

IRNC Network Map

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Motivation

- IRNC PIs desire way to see circuits and exchanges funded by IRNC and partnering infrastructure.
 - Who, What, Where
 - Is it up?
 - how much traffic?
- Want to avoid bit rot
- General interest in going beyond IRNC



Goals

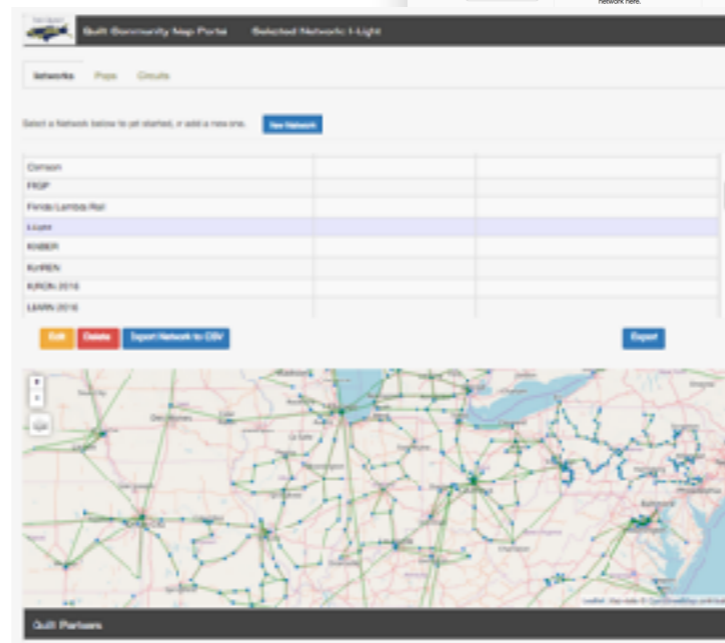
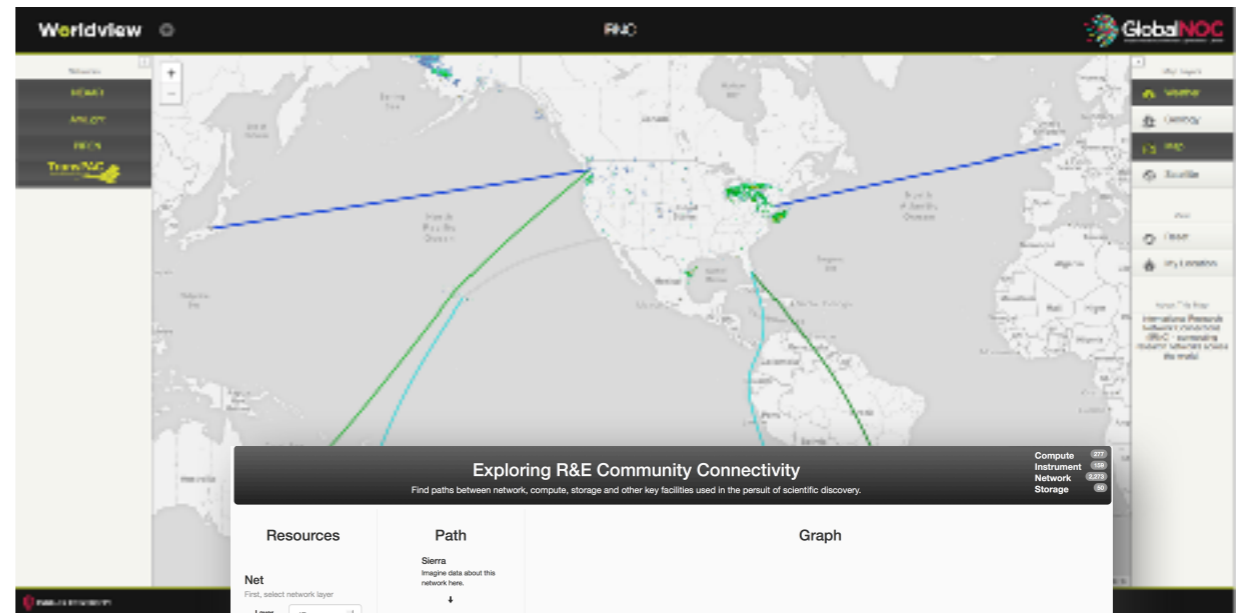
- Document and display exchange points and circuits
- Show operational state or utilization based on participant
 - up/down status hopefully lowest common denominator
- Create a service and associated suite of tools to collaboratively maintain maps
- Leverage existing technologies

The Plan

- leverage existing components to create shared map of IRNC and related networks.
- develop initial workflow for data management
- get initial set of participants to work with us
- develop data management portal
- get a greater set of participants
- streamline community crowd sourcing efforts

Past GlobalNOC efforts to map R&E infrastructure

- original weather map
- Atlas and Worldview
- QuiltMap
- Worldview IRNC Layers
- Global Research Map PoC
- QuiltMap take 2
- NOAA portal





Waaaaay back

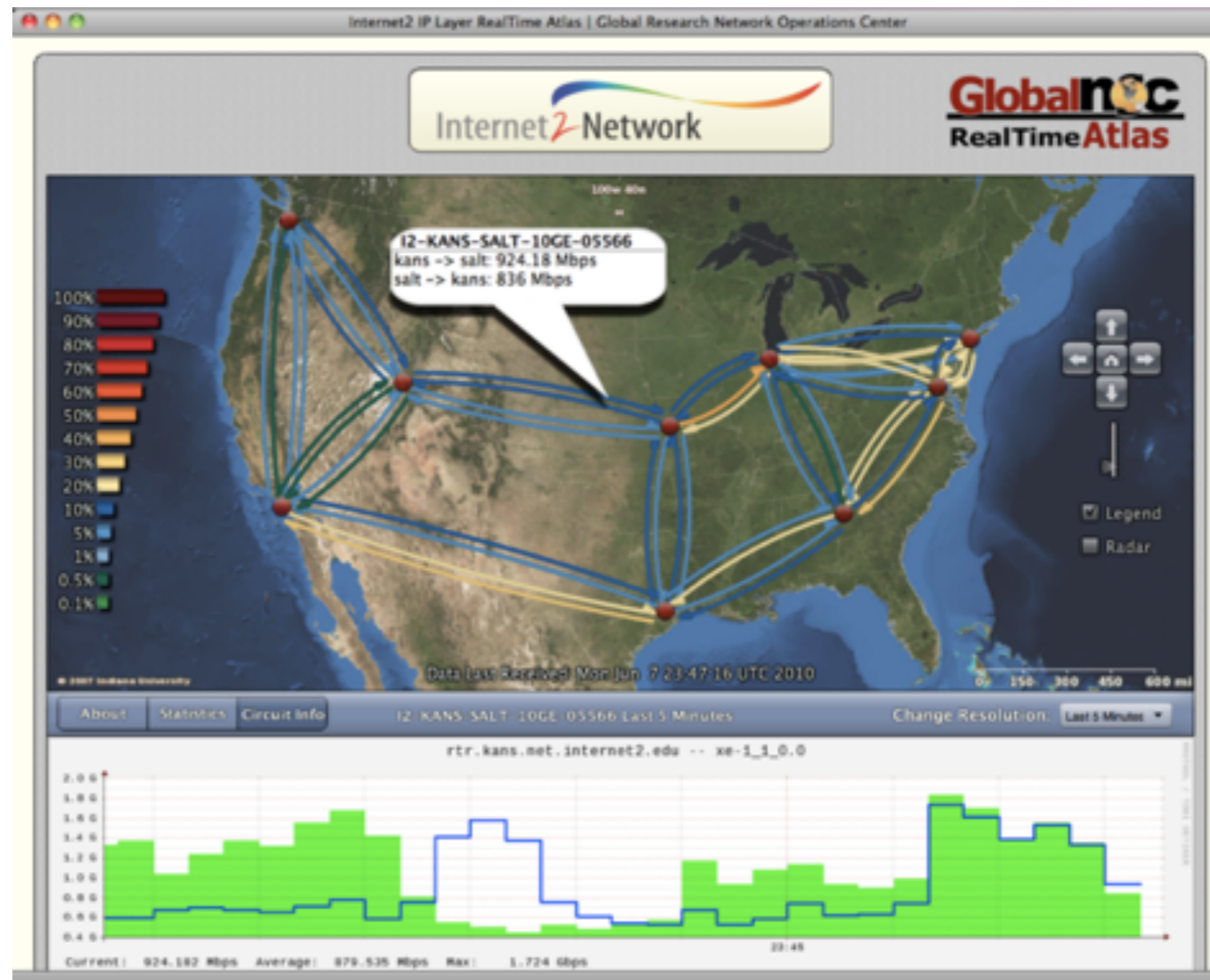
Quilt Map -> a little later

- ANML
 - Steve Wallace + David Ripley
- Hand edited
- Manual process
- more complicated than it first appears



