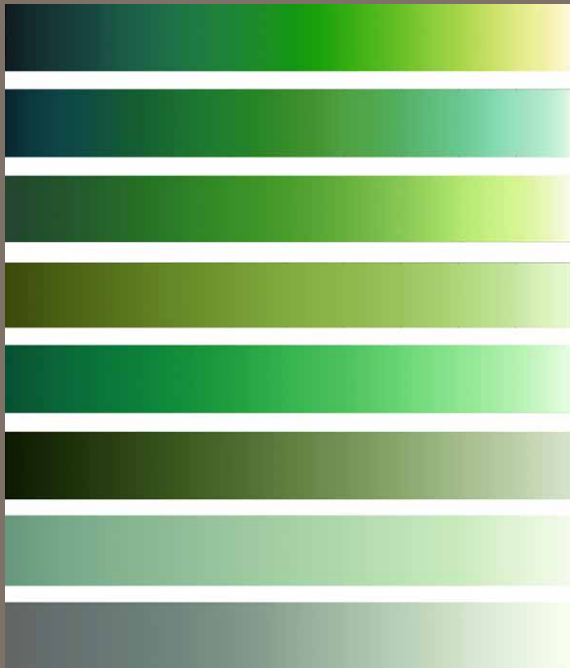
(Click on the ColorScale to download its respective .xml file)



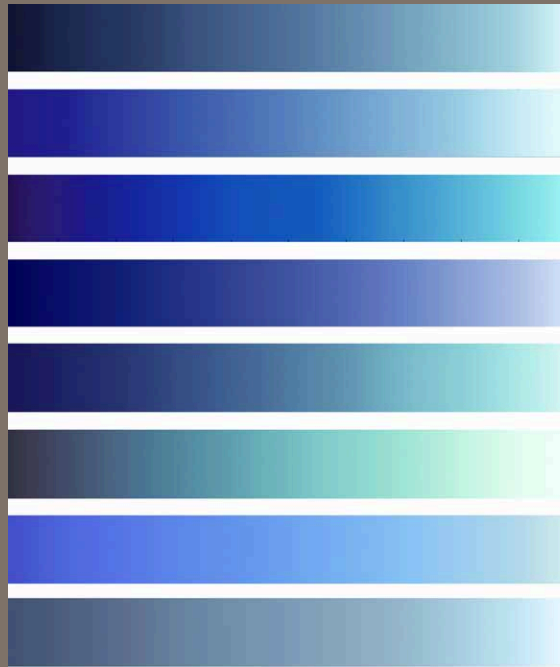
Usage

1. important data
2. alternative for use with yellows.
3. accent
4. For multiscale colormaps
5. For multiscale colormaps
6. receding context
7. context
8. lowest priority data

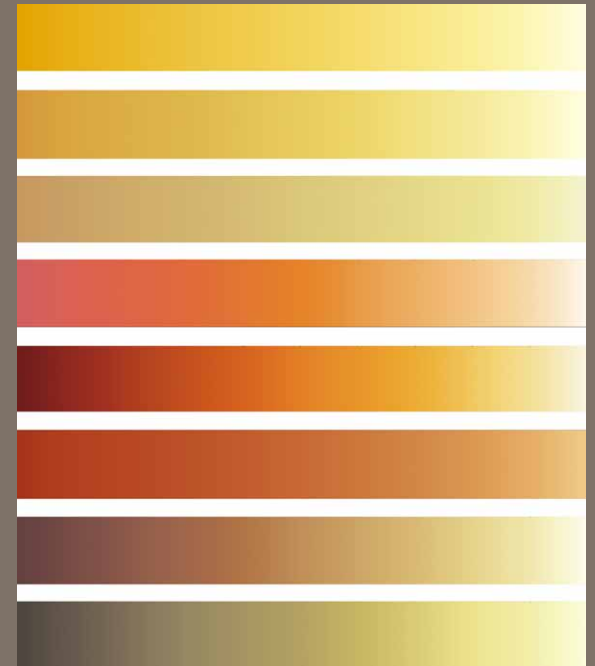
greens



blues



yellows and oranges



ColorMoves combines the color scales to built colormaps tuned to your task and data.

How it works....

Color Scales

Divergent Colormaps

Rainbow Alternatives

Structured Colormaps

Discrete Colormaps

HOME Colormaps ColorMoves Color Sets 3-D Color Gallery

ColorScales

Click color family for details and specs

XML files are available for all of the color scales shown here. Click the color family for the documentation.
The files are directly importable into ParaView or easily converted to other formats.

Red and Purple Color Scales

(Click on the ColorScale to download its respective .xml file)

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

click on a colormap
and the .xml downloads

```
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<Point x="0.350000" y="8" r="0.898176" g="0.845518" b="0.337255"/>  
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</ColorMap>  
</ColorMap>
```

.xml imports into ParaView
or translates into other formats

Divergent Colormaps

Contrasting Color Scales

(Click the colormap to download its respective .xml file)

Blue - Orange



Asymmetrical Orange - Blue



Gray - Gold



Green - Brown



Turquoise - Olive



Greater discriminatory power than the standard cool / warm.

Consider an asymmetrical divergent if there is important data in the mid-range.

Think about using intuitive subject to color relationships.

Rainbow Alternatives

(Click the colormap to download its respective .xml file)

Pale-Saturated Blue Rainbow



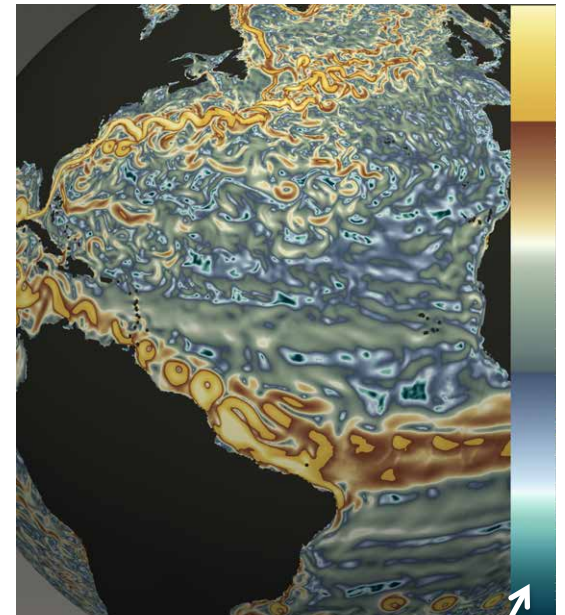
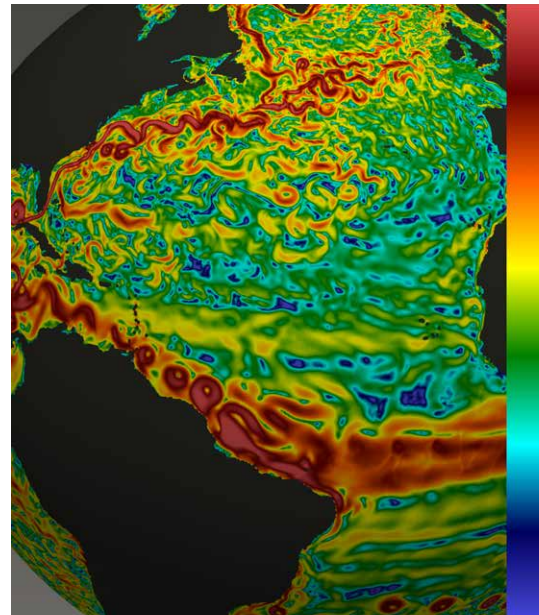
5 Step Mellow Wave



The Mellow Rainbow

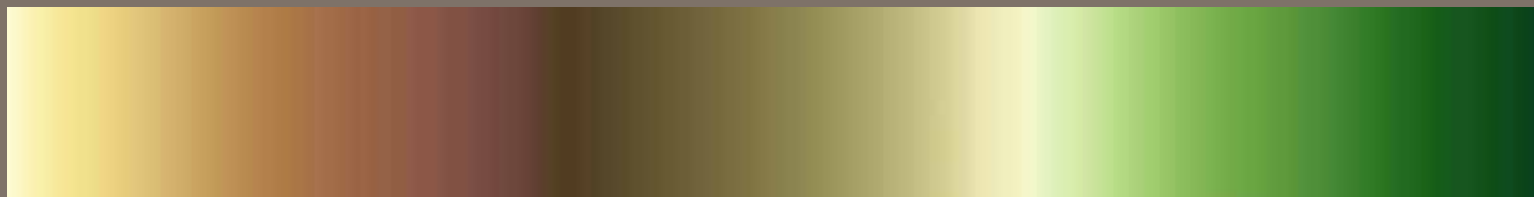
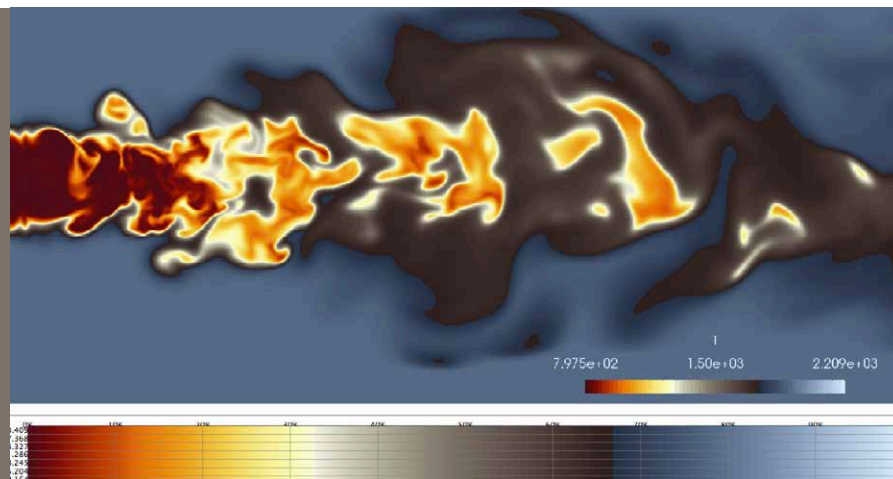


Rainbow Alternatives



Wave colormaps are good substitutes for the rainbow and desaturated rainbow.

3 Wave colormaps
Very effective starting points...



You can see detail in the middle.
Three value ranges provides detail but not so much as to be confusing.

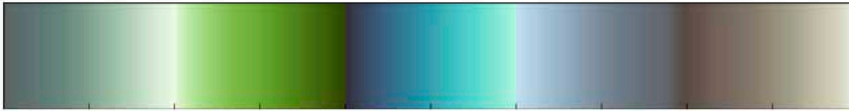


Colormap Waves

Multiple value spans within one colormap

These are available in the Colormap section.
Other configurations can be created in ColorMoves.
Documentation soon to be on SciVisColor.org.

5 Wave Mellow Green - Green - Blue - Mellow Blue - Gray



Focuses on the 20 – 60% range.

5 Wave Yellow - Red - Brown - Gold - Green



Focus on last 20% with milder contrast throughout.

5 Wave Yellow to Blue



Fairly equal focus in the yellow, green, blue palette.

5 Wave Yellow & Green



Focuses on the 40 – 80% range.

5 Wave Orange to Green



Focuses on the first and last 20%.





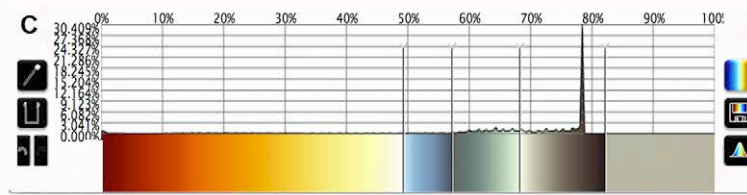
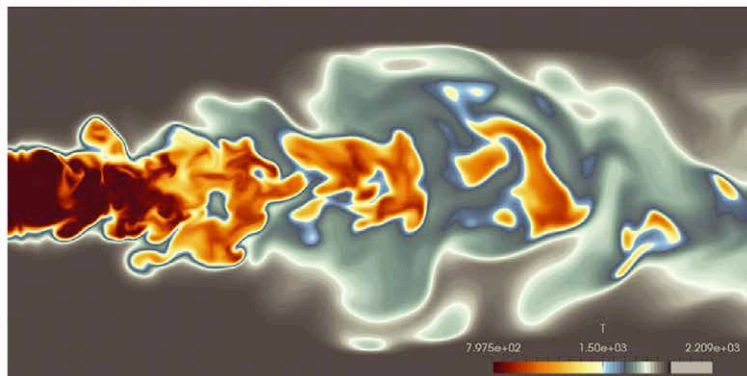
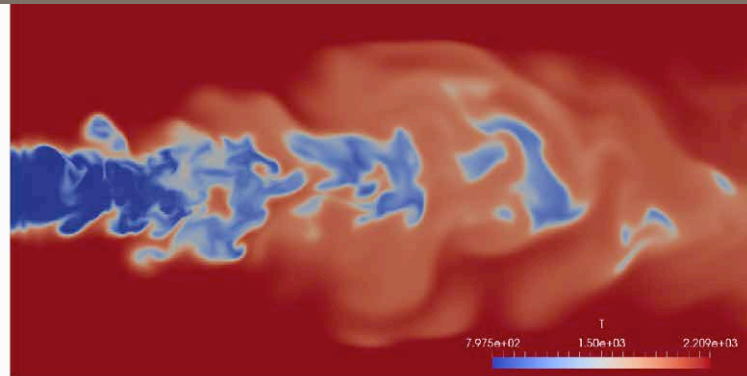
Yellow Orange 1
Yellow Orange 2
Yellow Orange 3
Yellow Orange 4
Yellow Orange 5
Yellow Orange 6
Yellow Orange 7
Yellow Orange 8

Blue 1
Blue 2
Blue 3
Blue 4
Blue 5
Blue 6
Blue 7
Blue 8
Blue 9
Blue 10
Blue 11

Green 1
Green 2
Green 3
Green 4
Green 5
Green 6
Green 7
Green 8

Red Purple 1
Red Purple 2
Red Purple 3
Red Purple 4
Red Purple 5
Red Purple 6
Red Purple 7
Red Purple 8

