Team Selene

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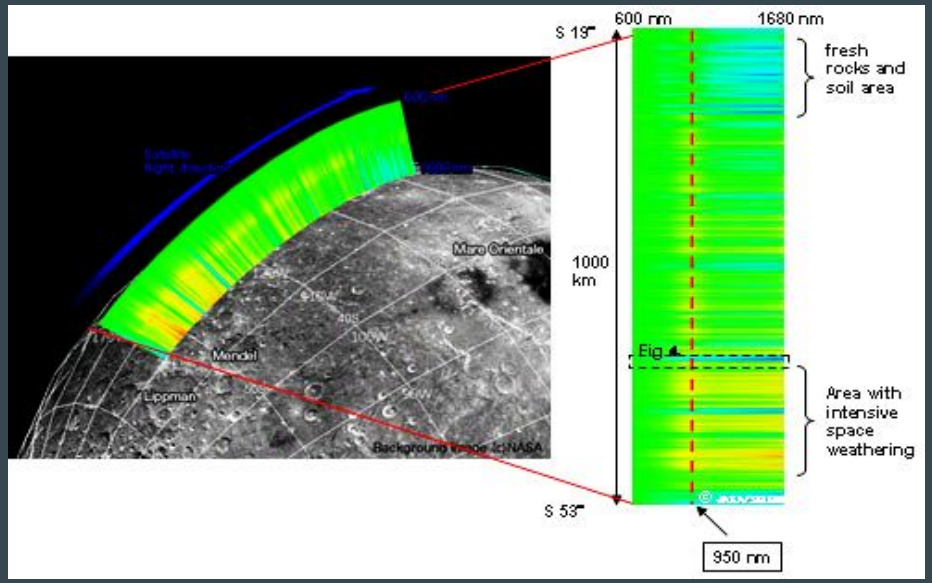
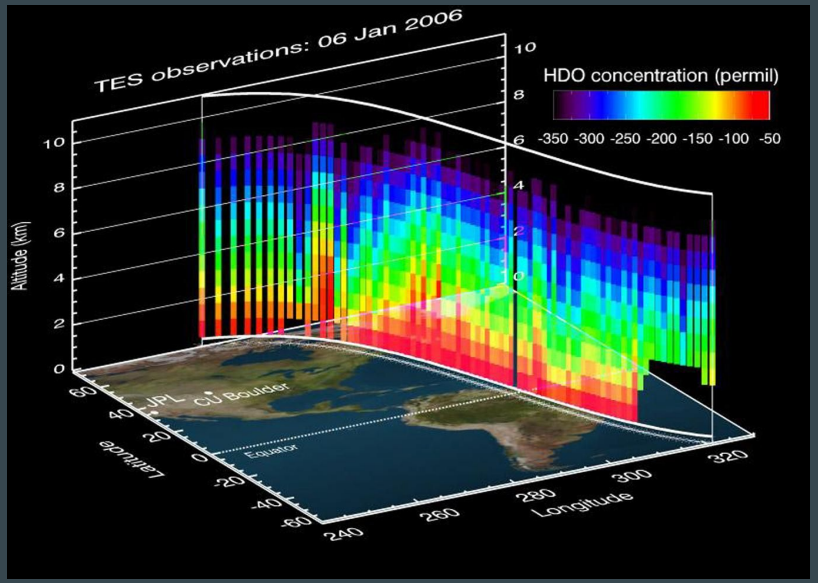
Client - Dr Jay Laura, Trent Hare USGS Astrogeology
Mentor - Dr James Palmer