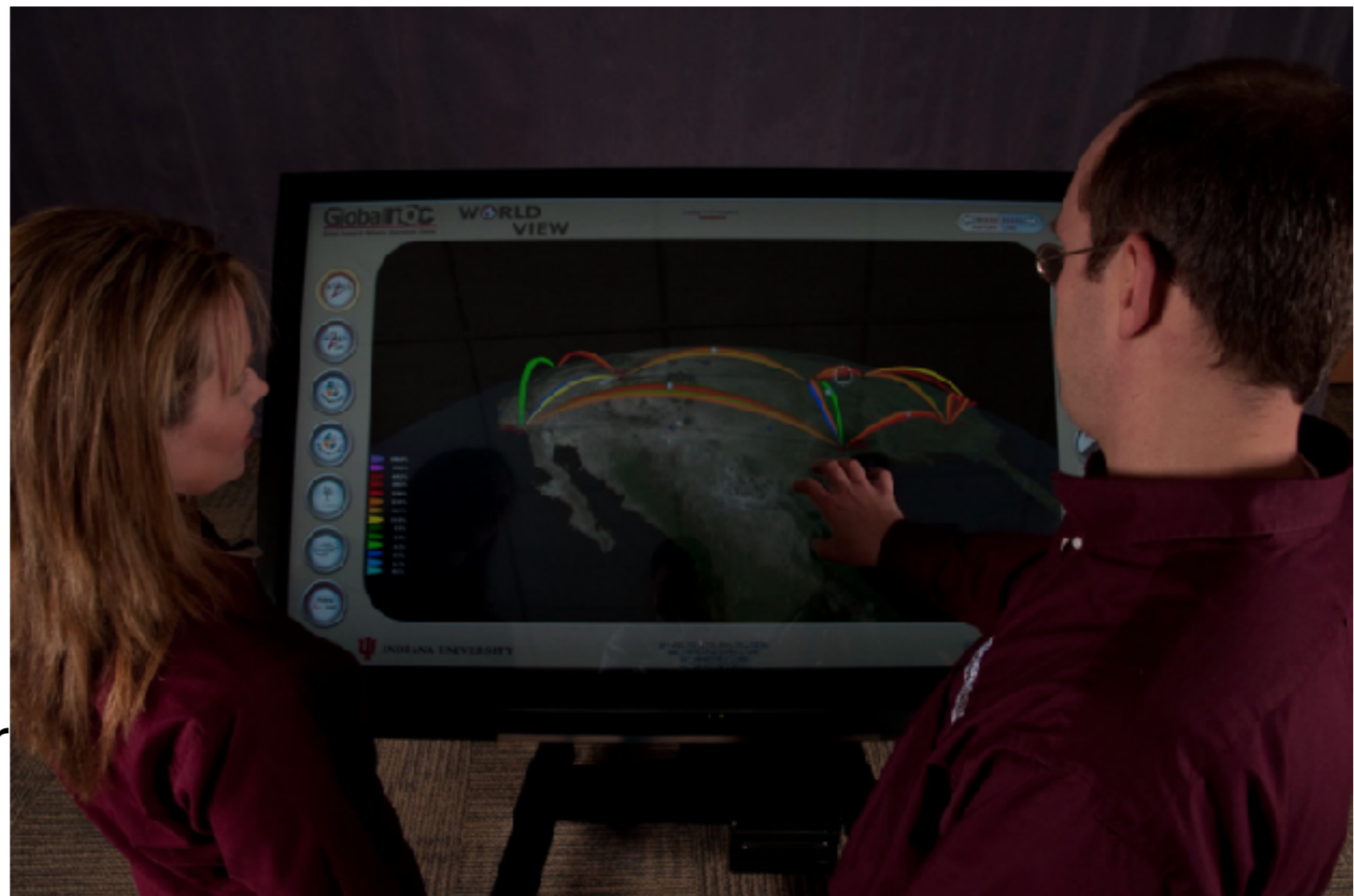
Atlas Map -> 2008

- flash based map
- first georeferenced map
- topology
- load
- radar



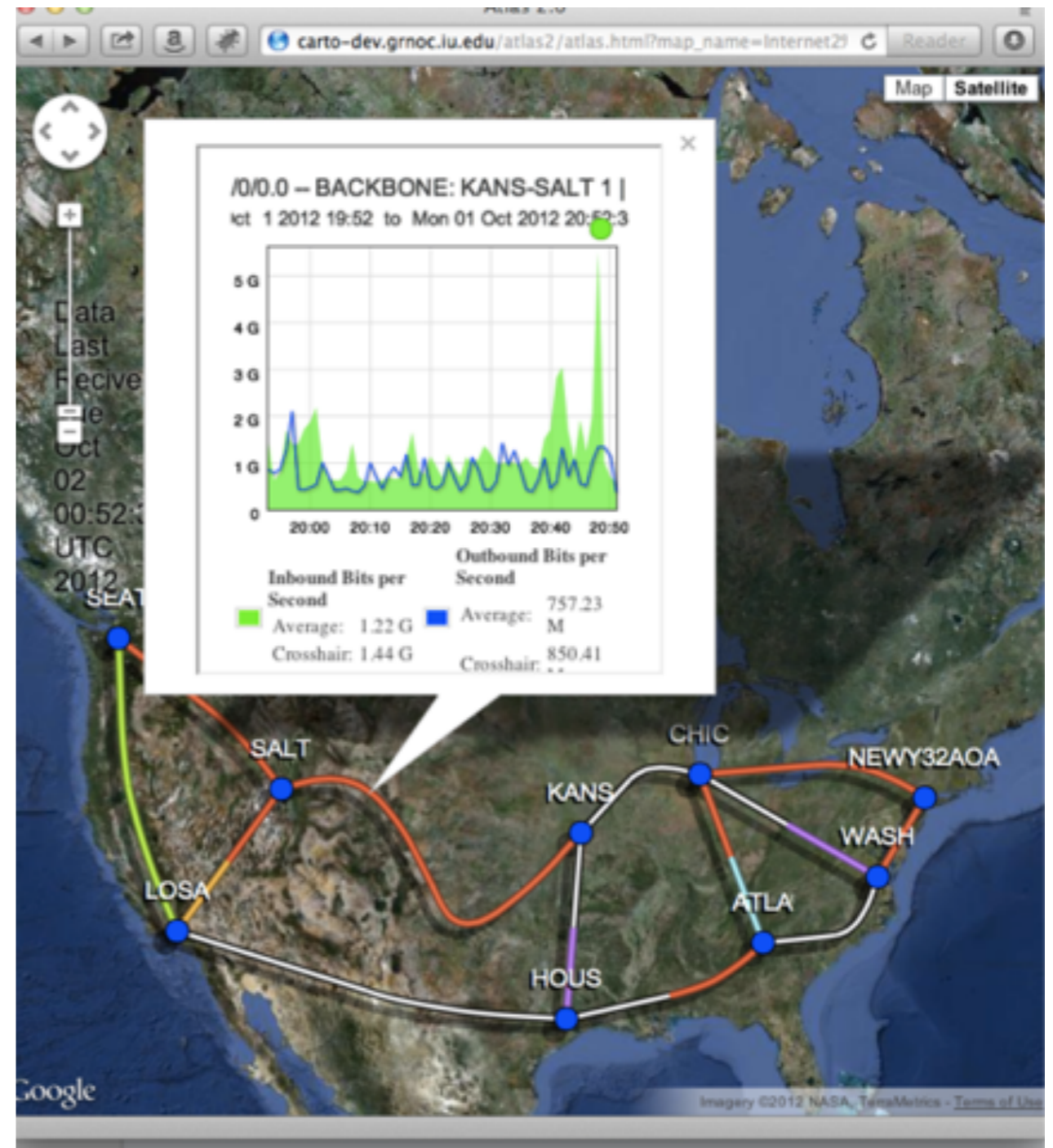
Worldview -> 2009

- Google earth based
- multitouch
- geo-referenced
- weather
- multiple network layers