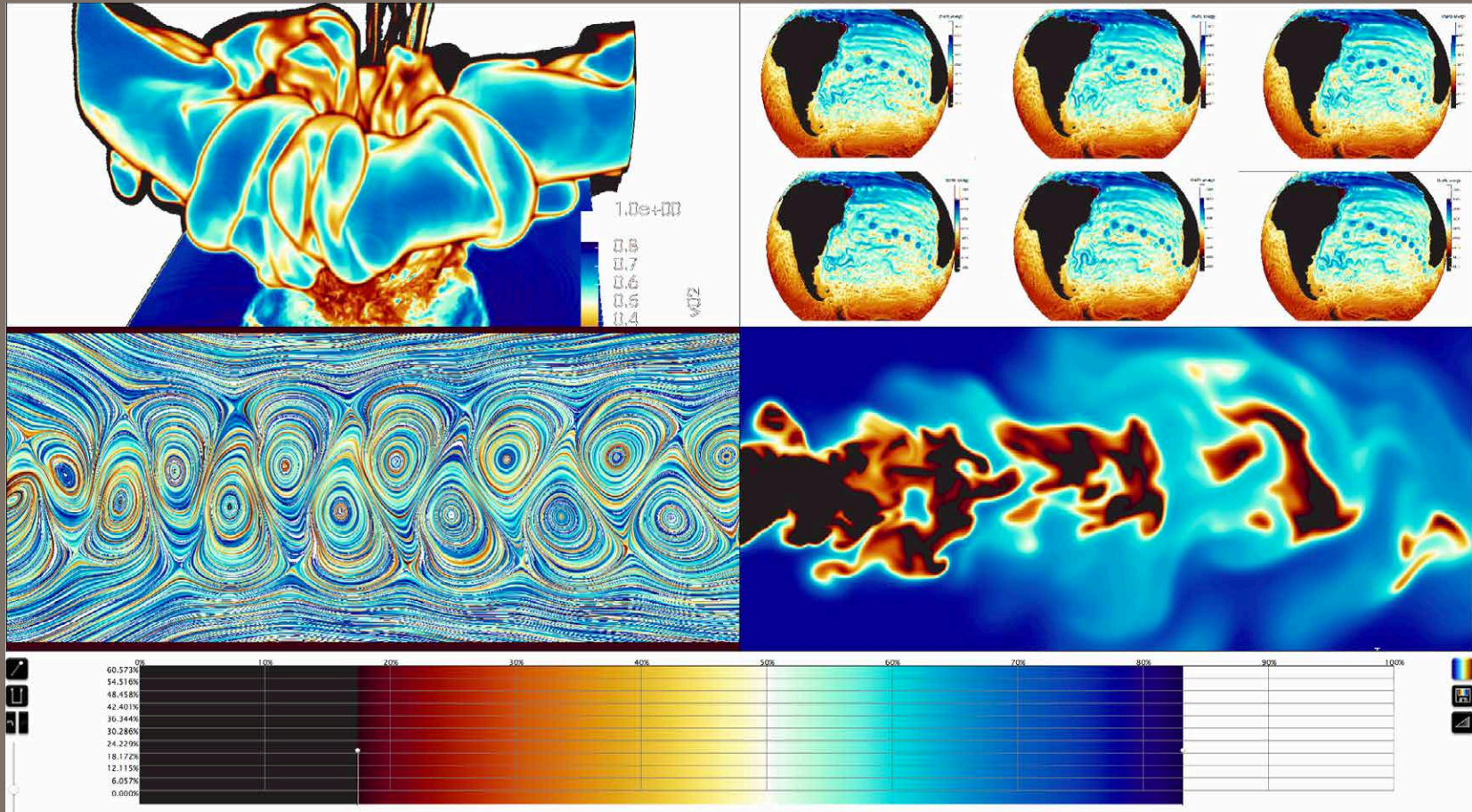
Brown 1
Brown 2
Brown 3



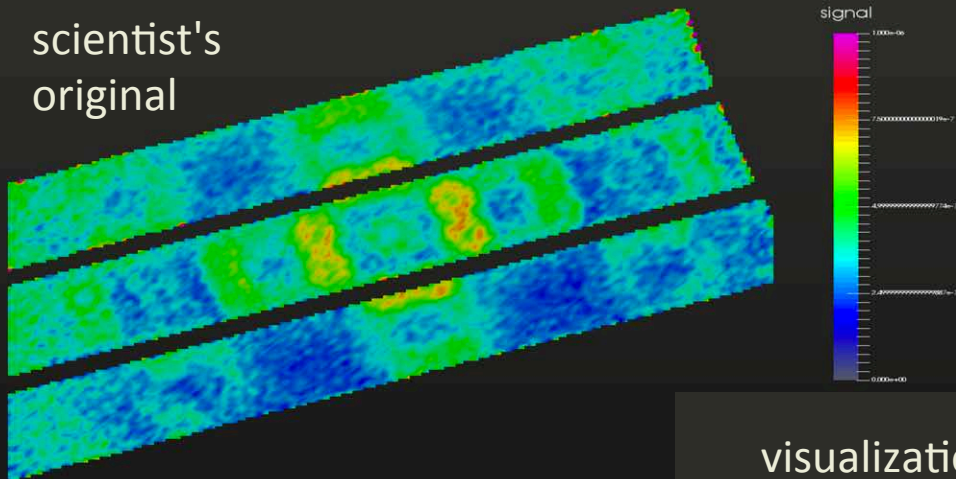
The impact of colormaps tuned to data...

Notice both muted and saturated scales.

A good colormap is not good for all types of data.

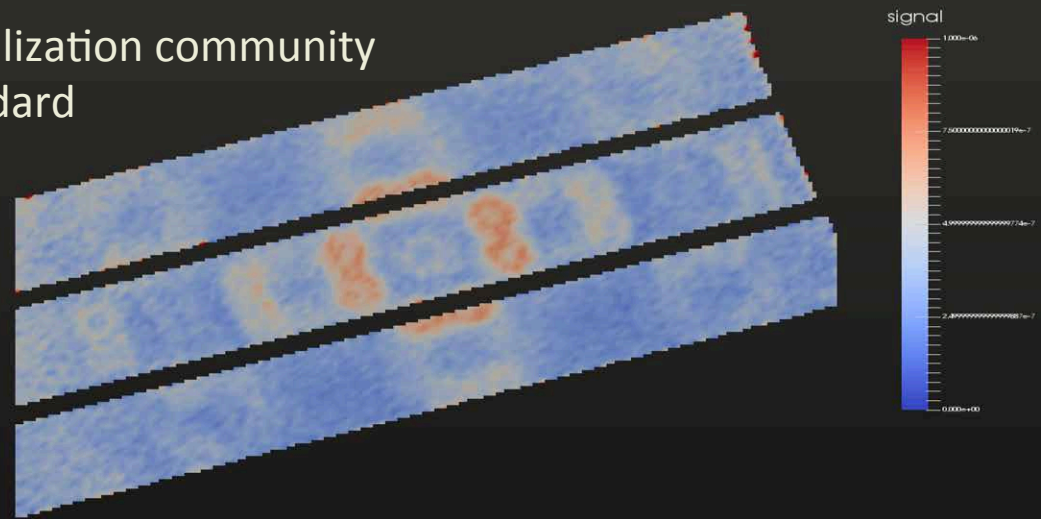


scientist's
original

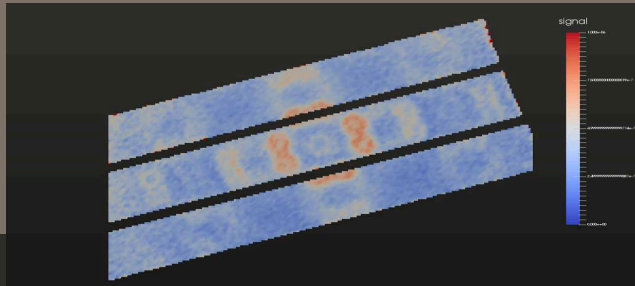
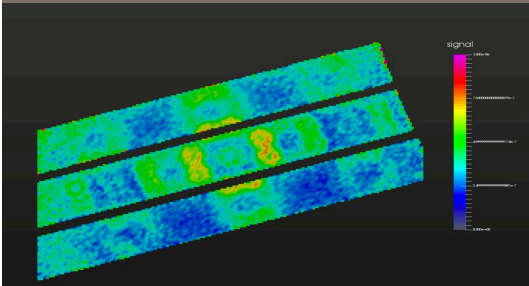


a straight forward problem

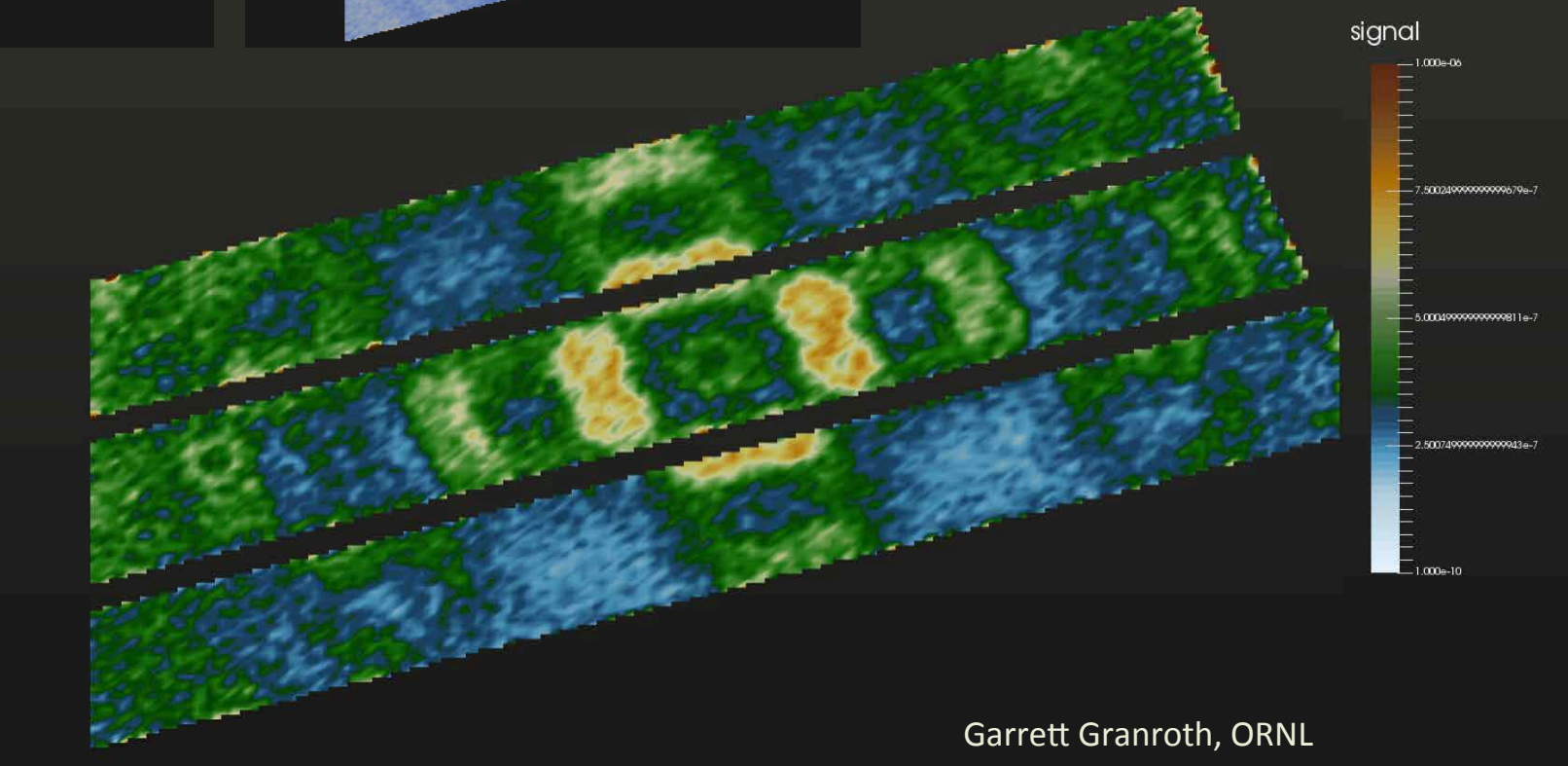
visualization community
standard



Garrett Granroth, ORNL



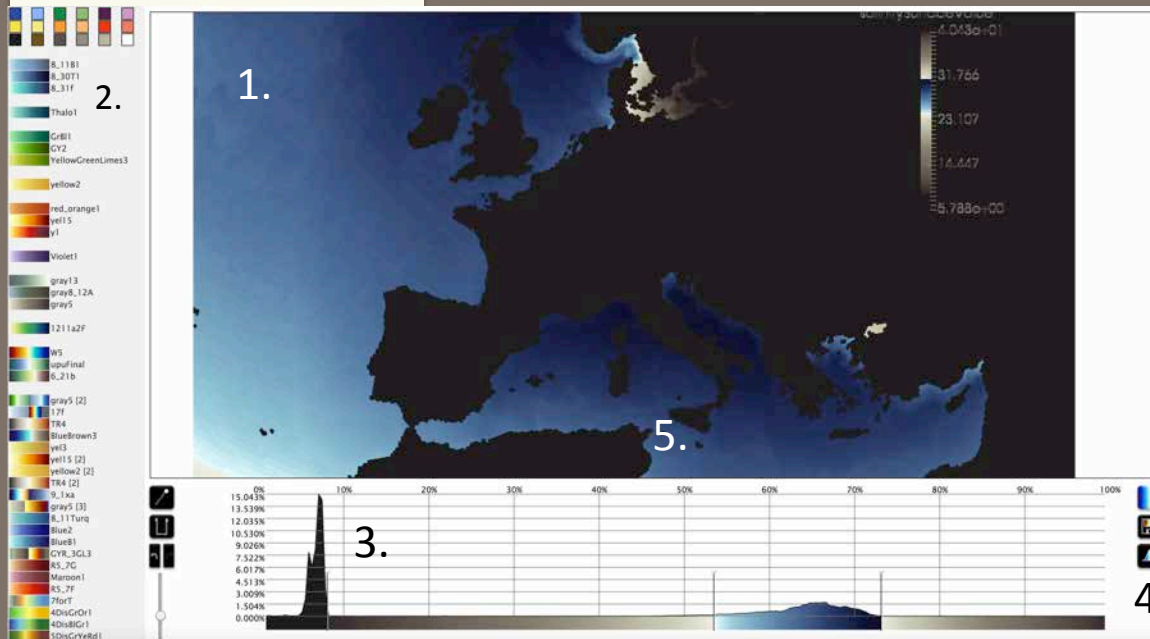
effective, quiet, harmony
exposing detail



Garrett Granroth, ORNL

was very happy.

