K&C Mosaicking update

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SCANSAR Mosaicking

GEOCODING:

SOFTWARE UPDATE FROM GAMMA May 2010.

This update partially solves the large geolocation errors in the data that were previously output. Geometric error now within a couple km, and well behaved along the strip.

It is still necessary, via a matching and error fitting procedure, to correct the orbit based geocoding parameters

We are still refining this matching and error fitting procedure to the 3 arcsecond level

SCANSAR Mosaicking

Radiometric corrections:

The ScanSAR data has three common radiometric problems:

- Artifacts in the near and far range
  - ↓ trim
- along track banding
  - ↓ Empirical correction required
- strip to strip brightness variations
  - ↓ Calibration error or real change?

FBD Mosaicking

GEOCODING:

We are reprocessing the N.America data this summer, based on what we have learned from the SCANSAR processing, to better geocode the data

We also need to incorporate 110 missing image strips (need to be processed)

Currently, accuracy is very good, but there are occasional small errors.

FBD Mosaicking

Radiometric corrections:

The FBD data has one common radiometric problem:

- Northern latitude data tends to have a large fall off in the far range (and some in the near range).
  - HV is worse
- We are still experimenting with the best empirical procedure to fix this problem for all scenes
- The data is well calibrated between strips

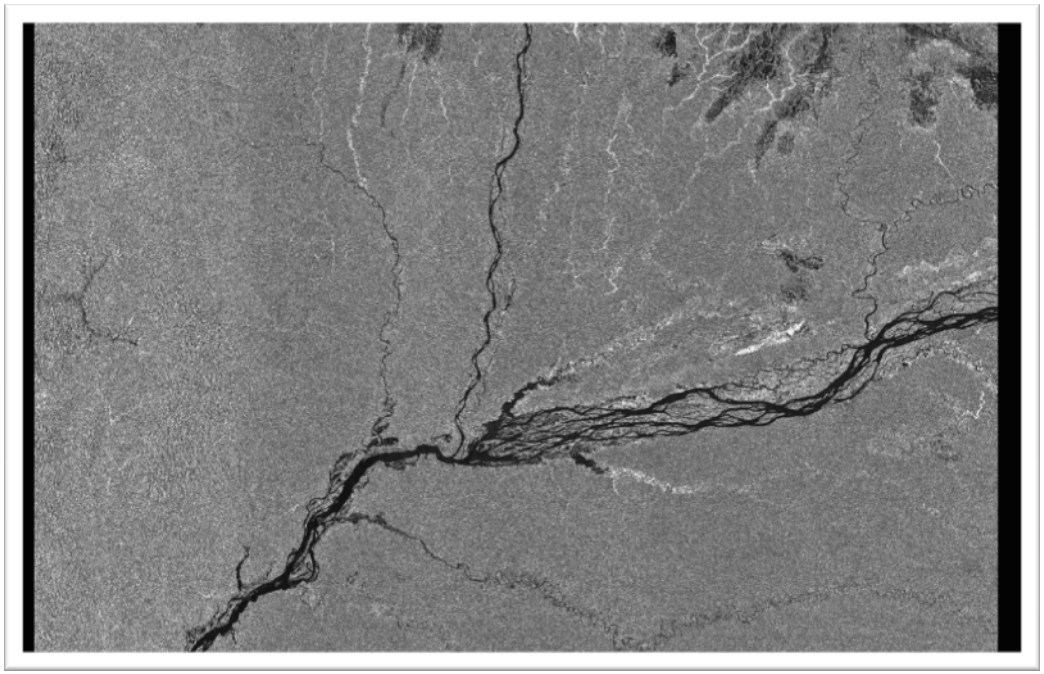
Most S. America FBD data has an antenna pattern error that must be corrected.

Step by step

Processing:

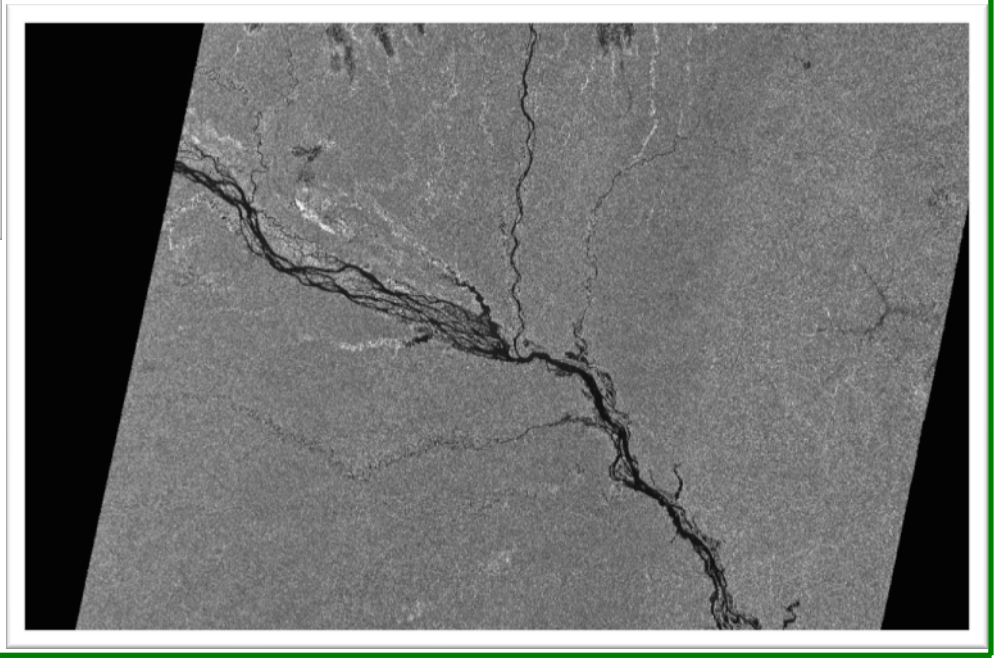
- Assemble UTM DEM tiles (6x8 deg) (need to ‘pad’ DEMs so that there are a few pixels overlapping between adjacent DEMs)
- ftp and untar strip map slant range ALOS PALSAR data from EORC
- Geocode
  - Using Gamma software executed through automating perl scripts
  - project image to ground plane based on orbit data and generate gecoding parameters
  - project reference image (either simulated or actual) back to slant range geometry (using parameters from orbit data)
  - match slant range image against slant range reference image, fit correction to polynomial, and correct projection parameters
  - Geocode slant range image to ground plane
  - refine geolocation if necessary (repeat)

Slant Range Data versus Geocoded to SRTM

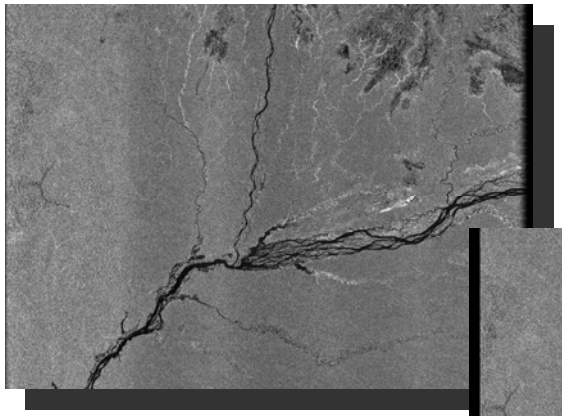


Slant range image

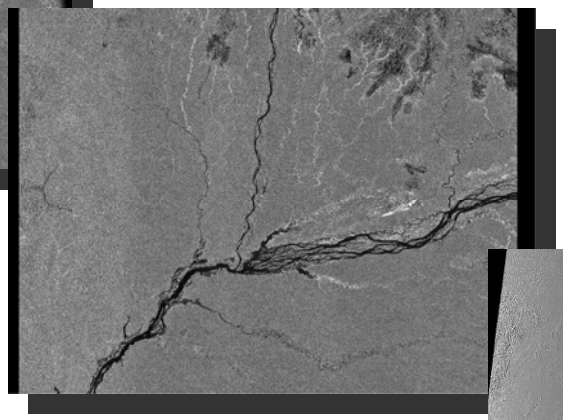
Geocoded image



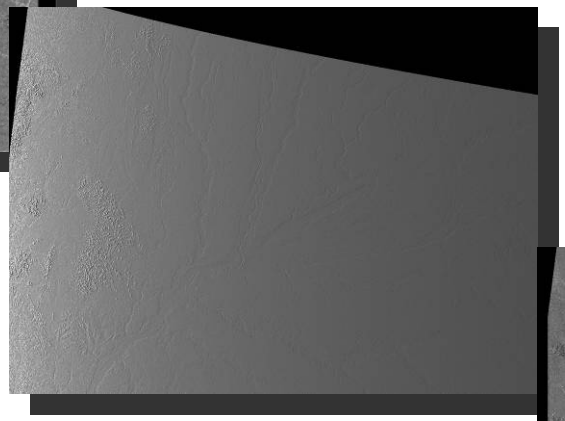
Calibration and matching



Original slant range image

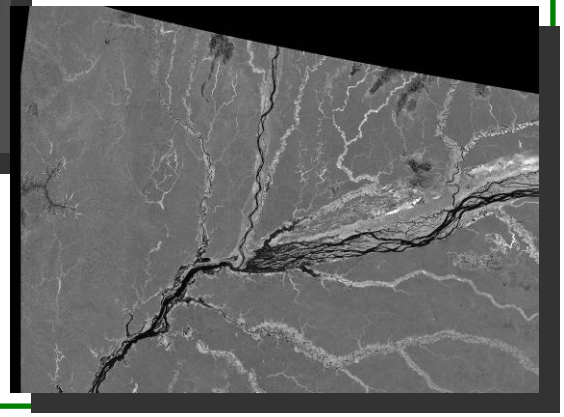


Trimmed and calibrated



Simulated SAR image based on SRTM

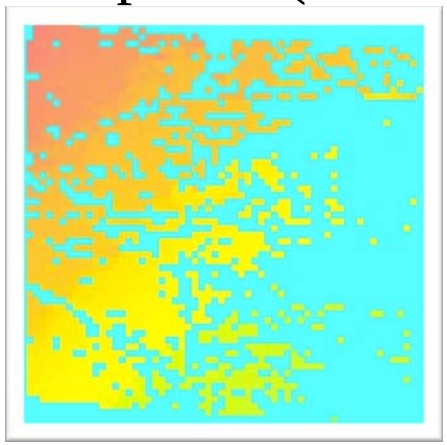
Averaged image geocoded back to slant range