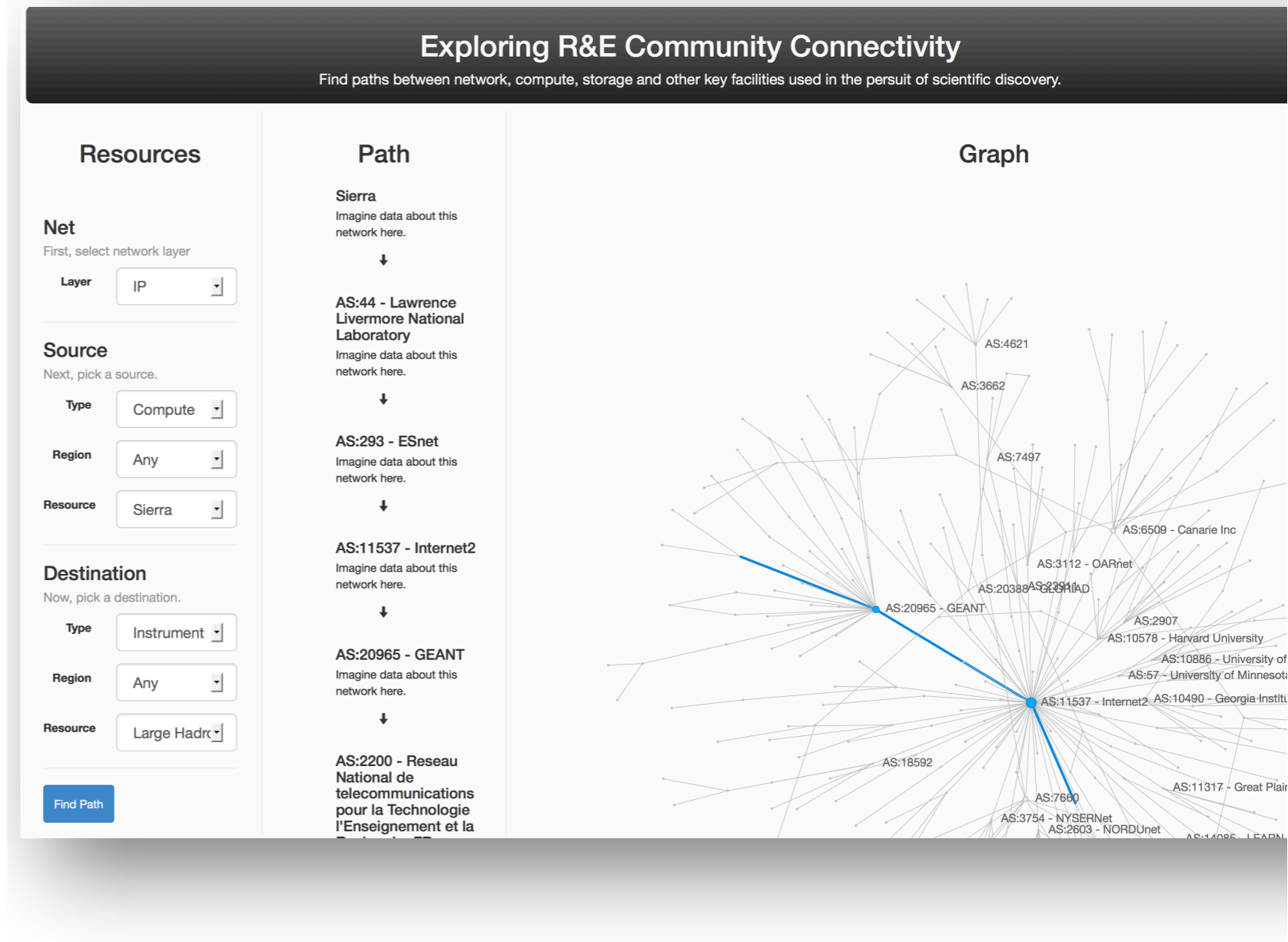
Atlas2 -> 2013

- first attempt at all javascript map
- demoed at SC
- stability problems lead to rethink
 - paper.js to d3.js



Global Research Map PoC -> 2014

- What can we mine in existing data
- Whats “easy”
 - layer3 connectivity
 - d3.js used for visuals
- Whats hard
 - layer2 connectivity
 - mapping end hosts to science resources
- <http://grm.grnoc.iu.edu/grm/>



