Analyzing ABI and Suomi NPP data using HYDRA2

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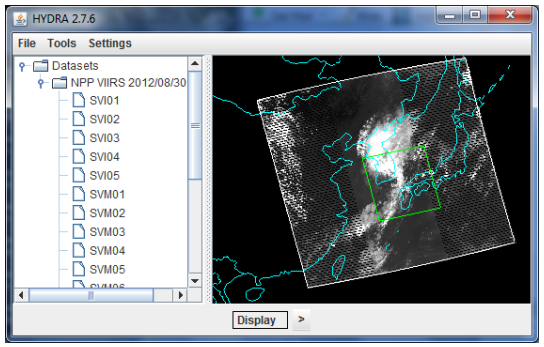
What is HYDRA2?
What can it do?
Some examples
How to get it?

HYperspectral viewer for Development of Research Applications – HYDRA2

AHI, ABI

MODIS, AIRS, AVHRR, IASI, VIIRS, CrIS, ATMS

Freely available gui-driven software
For researchers and educators
Computer platform independent
Extendable to more sensors and applications
Uses Java-based technologies
Interactive, high-performance 2D/3D animations
derived from SSEC VisAD api
On-going development effort (since 2004)



Developed by
Tom Rink

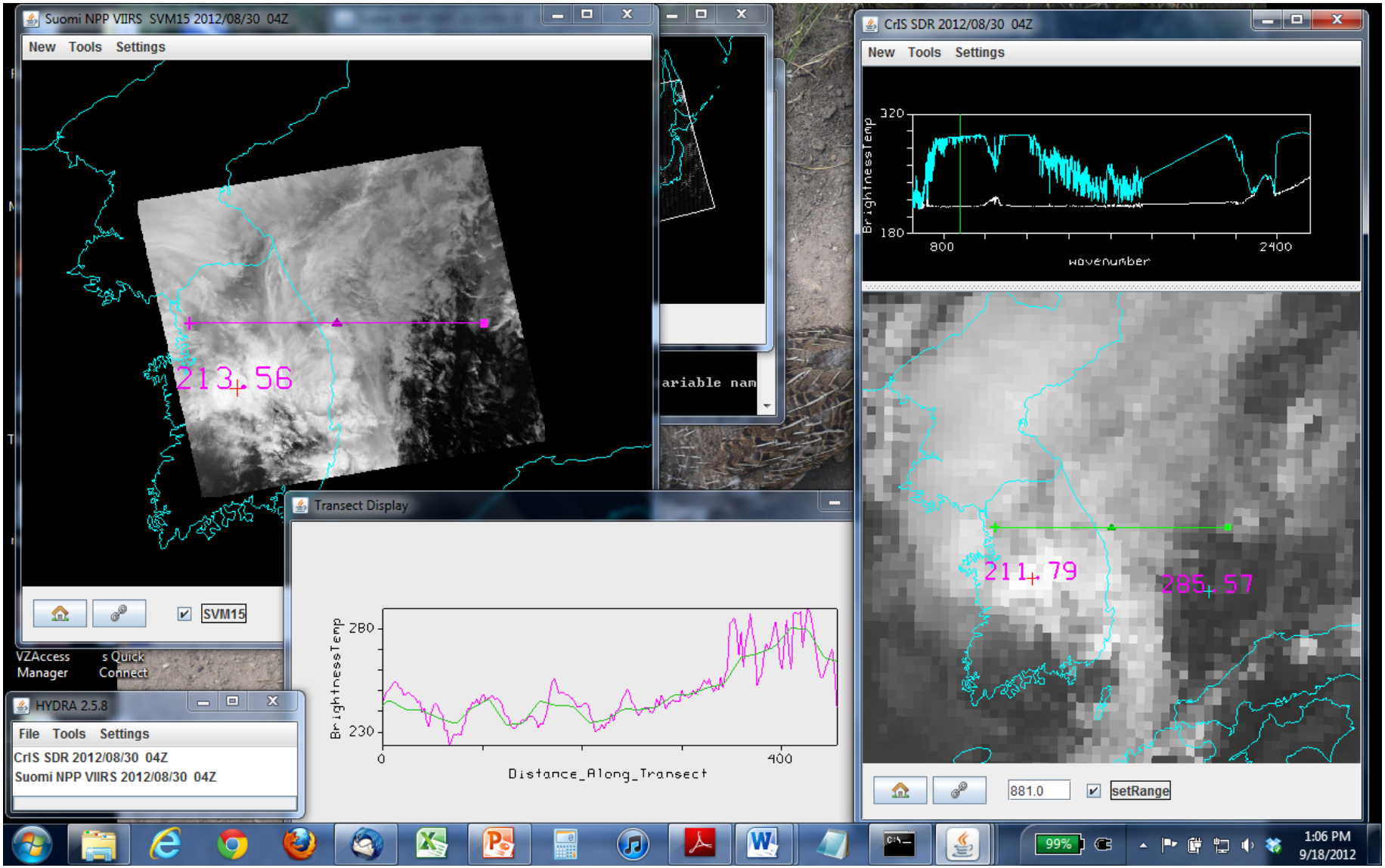
Programming Support from
Ghansham Sangar (ISRO)
Tommy Jasmin (SSEC)
Jon Beavers (SSEC)