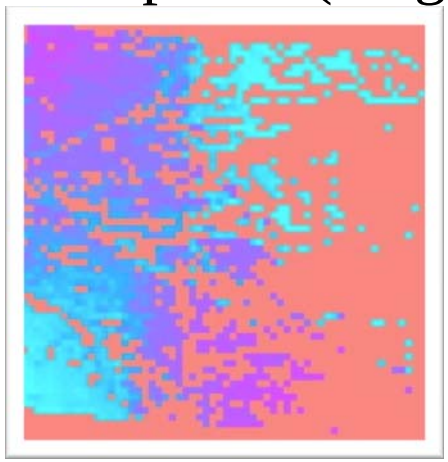
Range and Azimuth Offsets

Before geocoding refinement

0 to 23 pixels (azimuth)



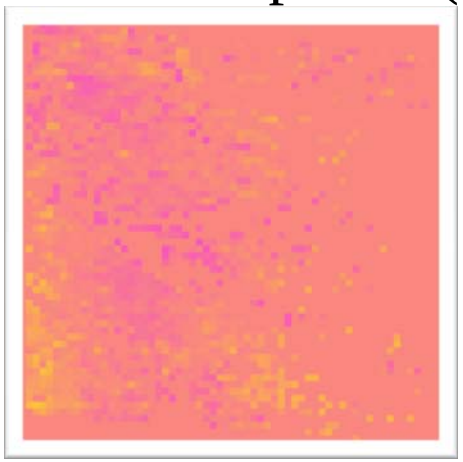
-2 to +2 pixels (range)



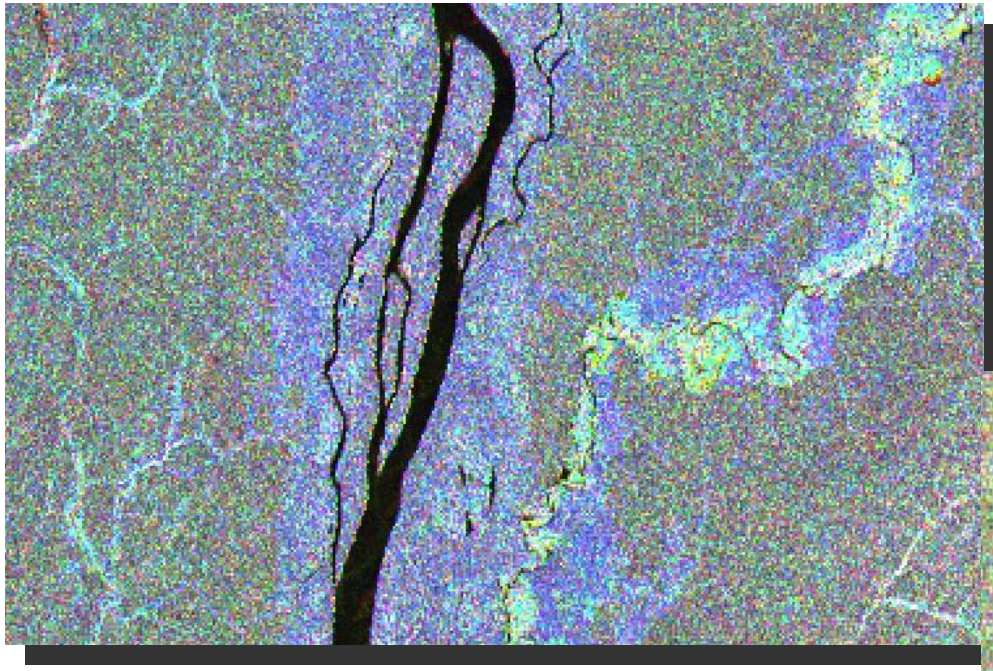
After geocoding refinement

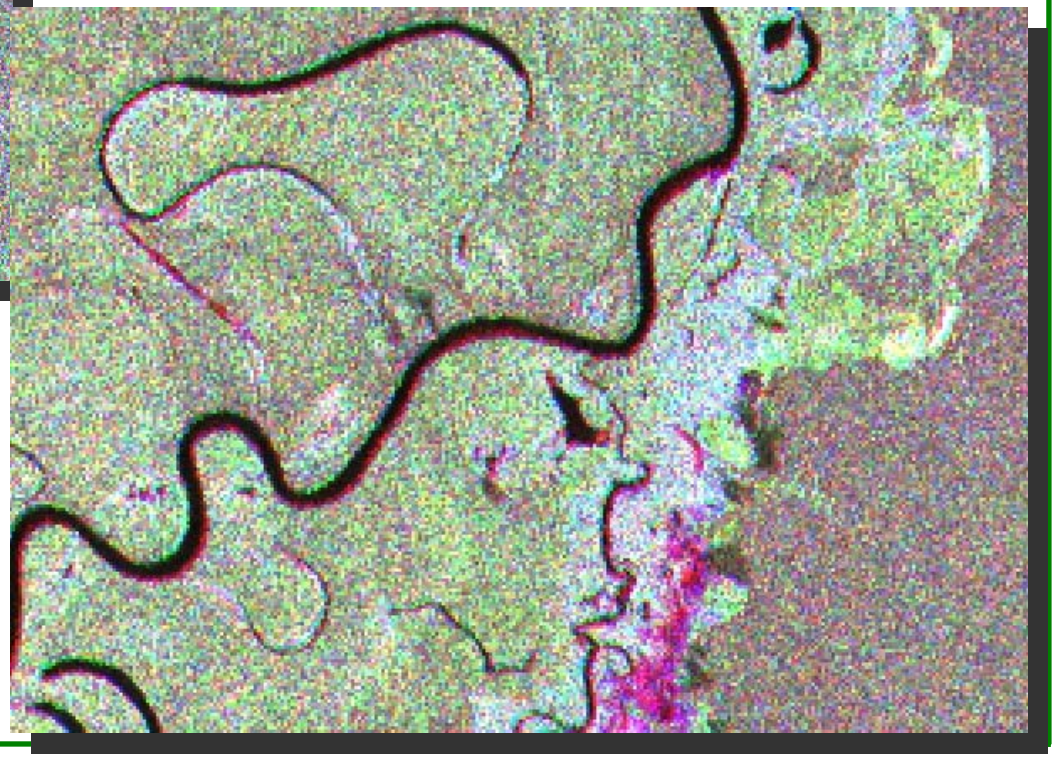
-1 to +1 pixels (azimuth)

-1 to +1 pixels (range)



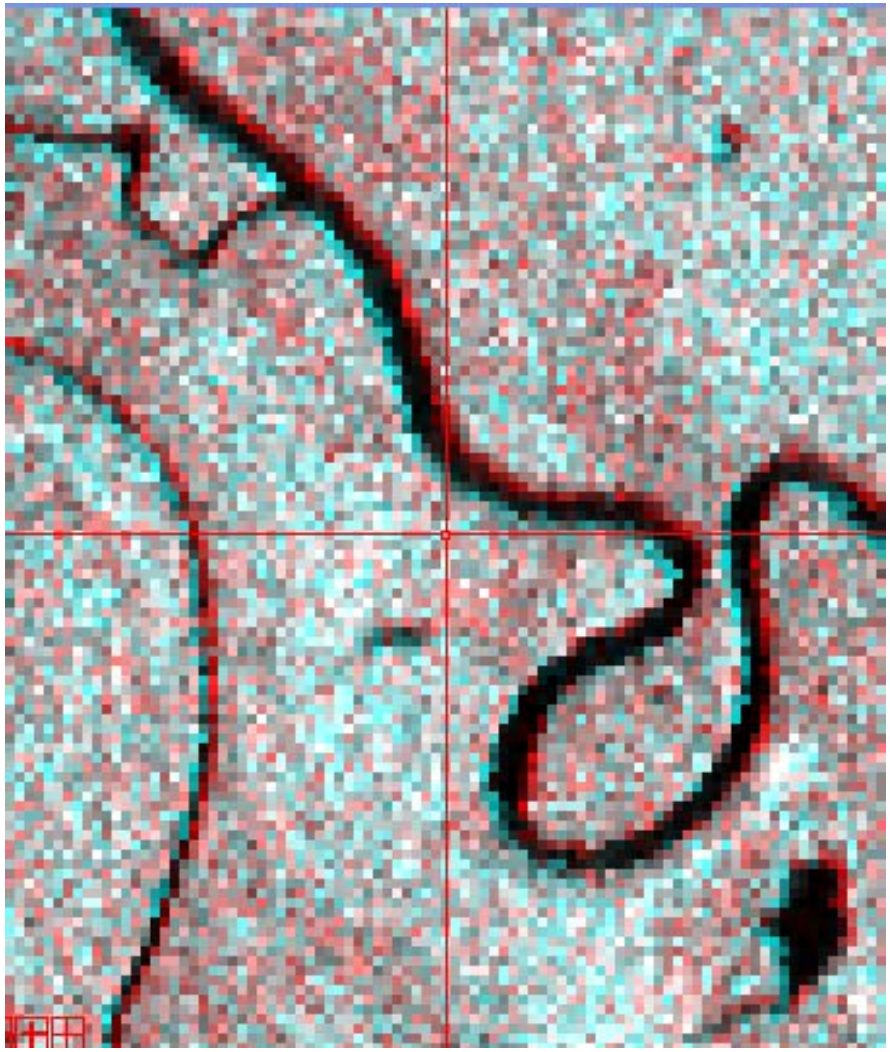
Geolocation Errors





Three combined SCANSAR images
Image 1 Red
Image 2 Green
Image 3 Blue

Geolocation Errors



- **Geometric offset between images visible as one color showing up on edge of river (in this case, the red image)**