Kaguya - Spectral Profiler

- SELENE = Kaguya
- Lunar Orbiter
- High Dimensionality Spatial Data

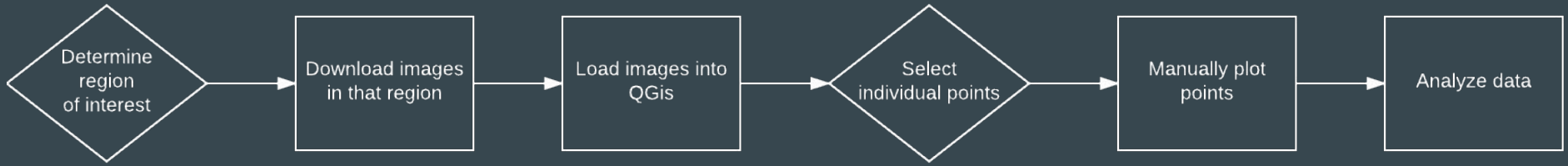


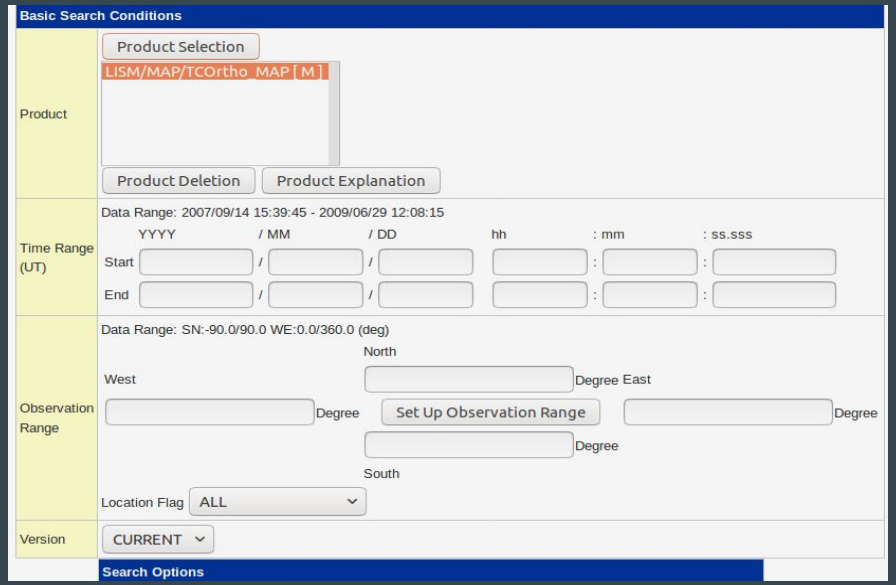


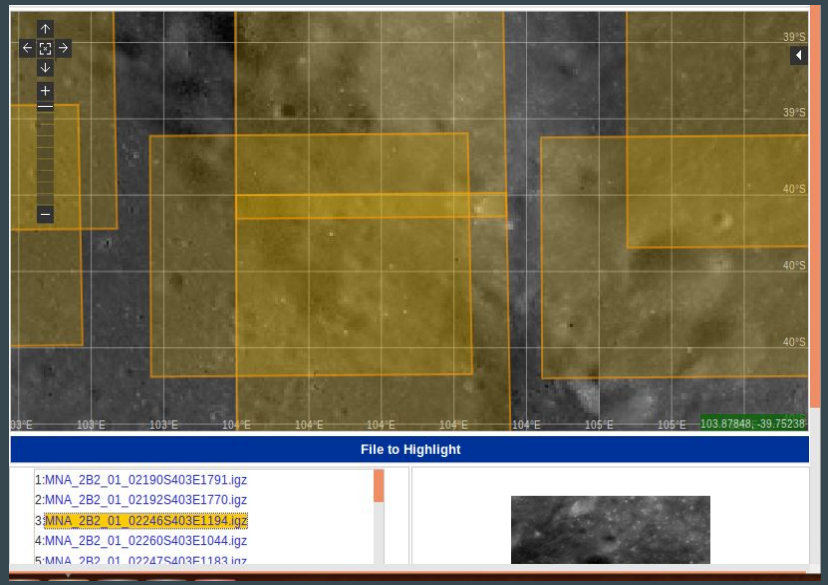
USGS

science for a changing world

Current Methodology

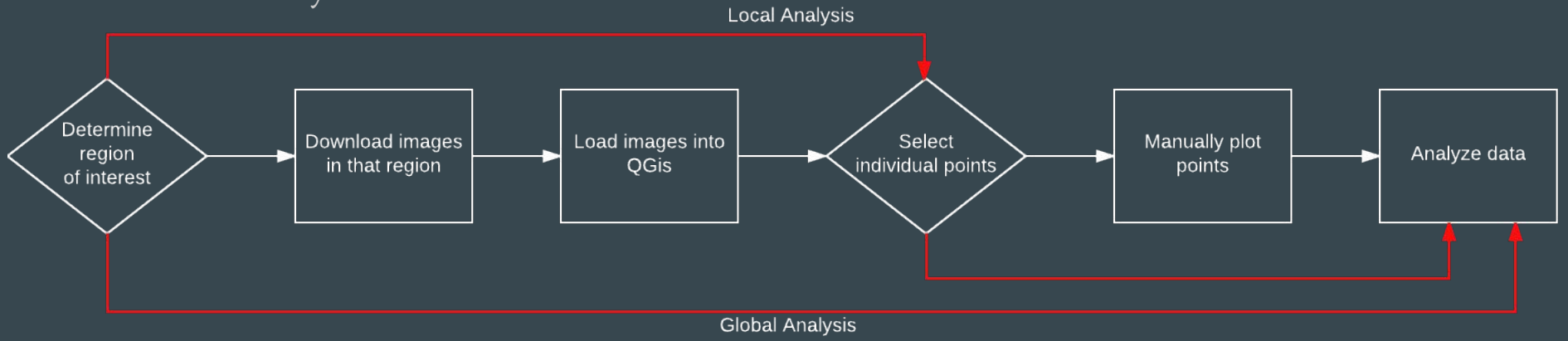






Our Solution

- Kaguya Spectral Profiler Explorer (KASPER)
- Visualize data
  - Globally
  - Locally



