

CSPP and IMAPP Real-Time Processing Serving Alaska

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**Geographic Information
Network of Alaska**
www.gina.alaska.edu



UAF-GINA

14 Staff

Rich*, Jess*, Scott, Jason, Jiang,
Cheryl, Pete, Greg, Jay, Will, Eric
Mark**, Tom, Dayne

* UAF-GINA folks deployed in Anchorage

** The New Guy

Data Reception

Data Archival

Data Serving

Research

Application Development

Metadata

What does GINA do?

Support

Web Development

QA/QC

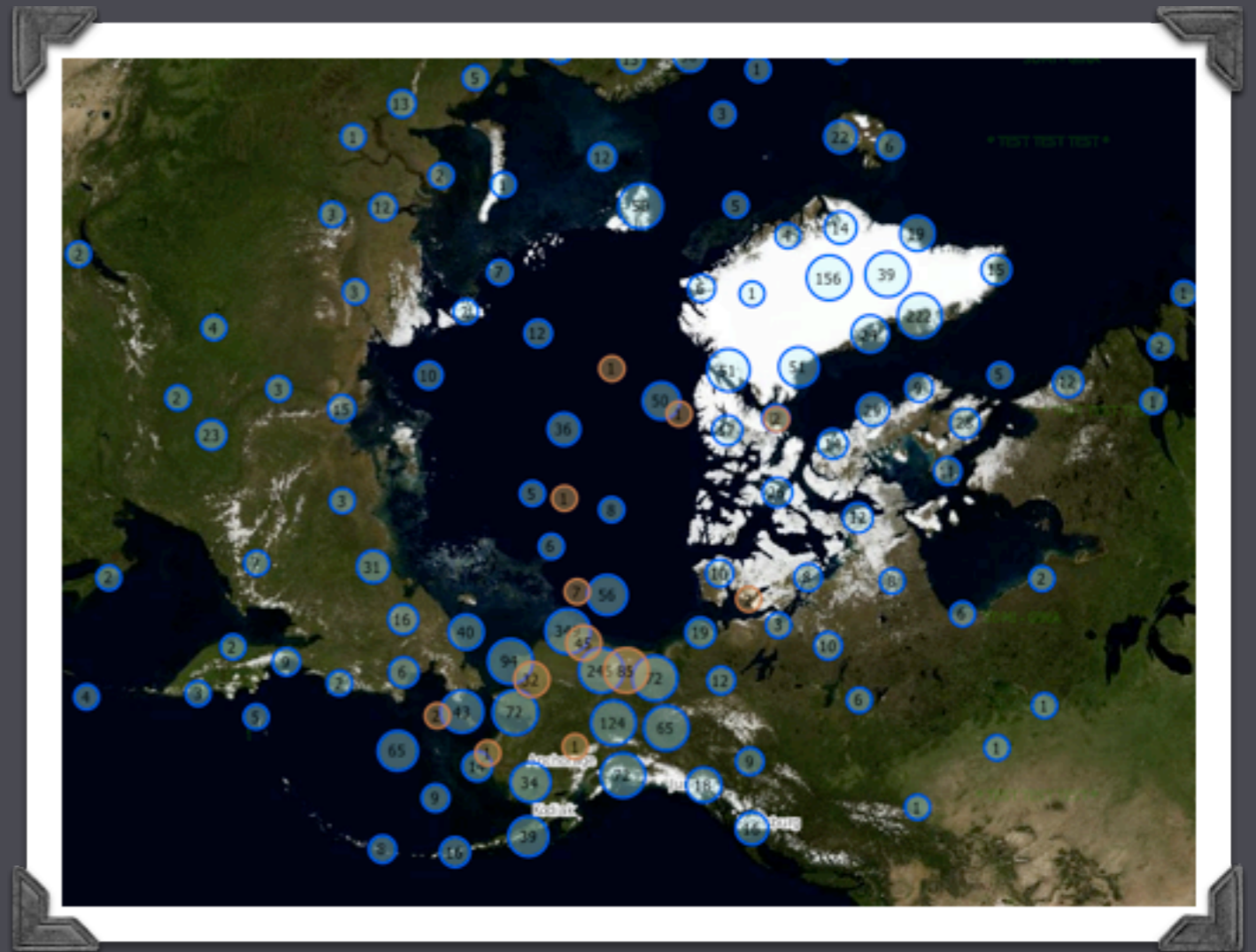
Project Management

Data Processing

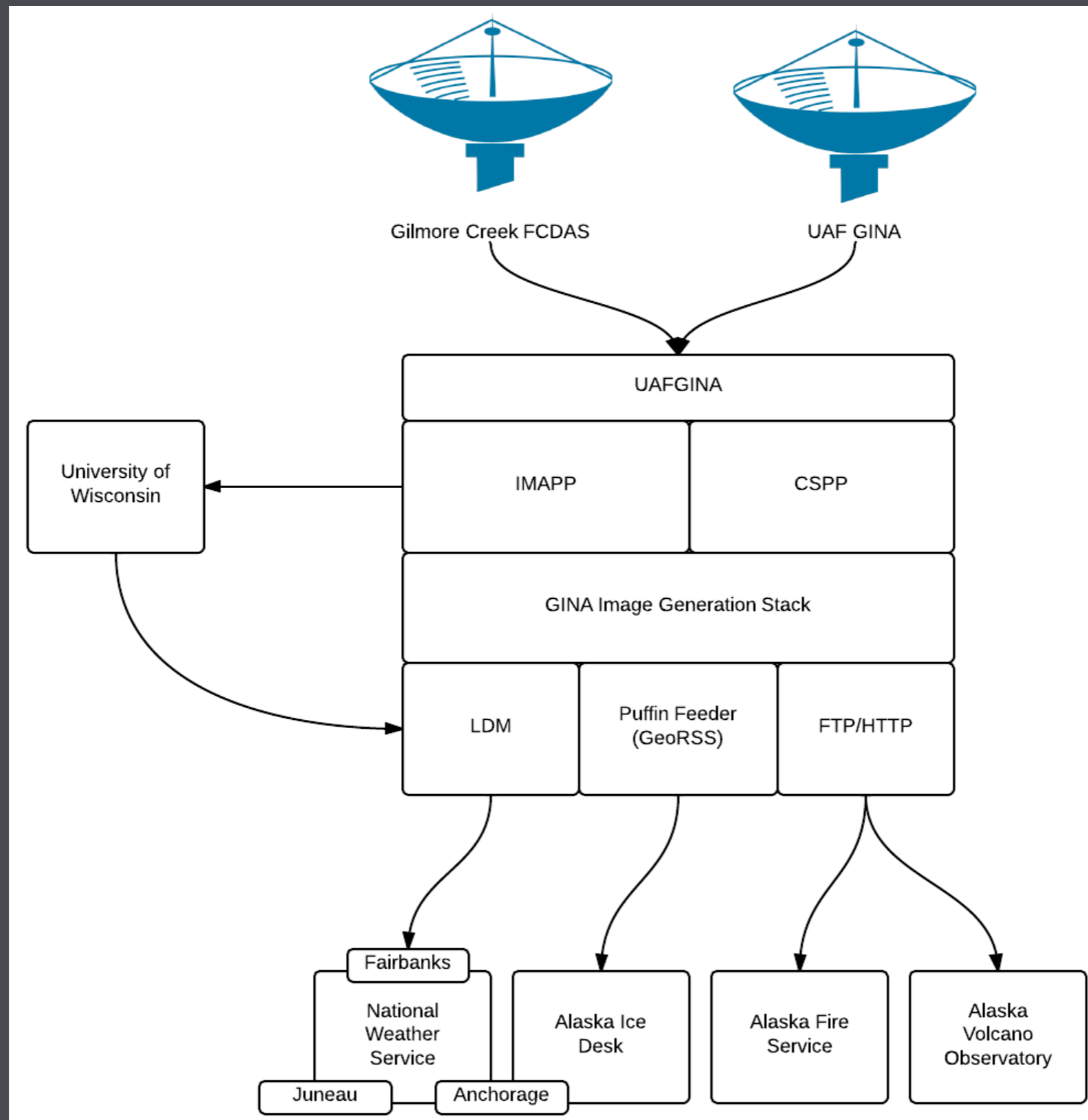
Training

Things we like to use

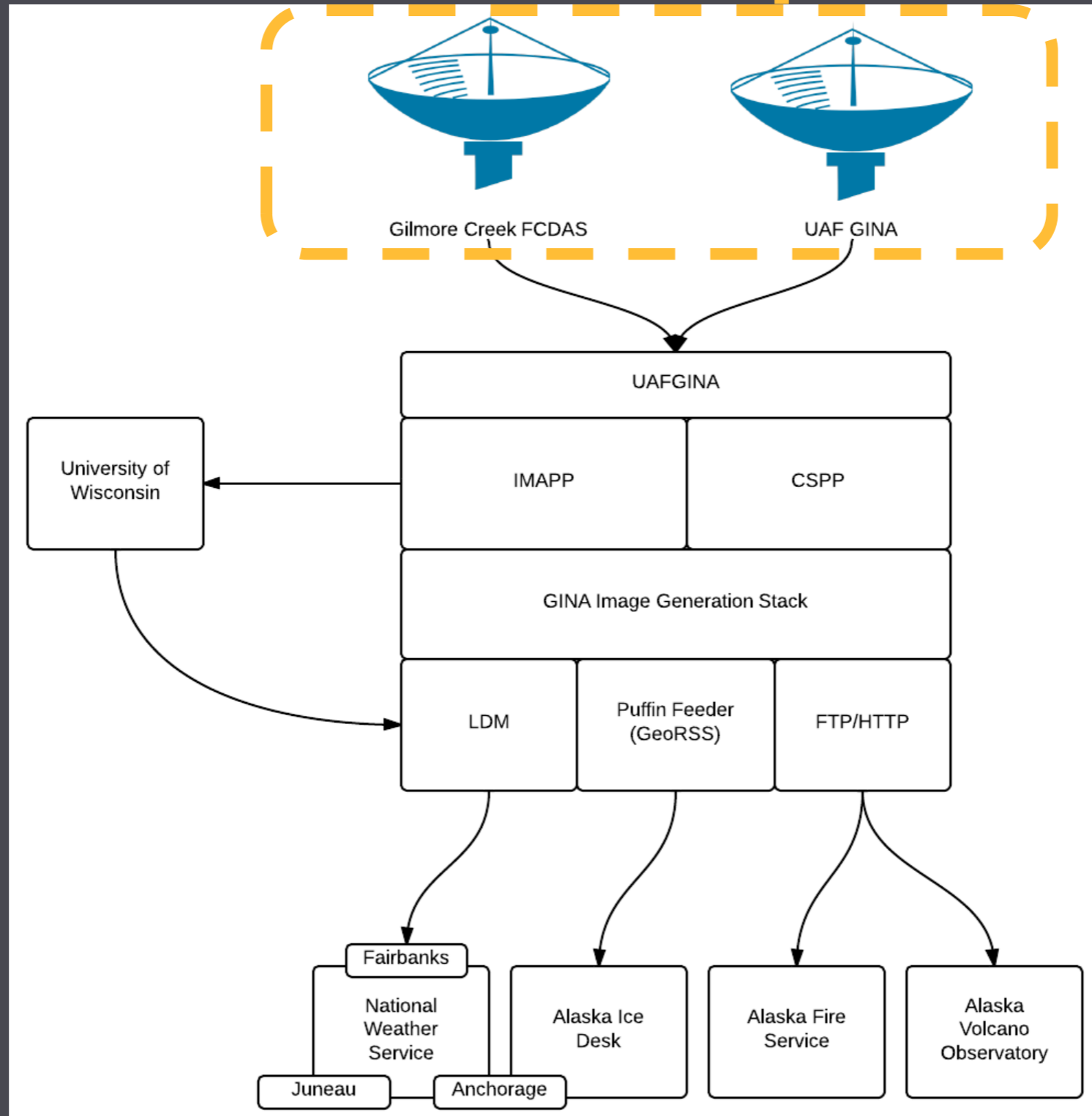
Ruby on Rails
Git/GitHub
jQuery
OpenLayers/proj4js
PostgreSQL/PostGIS
GDAL/OGR/Proj4
MongoDB
QGIS
MapServer
Solr
Redis
Chef
Sensu
And many more...



GINA from 2,312,990 ft.