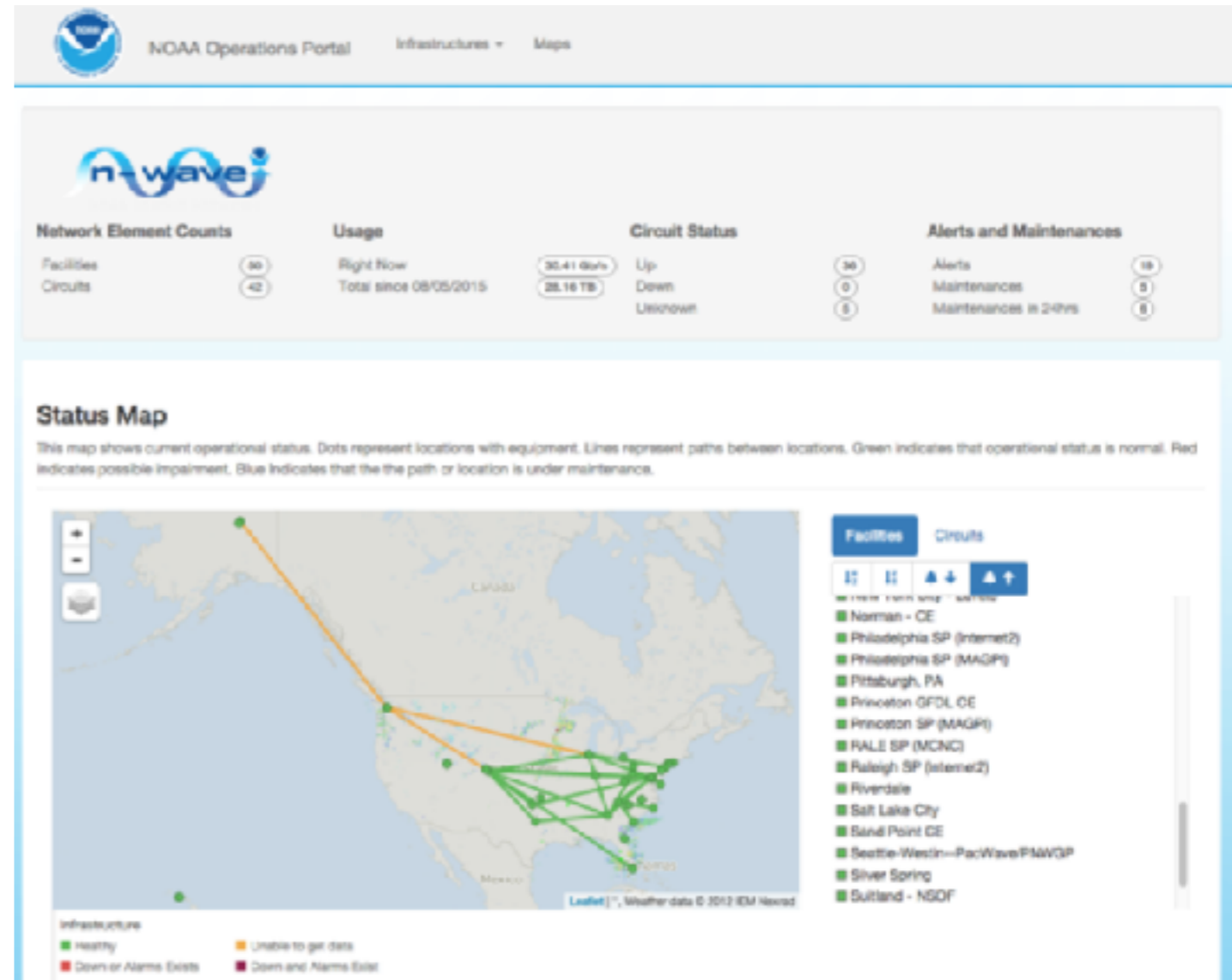
Quilt Map Circa -> 2015

- Collaborated on a map editor
- let users directly manage their network info
- allow for bulk input
- Mixed results in terms of adoption

The screenshot displays the 'Quilt Community Map Portal' interface. At the top, it shows 'The Quilt' logo, the title 'Quilt Community Map Portal', and the selected network 'I-Light'. Below the title, there are tabs for 'Networks', 'Pops', and 'Circuits'. A message prompts the user to 'Select a Network below to get started, or add a new one.' with a 'New Network' button. A list of networks is shown, with 'I-Light' selected and highlighted in blue. Other networks include Clemson, FRGP, Florida Lambda Rail, KINBER, KanREN, KyRCN 2016, and LEARN 2016. Below the list are buttons for 'Edit', 'Delete', 'Export Network to CSV', and 'Export'. The main area features a map of the United States with a network of green lines connecting various cities. The map includes a search bar, zoom controls, and a 'Quilt Partners' label at the bottom.