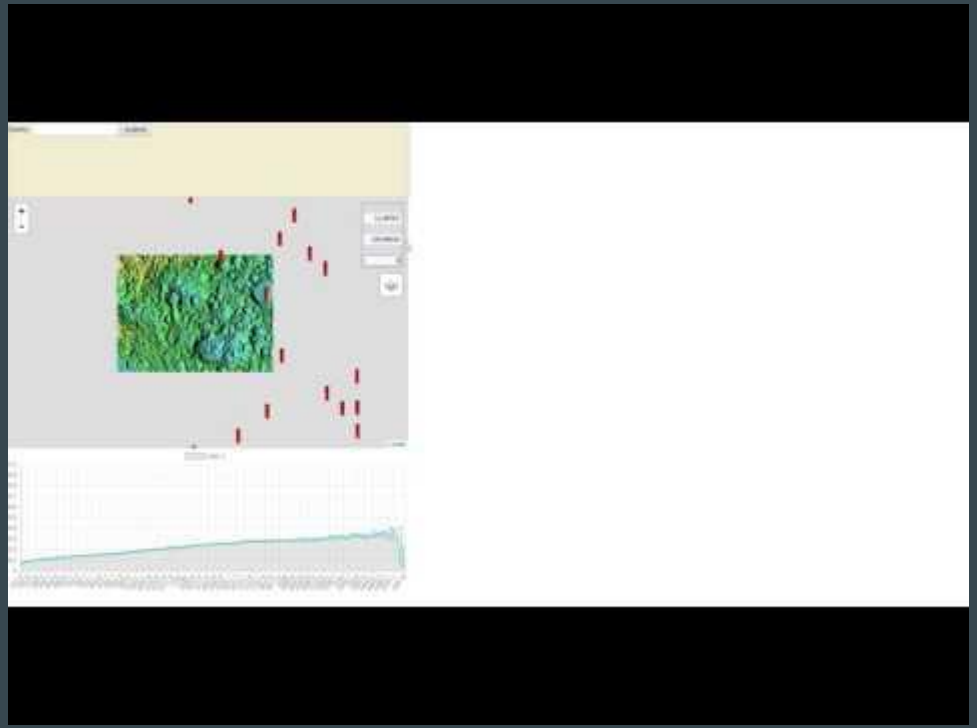
Technologies Overview

- MongoDB
- Node.js
- Geoserver
- Leaflet

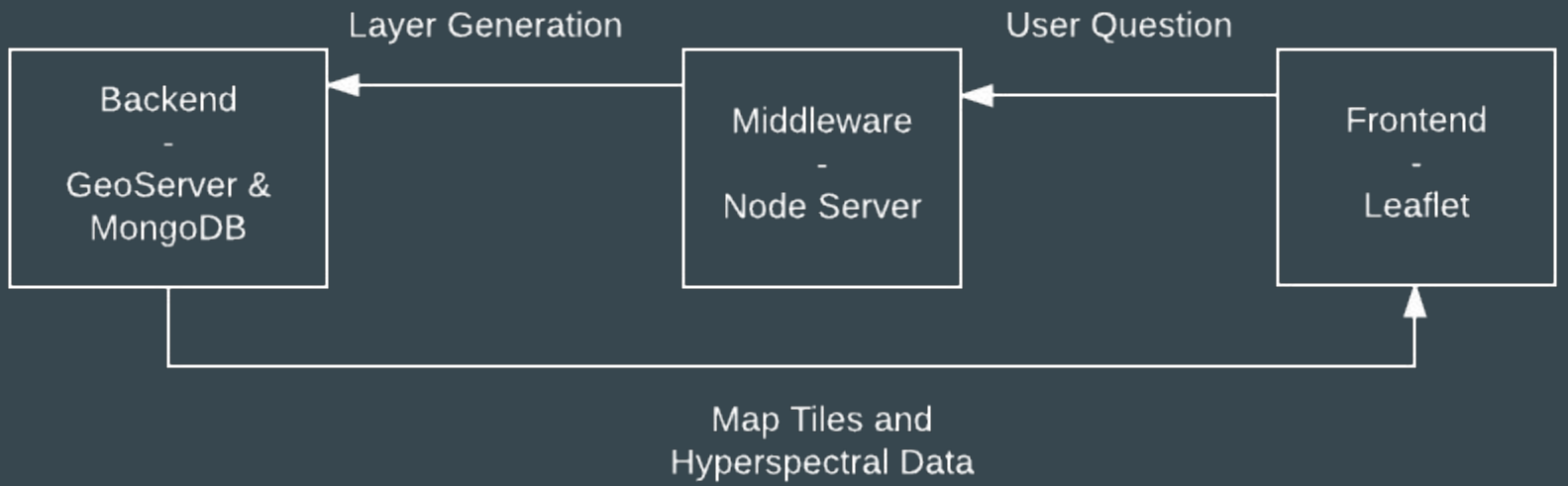
Requirements

- Web application interface
