

Interactive graphics in R:

A state of the union

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RStudio



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Why interactive?

- **Pan/zoom:** navigate to area of interest
- **Query:** what is this point?
- **Linked brushing:** connect multiple graphics
- ... (and many other useful techniques)

| | Strengths | Weaknesses | Examples |
|------------------------|----------------------------|---|---|
| Speak in tongues | Fast! | Hard to install. Designed for deep users | ggobi, cranvas, iplots, loon, ... |
| Hack existing graphics | Works with existing code! | Limited by existing code | animInt, shiny + ggplot2, plot.ly, ... |
| (Ab)Use the browser | Only need a browser to use | Can be slow. Mixed computation is challenging | R/qtlcharts, leaflet, threejs, networkd3, bokeh, plot.ly, ... |

**Speak in
tongues**

rggobi

Deborah Swayne,
Duncan Temple
Lang, Michael
Lawrence, me

1991 (S + XGobi)
2001 (rggobi 1.0)
2006 (rggobi 2.0)

ggobi (C)

iplots

Simon Urbanek

2006 (iplots)
2009 (acinonyx)

C++, openGL

cranvas

Michael Lawrence,
Heike Hofmann,
Yihui Xie, Xiaoyue
Cheng

2011

qtpaint (R) >>
qtbases (R) >>
qt (C++)