Data Reception



Direct Reception

SNPP
Terra
Aqua



NOAA/NESDIS FCDAS (Gilmore Creek) Partnership

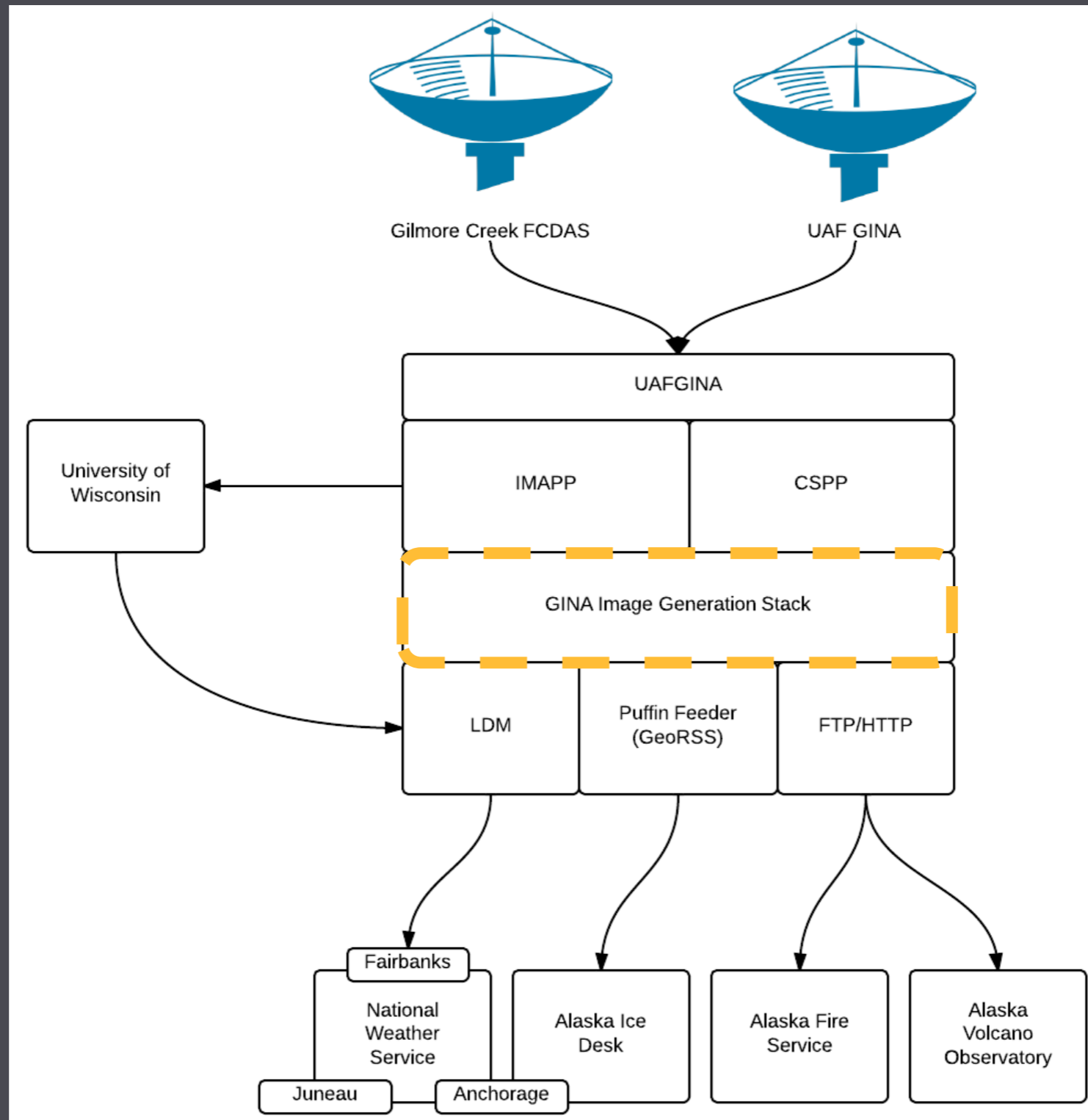
AVHRR

Aqua

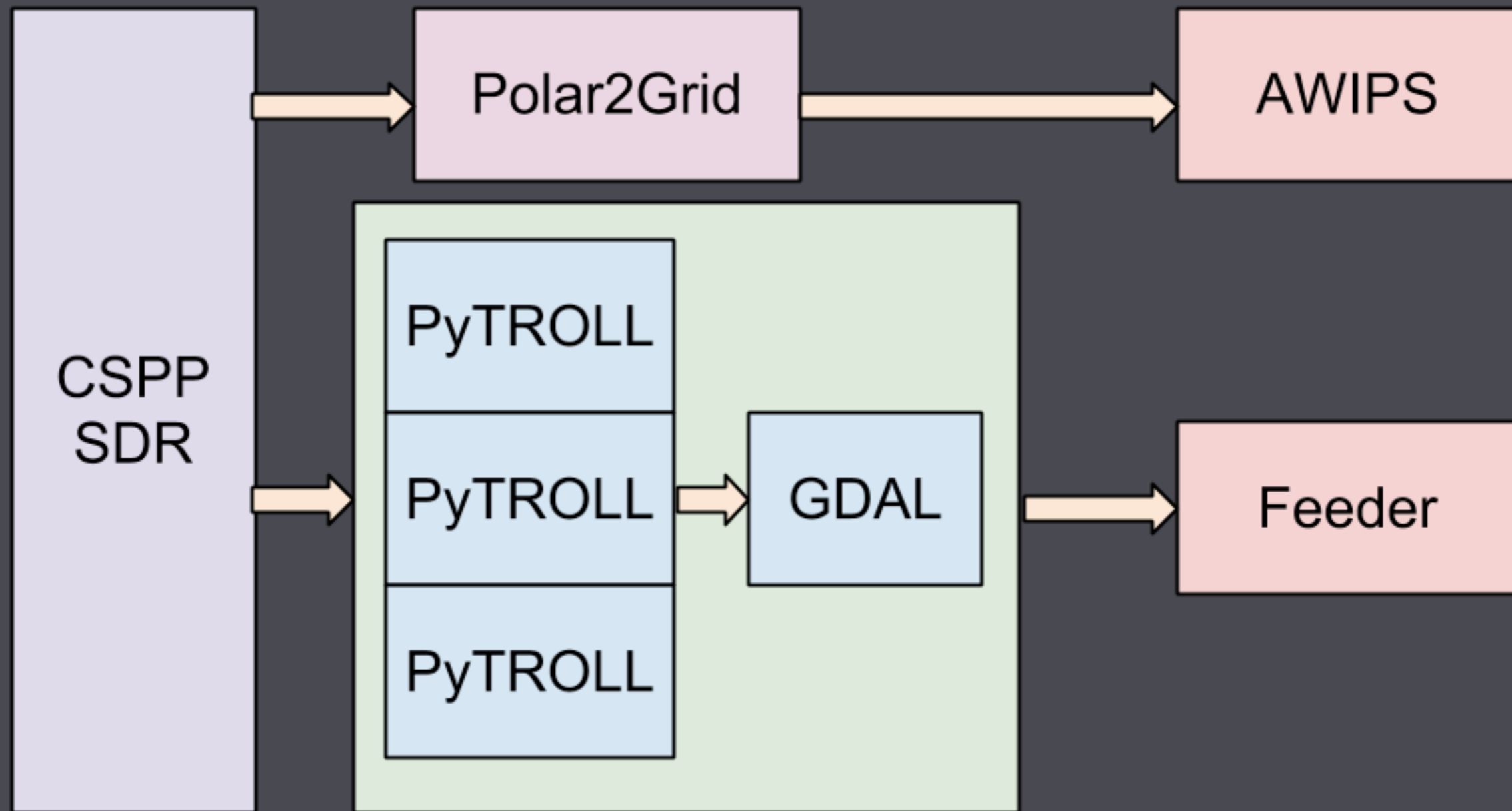
Terra



GINA Image Generation Stack



GINA Image Generation Stack



Dan's GDAL Tools

<https://github.com/gina-alaska/dans-gdal-scripts>

gdal_contrast_stretch

Contrast stretch and conversion from 8,16-bit or floating point to 8-bit

gdal_dem2rgb

Generate hillshaded images from DEMs

gdal_get_projected_bounds

Project a polygon and return its bounding rectangle

gdal_landsat_pansharp

Pansharpening - works best for Landsat 7 images

gdal_list_corners

Prints raster geocode information in YAML format (similar to gdalinfo but gives YAML)

gdal_merge_simple

Merge individual bands into a single GeoTIFF image (8-bit only)