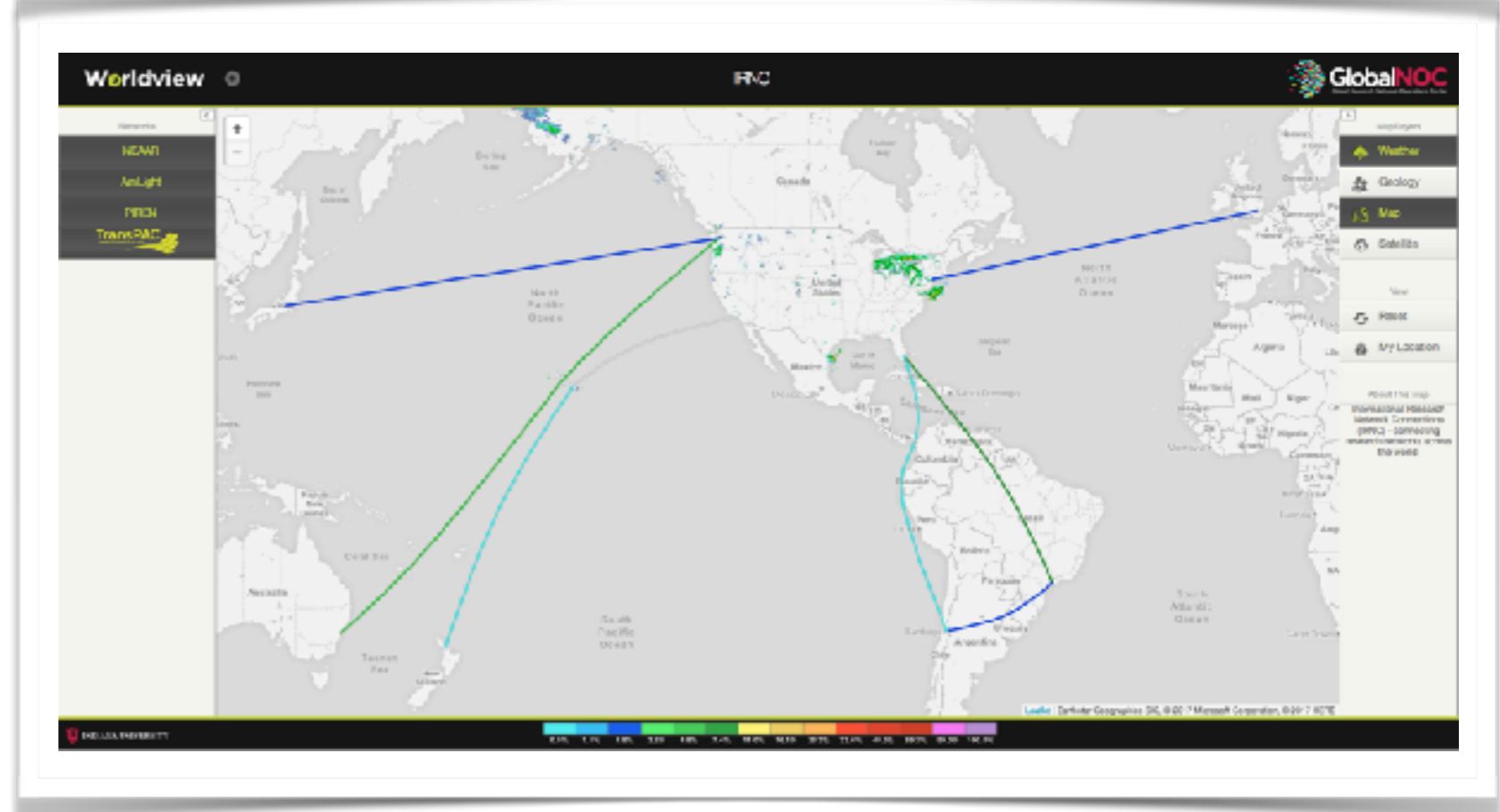
NOAA Ops Dashboard -> 2015

- Common Operations Picture
 - SNMP
 - Flow
 - Ticketing
- map shows up/down



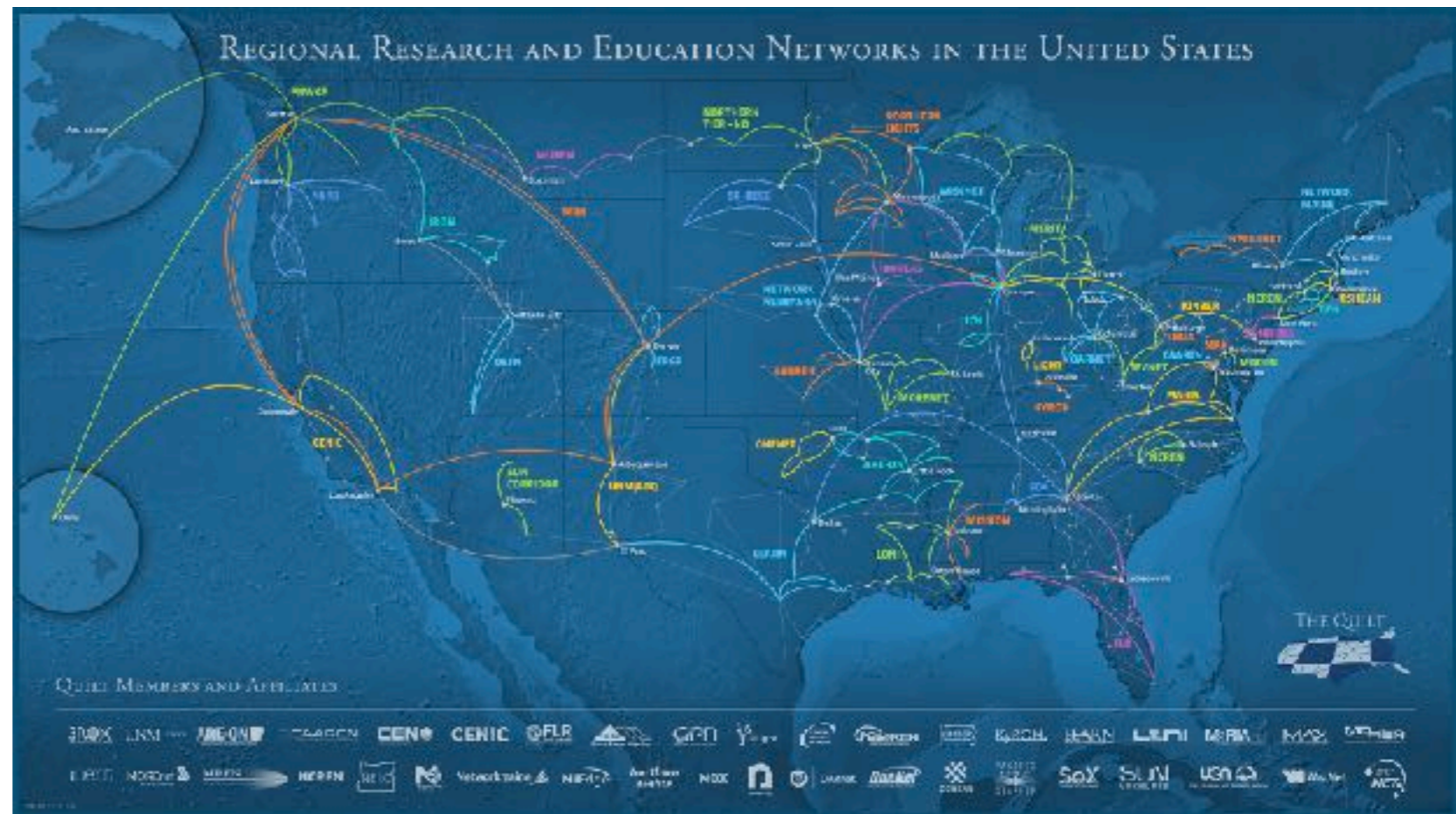
Worldview -> 2016

- Suite of mapping solutions used to visualize GlobalNOC supported networks.
- network layers
- weather
- just about any KML layer
- web, touch, mobile now supported in 1 platform



Quilt Map ala CENIC->2017

- Take data from quilt map editor
- Add artist skill
- enjoy

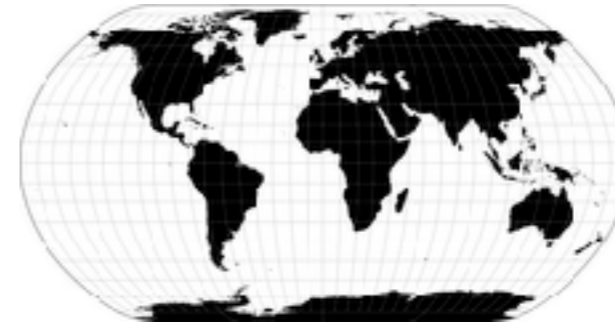


relevant open source tech

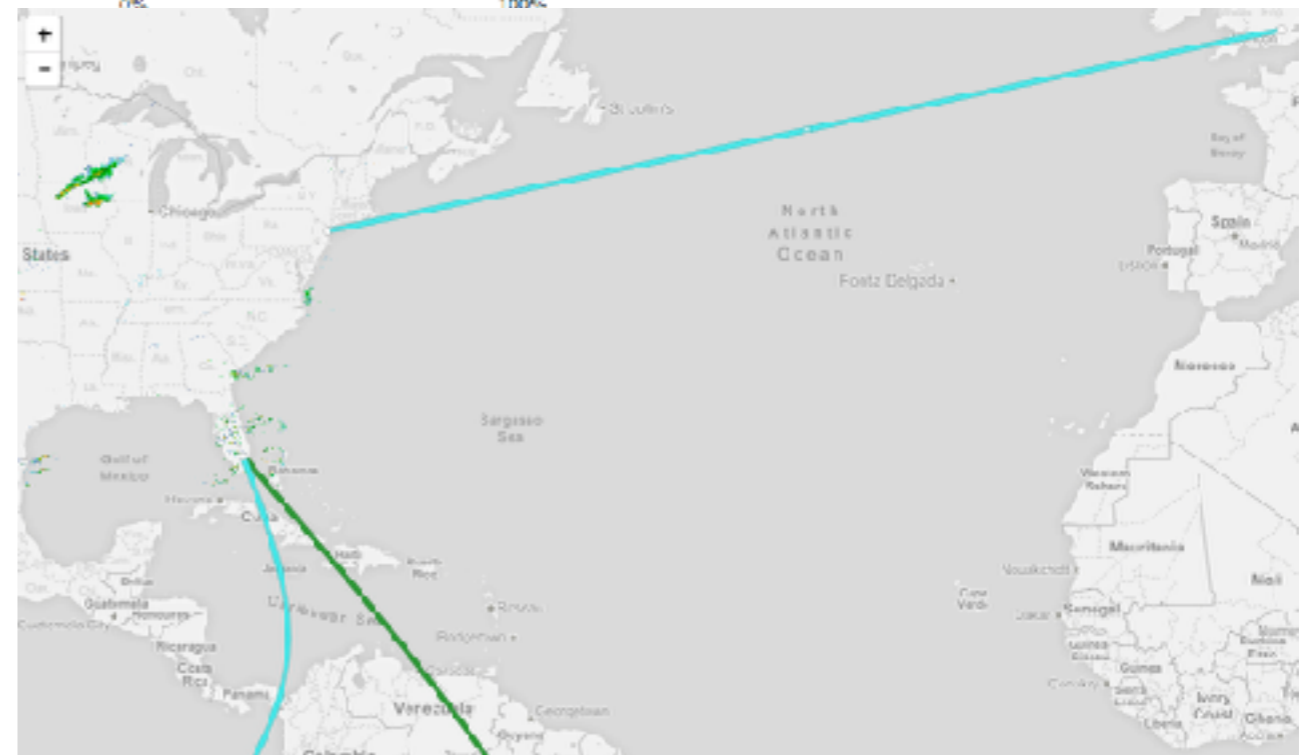
- Leaflet
- D3.js
- atlas3 js library
- all used in latest rev of worldview