loon

Adrian Waddell,
Wayne Oldford

2014

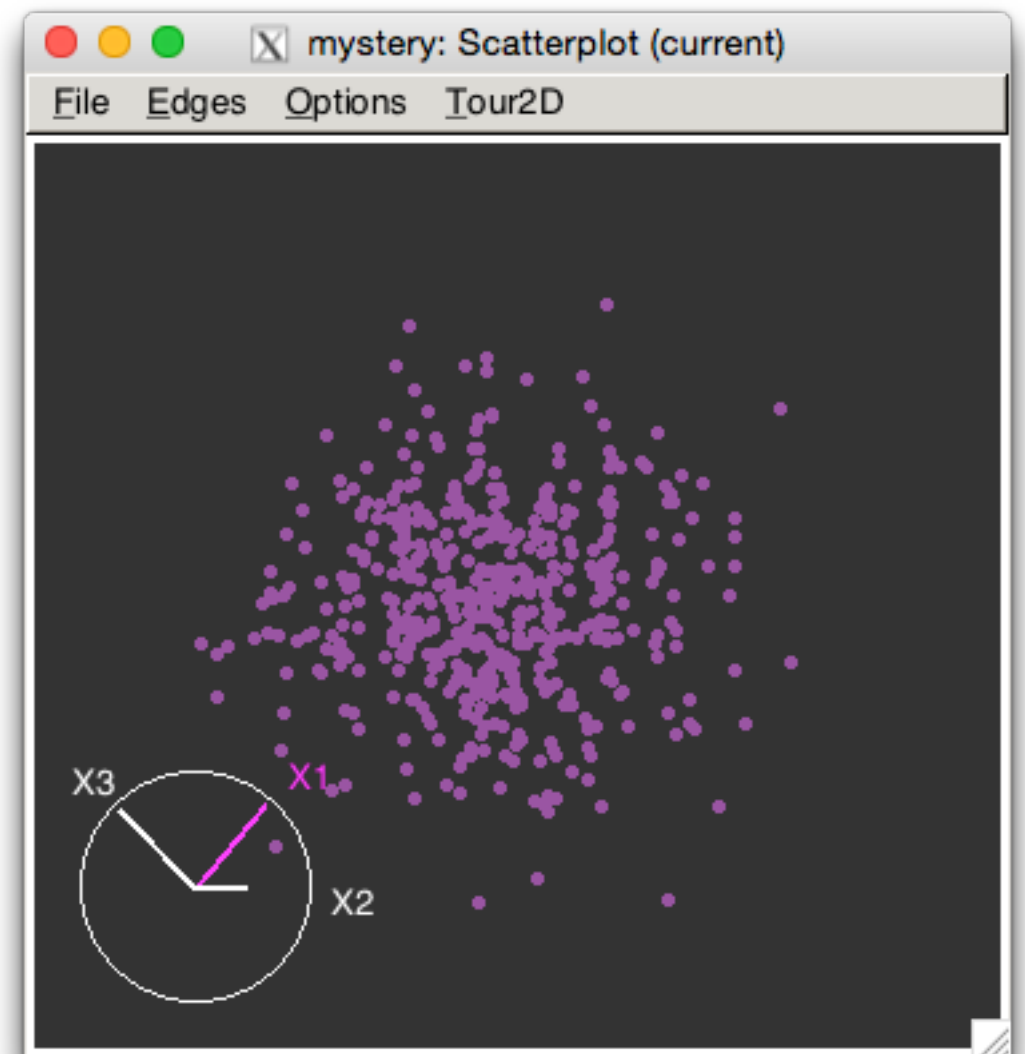
tcl/tk

rggobi

Known for: grand tour

Lets you script ggobi, a powerful tool for high-d vis.

See also clusterfly & classifly.

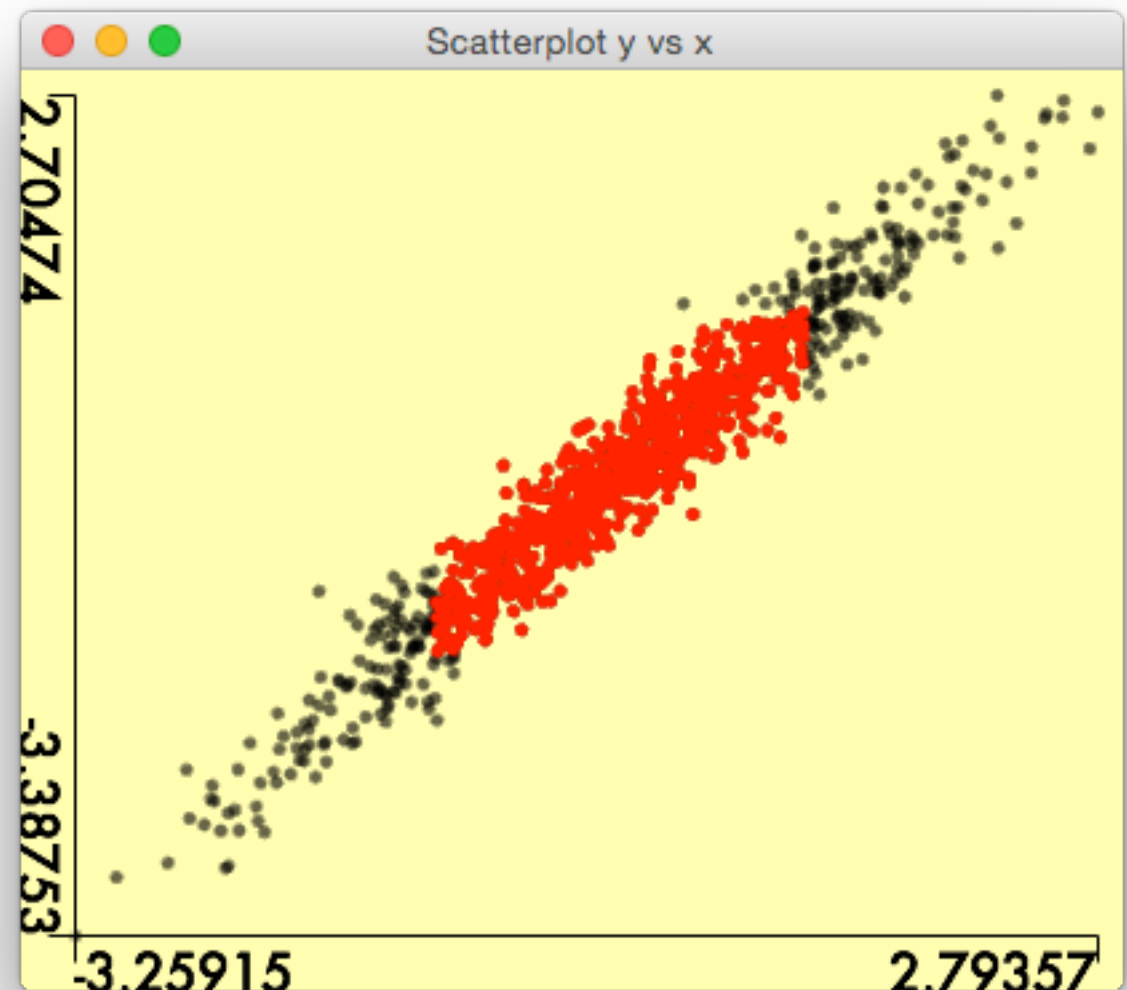


iplots

Known for: high-performance

Series of packages by Simon Urbanek.