gdal_merge_vrt

Merge individual bands into a single VRT image

gdal_raw2geotiff

Convert raw binary files into GeoTIFFs

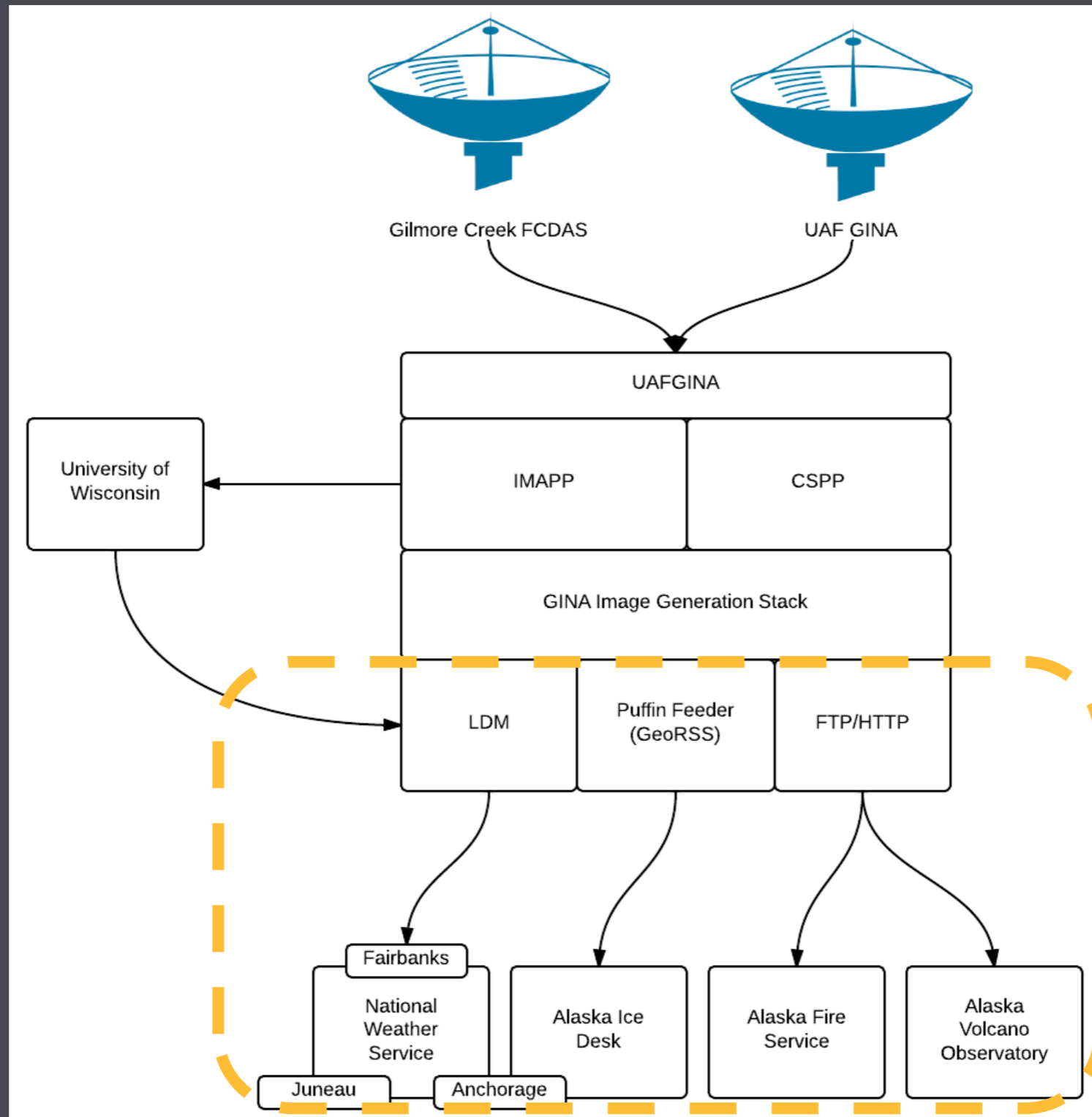
gdal_trace_outline

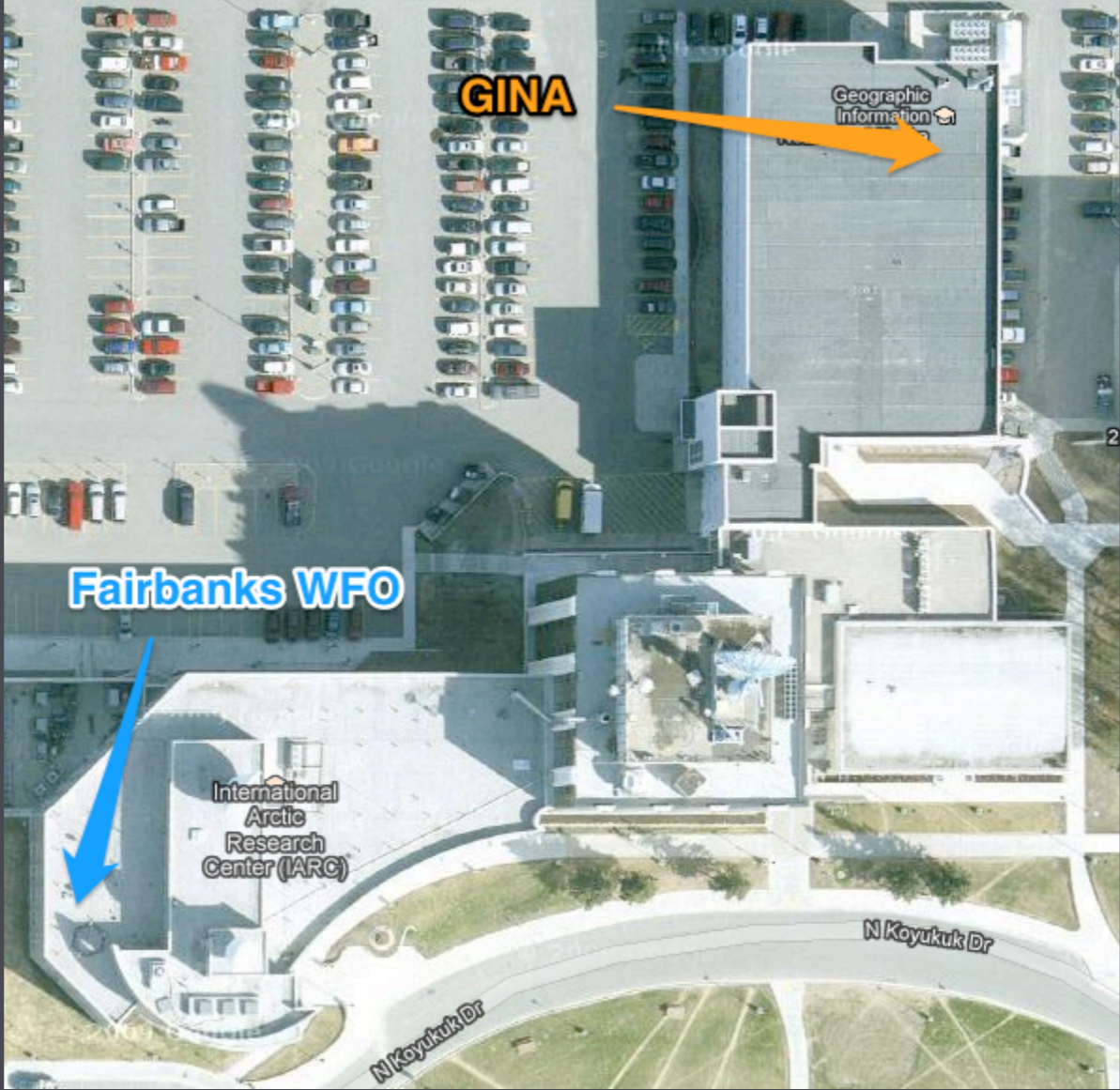
Trace the outline of an image and generate WKT or Shapefile (options exist for cleaning up raggedy edges, can also do feature classification)

gdal_wkt_to_mask

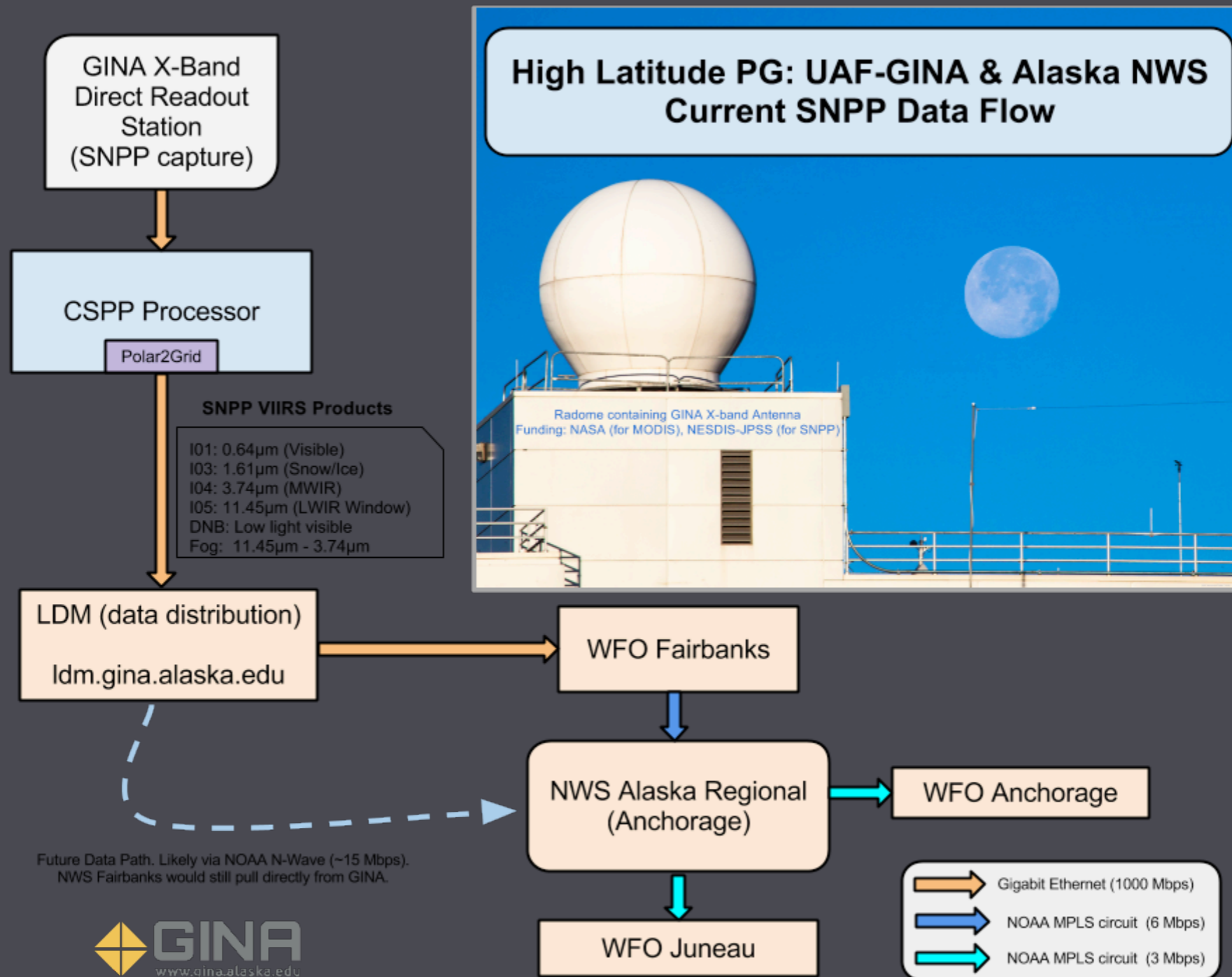
Generate a bitmap of the area covered by a polygon