ColorMoves



1. visualization area
2. color scale selection
3. interactive data range
4. structuring and exporting the color maps
5. resizing and saving



pin - splitting



U - nesting



histogram
alpha



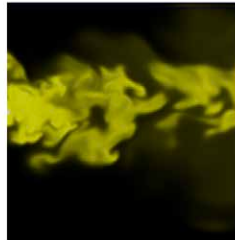
save / export
colormap



save image

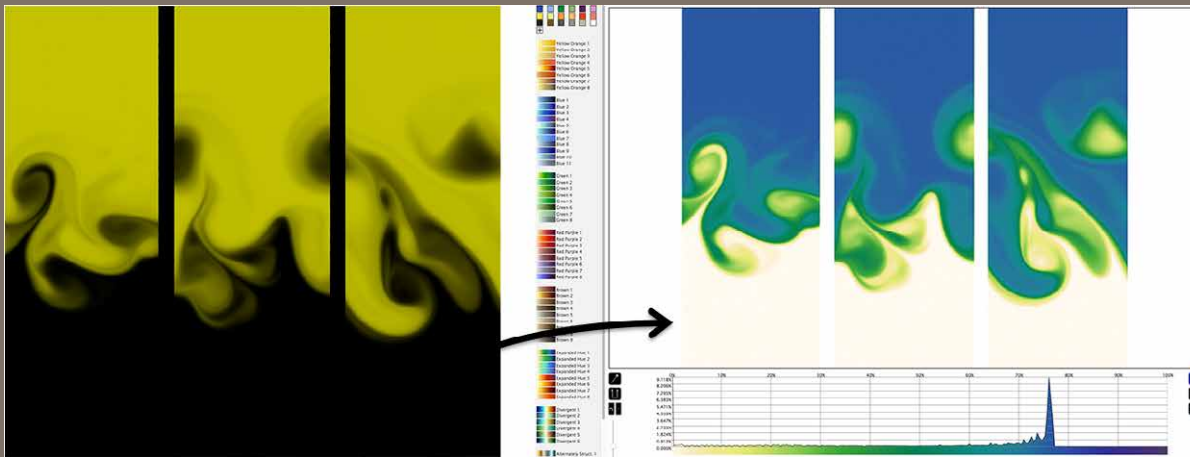


trash pins



Float Files Instructions
Download Examples

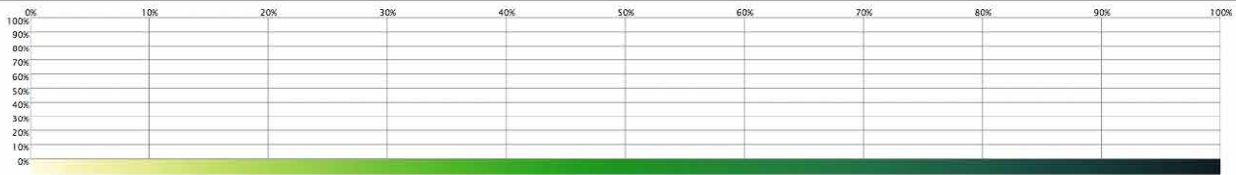
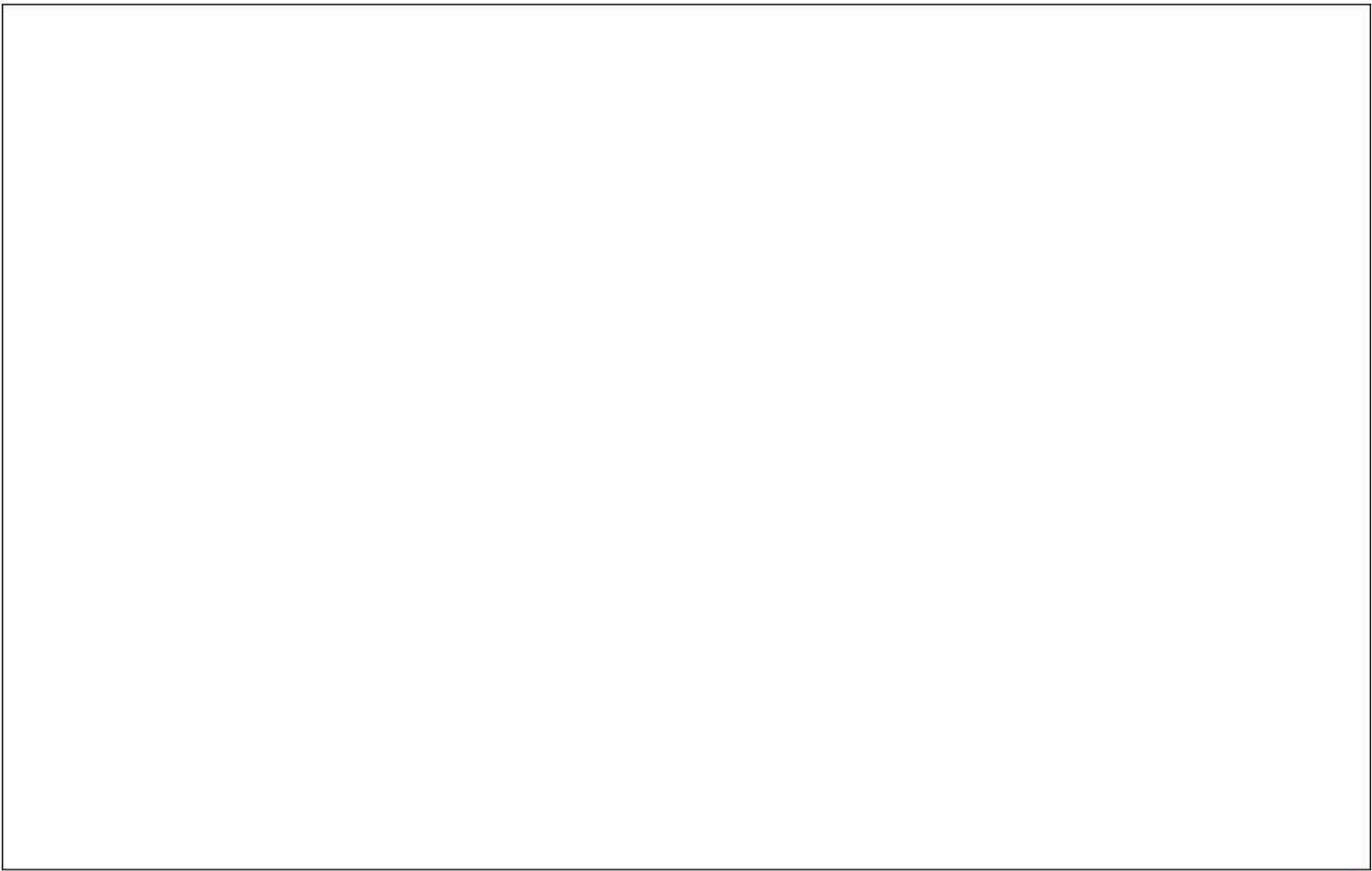
float color map

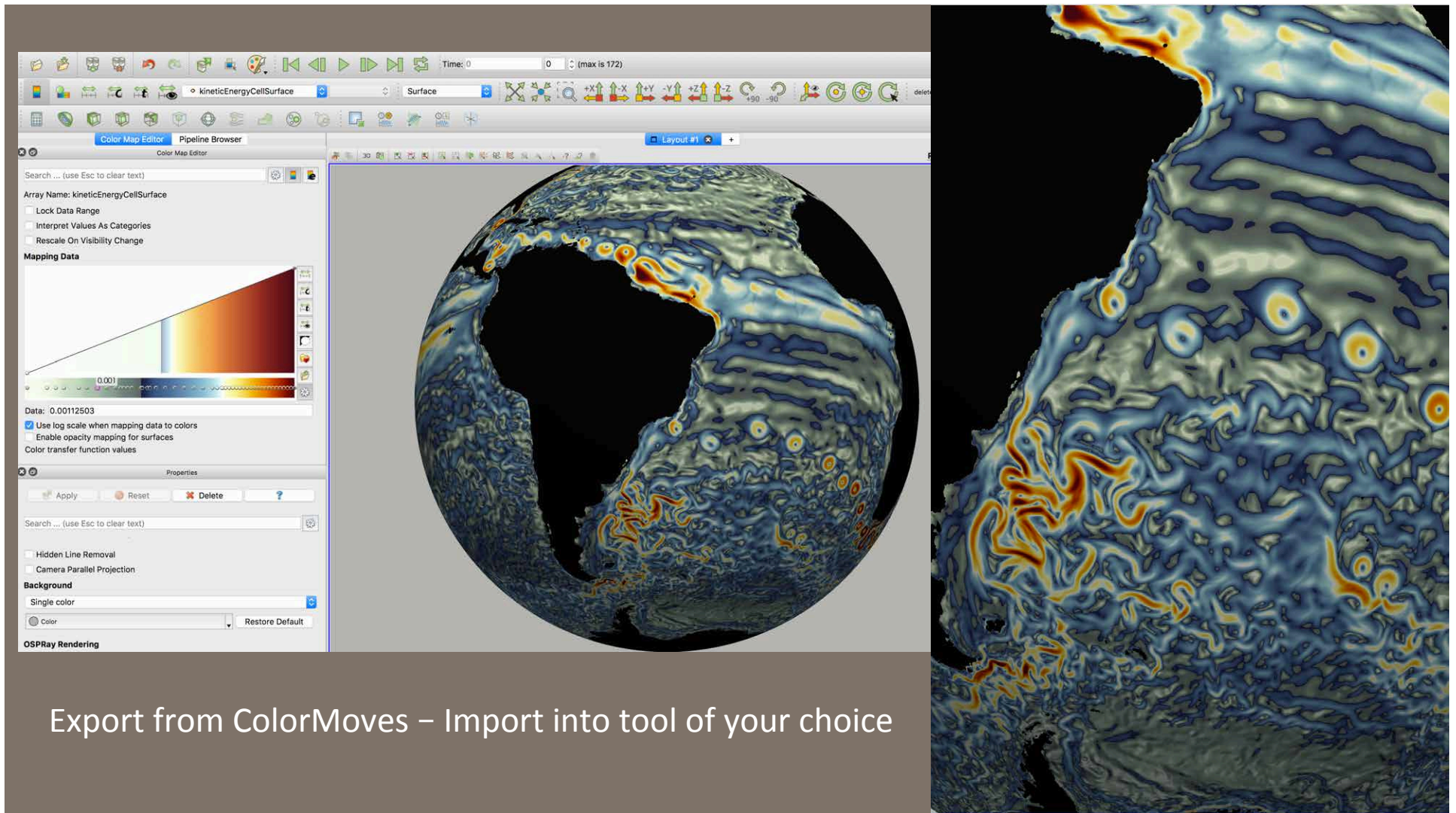


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  <Point x="0.054672188" o="1" r="0.051" g="1.000" b="0.000" />
  <Point x="0.054687447" o="1" r="0.055" g="0.000" b="0.000" />
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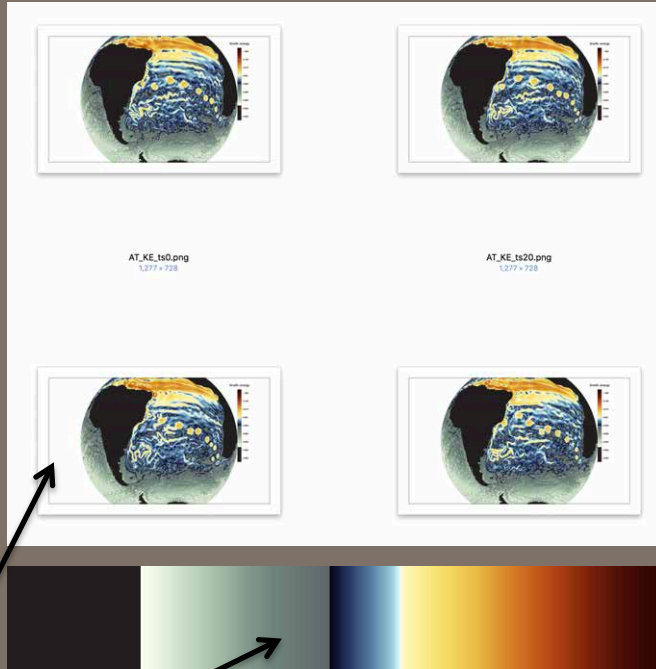
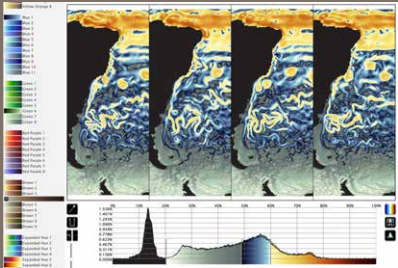
video

- Yellow Orange 1
- Yellow Orange 2
- Yellow Orange 3
- Yellow Orange 4
- Yellow Orange 5
- Yellow Orange 6
- Yellow Orange 7
- Yellow Orange 8
- Blue 1
- Blue 2
- Blue 3
- Blue 4
- Blue 5
- Blue 6
- Blue 7
- Blue 8
- Blue 9
- Blue 10
- Blue 11
- Green 1
- Green 2
- Green 3
- Green 4
- Green 5
- Green 6
- Green 7
- Green 8
- Red Purple 1
- Red Purple 2
- Red Purple 3
- Red Purple 4
- Red Purple 5
- Red Purple 6
- Red Purple 7
- Red Purple 8
- Brown 1
- Brown 2
- Brown 3
- Brown 4
- Brown 5
- Brown 6
- Brown 7
- Brown 8
- Brown 9
- Expanded Hue 1
- Expanded Hue 2
- Expanded Hue 3
- Expanded Hue 4
- Expanded Hue 5
- Expanded Hue 6
- Expanded Hue 7
- Expanded Hue 8
- Divergent 1
- Divergent 2
- Divergent 3
- Divergent 4
- Divergent 5
- Divergent 6
- Alternately Struct. 1
- Color Set 1
- Color Set 2
- Color Set 3
- Color Set 4
- Color Set 5
- Color Set 6
- Color Set 7