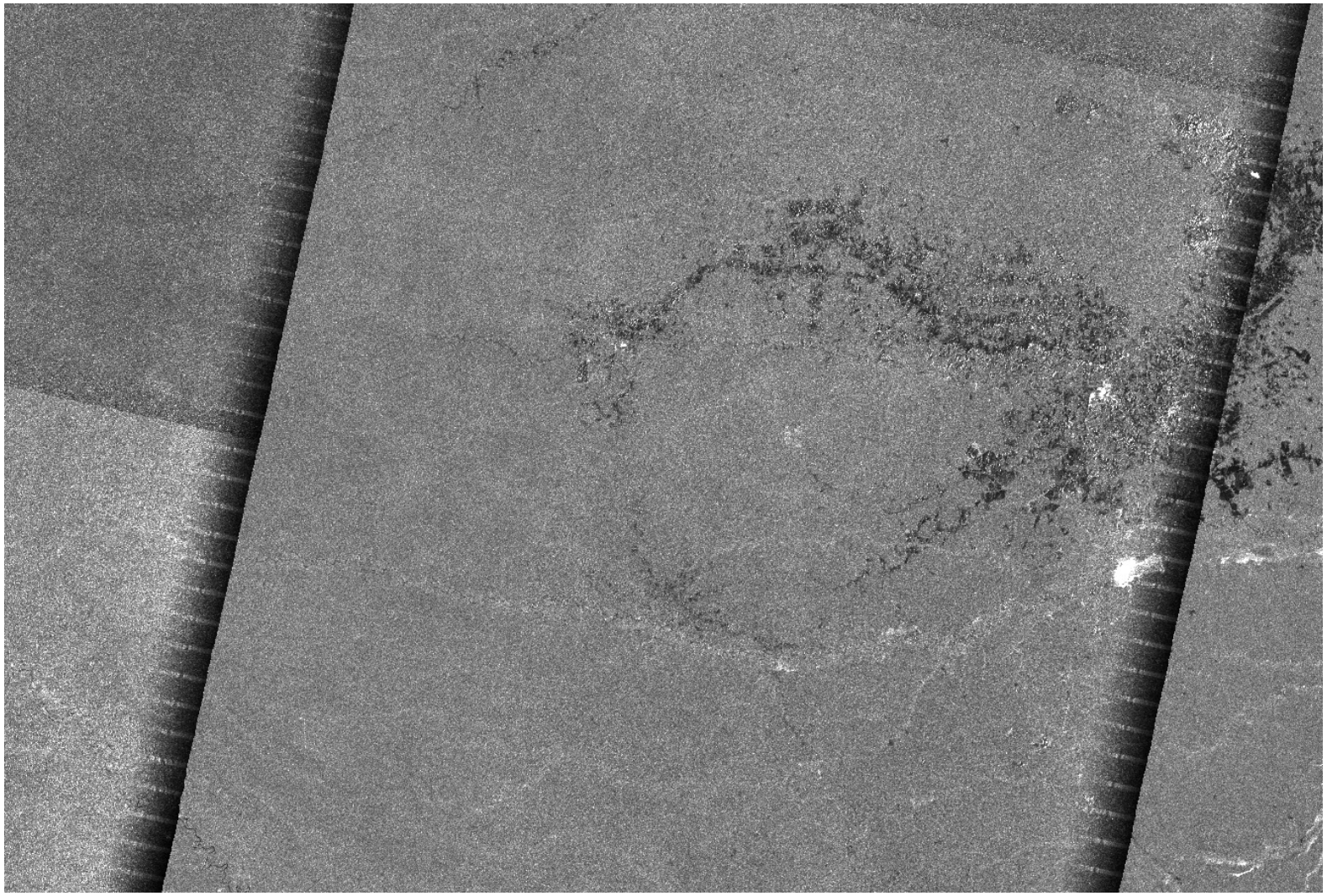
Three combined SCANSAR images
Image 1 Red
Image 2 Green
Image 3 Blue

Step by step

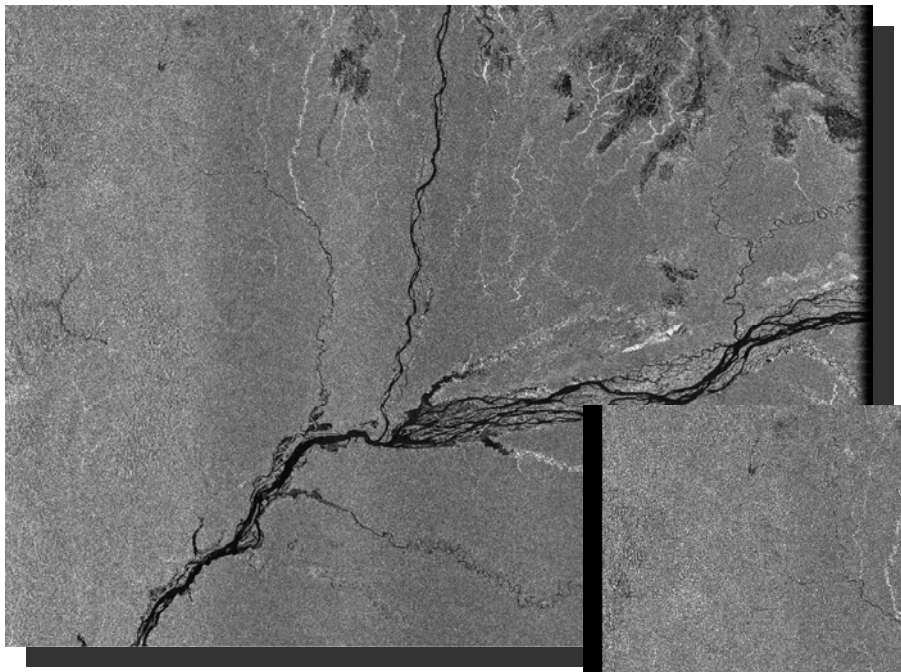
Processing:

- Calibrate
  - eliminate artifacts in near and far range in slant plane
  - correct other radiometric errors
  - apply slope and look angle dependent calibration factors (terrain correction)
  - using existing geocoding parameters, re-project data to ground plane
- Formatting
  - convert to geotiff
  - make date, inc angle, files
  - subset tp 1deg tiles
- Make large scale image mosaics