Data Distribution

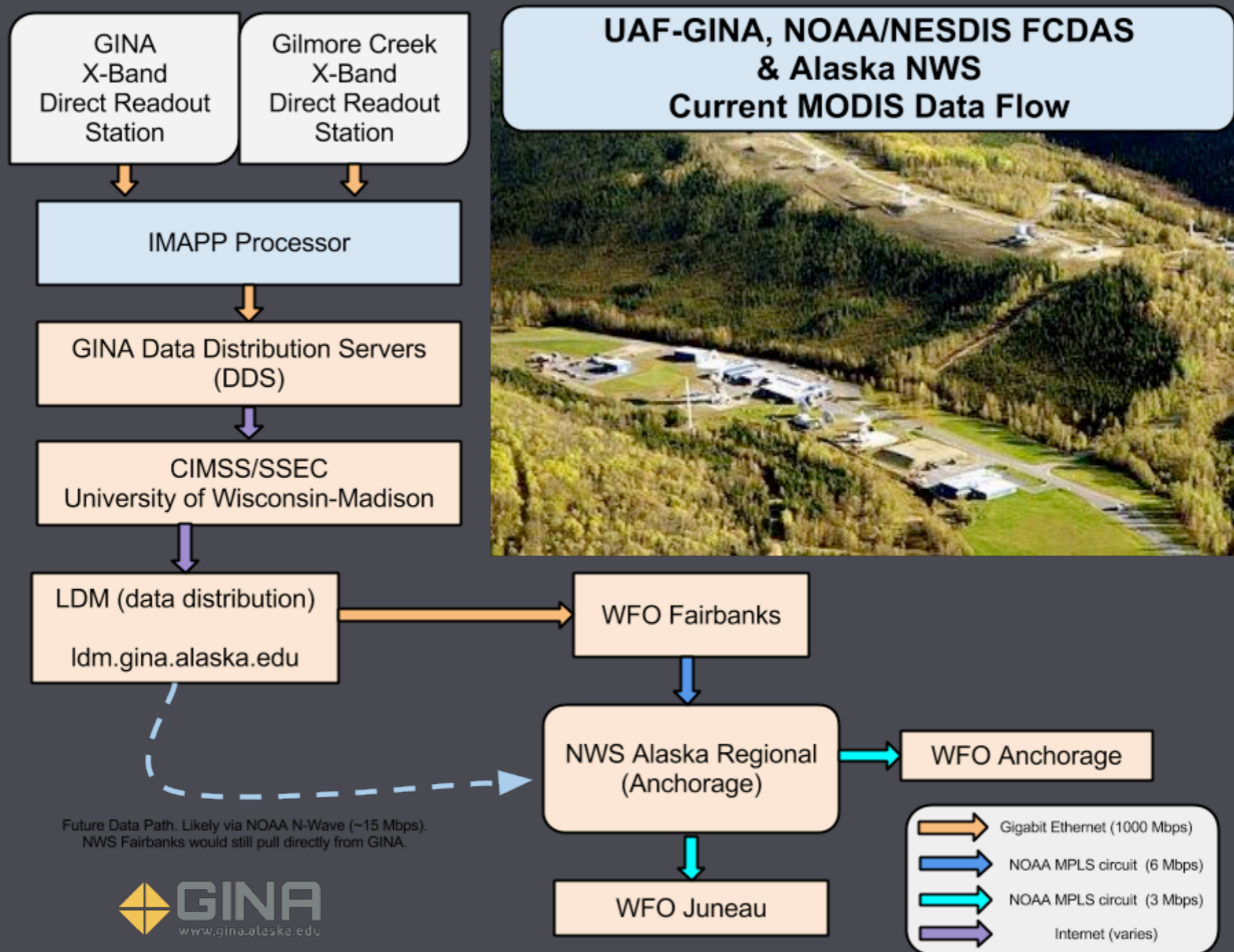




SNPP data flow

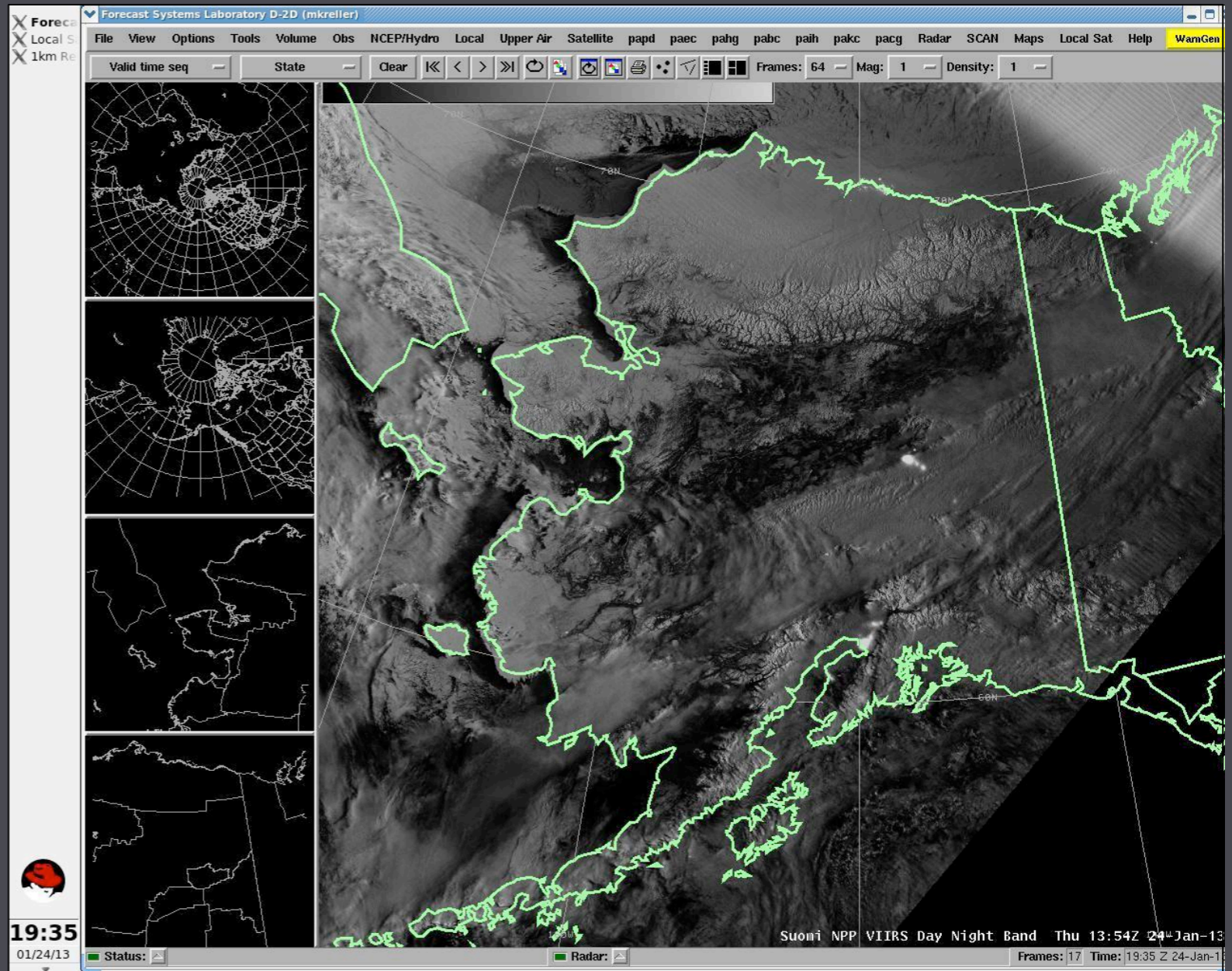


MODIS data flow



VIIRS in AWIPS

- 1354Z Jan 24, 2013
- Full moon at 0440Z Jan 27, 2013



Feeding puffins



Credit: Harvepino/Shutterstock

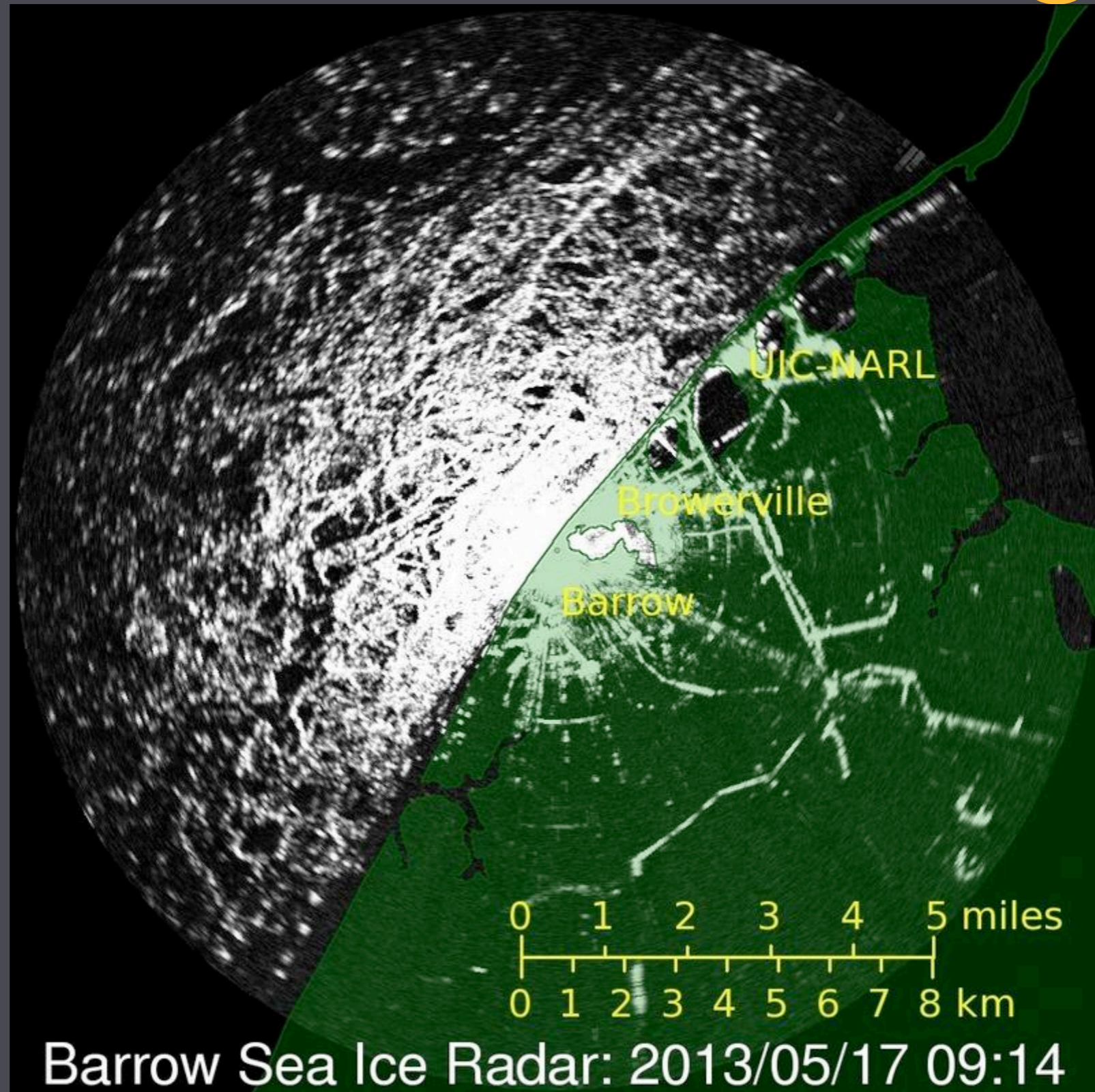
Puffin Feeder: Origins



Barrow Sea Ice Cam 2012-12-14 11:59:56

December 14, 2012 11:59AM

Puffin Feeder: Origins



Puffin Feeder: Evolution



Puffin Feeder: Archive

SNPP Landcover Current view dates: 2012/08/05 - 2012/08/04

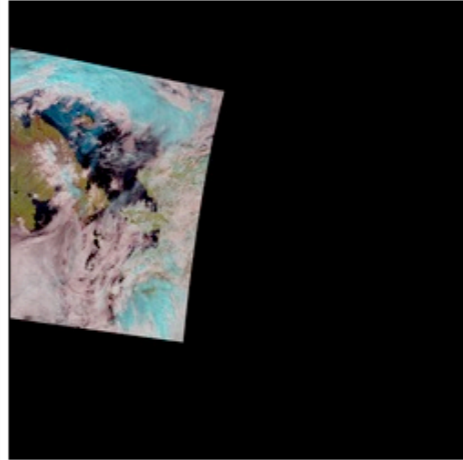
2012-08-05 10:58 UTC (JD218)



Processed 10 months ago

Medium Large Original

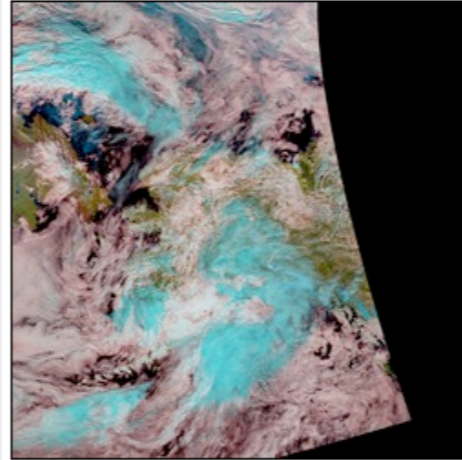
2012-08-05 00:37 UTC (JD218)



Processed 10 months ago

Medium Large Original

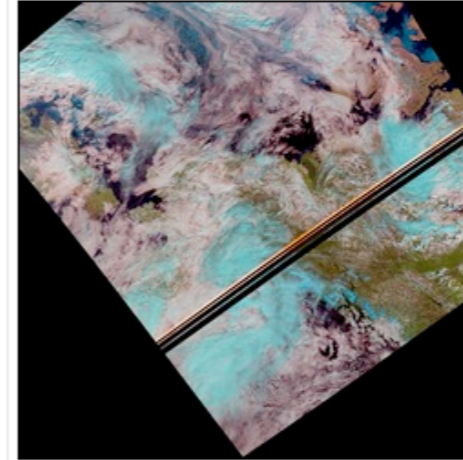
2012-08-04 22:53 UTC (JD217)



Processed 10 months ago

Medium Large Original

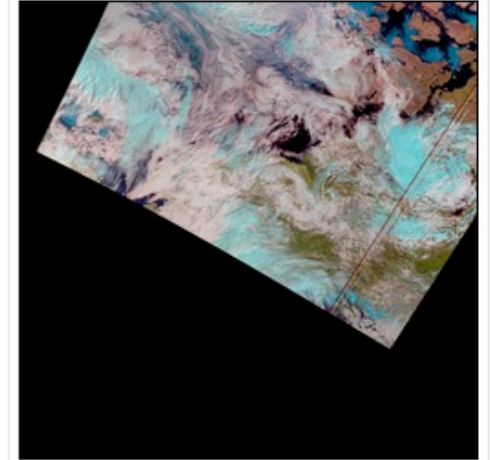
2012-08-04 21:12 UTC (JD217)



Processed 10 months ago

Medium Large Original

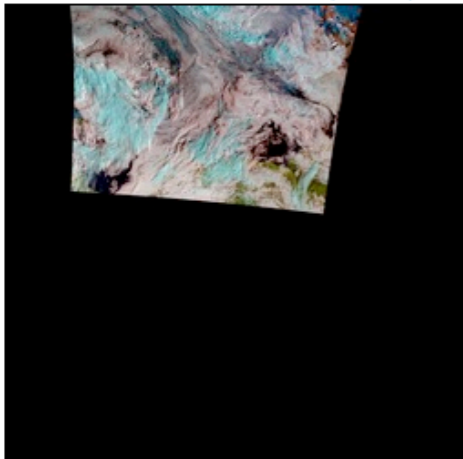
2012-08-04 19:34 UTC (JD217)



Processed 10 months ago

Medium Large Original

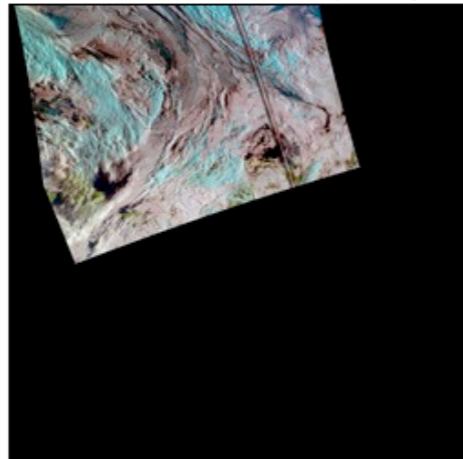
2012-08-04 17:56 UTC (JD217)



Processed 10 months ago

Medium Large Original

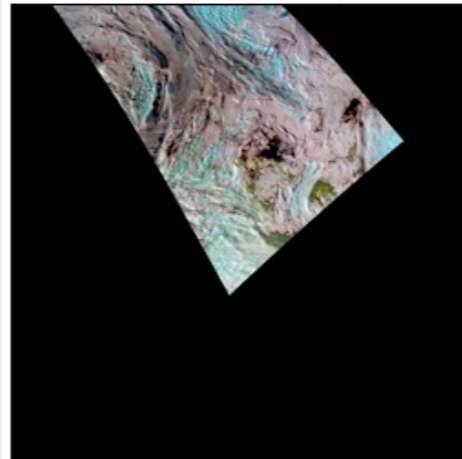
2012-08-04 16:18 UTC (JD217)



Processed 10 months ago

Medium Large Original

2012-08-04 14:37 UTC (JD217)



Processed 10 months ago

Medium Large Original

2012-08-04 12:59 UTC (JD217)



Processed 10 months ago

Medium Large Original

2012-08-04 11:17 UTC (JD217)



Processed 10 months ago

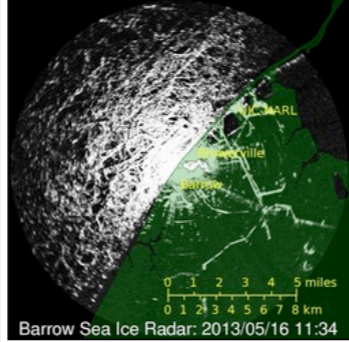
Medium Large Original


Puffin Feeder: Growth

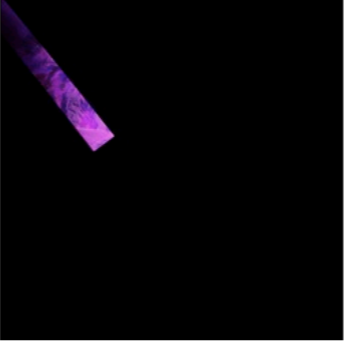
GINA Puffin Feeder Home Admin Sign out


All 11
Barrow 2
MODIS 5
SNPP 4

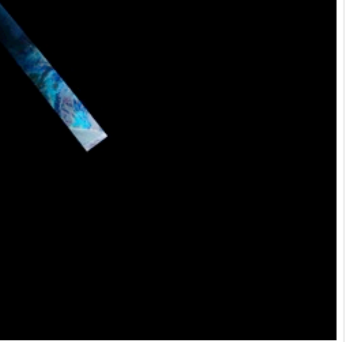
- 11 Feeds
 - 5 Modis
 - 4 NPP
- Added SNPP I05 at user request
- 1.6TB Archive
- ~10GB/day

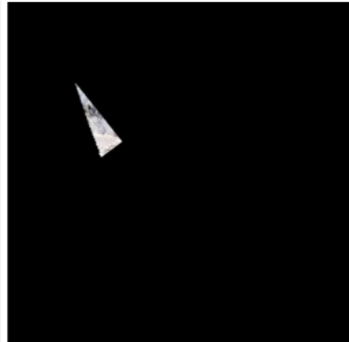
Barrow Radar
2013-05-16 11:34 AKDT (JD136)

Barrow Sea Ice Radar: 2013/05/16 11:34
Processed 22 minutes ago
All Current Movies


Barrow Webcam
2013-05-16 11:39 AKDT (JD136)