Built on OpenGL (and the GPU)

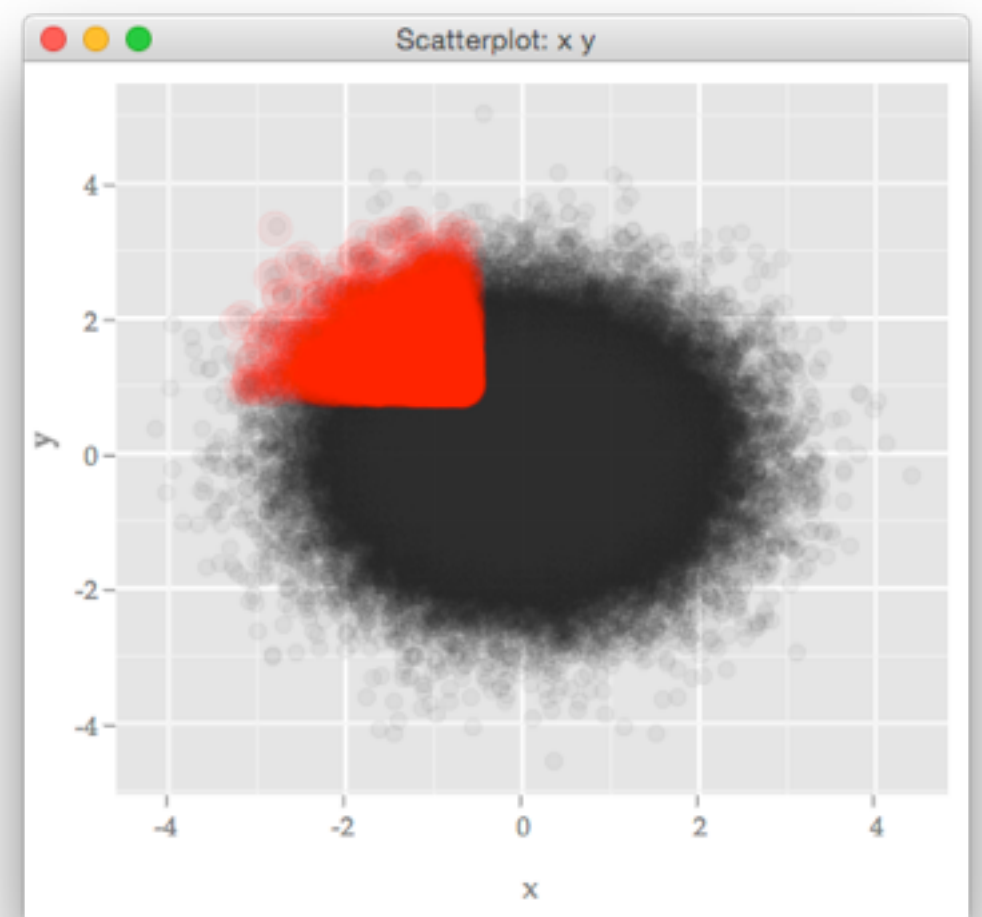


cranvas

Spiritual successor to ggobi.

Layered approach:
qtbase, qtpaint, cranvas.
Only R code in cranvas.

Built around a mutable data frame.