Export from ColorMoves – Import into tool of your choice



imports into Paraview

```
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ParaView color editor

Search ... (use Esc to clear text)

| Presets | |
|---------|-------------------|
| | Cool to Warm |
| | Cool to Warm ... |
| | Warm to Cool |
| | Warm to Cool ... |
| | Rainbow Desat... |
| | Cold and Hot |
| | Black-Body Ra... |
| | X Ray |
| | Grayscale |
| | Black, Blue an... |
| | Black, Orange ... |

Options to load:
 Colors
 Opacities
 Use preset range

Apply
Import
Export
Remove
Close

Tip: <click> to select, <double-click> to apply a preset.

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```

import .xml or json

Search ... (use Esc to clear text)

Array Name: v02

Lock Data Range
 Interpret Values As Categories
 Rescale On Visibility Change

Mapping Data

Choose Preset

Search ... (use Esc to clear text)

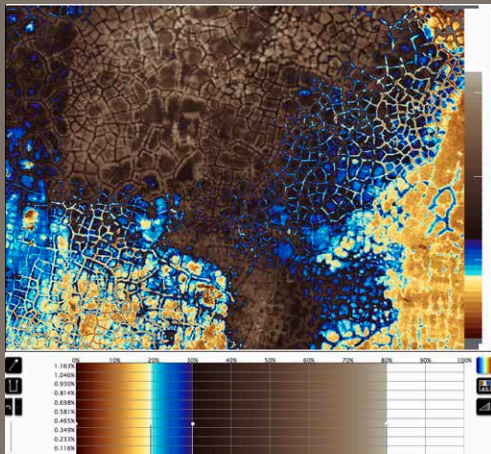
| Presets | |
|---------|--------------------|
| | 3Wbgy5 |
| | yel15 / Yellow ... |
| | 9_17f |
| | Gr4L |
| | TheROX |
| | Blue2 |
| | Preset 4 |
| | 3Wbgy5 |
| | yel15 / Yellow ... |
| | Yellow Orange... |
| | Black / Yellow ... |

Options to load:
 Colors
 Opacities
 Use preset range

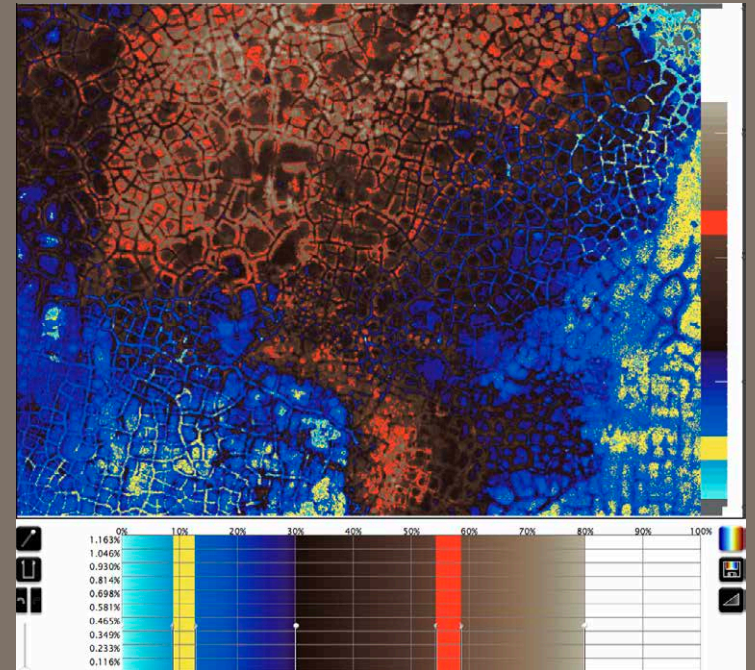
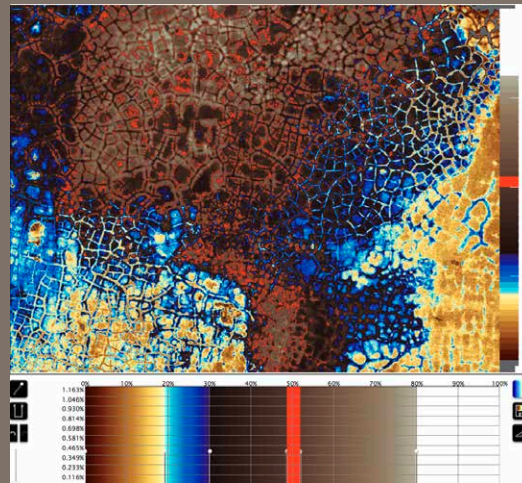
Apply
Import
Export
Remove
Close

Tip: <click> to select, <double-click> to apply a preset.

water and arid land



highlight area of concern

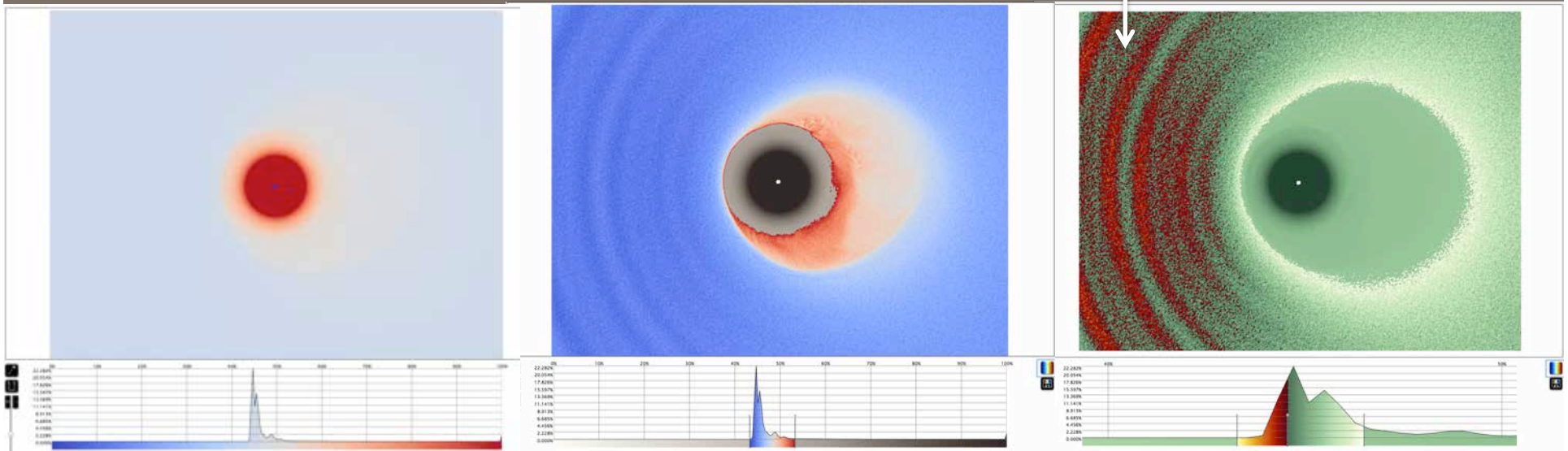


Communication

Highlight second area
expand blue map to enable
clarity yellow highlight

Honing the data range

bow fronts of interest



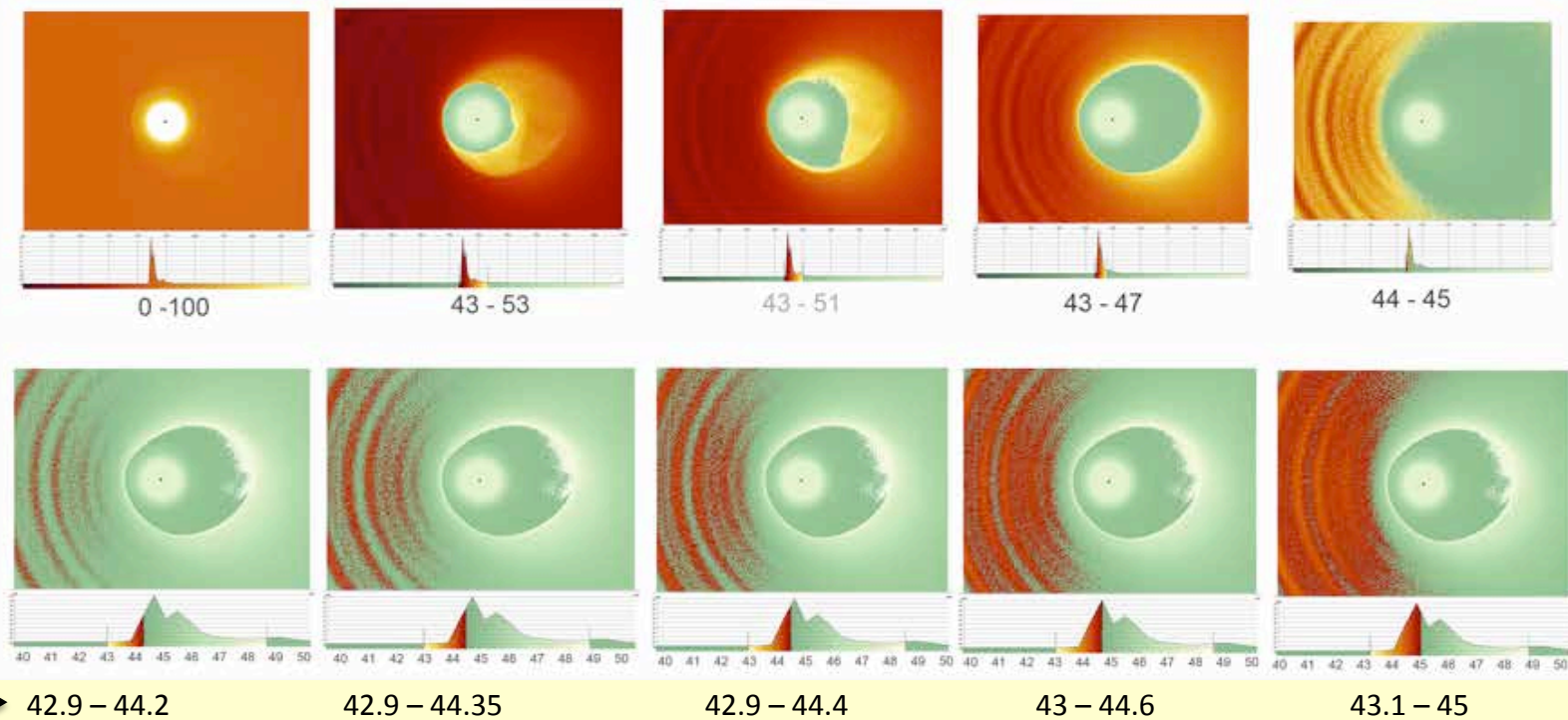
default in full data range

focused data range

optimal, task-driven data range

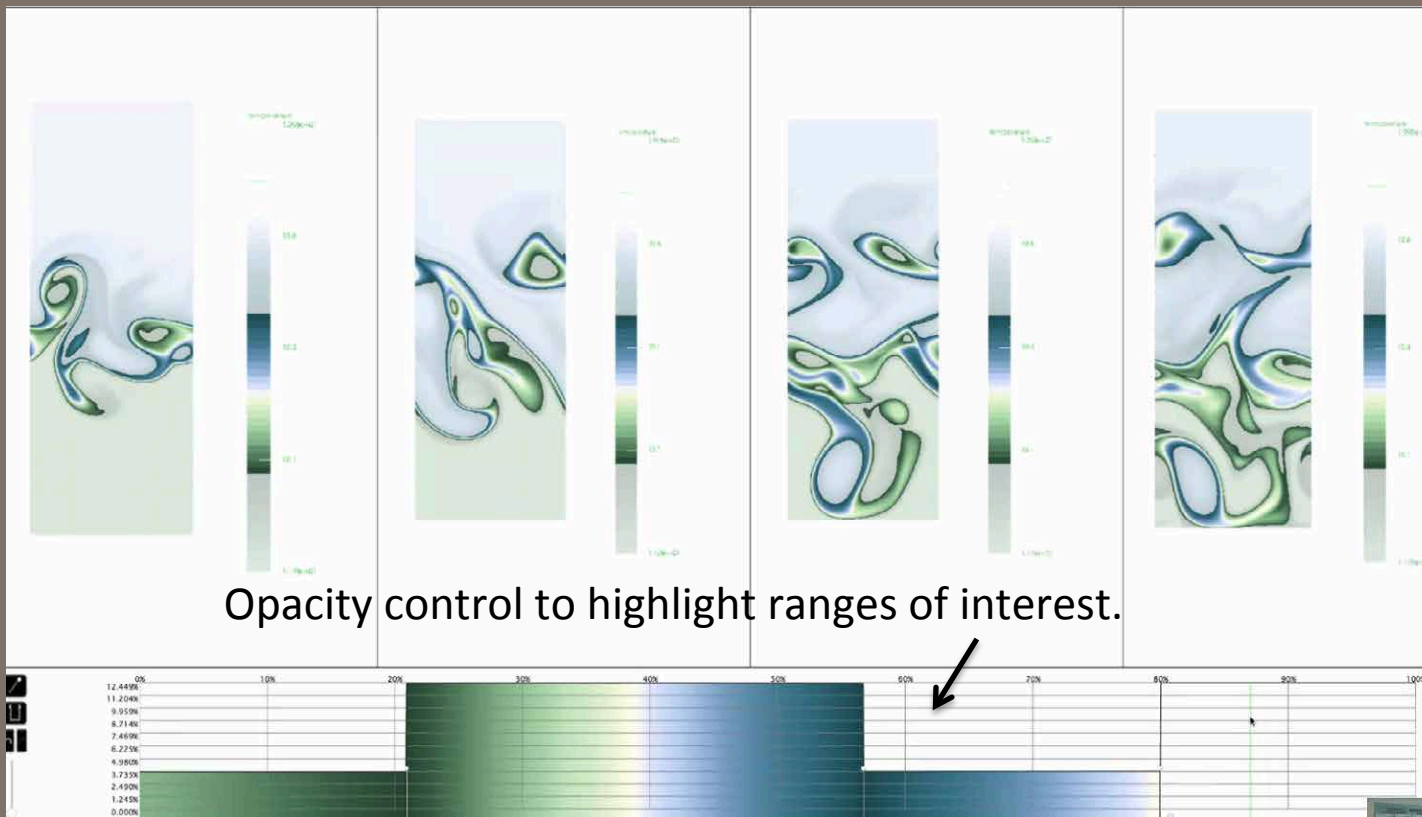
H3D Ganymede bow fronts
Daughton, LANL

Finding the optimal data range



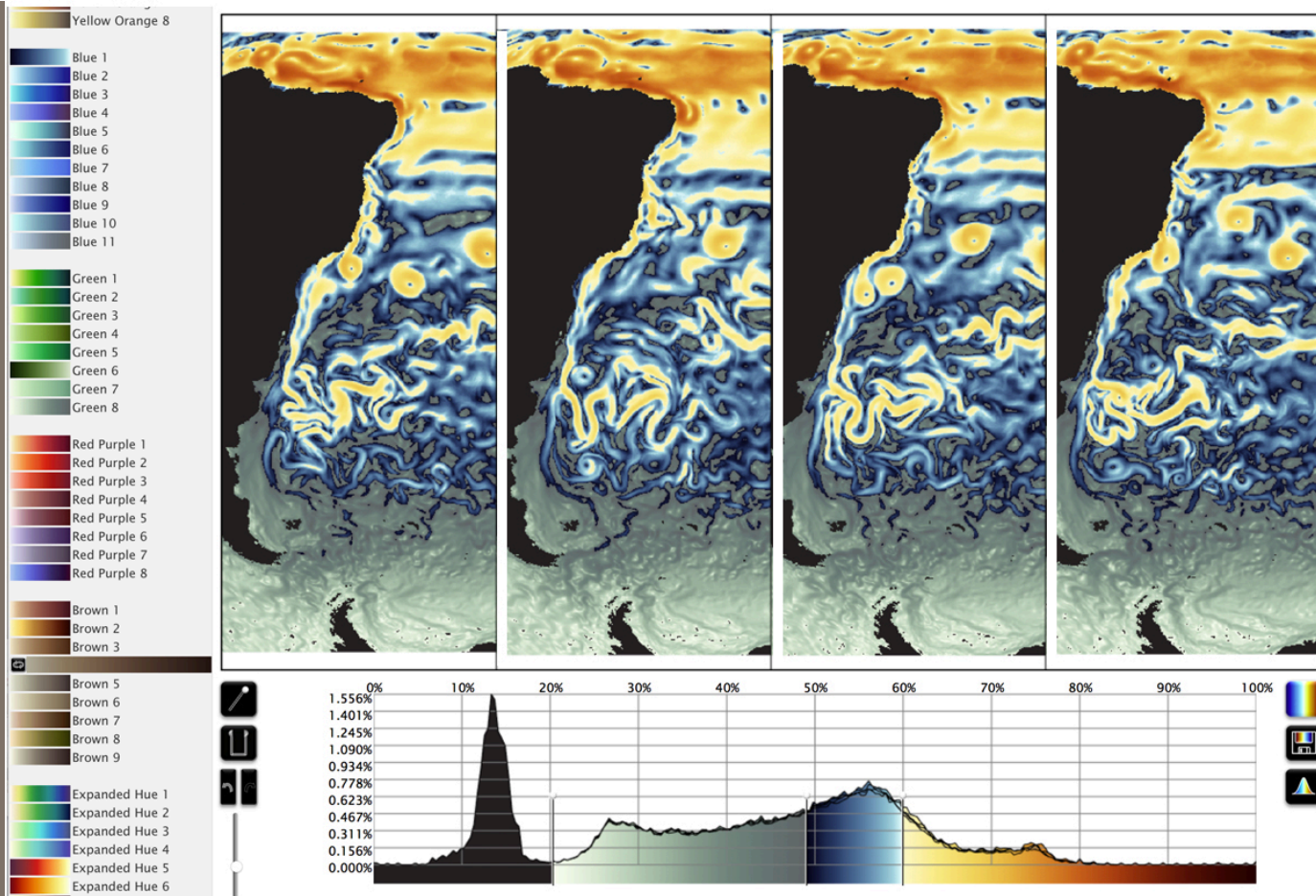
The interactivity enables the fidelity of control.

Opacity control



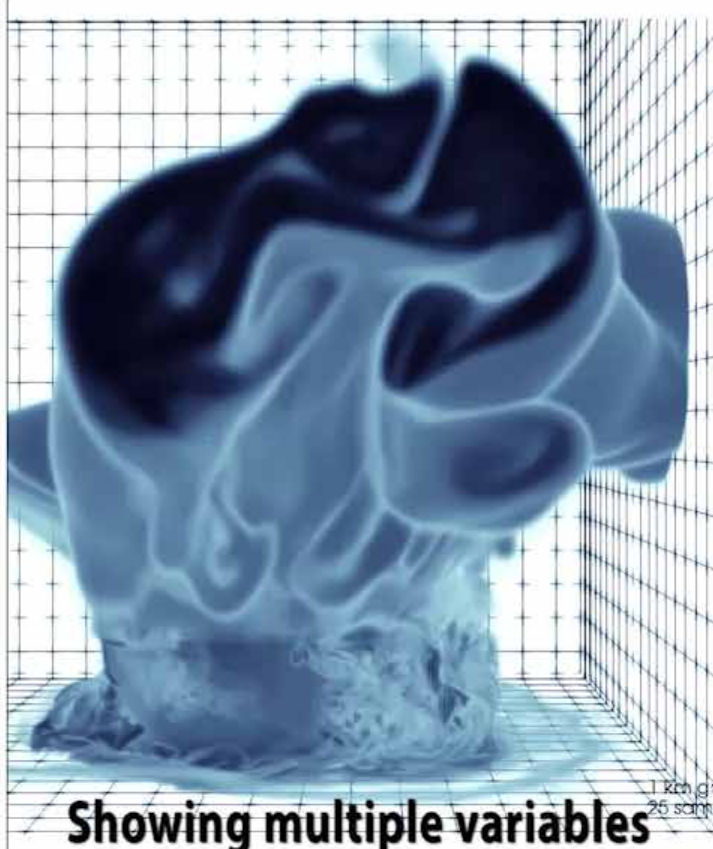
Opacity control to highlight ranges of interest.

The ability to control the opacity of each color scale individually enable one to focus attention without the cacophony of multiple colormaps.

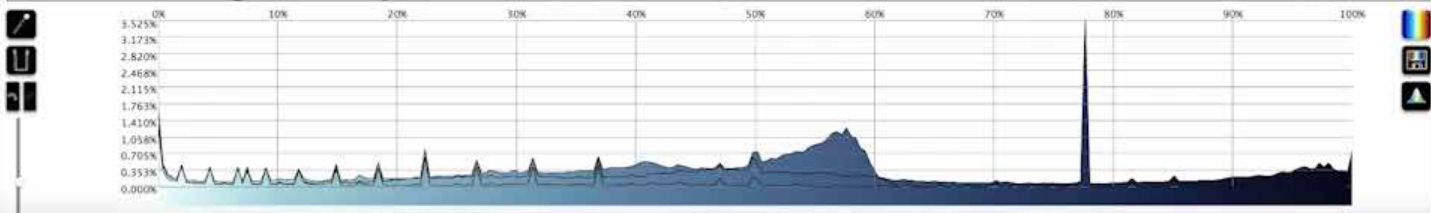
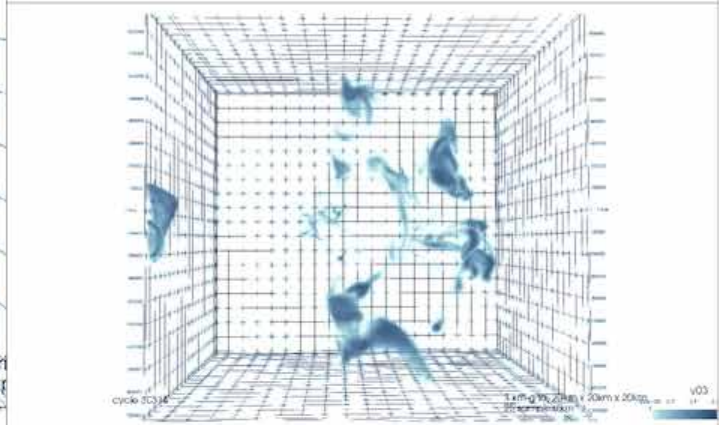
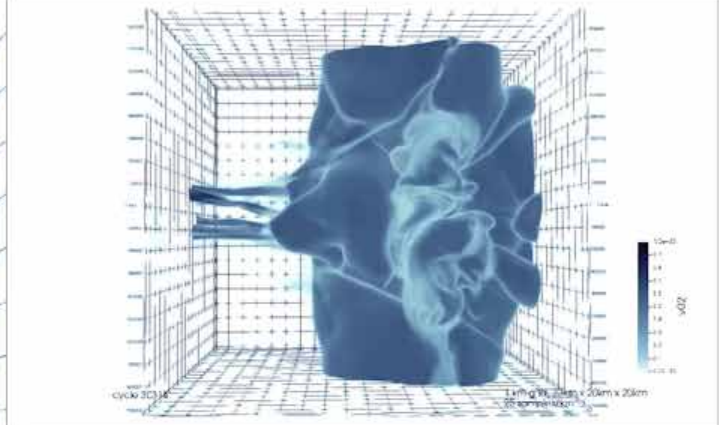


Enables crafting a colormap to work across time steps.

- Yellow Orange 1
- Yellow Orange 2
- Yellow Orange 3
- Yellow Orange 4
- Yellow Orange 5
- Yellow Orange 6
- Yellow Orange 7
- Yellow Orange 8
- Blue 1
- Blue 2
- Blue 3
- Blue 4
- Blue 5
- Blue 6
- Blue 7
- Blue 8
- Blue 9
- Blue 10
- Blue 11
- Green 1
- Green 2
- Green 3
- Green 4
- Green 5
- Green 6
- Green 7
- Green 8
- Red Purple 1
- Red Purple 2
- Red Purple 3