Processed 17 minutes ago
All Current Movies

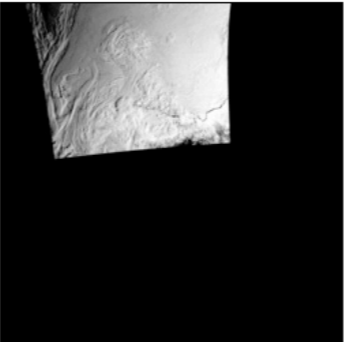
MODIS 261 Landcover
2013-05-16 15:28 UTC (JD136)

Processed about 4 hours ago
All Current

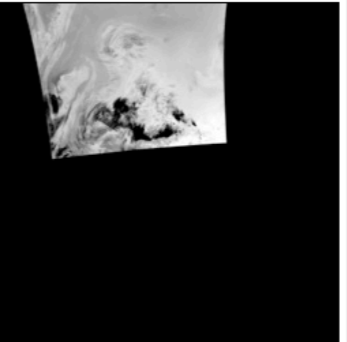
MODIS 367 Snowcover
2013-05-16 15:28 UTC (JD136)

Processed about 4 hours ago
All Current

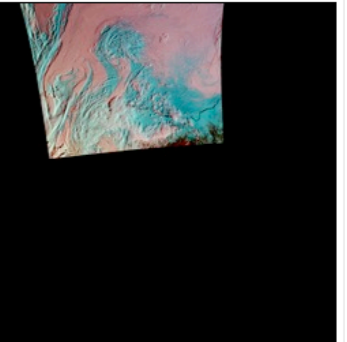
MODIS 721 Landcover
2013-05-16 15:28 UTC (JD136)

Processed about 4 hours ago
All Current

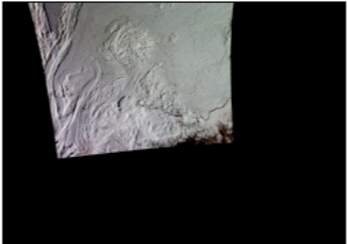
MODIS Naturalcolor
2013-05-16 15:28 UTC (JD136)

Processed about 4 hours ago
All Current

MODIS Thermal
2013-05-16 15:28 UTC (JD136)

Processed about 4 hours ago
All Current

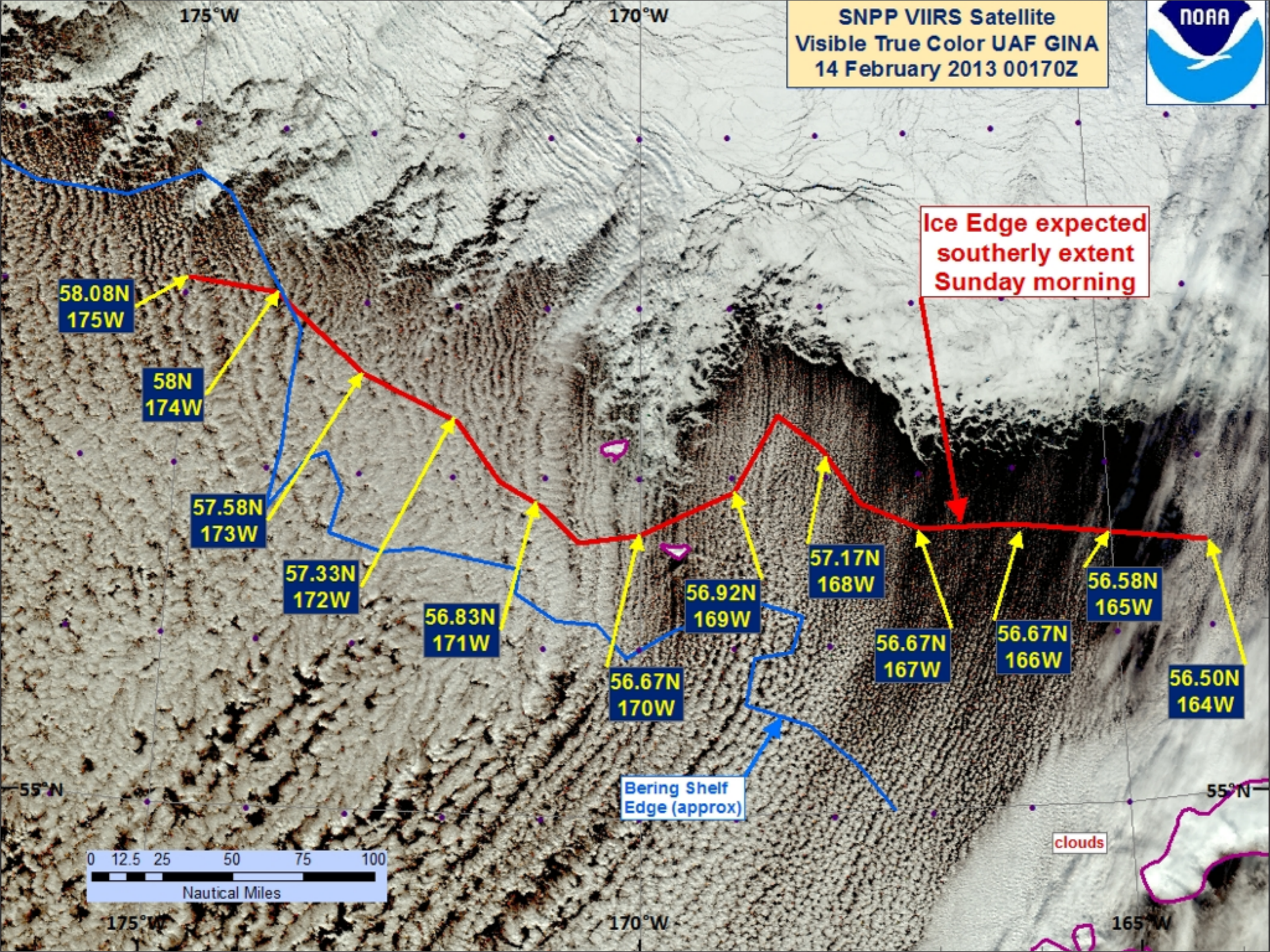
SNPP Day-Night-Band
2013-05-16 17:15 UTC (JD136)

Processed about 3 hours ago
All Current

SNPP I05
2013-05-16 17:15 UTC (JD136)

Processed about 3 hours ago
All Current

SNPP Landcover
2013-05-16 17:15 UTC (JD136)

Processed about 3 hours ago
All Current

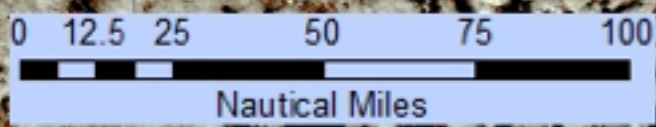
SNPP Truecolor
2013-05-16 17:15 UTC (JD136)


Puffin Feeder: Use



Ice Edge expected
southerly extent
Sunday morning

Bering Shelf
Edge (approx)



clouds



**MODIS Visible Satellite
True Color
2119Z 11Feb13**

Image provided by UAF GINA

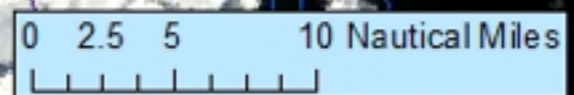
Sea Ice

Kalgin Island

Is it ice or clouds?

Homer

Satellite images are one of the major tools used by the NWS AK Sea Ice Program to determine ice locations. This clear sky image of Cook Inlet is an excellent example, but it's not always easy to identify ice vs. clouds.





152° W

151° W

150° W

MODIS Visible Satellite
False Color
2119Z 11Feb13

Image provided by UAF GINA

Sea Ice

Kalgin Island

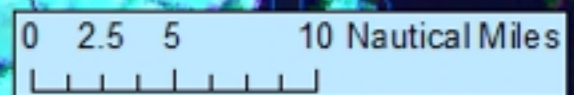
60° N

It's clouds!

60° N

This is the same satellite image color enhanced to differentiate between sea ice and cloud cover. Snow and ice are the blue color. Clouds appear with a red color. It is easy to determine the features in Kachemak Bay near Homer are clouds. Low cloud cover can even be seen over the land. Can you see this cloud layer on the visible image? Probably only if you know where to look.