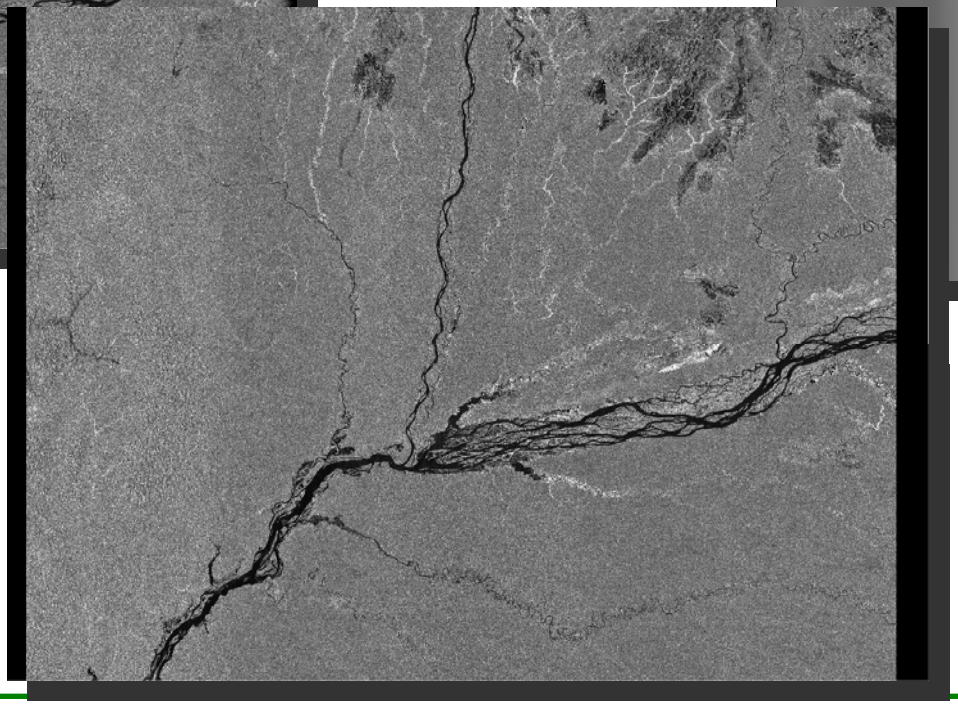
Far range artifacts in SCANSAR data



Not calibrated and trimmed versus calibrated and trimmed



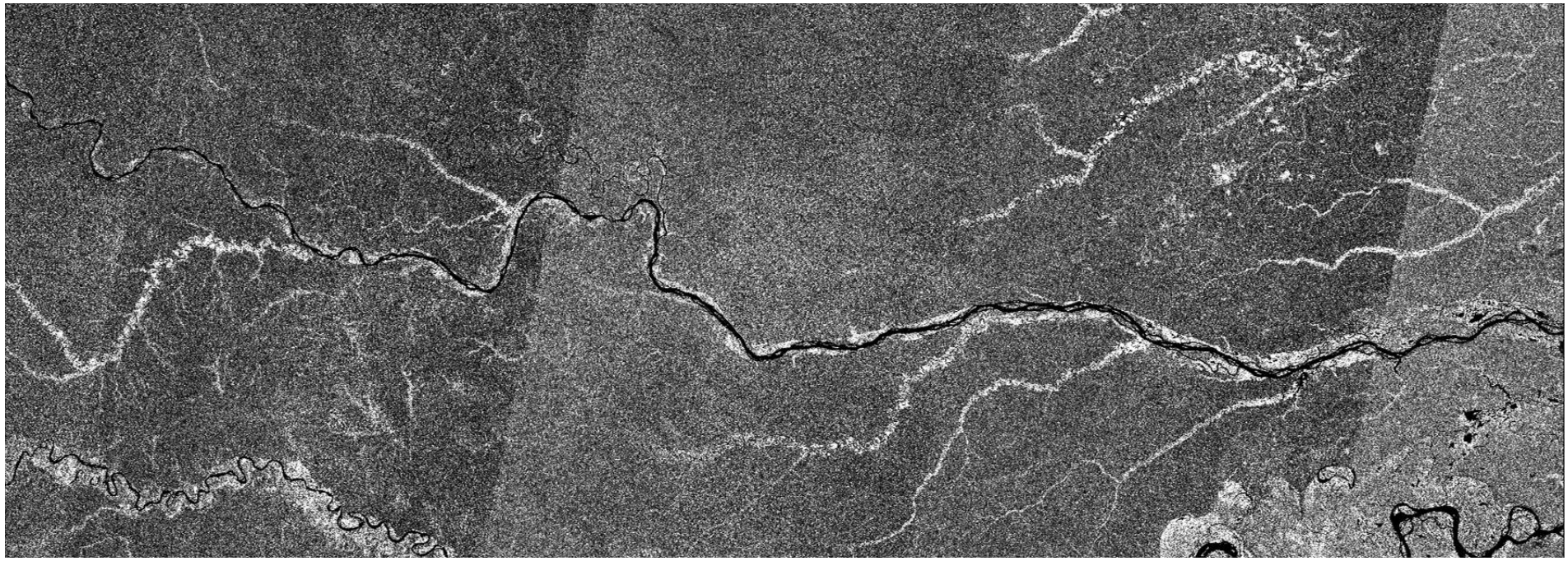
Original



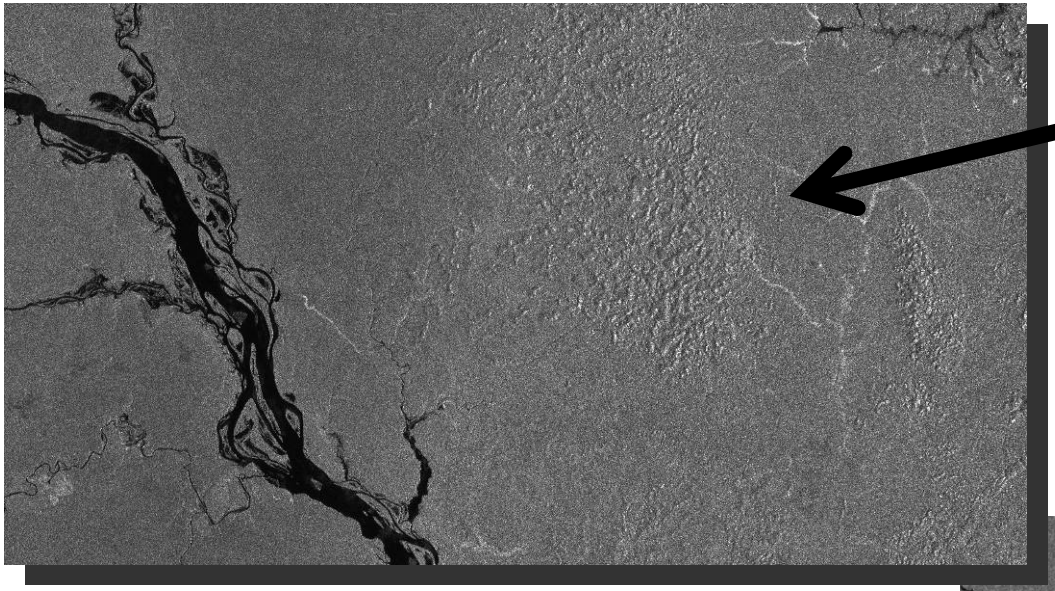
Calibrated and trimmed

Radiometric correction applied

Absolute Calibration Errors (or banding caused by environmental changes to signal)

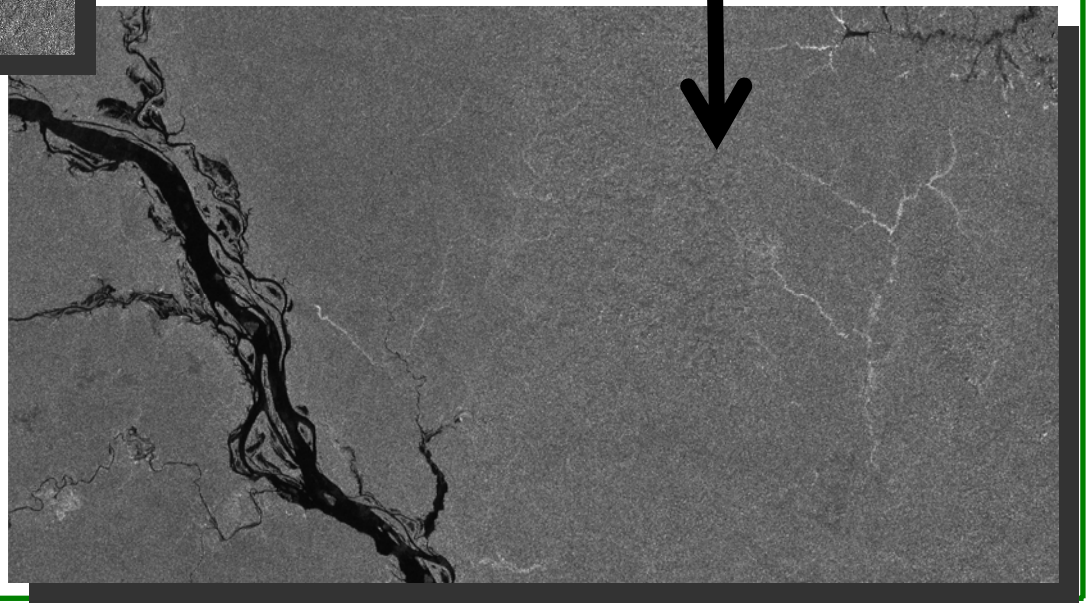


Terrain correction to radiometry versus no Terrain correction



Terrain effects due to slope

Terrain effects reduced



- ✓ Terrain effects can cause confusion during classification
- ✓ Correction requires accurate geolocation