- Red Purple 4
- Red Purple 5
- Red Purple 6
- Red Purple 7
- Red Purple 8
- Brown 1
- Brown 2
- Brown 3
- Brown 4
- Brown 5
- Brown 6
- Brown 7
- Brown 8
- Brown 9
- Expanded Hue 1
- Expanded Hue 2
- Expanded Hue 3
- Expanded Hue 4
- Expanded Hue 5
- Expanded Hue 6
- Expanded Hue 7
- Expanded Hue 8
- Divergent 1
- Divergent 2
- Divergent 3
- Divergent 4
- Divergent 5
- Divergent 6
- Alternately Struct. 1



Showing multiple variables





ast_Variable_SET_30314_300_v1.png



ast_Variable_SET_30314_300_v2.png

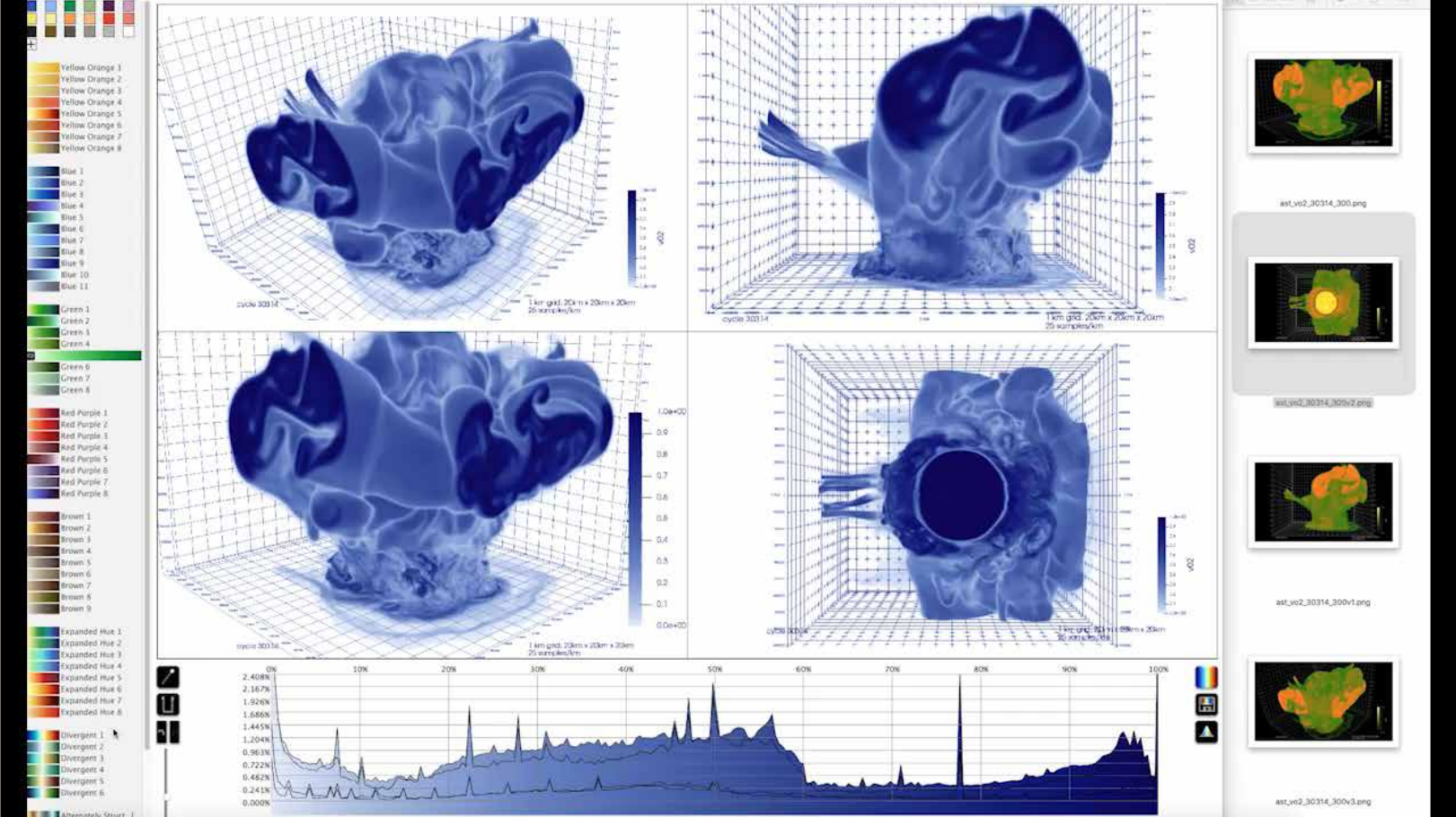


ast_Variable_SET_30314_300_v2v2.png



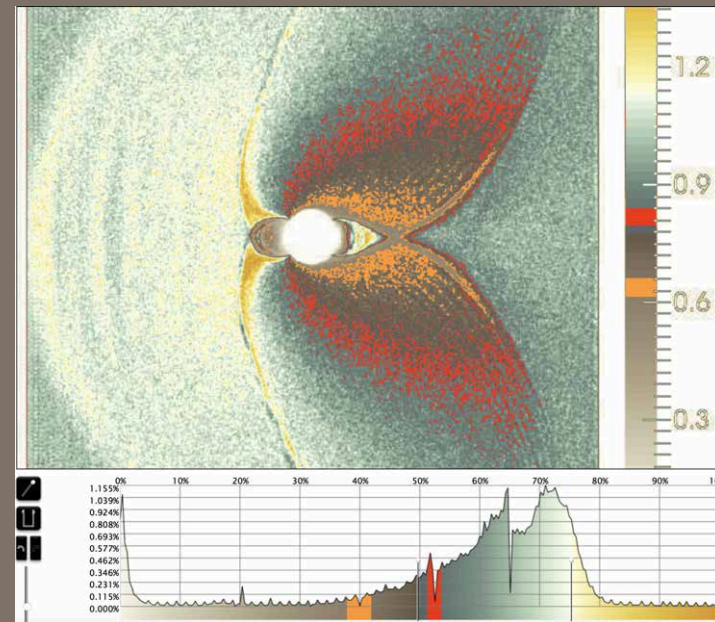
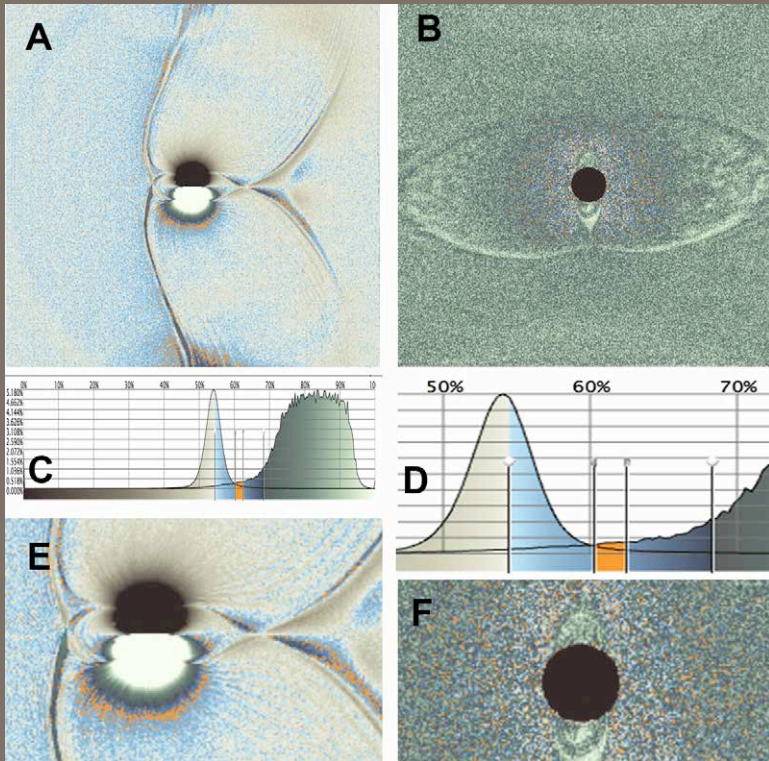
ast_Variable_SET_30314_300_v2temp.png

Multiple views



video

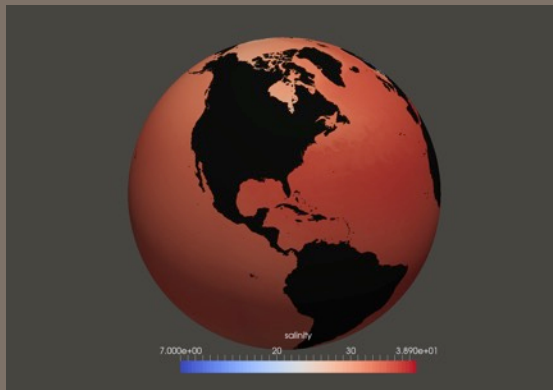
ColorMoves, showing the value of narrow data range identification within context



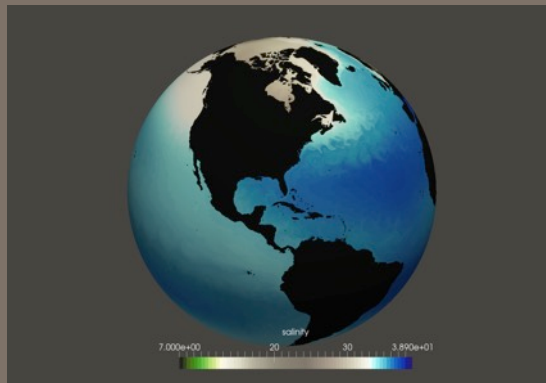
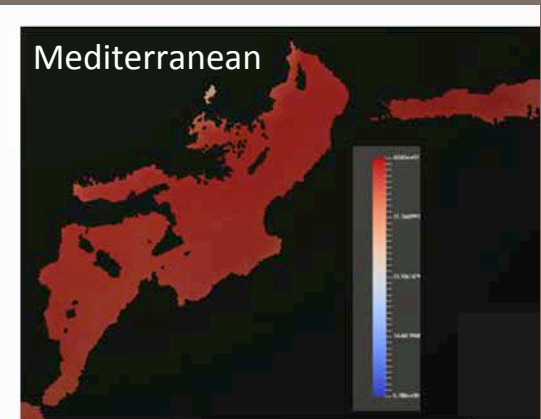
Focal points

Enable viewing of subtle data shifts, in varying ranges

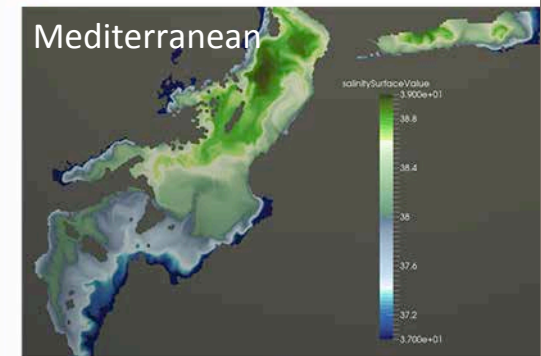
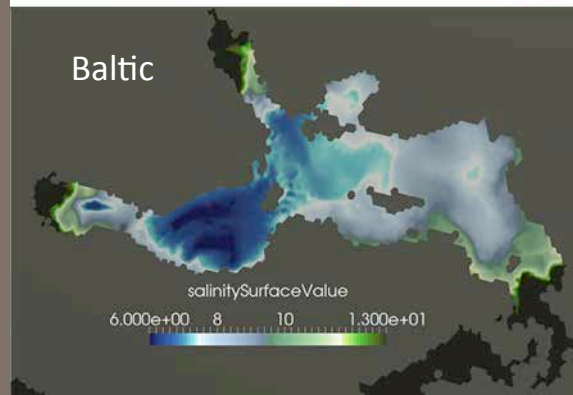
top: ParaView customized data range



ParaView cool-warm colormap



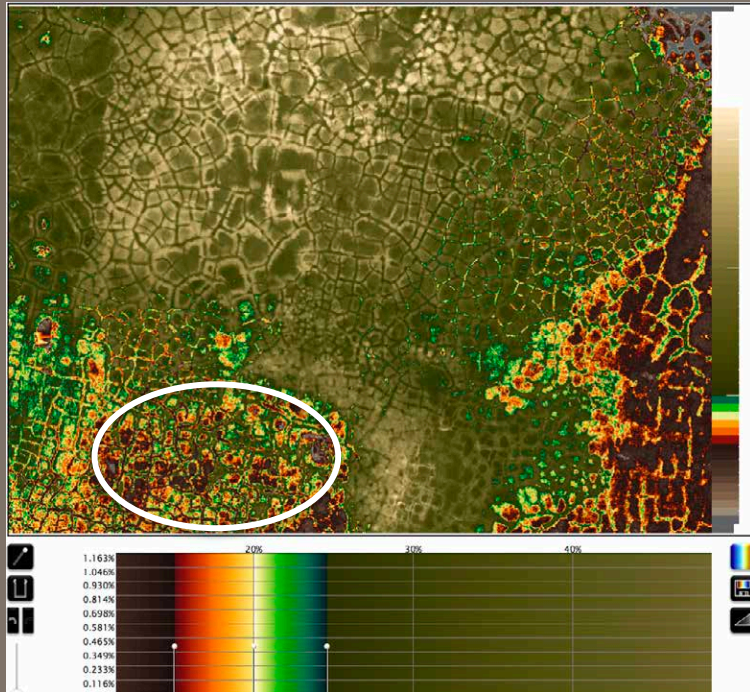
Structured colormap



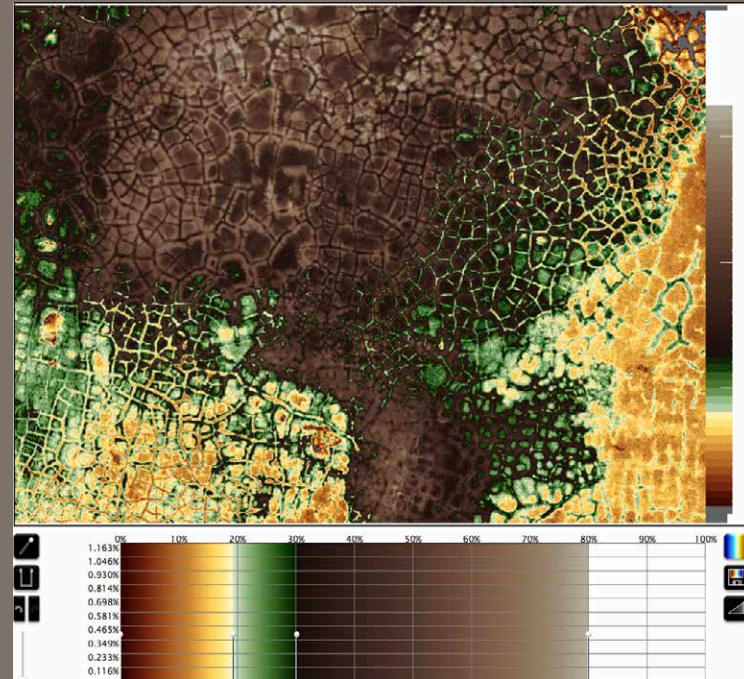
Salinity, MPAS, COSIM, LANL

bottom: ColorMoves customized data range

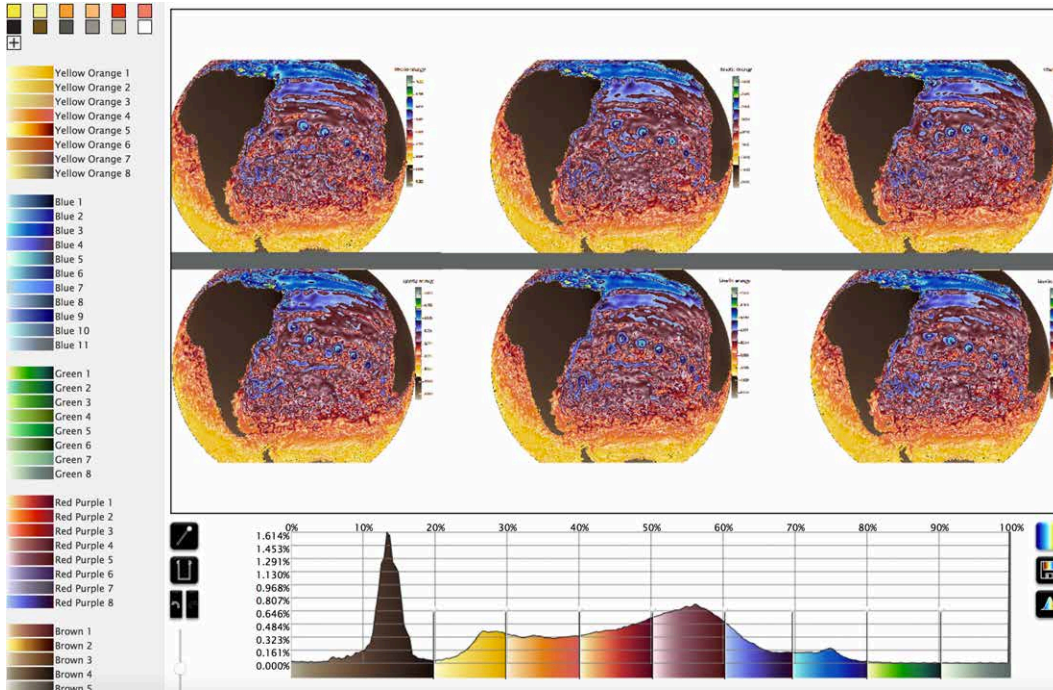
Caution...



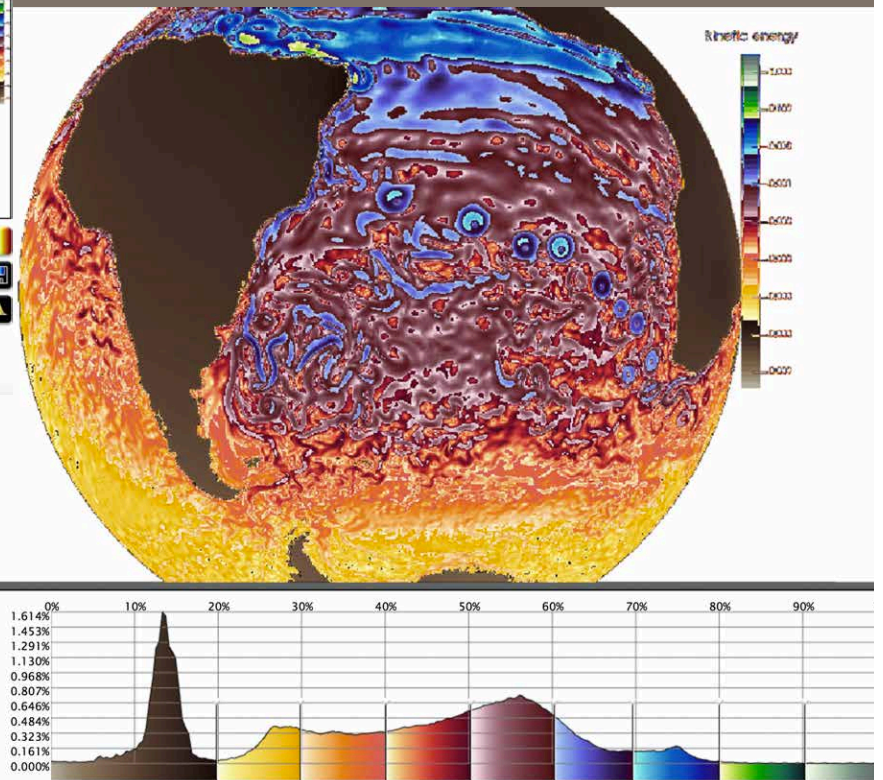
an example of too much contrast on small features



two neutral colors and a mellow green accent



How many is too many depends on the feature size.



If you must use ten, start with the muted color scales.

Or start with a wave map



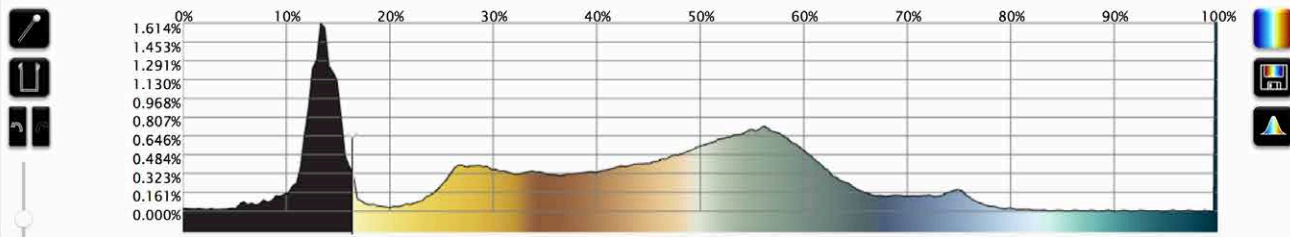
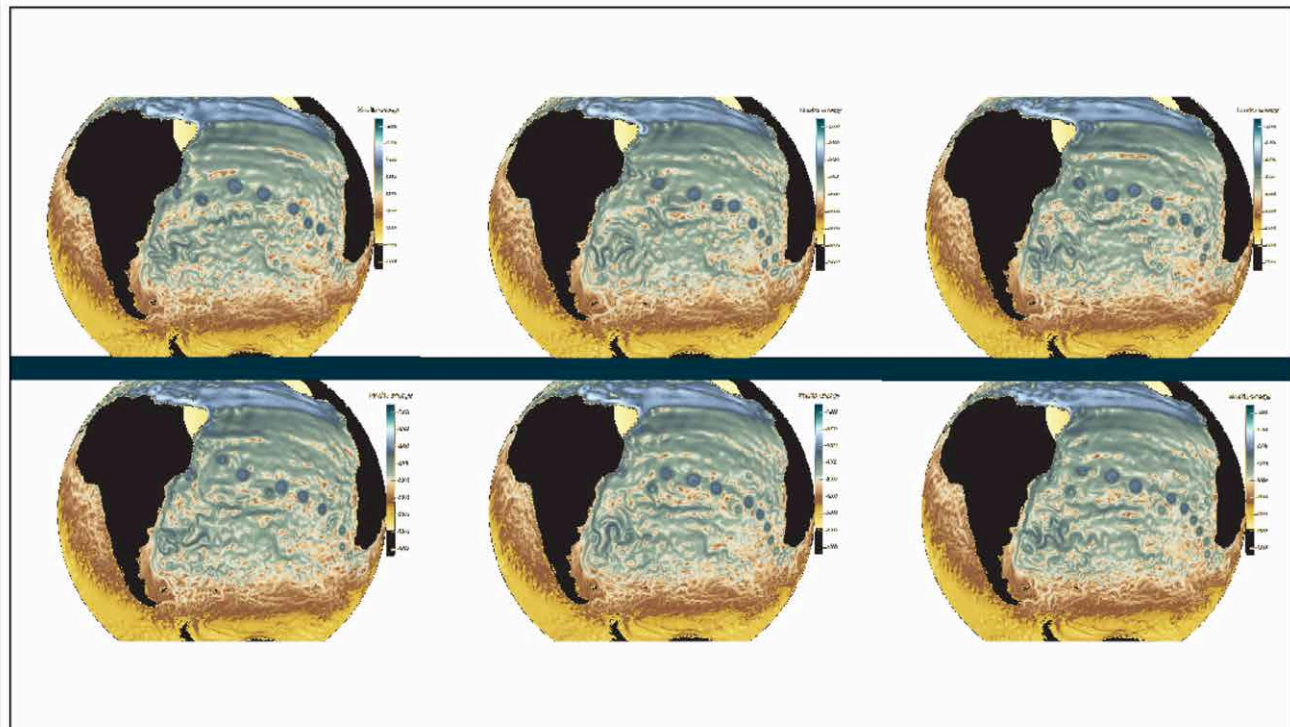
- Yellow Orange 1
- Yellow Orange 2
- Yellow Orange 3
- Yellow Orange 4
- Yellow Orange 5
- Yellow Orange 6
- Yellow Orange 7
- Yellow Orange 8

- Blue 1
- Blue 2
- Blue 3
- Blue 4
- Blue 5
- Blue 6
- Blue 7
- Blue 8
- Blue 9
- Blue 10
- Blue 11

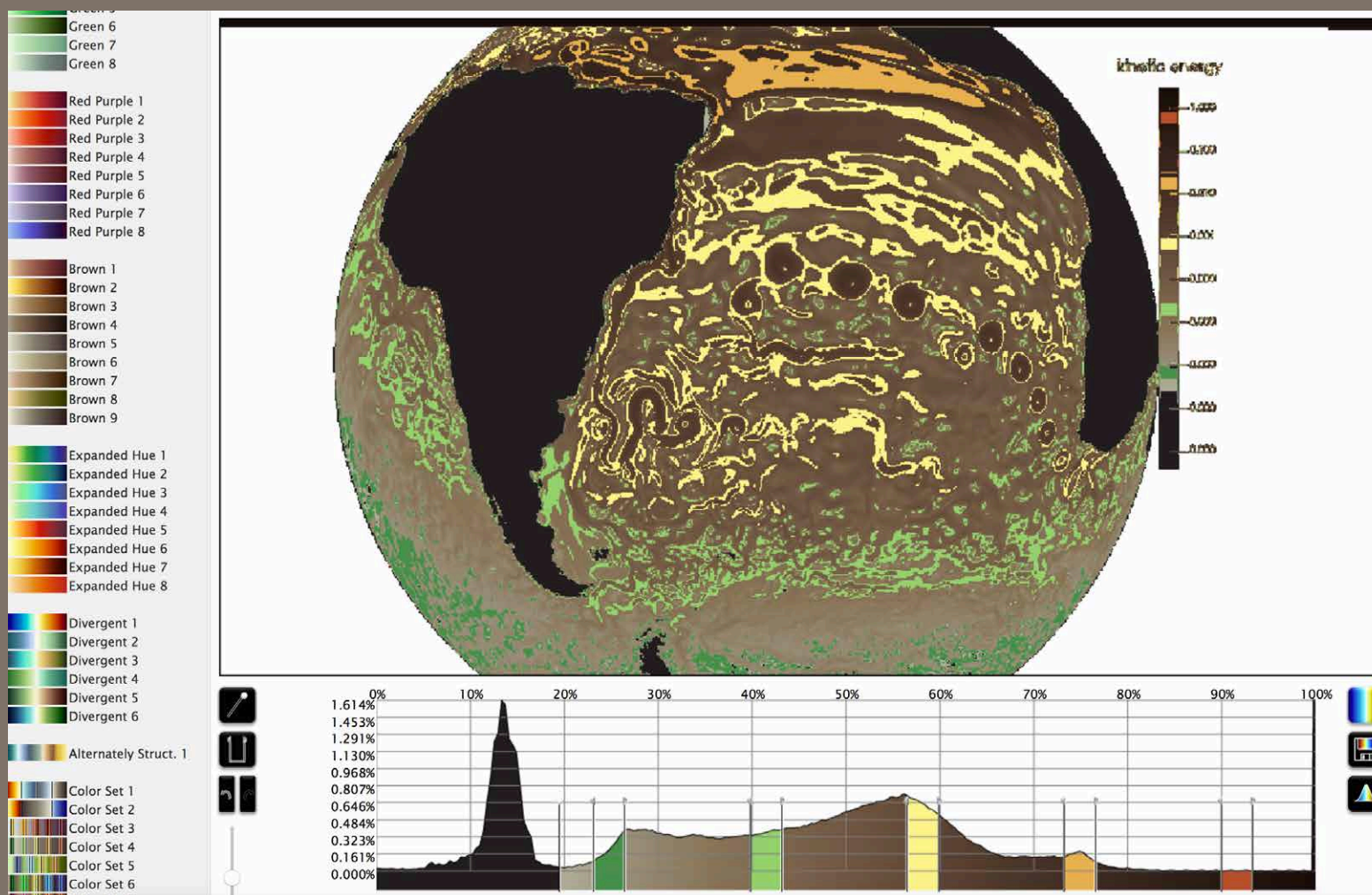
- Green 1
- Green 2
- Green 3
- Green 4
- Green 5
- Green 6
- Green 7
- Green 8

- Red Purple 1
- Red Purple 2
- Red Purple 3
- Red Purple 4
- Red Purple 5
- Red Purple 6
- Red Purple 7
- Red Purple 8

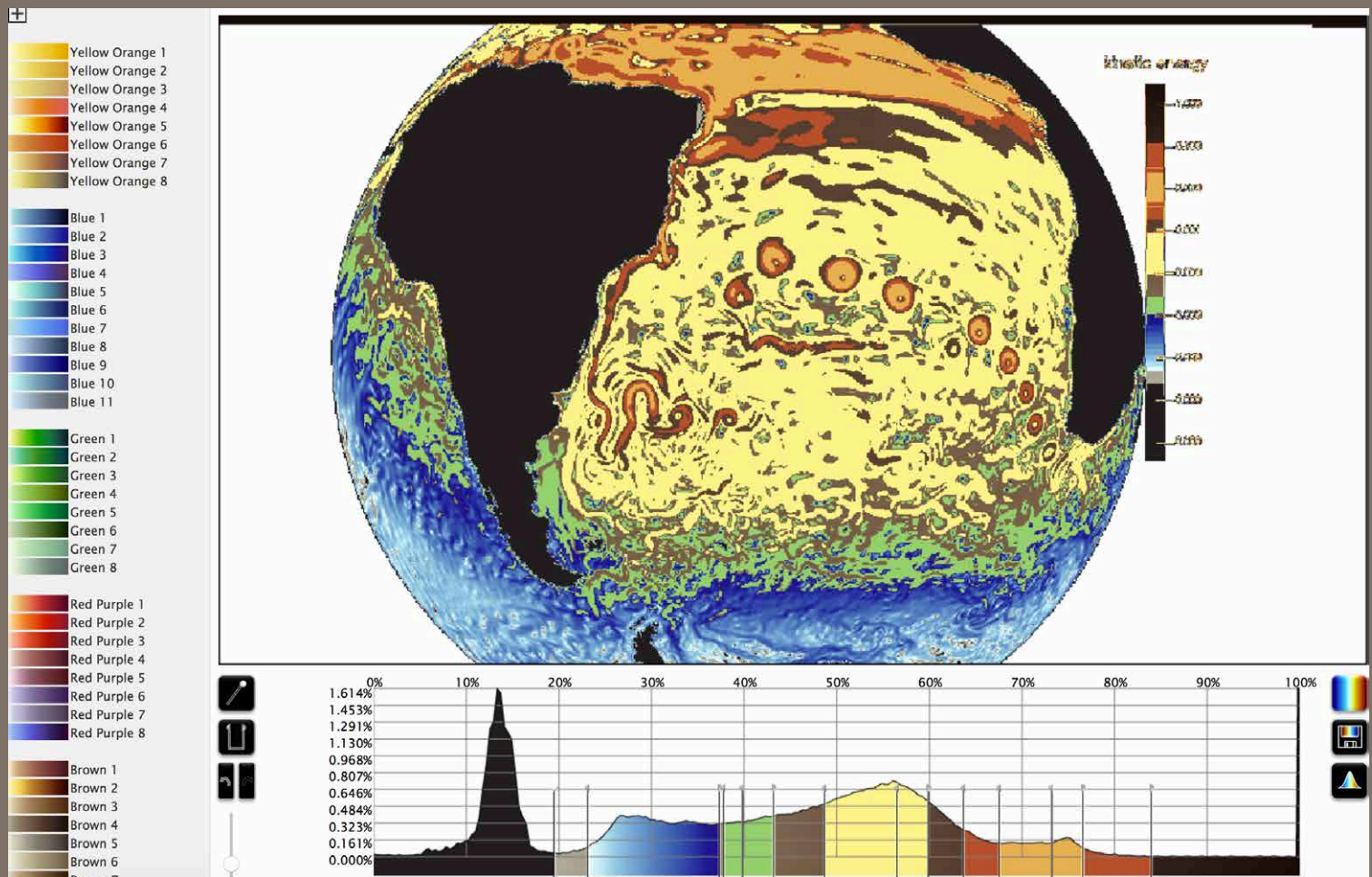
- Brown 1
- Brown 2
- Brown 3

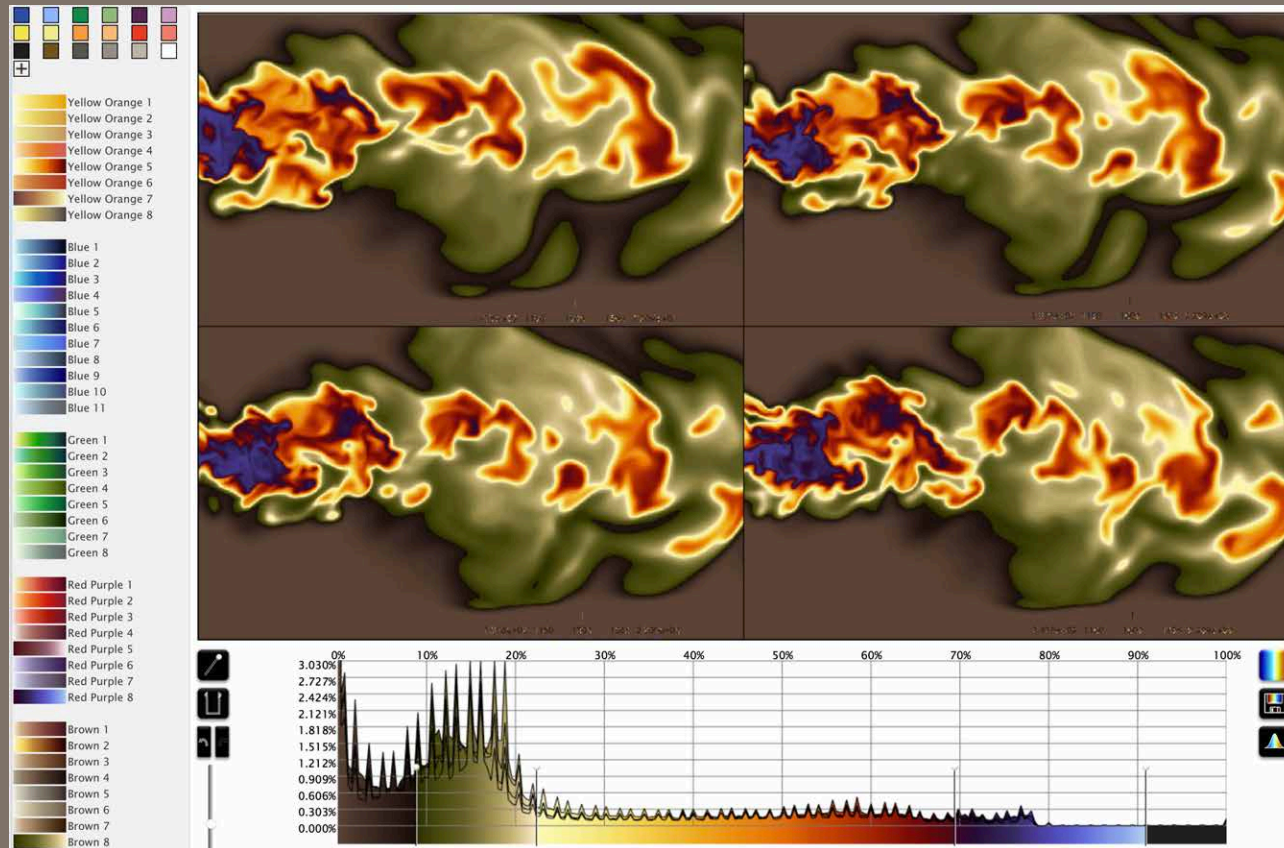


Or the "set" maps



and customize
the set map.





Beautiful isn't bad, it is an artifact of good design.

ColorMoves: Real-time Interactive Colormap Construction for Scientific Visualization

Francesca Samsel, Sebastian Klaassen, David H. Rogers

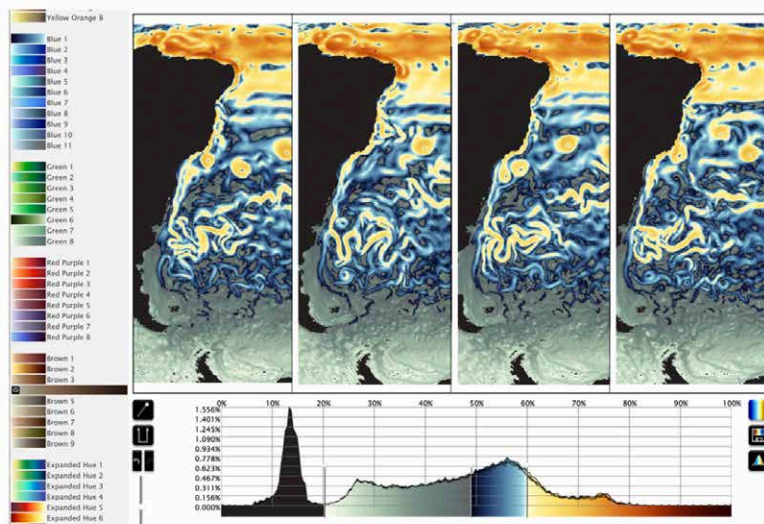