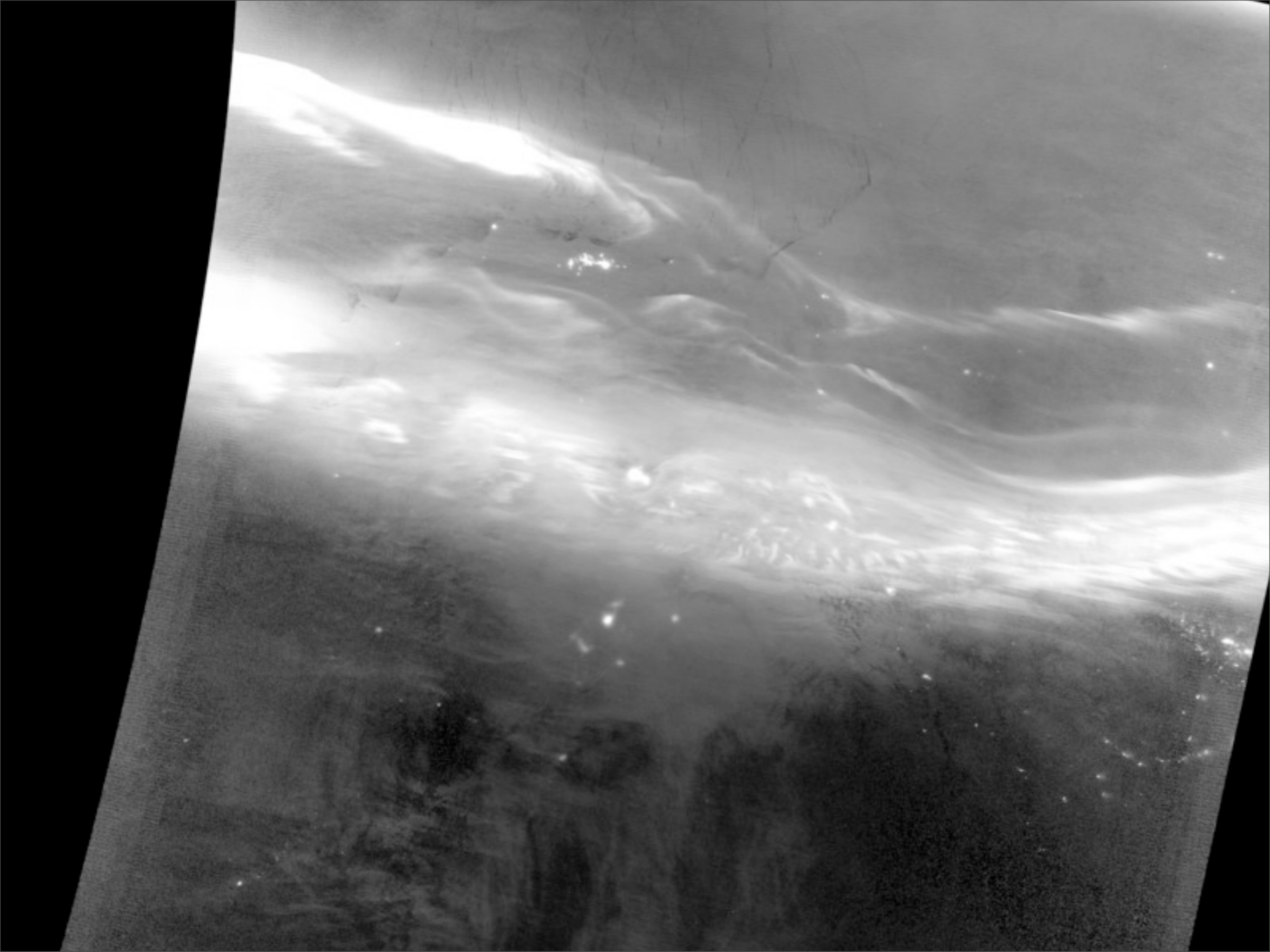
Homer



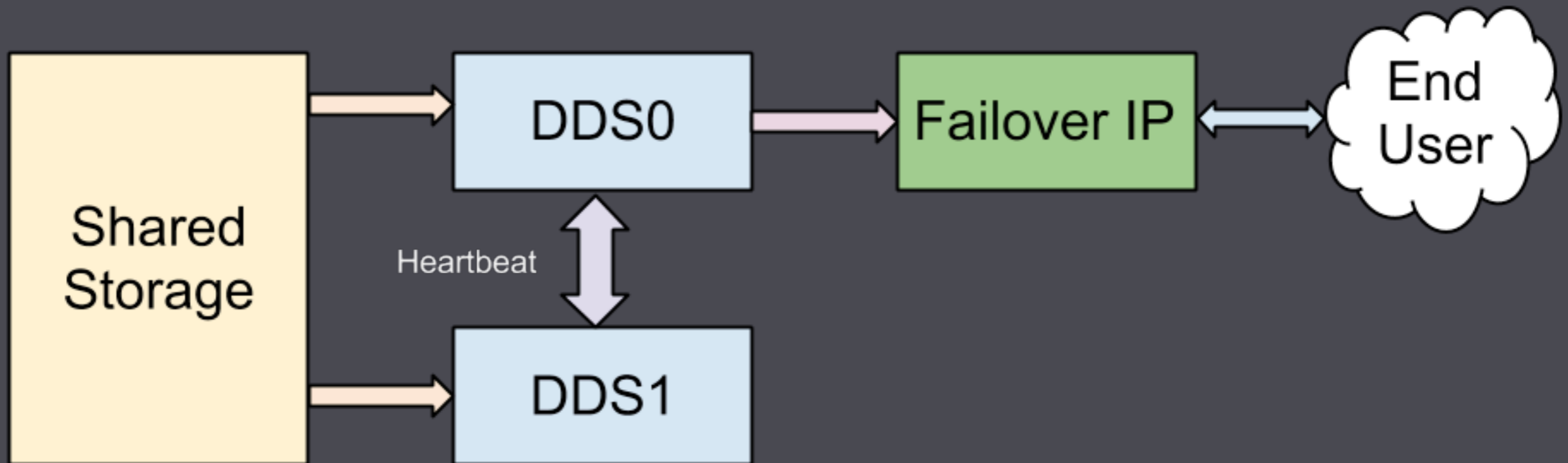
153° W

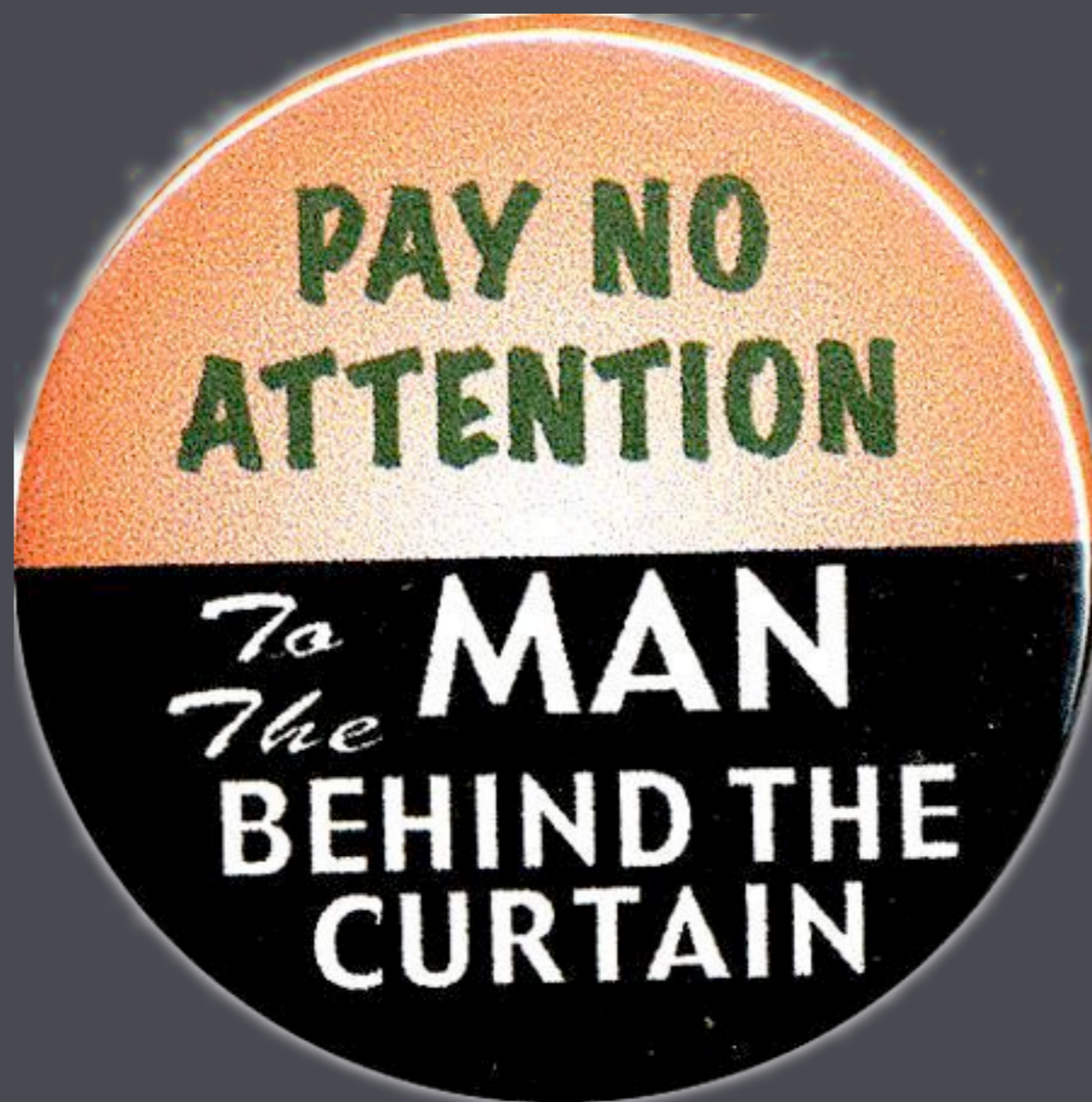
152° W

151° W

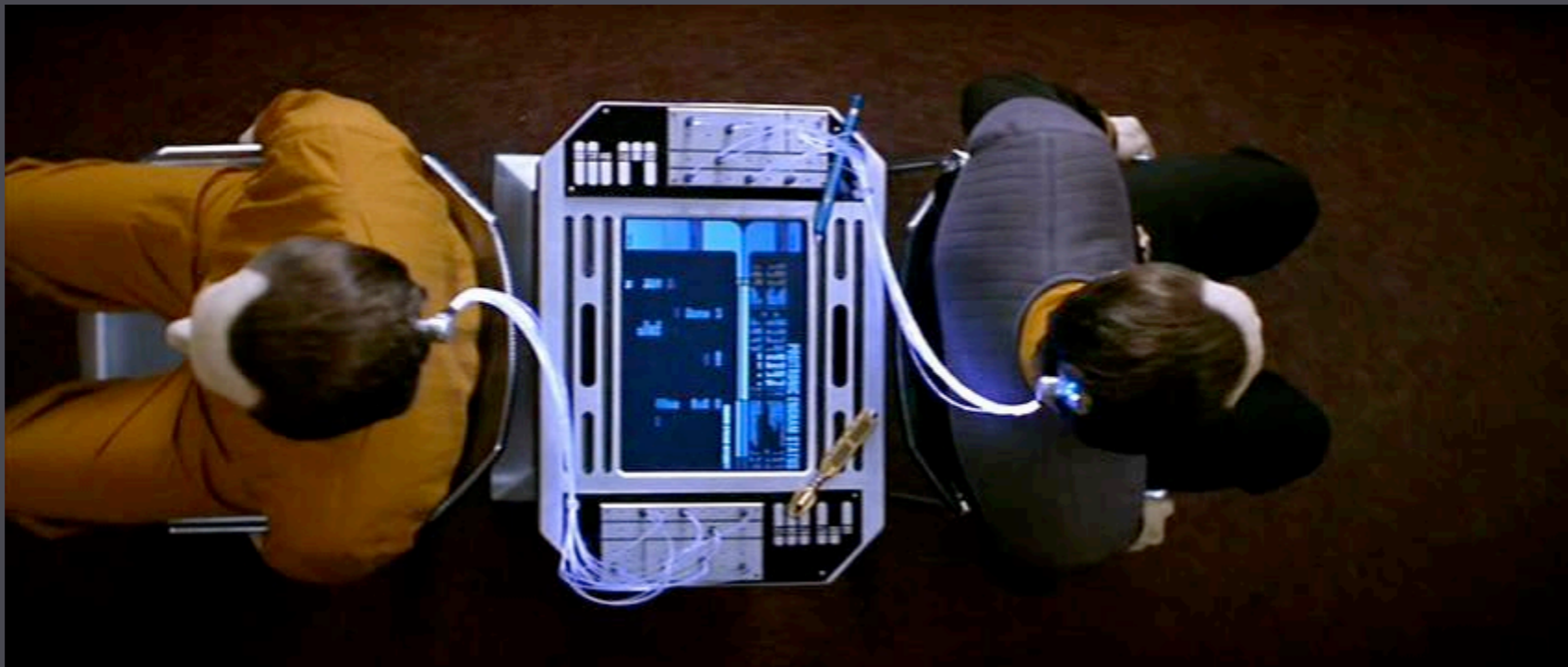


Delivering data over http/ftp





Transferring data



Image(c) Paramount Pictures

waitp.perl

#ID	PATH	MATCH	SCRIPT	[TIMING]
MODISLev0	Level0_MODIS	*.md5	MD5.csh	30 1 96
AVHRRB	INCOMING	*.md5	Avhrr.Browse.generation.script	30 1 96

waitp.perl

Simple, but...

Serial, no logging, no notifications



Conveyor

```
watch "/mnt/raid/processing/data/level1.gina" do
  # watches for a file named "done" and run viirs edr against
  that directory
  match file done do |path|
    dirname = File.dirname(filename)
    run "run_viirs_edr.bash #{dirname}"
    unless status.success?
      announce "Error running #{File.basename(filename)}"
    end
  end
end
end
```

Conveyor

- Parallel
- Notifications
- Logging
- Native FS events
- Falls back to polling when FS events aren't available



<http://github.com/gina-alaska/conveyor>

Why file driven
processing?

Designing around failure

What can go wrong?











Image (c) Paramount Pictures

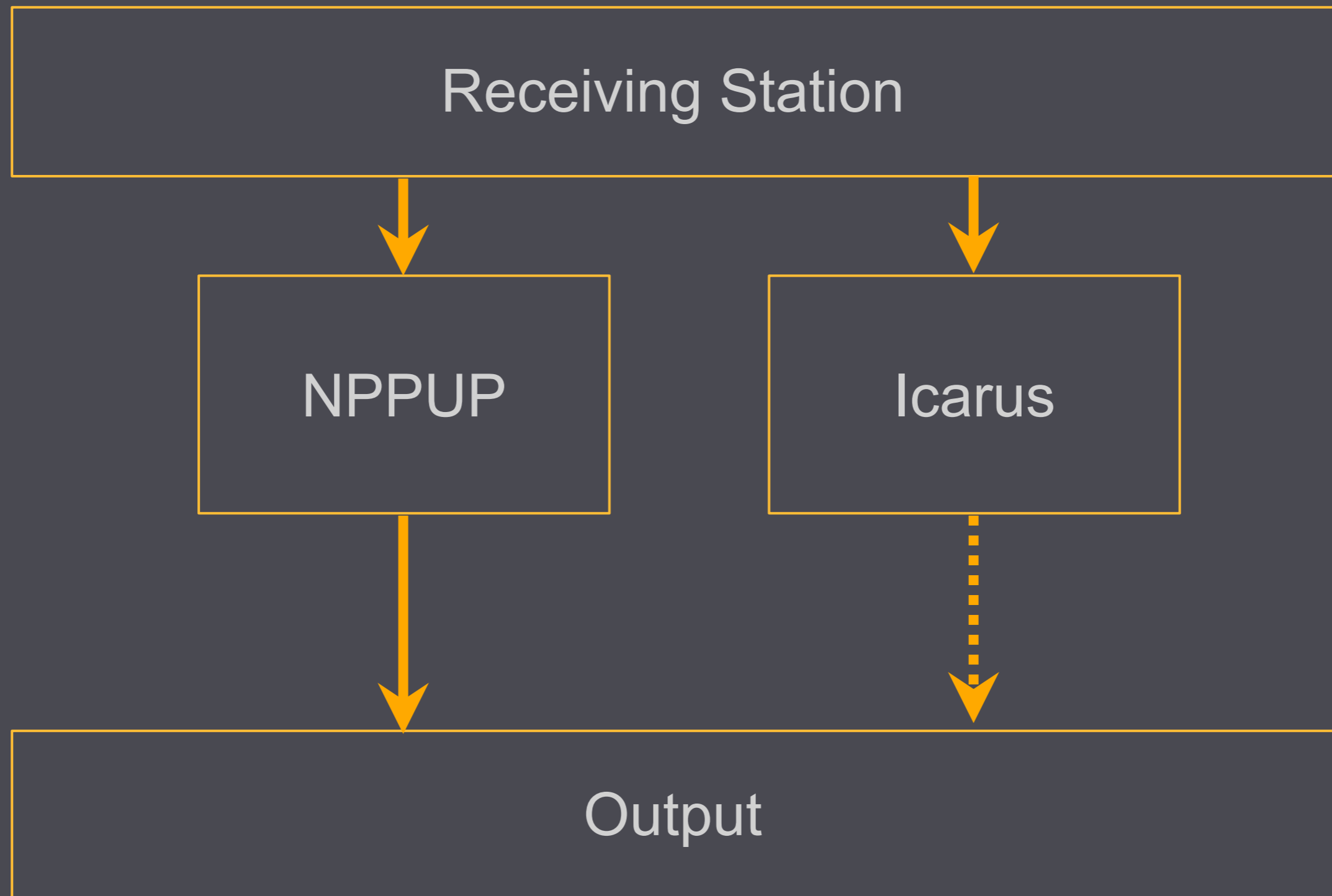
Wednesday, May 22, 13

How can it be
mitigated?