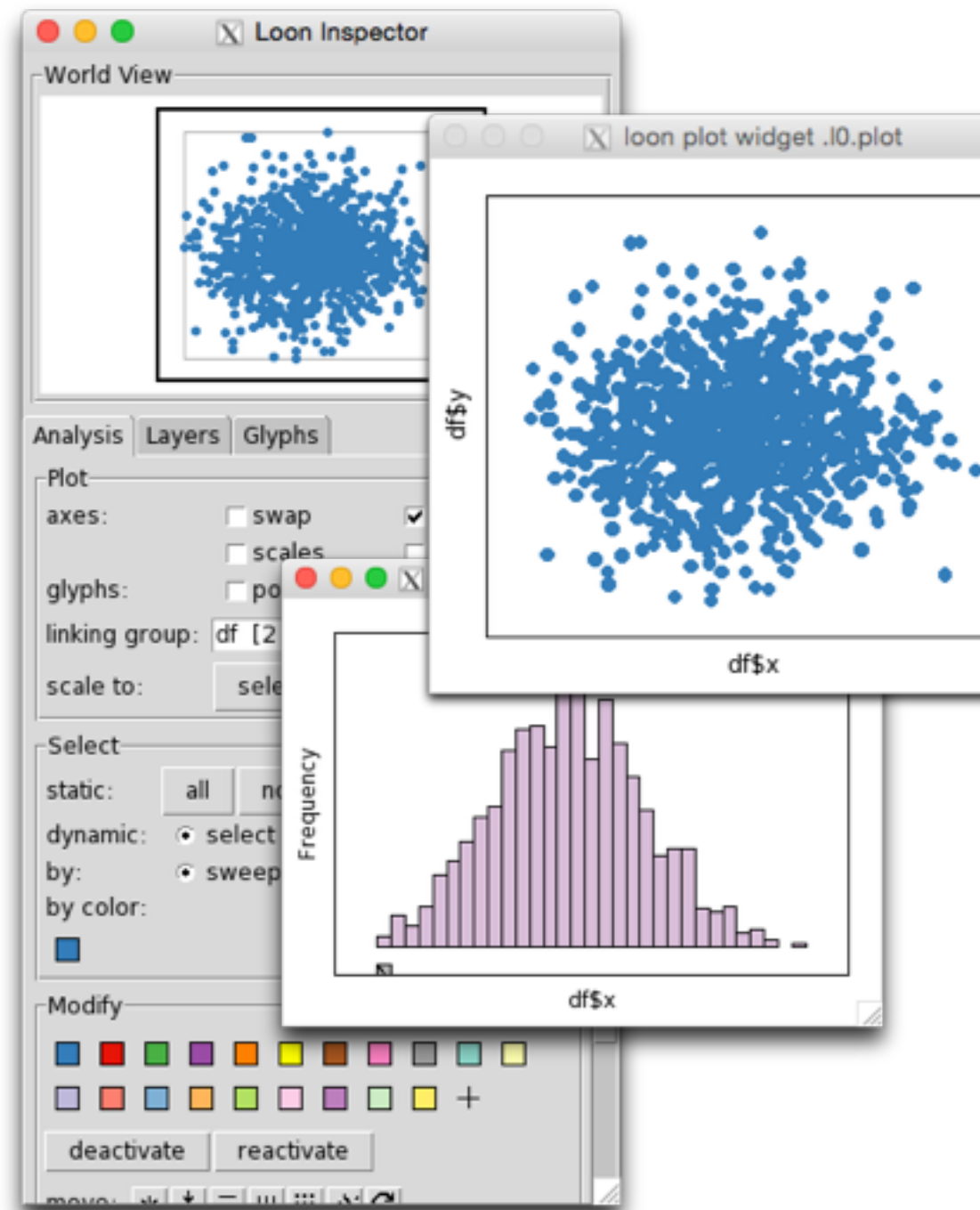


loon

Very recent package
(not publicly available yet)

Built on tcl/tk
(makes install easy)

Provides full interactive
graphics environment
within R.



Hacks

“A pragmatic solution to a complex problem.”

animInt

Toby Dylan Hocking,
Susan VanderPlas,
Carson Sievert

Hacks ggplot2 to add animation,
querying & linked brushing. Pure JS.

ggplot2 + shiny

Winston Chang

Hacks ggplot2 to add querying and
linked brushing. Built on shiny

Others

animation, ggiraph, gridSVG, playwith, zoom, ...