Fig. 1. Four timesteps of an MPAS-Ocean kinetic energy simulation is shown in the ColorMoves interface. ColorMoves is an interface that enables scientists to construct colormaps with contrast applied to regions of greatest interest. It also promotes interactive exploration of data through color. The ability to load several images into the interface window enables scientists to construct colormaps that are effective across time ranges, camera views, variables and more.

Abstract—The visualization of scientific data is both a science and an art, in which many tools are used to explore, discover and communicate the information within the data. This process is increasingly difficult, as the size and complexity of data is constantly advancing. Color is a potent tool in scientific data visualization, and has been well studied. However, color's full potential for communication and discovery remains untapped. Effective use of color requires a depth of understanding and experience employing color and color relationships, in combination with tools to translate that knowledge into scientific visualization workflows. In this paper, we present ColorMoves, an interactive tool that promotes exploration of scientific data through color in a unique and transformative way. We discuss the power of contrast in scientific visualization, the design of the ColorMoves tool, and the tool's application in several science domains.

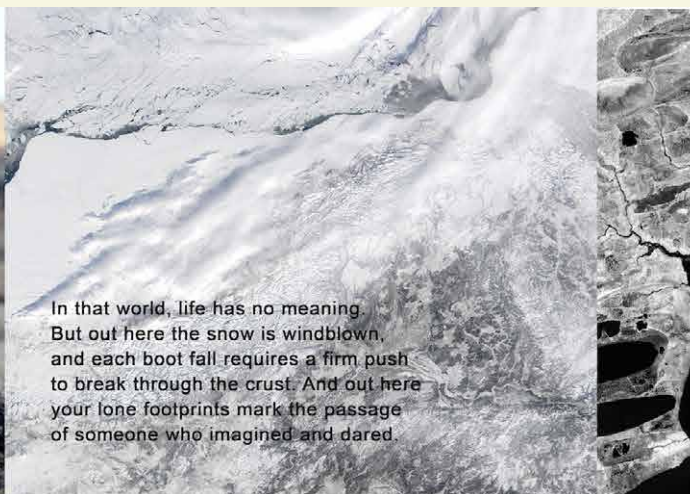
IEEE Computer Graphics & Applications
January 2018

Thinking About Data by Michael G. Smith



Thinking About the Data

There are those times when you must walk away from the laptop or white board scribbled with notes and equations and step past the door into the winter that seemingly goes on forever. You've stopped being in the world of hard numbers.



In that world, life has no meaning. But out here the snow is windblown, and each boot fall requires a firm push to break through the crust. And out here your lone footprints mark the passage of someone who imagined and dared.

| i | Index | hd | splt | phht | time | z | z | thawnd | z | Frozen | T | thawnd | T | Frozen | SI | va | T | va | satpor | va |
|----|-------|-------|--------|--------|---------|----------|------|--------|---------|---------|----------|---------|-----------|--------|----|----|---|----|--------|----|
| 1 | 1.0 | -0.51 | 0.0769 | 2.001 | 3.63039 | 0.389986 | 0.37 | 0.39 | 273.266 | 273.15 | 0.505291 | 274.077 | 0.122011 | | | | | | | |
| 2 | 2.0 | -0.51 | 0.0769 | 4.001 | 3.63039 | 0.389438 | 0.37 | 0.39 | 273.236 | 273.148 | 0.509556 | 274.842 | 0.118138 | | | | | | | |
| 3 | 3.0 | -0.51 | 0.0769 | 6.001 | 3.63039 | 0.38995 | 0.35 | 0.37 | 273.241 | 273.15 | 0.560755 | 274.807 | 0.073329 | | | | | | | |
| 4 | 4.0 | -0.51 | 0.0769 | 8.001 | 3.63039 | 0.357759 | 0.35 | 0.37 | 273.181 | 273.182 | 0.569191 | 274.831 | 0.043773 | | | | | | | |