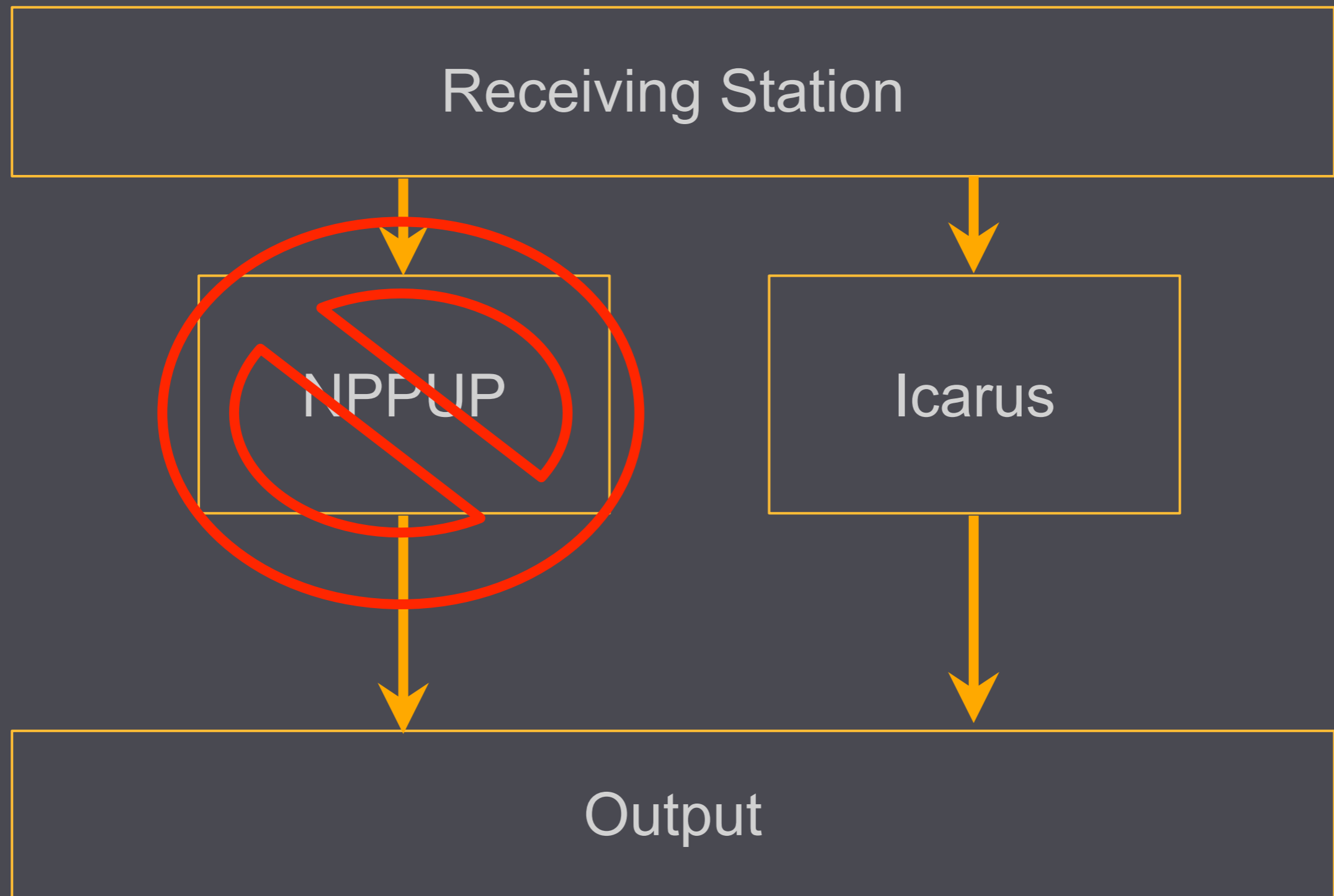
Making it highly available

- Virtual Machines
- Primary/Secondary “Warm Spare”
- Configuration Management
- Monitoring