Maps in D3

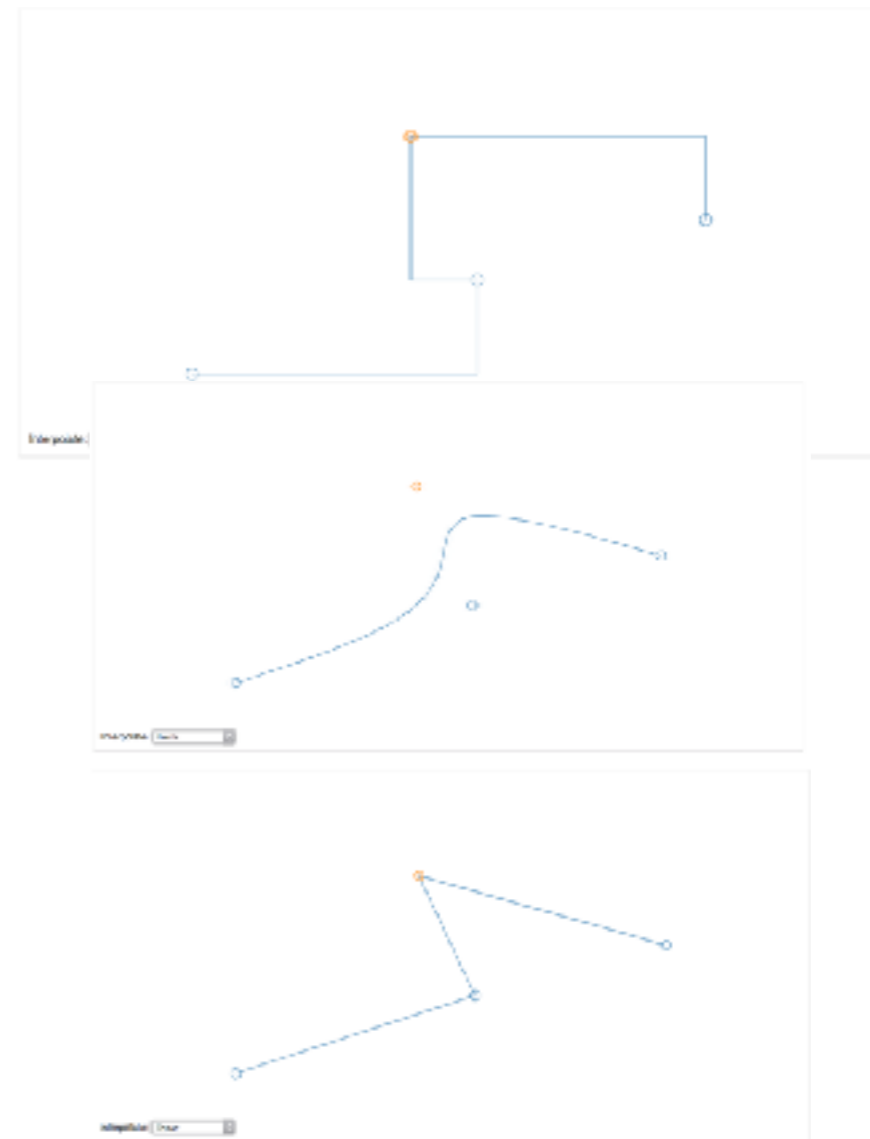


- powerful suite of javascript libraries supporting interactive data viz including map
- geojson support
- client side projection
- animations
- can be rendered on top of other map like leaflet or google maps



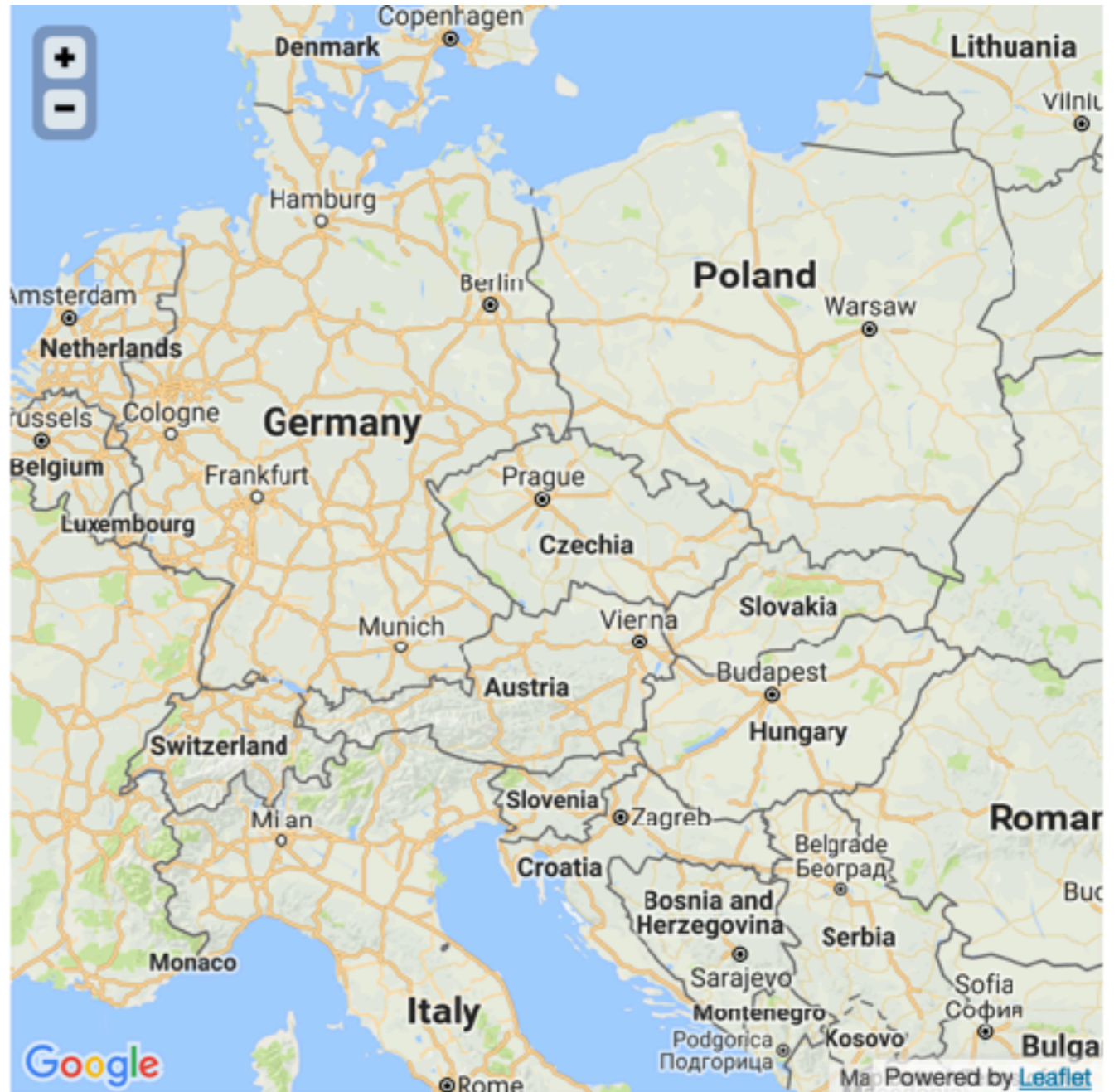
D3 relevant features

- Line interpolation lets you style things
 - angular vs swoopy
- generates SVG or canvas
 - style with a style sheet
- Animations
 - good eye candy potential