- Support exploratory analysis
- High interactivity
- Visualize
  - Geospatial data
  - Hyperspectral data

Prototype Review

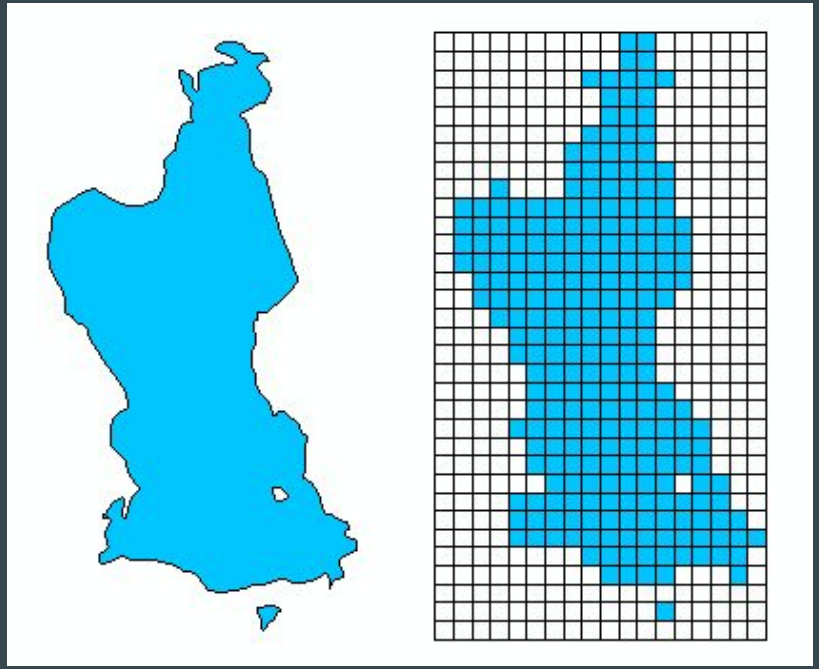


Architecture Overview



How do we make this fast?