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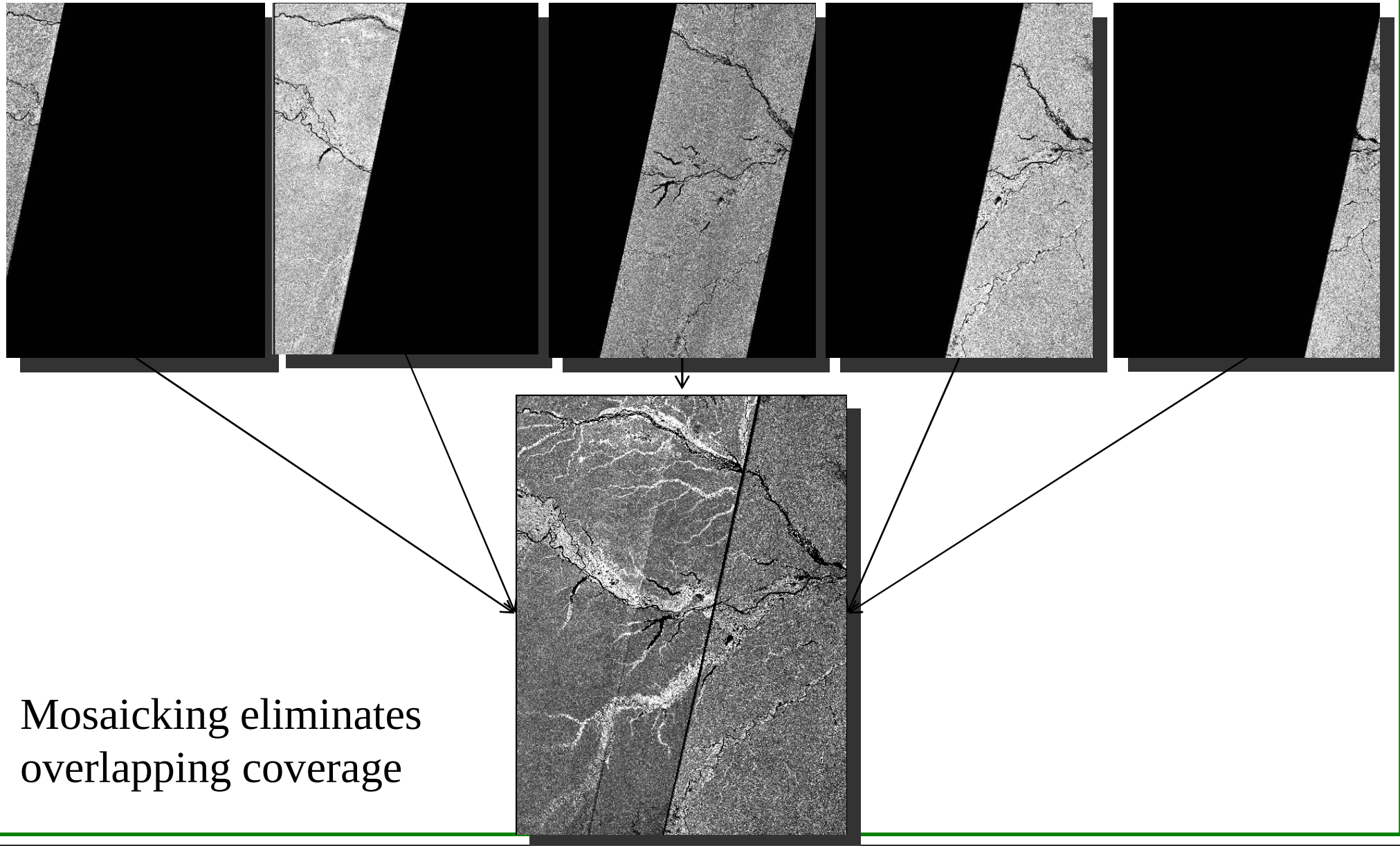
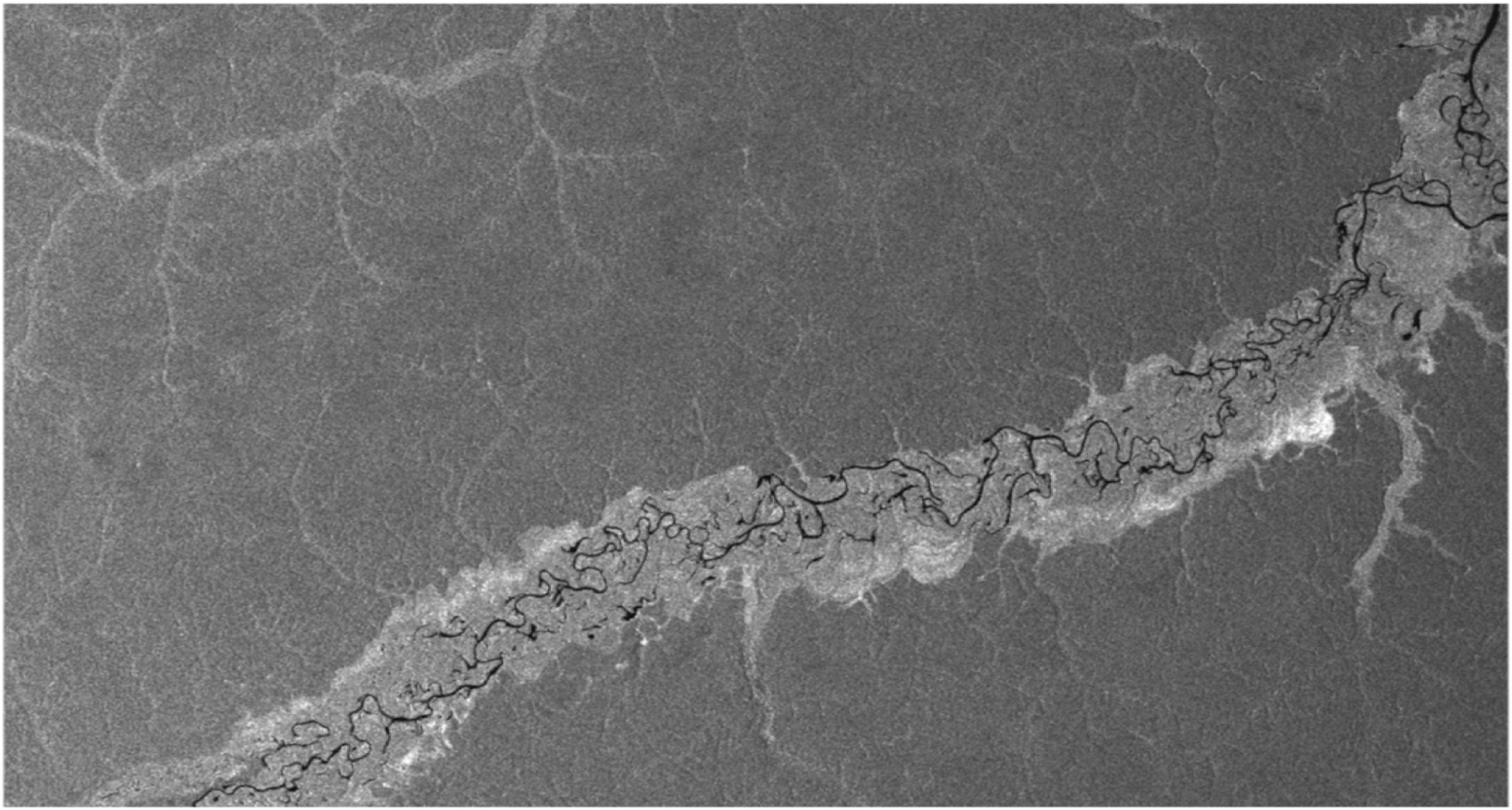


Mosaicking eliminates overlapping coverage

Averaging of 5 PALSAR scenes



FBD Mosaicking

Processing:

- N. America:
  - We still have gaps that need to be filled in (110 image strips are needed still)
  - We have processed 371 image strips (all)

- S. America:
  - Radiometric Calibration of the data is still TBD
  - We have processed 17 image strips (some have radiometric error still)

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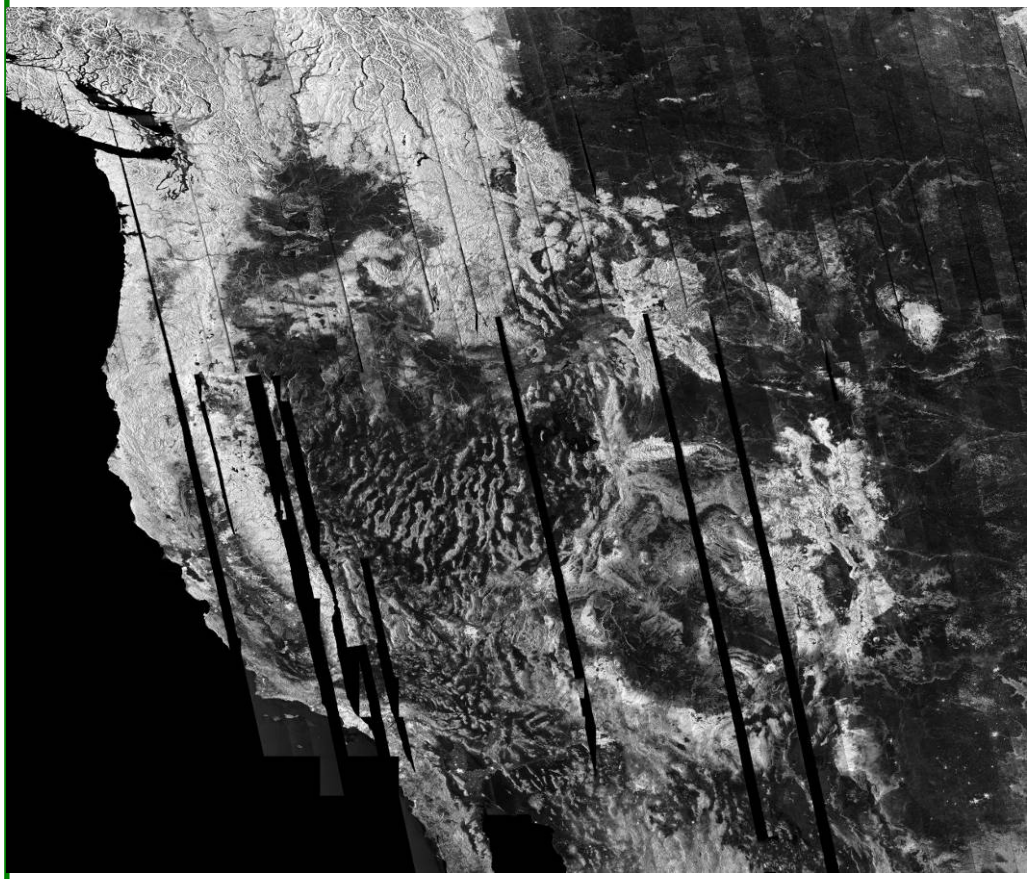
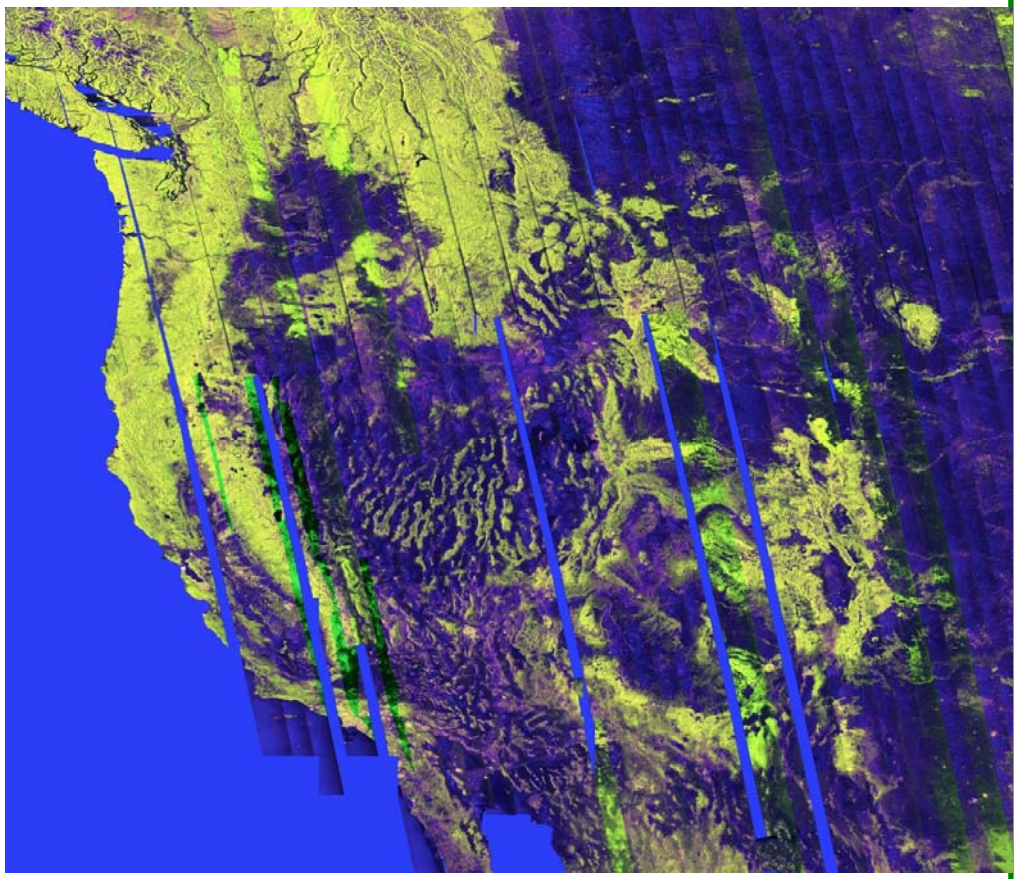
Preliminary FBD Mosaics