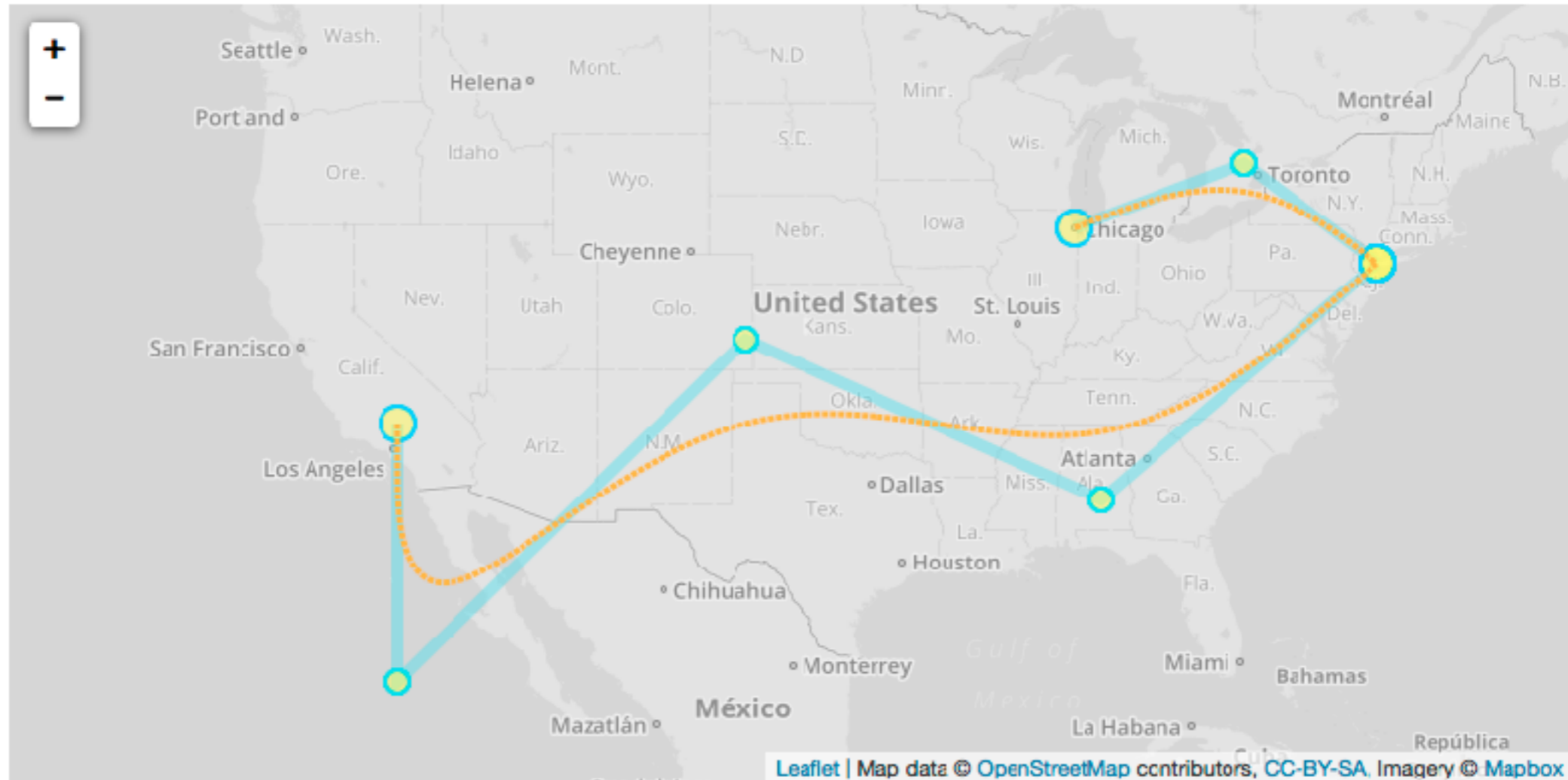


Leaflet

- Open Source web maps
- mobile supported
- ability to support numerous data sources
 - including google or ms map tiles
- support for overlays
 - in particular SVG



MapBuilder PoC based on Leaflet and D3 with interpolation



Interpolate:

- take D3, have it control a SVG layer in Leaflet
- hook up events
- have fun

Atlas3.js

- modular JS based map rendering at heart of latest generation of GlobalNOC tools
 - leaflet, d3, cesium used
- geographic network map with live status
- supports multiple viz approaches (twin tube, single line max)
- developed by my team
- not yet released on GitHub



Welcome to the International Research Network Connections Network Operations Center.



GLOBAL RESEARCH MAP

Africa ▾

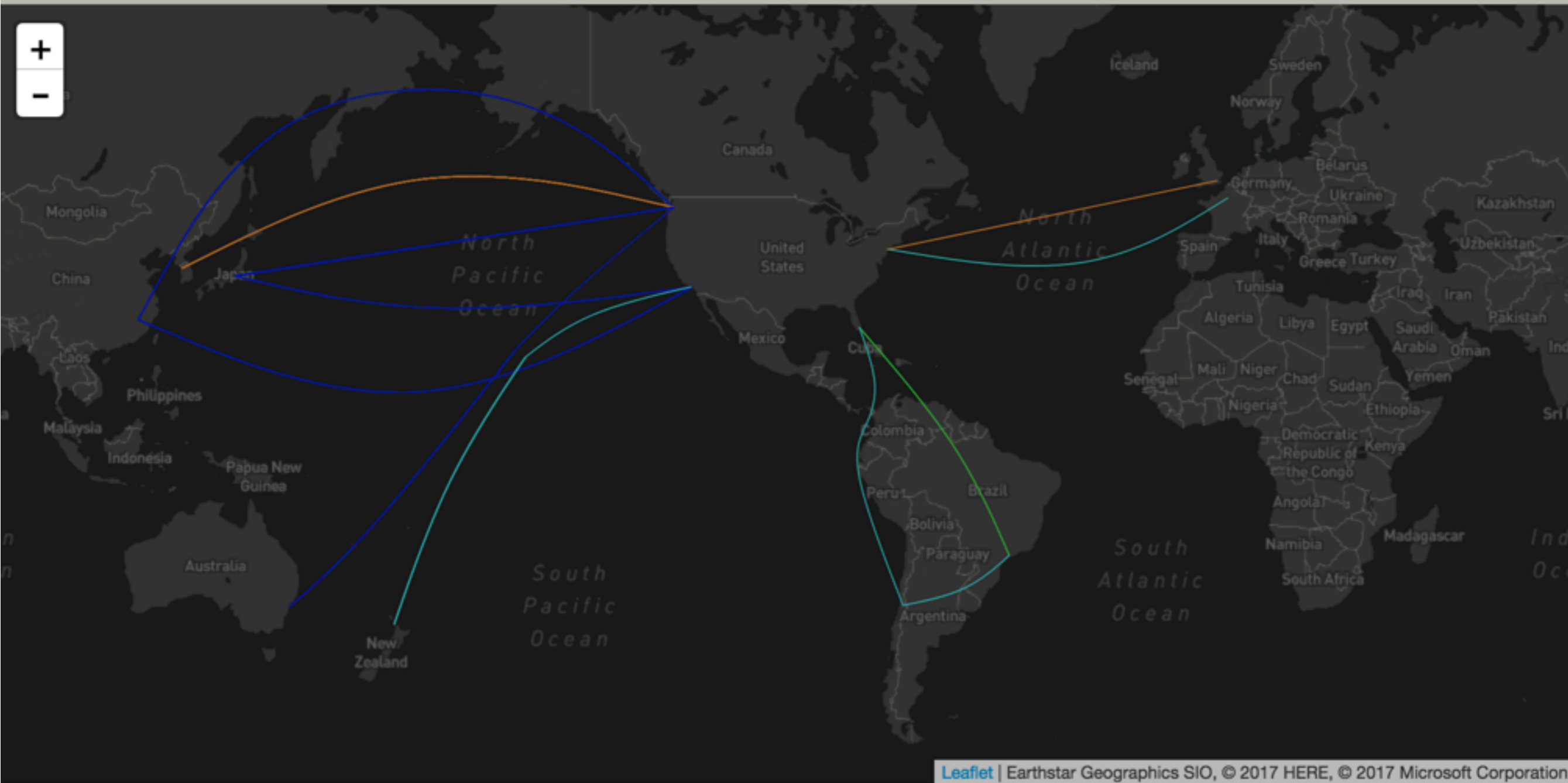
Asia ▾

Australia ▾

Europe ▾

N. America ▾

S. America ▾



Leaflet | Earthstar Geographics SIO, © 2017 HERE, © 2017 Microsoft Corporation

Selected Networks

■ AmLight ■ CERNET ■ CSTNET ■ GEANT ■ GEMNet2 ■ JGN ■ KIREN ■ NEAAR ■ PIREN ■ SINET5 ■ TransPAC

Coming soon to globalresearchmap.org

Map Features

- Current
 - ability to toggle network layers by continent
 - interface load or operational status
 - display data provider logos
- future
 - labels on circuits
 - points of interest
 - map editor

Getting your data into map

- near term focus on IRNC community
- email Ed @ ebal@iu.edu
- we will have a call to discuss details and get the network data into the map
- we can help with tuning and styling of circuits
- because map shows 1 or more networks concurrently need to have some form of coordinated layout.