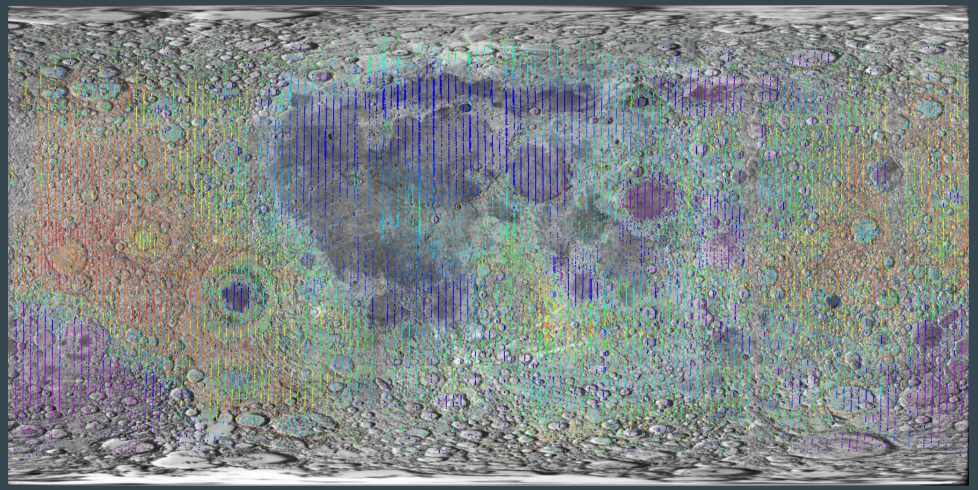
- Raster Layers
  - Bitmap
  - Less data global view
  - Poor resolution
- Vector Layers
  - Vector
  - Less data zoomed in
  - Better resolution



Source: ESRI ArcGIS, http://desktop.arcgis.com/en/arcmap/10.3/manage-data/raster-and-images/what-is-raster-data.htm

Challenges and Resolutions

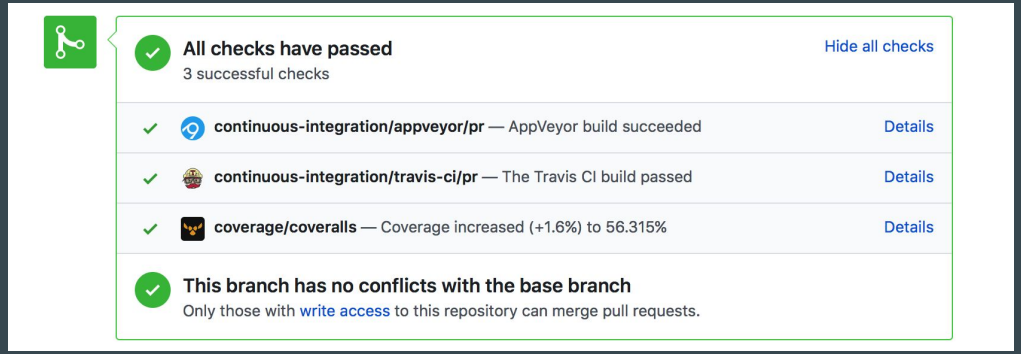
- Raster vs Vector
  - Dynamically change
  - gsconfig
- Testing
  - Code testing frameworks
  - User studies



Taken from the Clementine spacecraft
(Example of a raster layer)