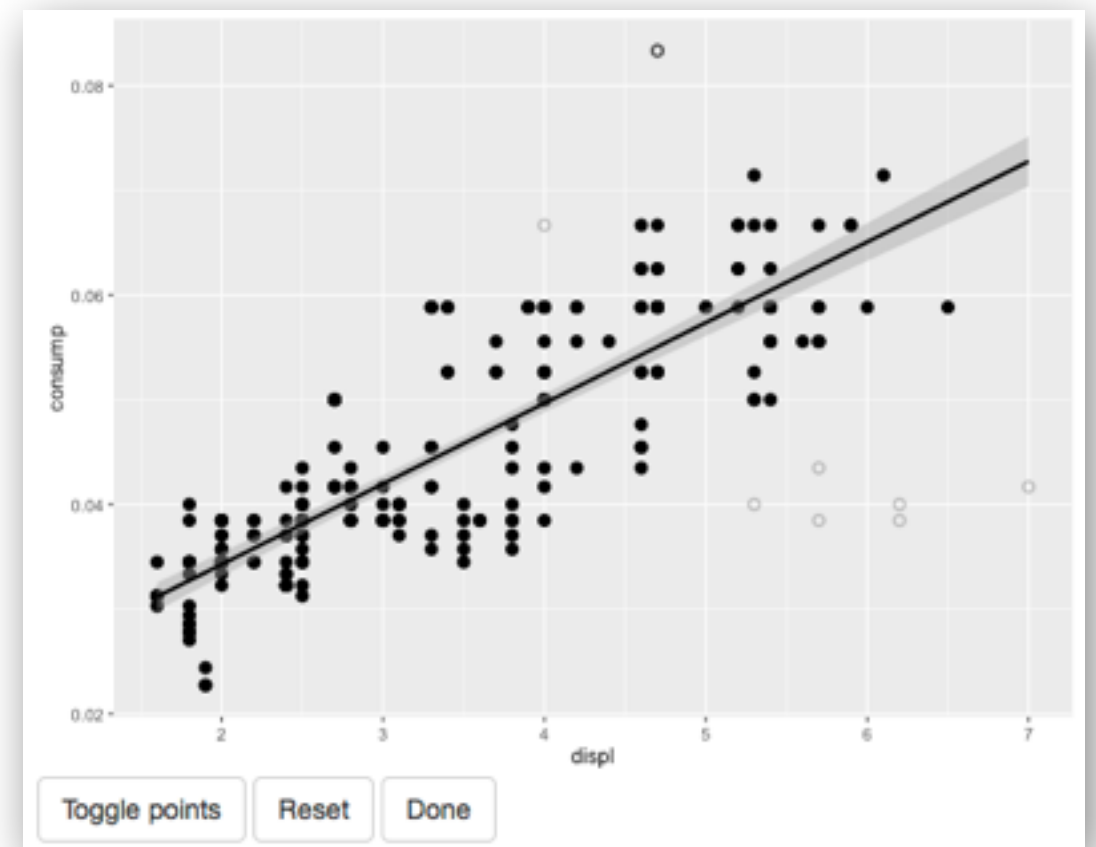
animInt

ggplot2 + shiny

Written by Winston Chang

Access ggplot2 (and base)
brush and hover events
from shiny

Makes it possible to
create interactive ggplots



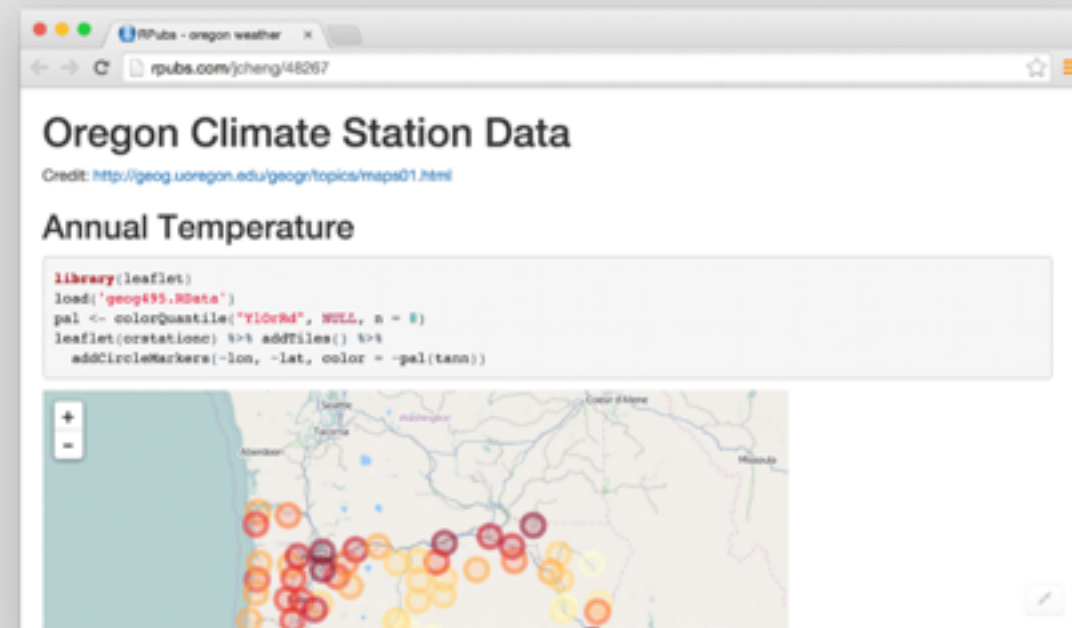
**Abuse the
browser**

Bring the best of JavaScript data visualization to R

Use JavaScript visualization libraries at the R console, just like plots

Embed widgets in R Markdown documents and Shiny web applications