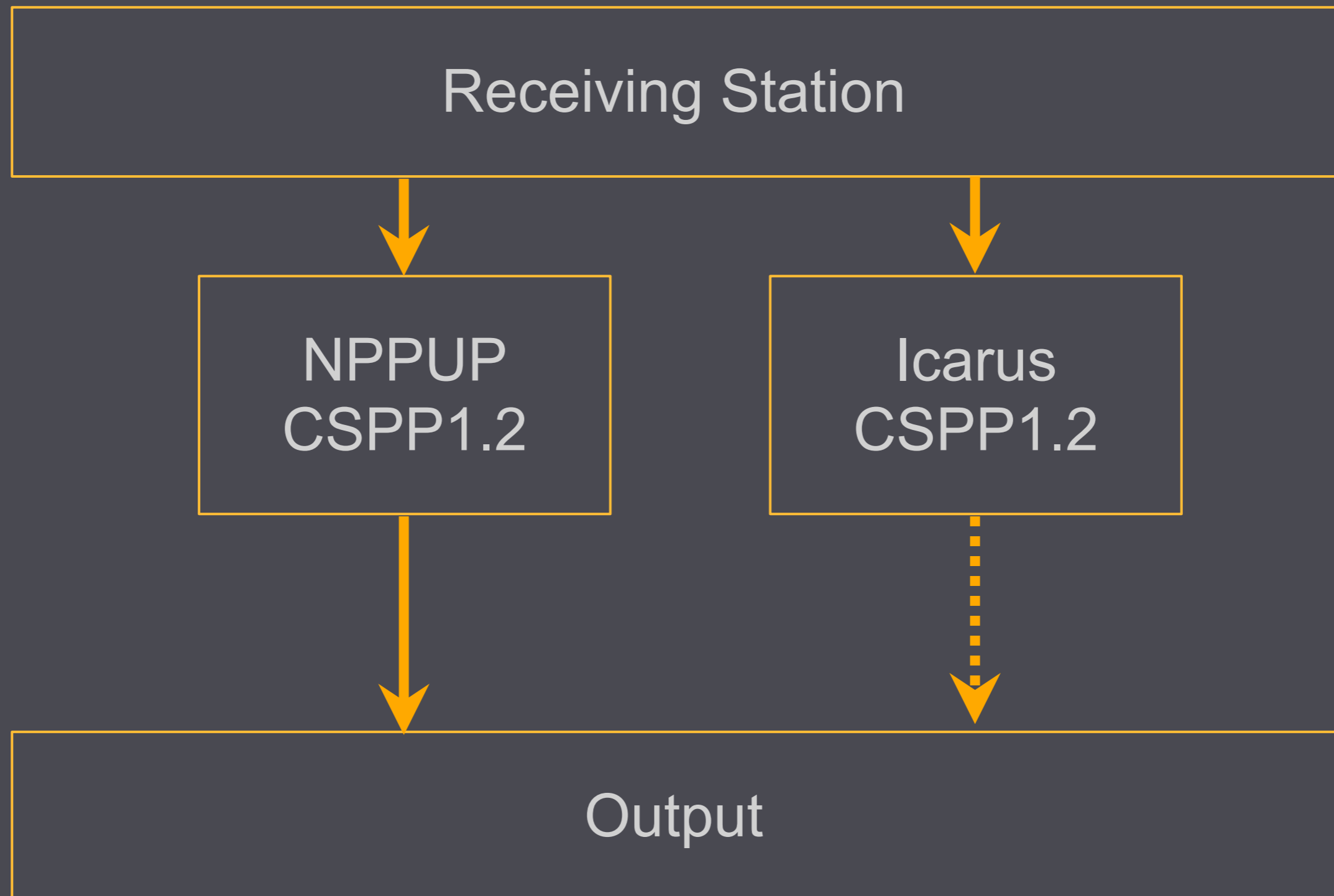
Primary/Secondary



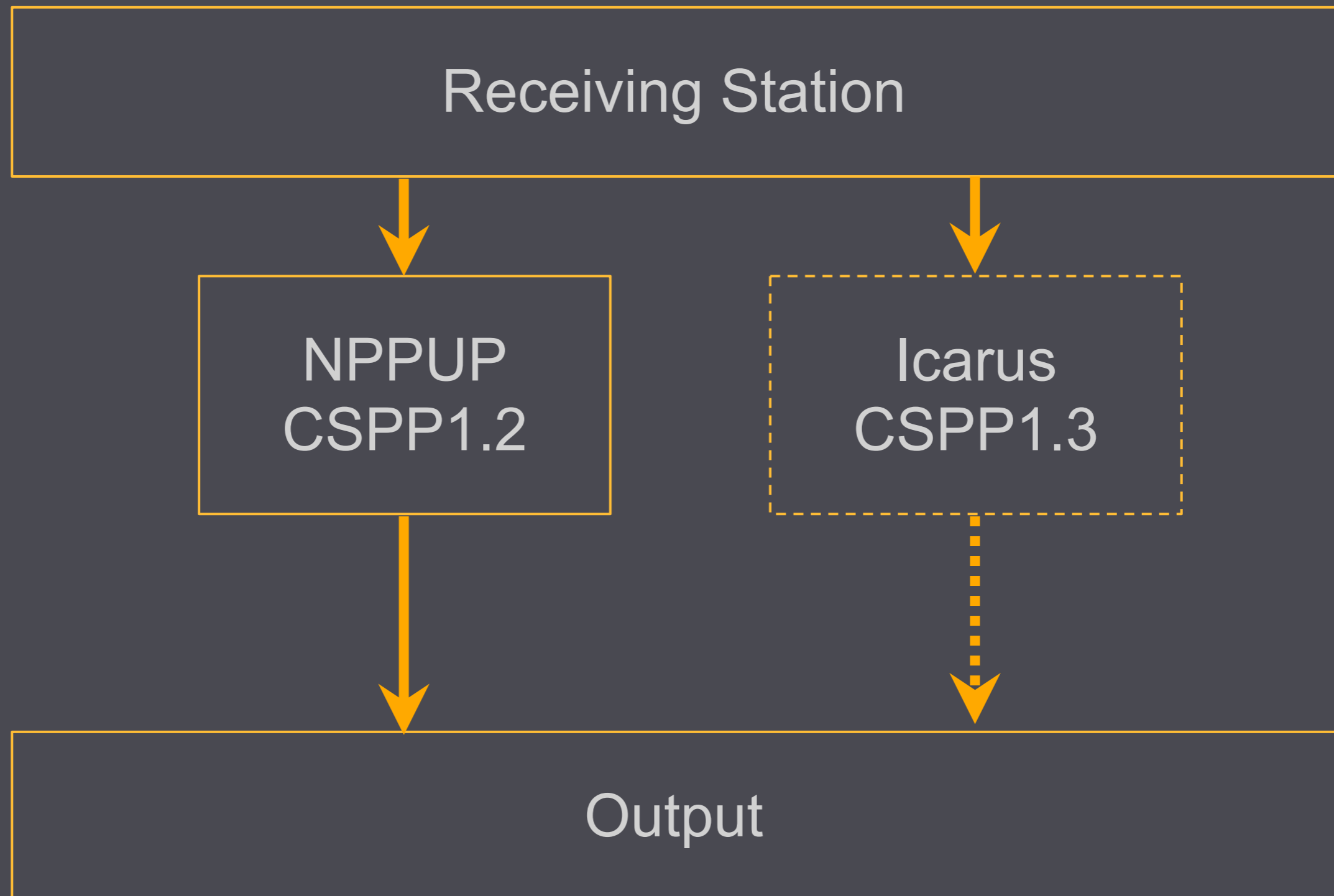
Primary/Secondary



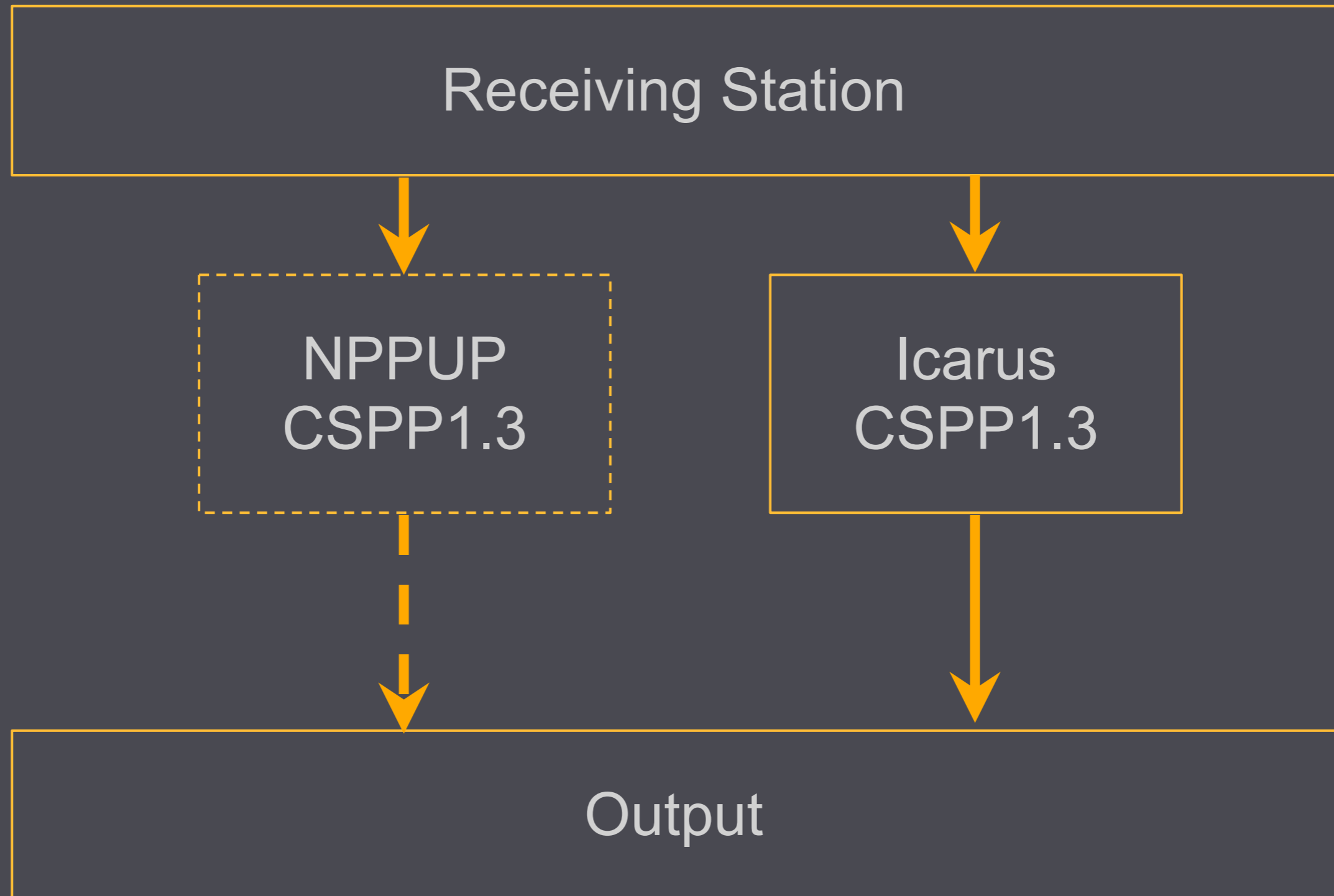
Primary/Secondary



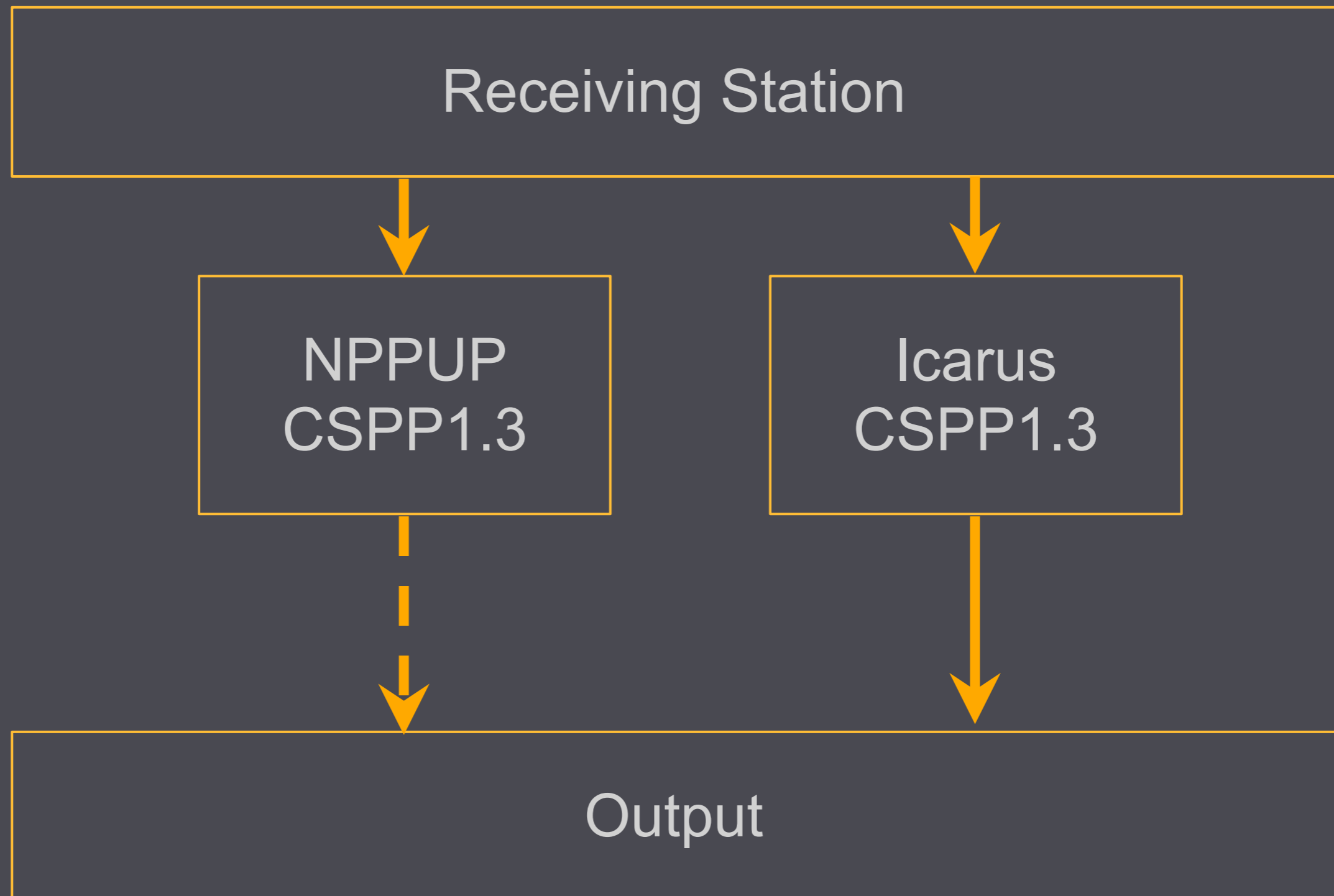
Primary/Secondary



Primary/Secondary



Primary/Secondary

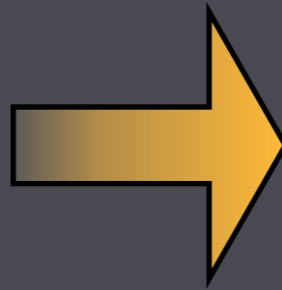


Configuration Management

Programmatically describe the state a machine
should be in.

Not just configuration files

- User accounts
- Package Dependencies
- File/Directory creations
- Permissions
- Services
- OS/Distribution agnostic (sort of)
- Test your infrastructure



```
package 'bash'

user node['cspp']['user']

directory node['cspp']['home'] do
  owner node['cspp']['user']
  group node['cspp']['user']
  recursive true
end

template "#{node['cspp']['home']}/cspp_env.sh" do
  owner node['cspp']['user']
  group node['cspp']['user']
  mode 0755
end
```



```
describe "cspp" do
  it 'adds the cspp user' do
    user(node['cspp']['user']).must_exist
  end

  it 'ensures bash is installed' do
    package("bash").must_be_installed
  end

  it 'configures the cspp environment' do
    file("#{cspp_home}/cspp_env.sh").must_exist.
      with(:owner, node['cspp']['user']).with(:mode, "755")
  end
end
```

Monitoring

- Monitor everything
- Make sure you're monitoring what you think you are
- Be smart about when you alert

<https://github.com/sensu/sensu>

The Future

CSPP

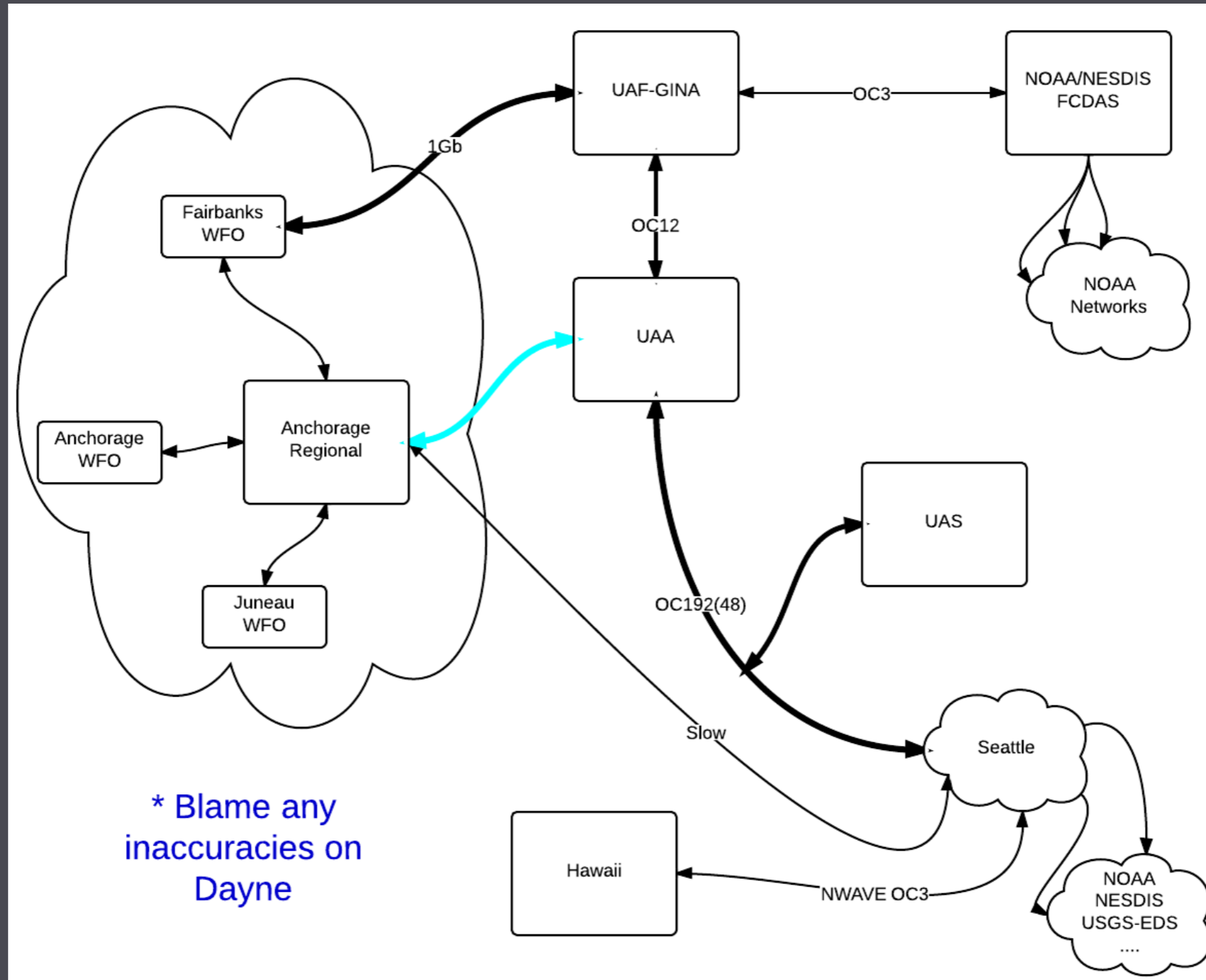
Enhancements

Multi-core processing
Other optimizations

Expanded Failover Capacity

NPP Reception at Gilmore Creek
Install CSPP at Gilmore Creek

Optimizing network paths



FEEDS

Select: [All](#) / [None](#)

- Barrow Webcam
- MODIS Naturalcolor

SENSORS

Select: [All](#) / [None](#)

- Webcam
- Radar
- VIIRS
- MODIS

DATE SELECTION

2013/05/15 to 2013/05/15

Enter a date range to filter selection, if left blank the date range will be open ended

Reset

Search

Barrow Webcam

2013-04-01 23:55 AKDT (JD91)

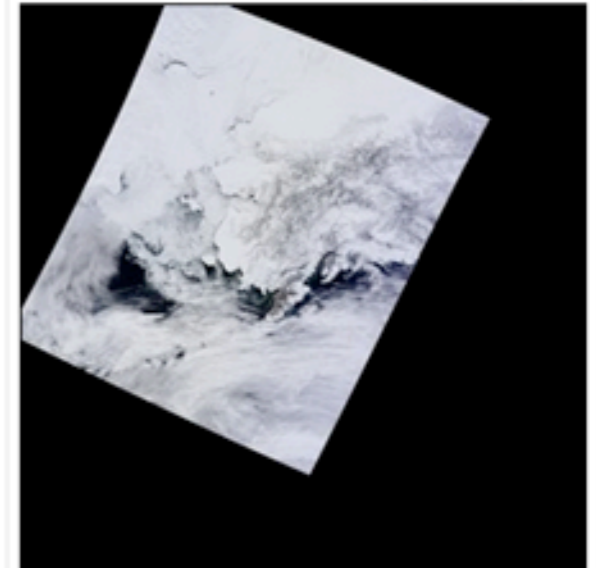


Processed 2 months ago

[All](#) [Current](#) [Movies](#)

MODIS Naturalcolor

2013-04-15 22:17 UTC (JD105)



Processed about a month ago

[All](#) [Current](#)



'C' is for Community

<https://github.com/gina-alaska/>

<https://github.com/gina-alaska/cspp-cookbook>

<https://github.com/gina-alaska/dbvm-cookbook>

<https://github.com/gina-alaska/rtstps-cookbook>

<https://github.com/gina-alaska/omnibus-pytroll>