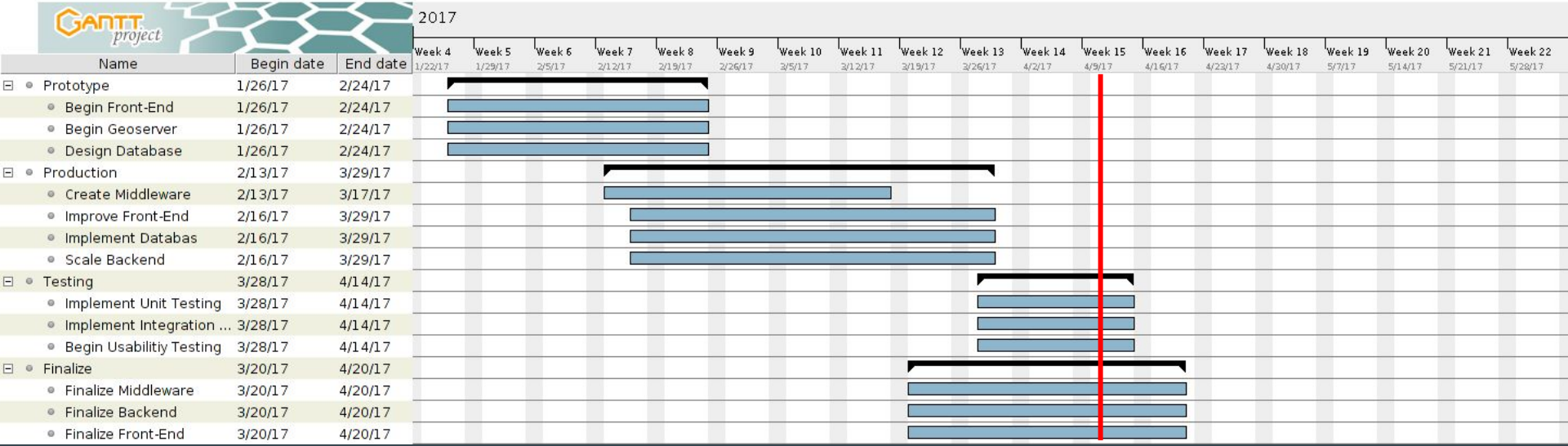
Testing

- Unit / Integration
  - ExpressJS / API
  - Mocha / Chai
  - Travis-CI
  - Coverall
- Usability
  - Expert reviews - Jay & Trent
  - User studies

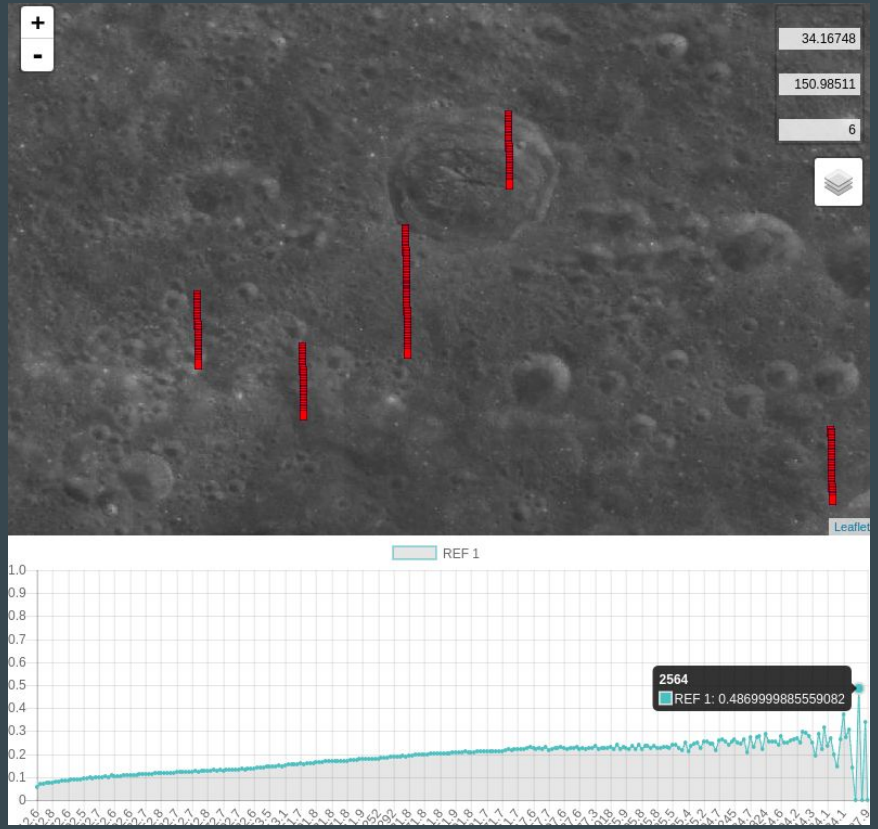


Example of some test suites

Schedule



Name	Begin date	End date
Prototype	1/26/17	2/24/17
Begin Front-End	1/26/17	2/24/17
Begin Geoserver	1/26/17	2/24/17
Design Database	1/26/17	2/24/17
Production	2/13/17	3/29/17
Create Middleware	2/13/17	3/17/17
Improve Front-End	2/16/17	3/29/17
Implement Databas	2/16/17	3/29/17
Scale Backend	2/16/17	3/29/17
Testing	3/28/17	4/14/17
Implement Unit Testing	3/28/17	4/14/17
Implement Integration ...	3/28/17	4/14/17
Begin Usabilitiy Testing	3/28/17	4/14/17
Finalize	3/20/17	4/20/17
Finalize Middleware	3/20/17	4/20/17
Finalize Backend	3/20/17	4/20/17
Finalize Front-End	3/20/17	4/20/17

Conclusion

- Kaguya data set ~1.4 terabytes
- Current methods
  - Slow
  - Inefficient
- Our solution - KASPER
  - GeoServer
  - Leaflet
  - MongoDB
- Progress
  - Testing
  - Finalizing Project