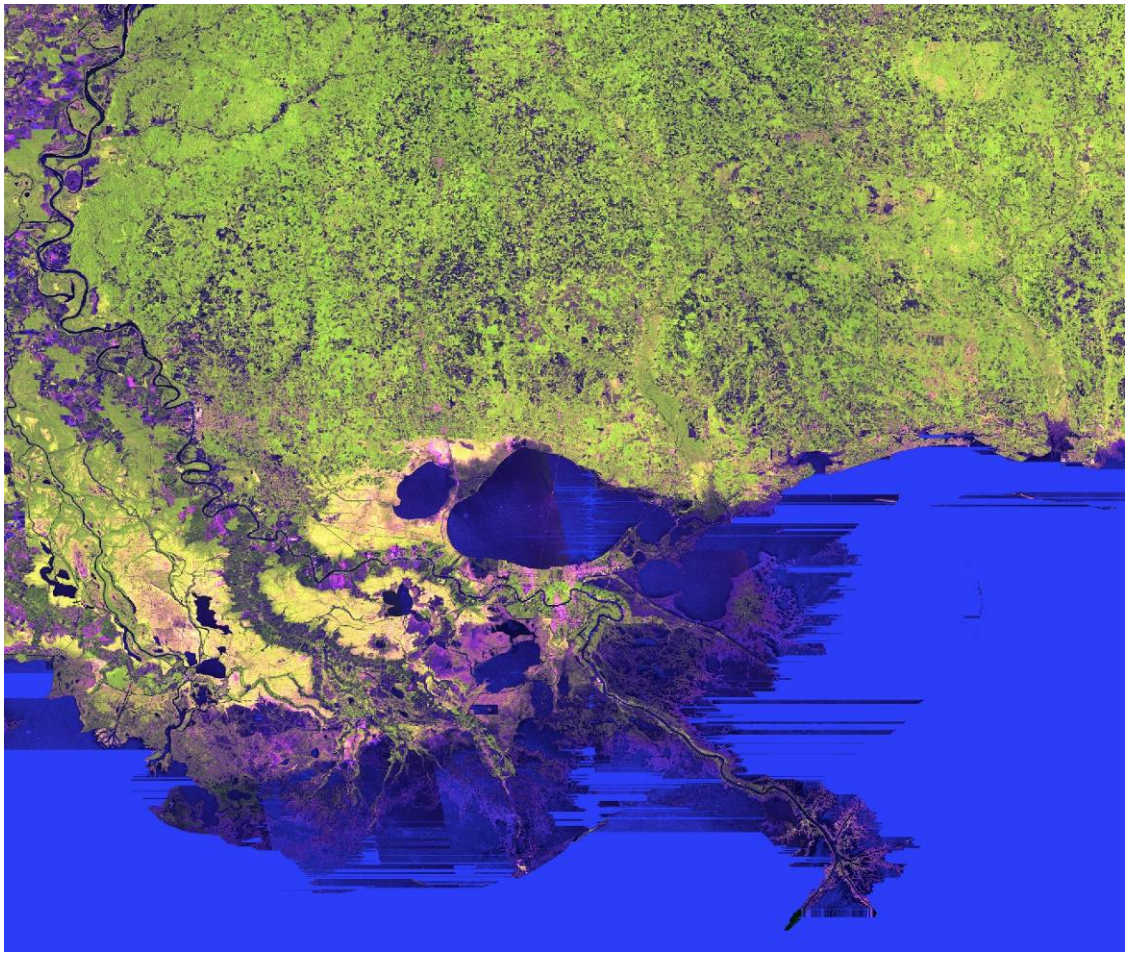
HH



HH HV RT

Western North America

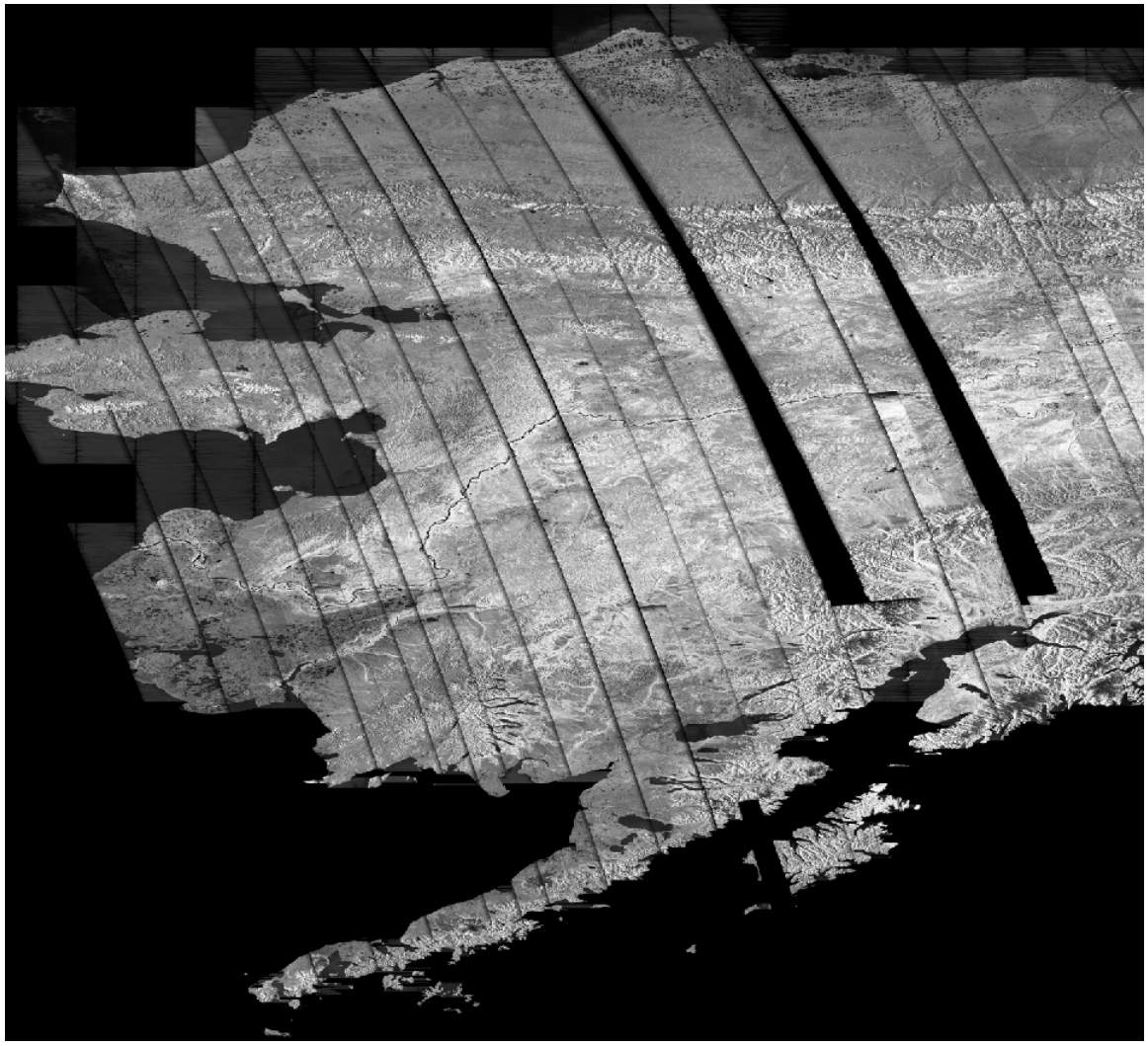
Preliminary FBD Mosaics



HH HV RT

Mississippi Delta

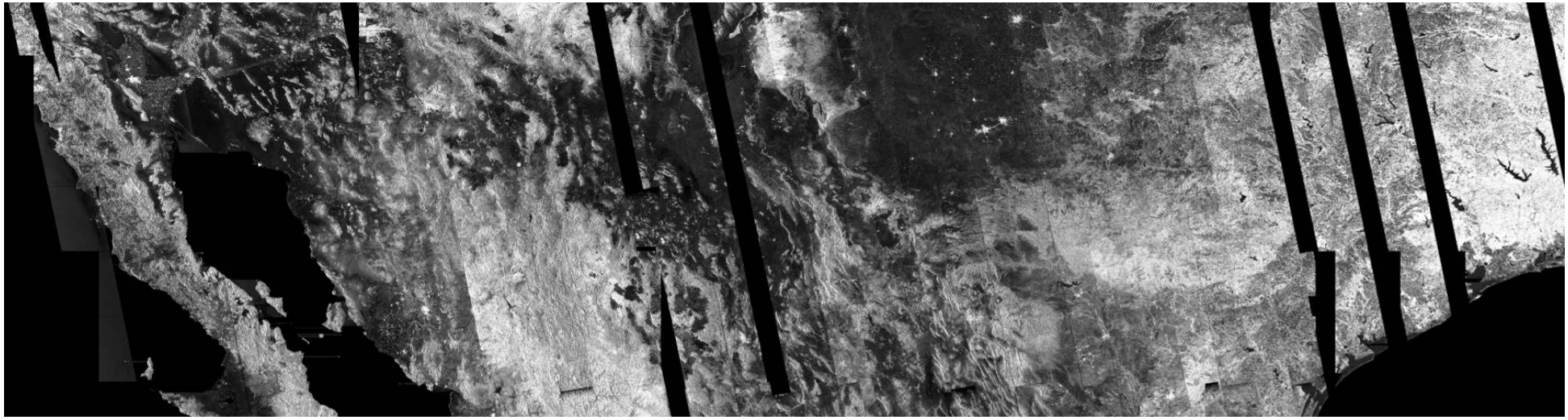
Preliminary FBD Mosaics



Alaska

HH

Preliminary FBD Mosaics



HH

Mexico and Texas

SCANSAR Mosaicking

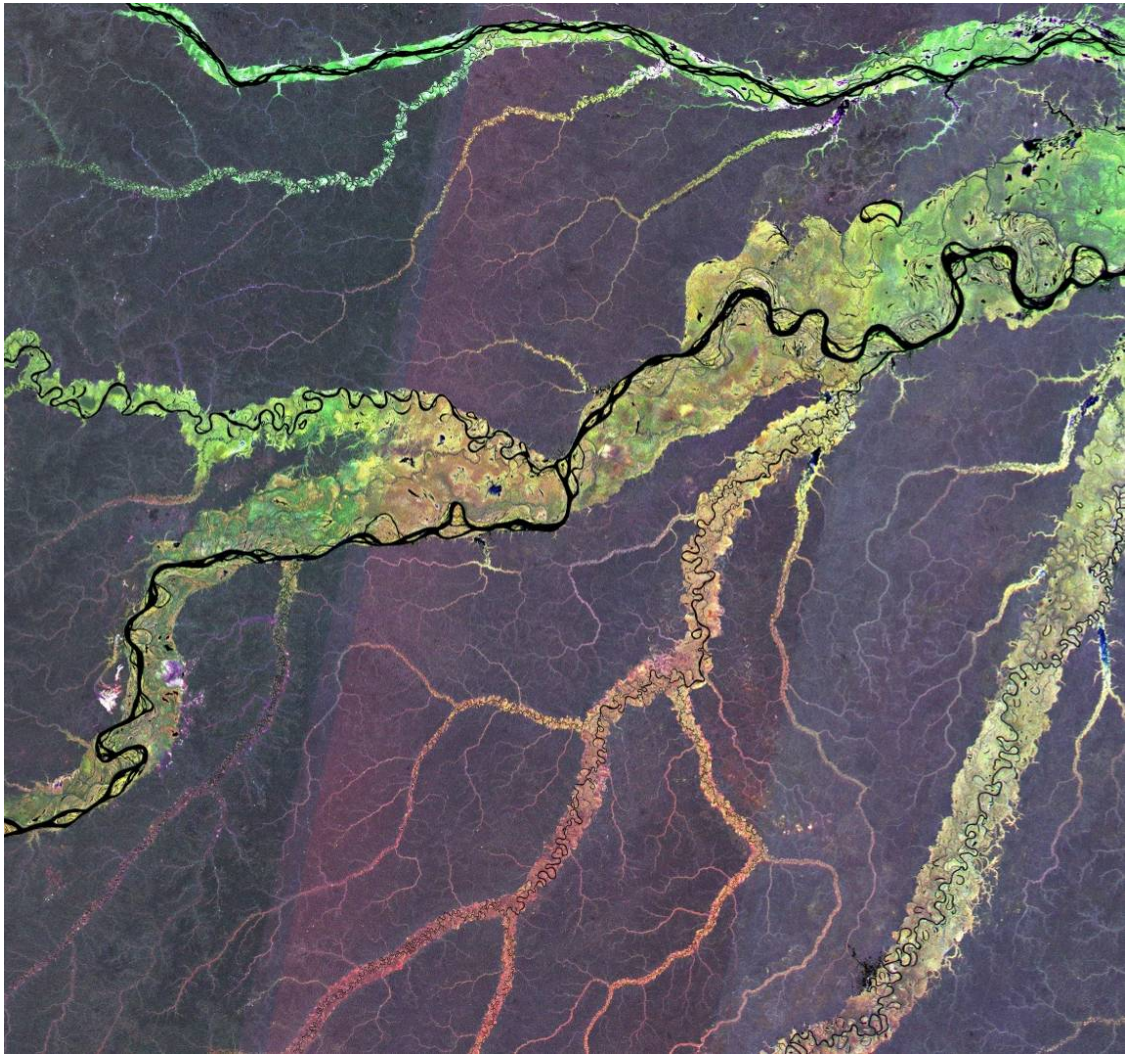
Processing so far:

- South America:
  - 152 SCANSAR image strips have been partially processed out of 229.
  - 2 TB of data products
- Africa
  - A small number of strips

Preliminary SCANSAR Mosaics

Three color overlay of

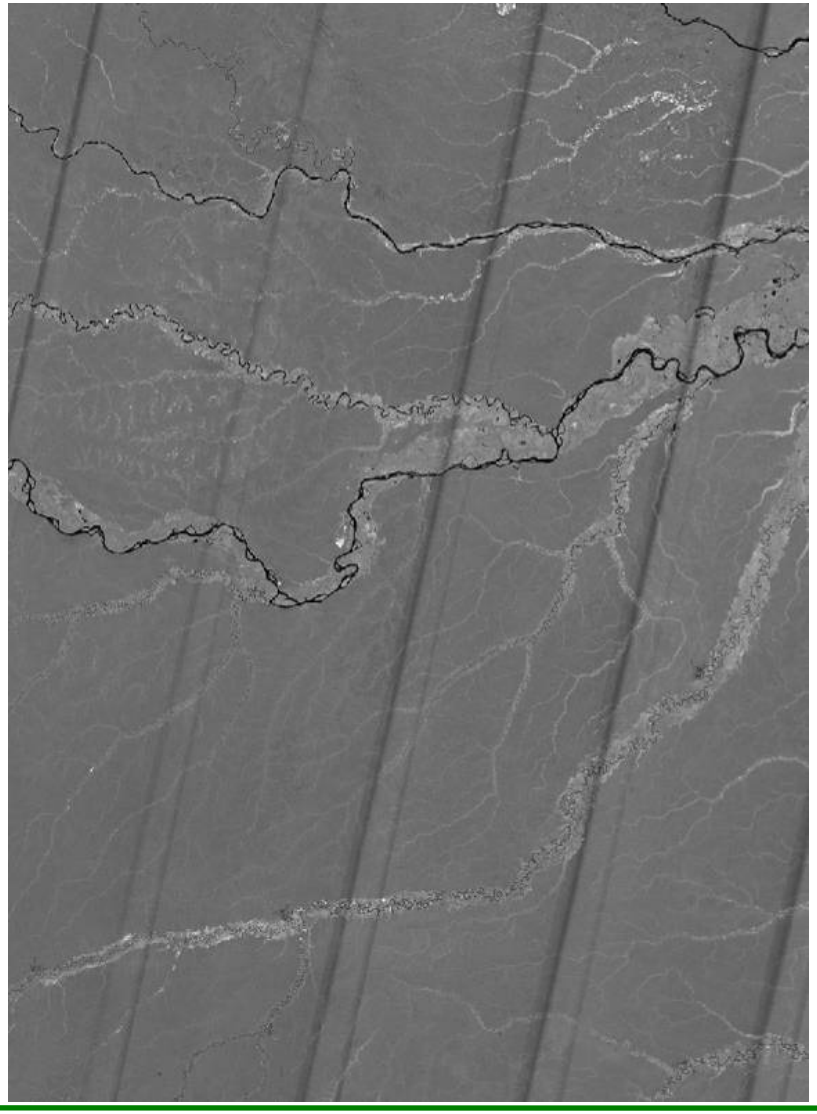
- March
- June
- November



Preliminary SCANSAR Mosaics

November scenes

HH



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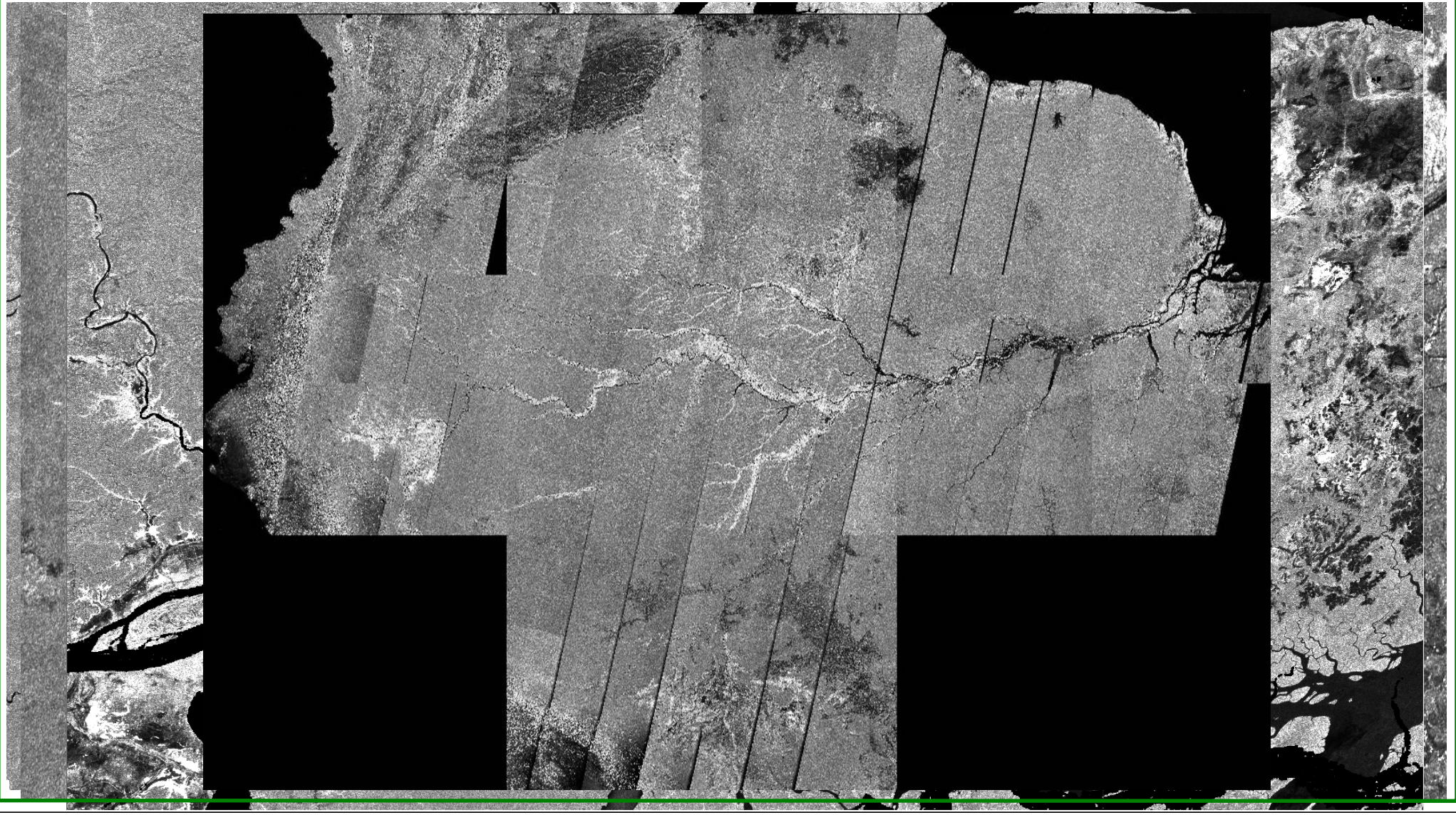
July 2007 data