| 5 | 5.0 | -0.51 | 0.0769 | 10.001 | 3.63039 | 0.349923 | 0.33 | 0.35 | 273.241 | 273.15 | 0.575939 | 274.843 | 0.0734761 | | | | | | | |
| 6 | 6.0 | -0.51 | 0.0769 | 12.001 | 3.63039 | 0.320995 | 0.31 | 0.33 | 273.275 | 273.15 | 0.566551 | 274.864 | 0.0 | | | | | | | |
| 7 | 7.0 | -0.51 | 0.0769 | 14.001 | 3.63039 | 0.329064 | 0.31 | 0.33 | 273.251 | 273.15 | 0.563589 | 274.909 | 0.0 | | | | | | | |
| 8 | 8.0 | -0.51 | 0.0769 | 16.001 | 3.63039 | 0.32081 | 0.31 | 0.33 | 273.227 | 273.149 | 0.560248 | 274.905 | 0.0 | | | | | | | |
| 9 | 9.0 | -0.51 | 0.0769 | 18.001 | 3.63039 | 0.322922 | 0.31 | 0.33 | 273.203 | 273.121 | 0.555350 | 274.861 | 0.0 | | | | | | | |
| 10 | 10.0 | -0.51 | 0.0769 | 20.001 | 3.62765 | 0.309936 | 0.29 | 0.31 | 273.268 | 273.15 | 0.555235 | 275.584 | 0.0 | | | | | | | |
| 11 | 11.0 | -0.51 | 0.0769 | 22.001 | 3.63039 | 0.300036 | 0.29 | 0.31 | 273.191 | 273.109 | 0.561835 | 274.978 | 0.0 | | | | | | | |
| 12 | 12.0 | -0.51 | 0.0769 | 24.001 | 3.63039 | 0.280041 | 0.27 | 0.29 | 273.242 | 273.149 | 0.563645 | 275.011 | 0.0 | | | | | | | |
| 13 | 13.0 | -0.51 | 0.0769 | 26.001 | 3.62765 | 0.269972 | 0.25 | 0.27 | 273.514 | 273.149 | 0.576842 | 275.091 | 0.0 | | | | | | | |
| 14 | 14.0 | -0.51 | 0.0769 | 28.001 | 3.63039 | 0.26146 | 0.27 | 0.29 | 273.249 | 273.076 | 0.576532 | 275.013 | 0.0 | | | | | | | |
| 15 | 15.0 | -0.51 | 0.0769 | 30.001 | 3.63039 | 0.281801 | 0.27 | 0.29 | 273.275 | 273.11 | 0.579889 | 275.022 | 0.0 | | | | | | | |
| 16 | 16.0 | -0.51 | 0.0769 | 32.001 | 3.63039 | 0.284852 | 0.27 | 0.29 | 273.204 | 273.103 | 0.578435 | 275.035 | 0.0 | | | | | | | |
| 17 | 17.0 | -0.51 | 0.0769 | 34.001 | 3.62765 | 0.286197 | 0.27 | 0.29 | 273.314 | 273.112 | 0.57995 | 275.575 | 0.0 | | | | | | | |
| 18 | 18.0 | -0.51 | 0.0769 | 36.001 | 3.63039 | 0.287699 | 0.27 | 0.29 | 273.313 | 273.129 | 0.57621 | 275.032 | 0.0 | | | | | | | |
| 19 | 19.0 | -0.51 | 0.0769 | 38.001 | 3.63039 | 0.288177 | 0.27 | 0.29 | 273.318 | 273.133 | 0.575884 | 275.024 | 0.0 | | | | | | | |
| 20 | 20.0 | -0.51 | 0.0769 | 40.001 | 3.63039 | 0.288727 | 0.27 | 0.29 | 273.326 | 273.138 | 0.574939 | 275.025 | 0.0 | | | | | | | |
| 21 | 21.0 | -0.51 | 0.3077 | 2.001 | 3.63039 | 0.309971 | 0.37 | 0.39 | 273.250 | 273.15 | 0.505577 | 274.076 | 0.121579 | | | | | | | |
| 22 | 22.0 | -0.51 | 0.3077 | 4.001 | 3.63039 | 0.369999 | 0.35 | 0.37 | 273.286 | 273.15 | 0.563181 | 274.885 | 0.0751647 | | | | | | | |
| 23 | 23.0 | -0.51 | 0.3077 | 6.001 | 3.63039 | 0.369745 | 0.35 | 0.37 | 273.238 | 273.149 | 0.569873 | 274.848 | 0.0728994 | | | | | | | |
| 24 | 24.0 | -0.51 | 0.3077 | 8.001 | 3.63039 | 0.349978 | 0.33 | 0.35 | 273.255 | 273.15 | 0.560586 | 274.859 | 0.0 | | | | | | | |