Develop new widgets using a framework that seamlessly bridges R and JavaScript

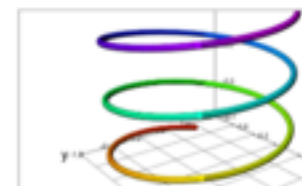
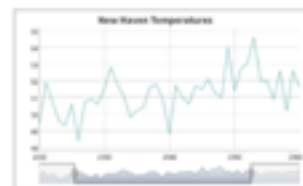


At the R console

In R Markdown docs

In Shiny apps

Widgets in action

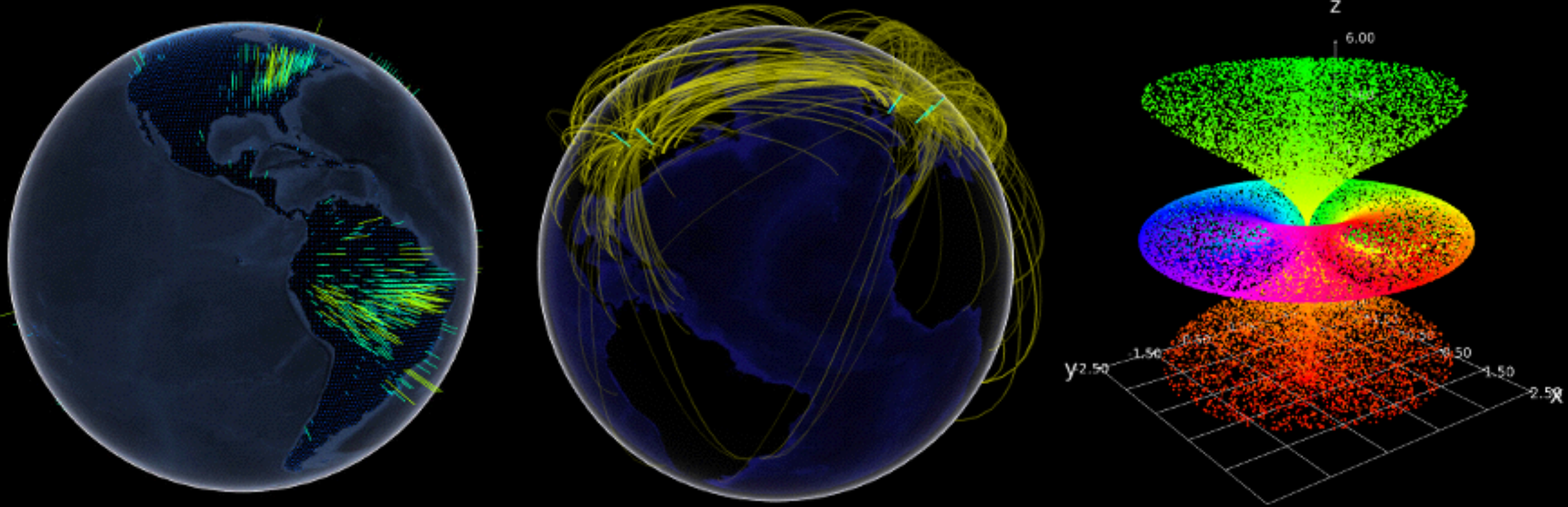


See how just a line or two of R code can be used to create interactive visualizations with Leaflet (mapping), dygraphs (time-series), networkD3 (graph visualization), and more.