Preliminary SCANSAR Mosaics

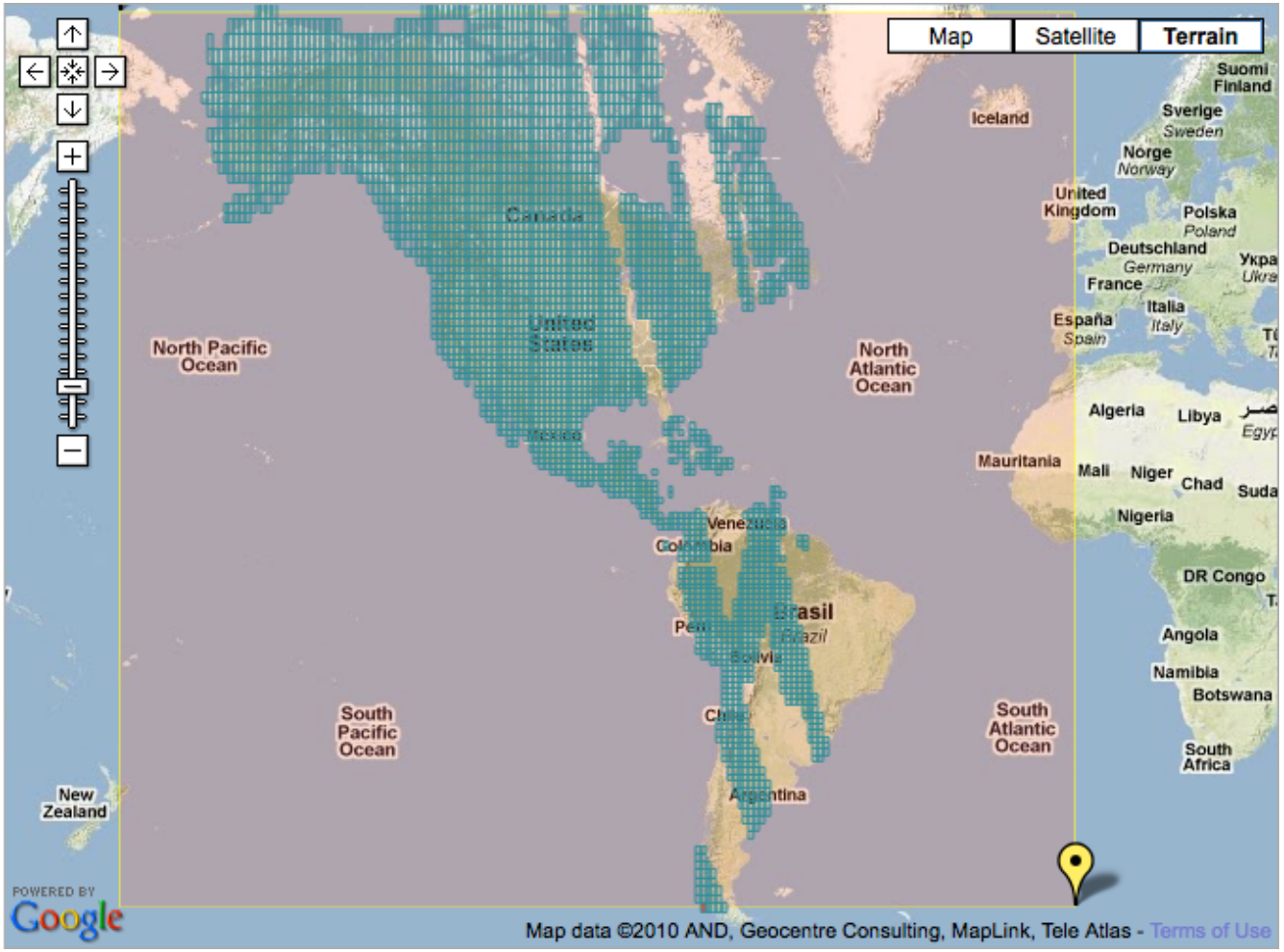


Web Tool for Mosaicking

Status

- scripts developed to read through data directories to update mySQL database
- user accounts and passwords managed through website
- may display orbit paths
- geographically, temporally, modally select data to mosaic
- mosaic 1 deg tiles
- profile page where user may manage saved mosaics (view, download, delete, email)

Coverage


Map
Satellite
Terrain
Iceland
Suomi Finland
Sverige Sweden
Norge Norway
United Kingdom
Polska Poland
Deutschland Germany
France
España Spain
Italia Italy
Canada
United States
North Pacific Ocean
North Atlantic Ocean
Algeria
Libya
Mauritania
Mali
Niger
Chad
Nigeria
DR Congo
Angola
Namibia
Botswana
South Africa
Venezuela
Brasil
Peru
Bolivia
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Argentina
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South Atlantic Ocean
New Zealand
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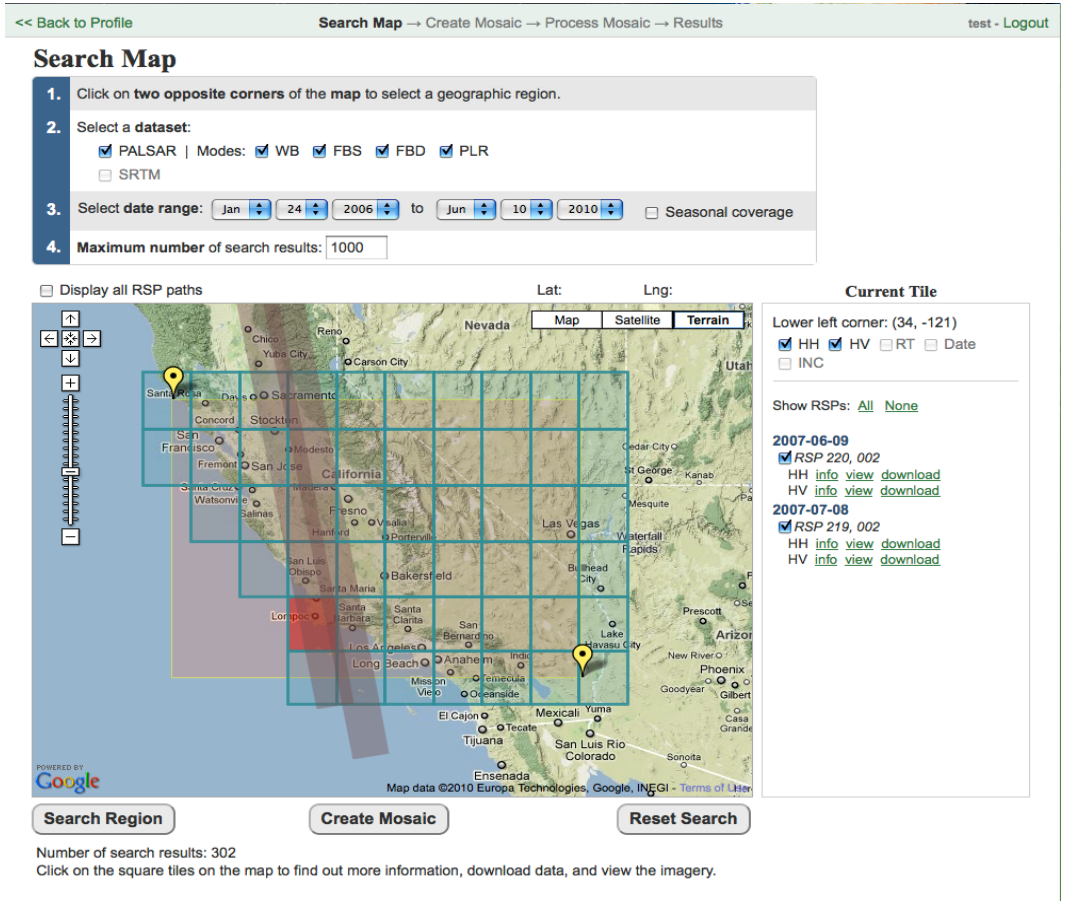
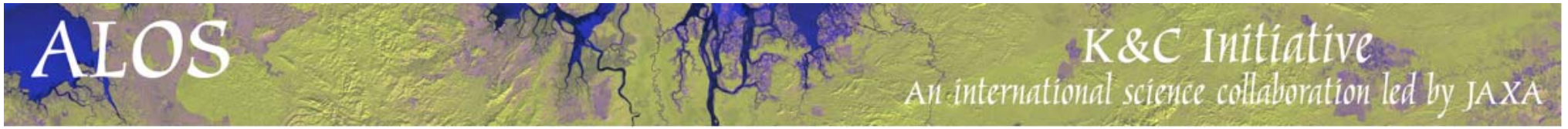
  - RSPs (image swaths)





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