What's in the future

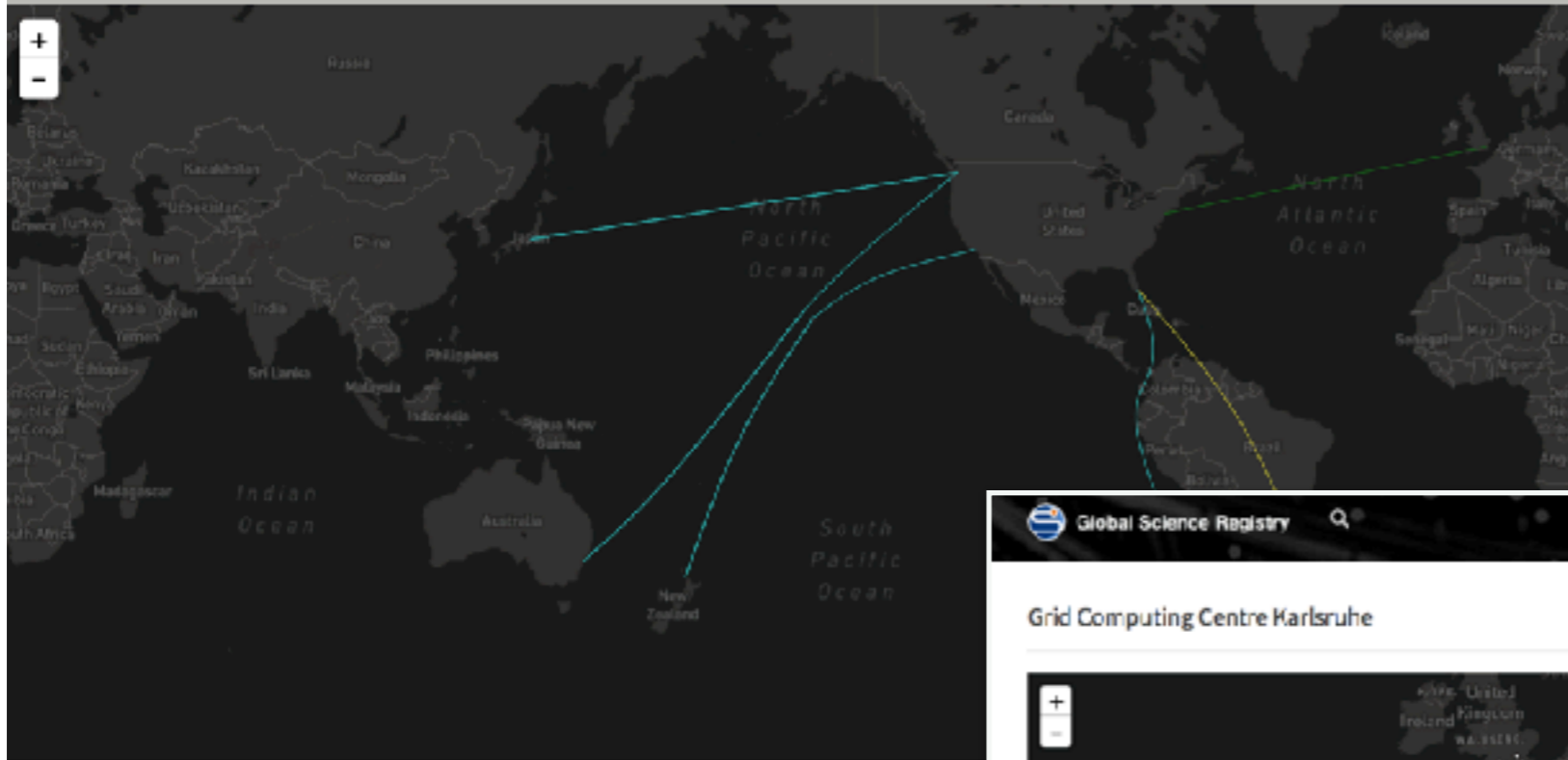
- Get more IRNC sister circuits data into system
- work to develop desired pattern of data curation
- develop system aligned to those patterns
- explore broader deployment

Map and Science registries

- NetSAGE working on a science registry to document network endpoints
 - network host —> research project and organization
- IRNC NOC working on a map of network infrastructure
- IU engaged on both projects
- Significant synergy between to two
- Both are precursors to a system that can show networks and how they are used to enable data intensive scientific endeavors.

GLOBAL RESEARCH MAP

Africa ▾ Asia ▾ Australia ▾ Europe ▾ N. America ▾ S. America ▾

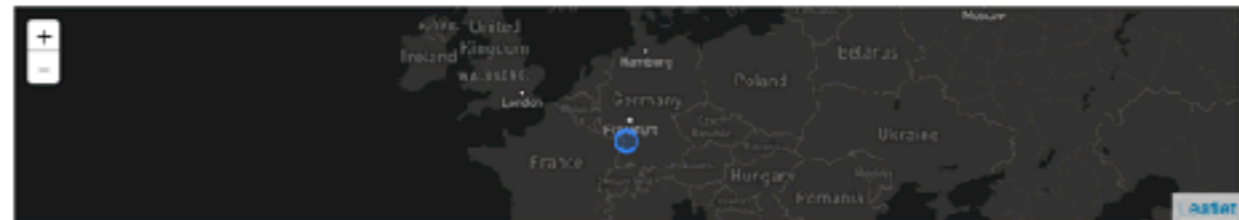


Selected Networks

■ AmLight ■ NBAAR ■ PIREN ■ TransPAC

Global Science Registry

Grid Computing Centre Karlsruhe



Science Registry Information

Registry record

GRID 192.108.68.30
Country Germany
Geolocation 43.004700 8.383000
Organization Baden-Württemberg Cooperative State University (DHRW)
Role Storage



Projects

Events

Name	Description
ALICE experiment	A simple ALICE is optimized to study heavy-ion (Pb-Pb nuclei) collisions at a centre of mass energy of 2.76 TeV per nucleon pair. The resulting temperature and energy density are expected to be high enough to produce quark-gluon plasma, a state of matter wherein quarks and gluons are freed. Similar conditions are believed to have existed a fraction of the second after the Big Bang before quarks and gluons bound together to form hadrons and heavier particles.[1]

External Information

Geolocation Data

Provider	MaxMind
Organization	University of the State of Baden-Wuerttemberg and
ASN	34878
Country	Germany
City	Karlsruhe
Region	01
Latitude	49.0047
Longitude	8.3830

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Desired (distant) future

- Combined crowd sourced map of networks and big data science projects
- a geeky facebook or linked in for research projects and networks
- better understand our users and our impact

The screenshot shows the 'Global Research Map' website for 'Operation Ice Bridge'. The page features a blue header with navigation links for 'Options', 'Project', and 'About', and a 'Project HIPP0' button. The main content area is divided into a left sidebar with a 'Description' section and a main right section with a satellite map of Antarctica. The map shows a red flight path over the continent. Below the map, there is a section titled 'Phase 1: Collect Data over Antarctic using Aircraft based LIDAR' with a list of flight dates: Oct 13 Flight, Dec 2nd Flight, Dec 3rd Flight, and Dec 9th Flight. At the bottom right, there is a photograph of a group of people in a snowy environment.

Global Research Map
Options | Project | About

Project HIPP0

Operation Ice Bridge

Description:
NSIDC manages data for products derived from NASA's Operation IceBridge aircraft missions, and implements tools and services extending the uses of IceBridge data products.
The Operation IceBridge mission, initiated in 2009, collects airborne remote sensing measurements to bridge the gap between NASA's Ice, Cloud and Land Elevation Satellite (ICESat) mission and the upcoming ICESat 2 mission.
IceBridge mission observations and measurements include coastal Greenland, coastal Antarctica, the Antarctic Peninsula, interior Antarctica, the southeast Alaskan glaciers, and Antarctic and Arctic sea ice.
The NASA IceBridge mission combines multiple instruments to map ice surface topography, bedrock topography beneath the ice sheets, grounding line position, ice and snow thickness, and sea ice distribution and freeboard. Data from laser altimeters and radar sounders are paired with gravimeter, magnetometer, mapping camera, and other data to provide dynamic, high-value, repeat measurements of rapidly-changing portions of land and sea ice.

Sponsors:

Phase 1: Collect Data over Antarctic using Aircraft based LIDAR

- Oct 13 Flight
- Dec 2nd Flight
- Dec 3rd Flight
- Dec 9th Flight

Photograph of a group of people in a snowy environment.