| 25 | 25.0 | -0.51 | 0.3077 | 10.001 | 3.63039 | 0.349512 | 0.33 | 0.35 | 273.234 | 273.148 | 0.574408 | 274.807 | 0.0725416 | | | | | | | |
| 26 | 26.0 | -0.51 | 0.3077 | 12.001 | 3.63039 | 0.329978 | 0.31 | 0.33 | 273.255 | 273.15 | 0.567569 | 274.866 | 0.0 | | | | | | | |
| 27 | 27.0 | -0.51 | 0.3077 | 14.001 | 3.63039 | 0.329829 | 0.31 | 0.33 | 273.236 | 273.149 | 0.567717 | 274.884 | 0.0 | | | | | | | |
| 28 | 28.0 | -0.51 | 0.3077 | 16.001 | 3.63039 | 0.313149 | 0.31 | 0.33 | 272.197 | 273.106 | 0.564602 | 274.92 | 0.0 | | | | | | | |
| 29 | 29.0 | -0.51 | 0.3077 | 18.001 | 3.62765 | 0.309959 | 0.29 | 0.31 | 273.279 | 273.15 | 0.553903 | 275.578 | 0.0 | | | | | | | |
| 30 | 30.0 | -0.51 | 0.3077 | 20.001 | 3.63039 | 0.309852 | 0.29 | 0.31 | 273.236 | 273.148 | 0.556887 | 274.974 | 0.0 | | | | | | | |
| 31 | 31.0 | -0.51 | 0.3077 | 22.001 | 3.62765 | 0.289944 | 0.27 | 0.29 | 272.177 | 273.15 | 0.56515 | 275.496 | 0.0 | | | | | | | |
| 32 | 32.0 | -0.51 | 0.3077 | 24.001 | 3.63039 | 0.280222 | 0.27 | 0.29 | 273.196 | 273.111 | 0.574361 | 274.906 | 0.0 | | | | | | | |
| 33 | 33.0 | -0.51 | 0.3077 | 26.001 | 3.62765 | 0.269544 | 0.25 | 0.27 | 273.506 | 273.149 | 0.578968 | 275.703 | 0.0 | | | | | | | |
| 34 | 34.0 | -0.51 | 0.3077 | 28.001 | 3.62765 | 0.269948 | 0.25 | 0.27 | 273.509 | 273.149 | 0.57851 | 275.704 | 0.0 | | | | | | | |
| 35 | 35.0 | -0.51 | 0.3077 | 30.001 | 3.62765 | 0.269947 | 0.25 | 0.27 | 273.504 | 273.149 | 0.578902 | 275.683 | 0.0 | | | | | | | |
| 36 | 36.0 | -0.51 | 0.3077 | 32.001 | 3.62765 | 0.269956 | 0.25 | 0.27 | 273.511 | 273.149 | 0.575991 | 275.695 | 0.0 | | | | | | | |
| 37 | 37.0 | -0.51 | 0.3077 | 34.001 | 3.62765 | 0.269961 | 0.25 | 0.27 | 273.513 | 273.149 | 0.578047 | 275.697 | 0.0 | | | | | | | |
| 38 | 38.0 | -0.51 | 0.3077 | 36.001 | 3.62765 | 0.269968 | 0.25 | 0.27 | 273.516 | 273.149 | 0.575397 | 275.702 | 0.0 | | | | | | | |
| 39 | 39.0 | -0.51 | 0.3077 | 38.001 | 3.62765 | 0.269969 | 0.25 | 0.27 | 273.510 | 273.149 | 0.576099 | 275.711 | 0.0 | | | | | | | |
| 40 | 40.0 | -0.51 | 0.3077 | 40.001 | 3.62765 | 0.269972 | 0.25 | 0.27 | 273.512 | 273.149 | 0.57805 | 275.695 | 0.0 | | | | | | | |
| 41 | 41.0 | -0.51 | 0.5385 | 2.001 | 3.63039 | 0.389984 | 0.37 | 0.39 | 273.267 | 273.15 | 0.602746 | 274.879 | 0.122006 | | | | | | | |
| 42 | 42.0 | -0.51 | 0.5385 | 4.001 | 3.63039 | 0.369997 | 0.35 | 0.37 | 273.28 | 273.15 | 0.561741 | 274.883 | 0.0751694 | | | | | | | |
| 43 | 43.0 | -0.51 | 0.5385 | 6.001 | 3.63039 | 0.369746 | 0.35 | 0.37 | 273.230 | 273.149 | 0.571359 | 274.837 | 0.0728649 | | | | | | | |
| 44 | 44.0 | -0.51 | 0.5385 | 8.001 | 3.63039 | 0.349983 | 0.33 | 0.35 | 273.257 | 273.15 | 0.561388 | 274.855 | 0.0753538 | | | | | | | |

Drawn from the work of the NGE-E-Arctic research team, LANL