[See the showcase »](#)

threejs

<http://bwlewis.github.io/rthreejs/>

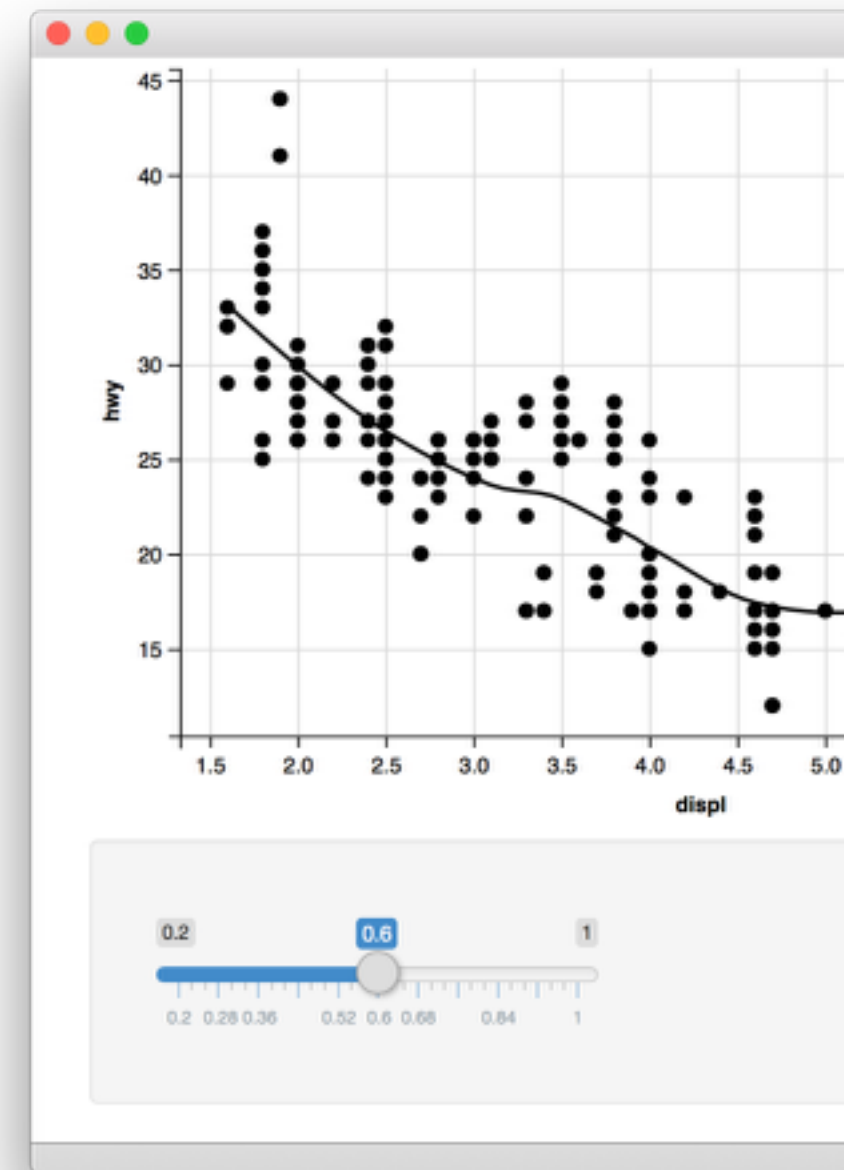


ggvis

Goal: ggplot2 + interactivity

Uses reactive programming model from Shiny. Uses vega.js to render plots.

Lots of bits missing, but a lot of promise.



plotly

Where should computation occur?

- In R? Can do anything you can do in R & you don't need to learn a new language.
- In JS? Computation done closer to rendering, so latency is lower.
- A mix? Can you have the best of both worlds?

Conclusion

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Reproducibility

- What does you want to reproduce?
Results of analysis or path of analysis?
- Connection to R makes all graphics fundamentally more reproducible.
- Most packages allow you to capture code to create plot & capture interactive state.

Publication

- What does it mean to publish an interactive graphic?
- Browser based techniques have huge promise.