Steering guidance from
Liam Gumley
Kathy Strabala
Paul Menzel

SSEC

S/W available at http://cimss.ssec.wisc.edu/cspp/
More description can be found in
Rink et al, 2015: HYDRA2, BAMS,97, 1283-1294. doi:10.1175/BAMS-D-14-00285

Viewing remote sensing data with HYDRA2



VIIRS and CrIS

Accessing visualization tools & data

For HYDRA2
http://cimss.ssec.wisc.edu/cspp

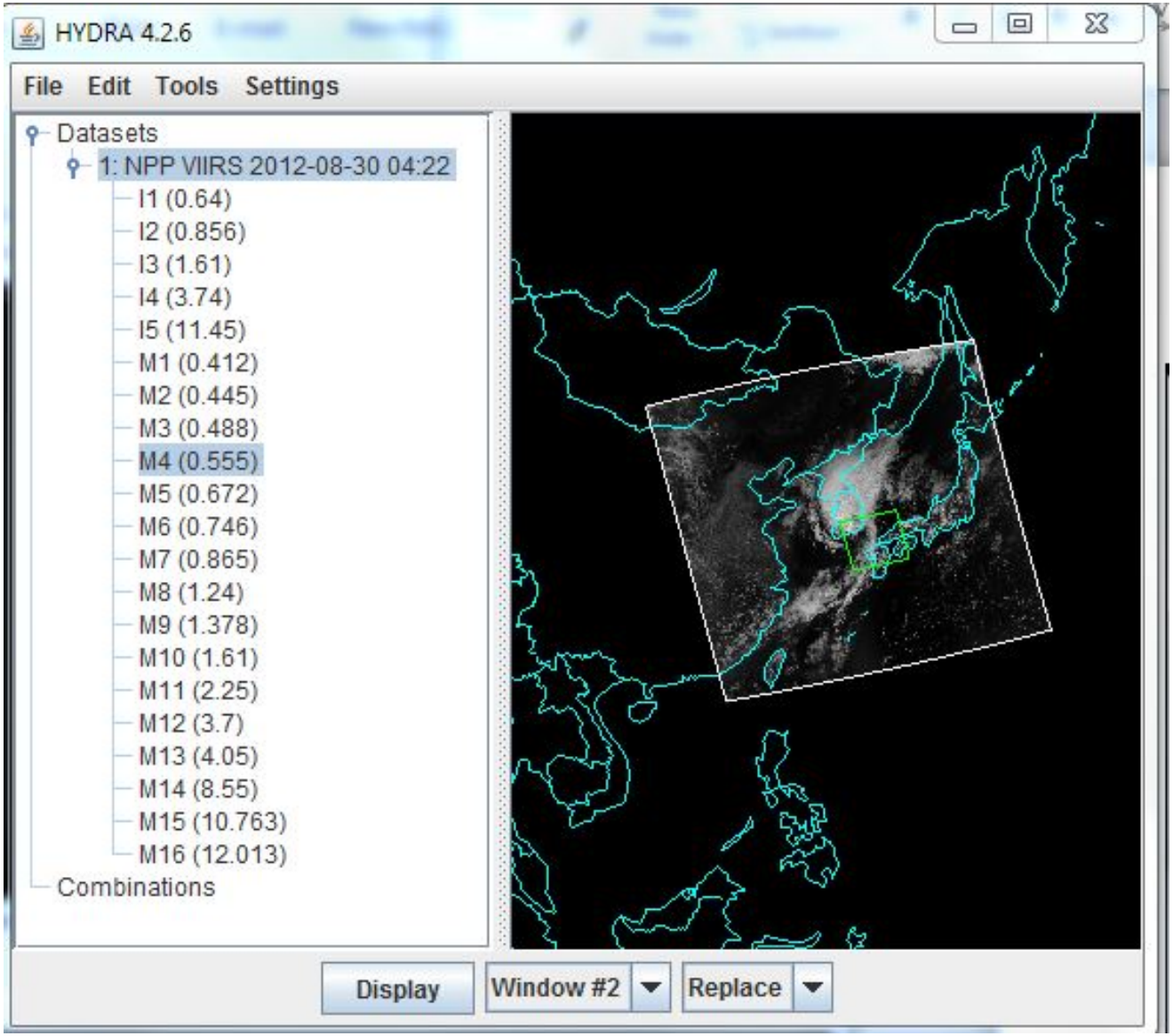
For MODIS data
http://rapidfire.sci.gsfc.nasa.gov/realtime
https://ladsweb.modaps.eosdis.nasa.gov/

For AIRS and AMSU data
http://daac.gsfc.nasa.gov/

For VIIRS, CrIS, and ATMS data, orbit tracks, & guide
http://www.nsof.class.noaa.gov
http://www.ssec.wisc.edu/datacenter/npp/
http://bolt.ssec.wisc.edu/products/
http://www.class.ncdc.noaa.gov/notification/faq_npp.htm
See tutorial "How do I order NPP data in CLASS (11/28/11)"

Starting HYDRA2 and Viewing VIIRS and MODIS data

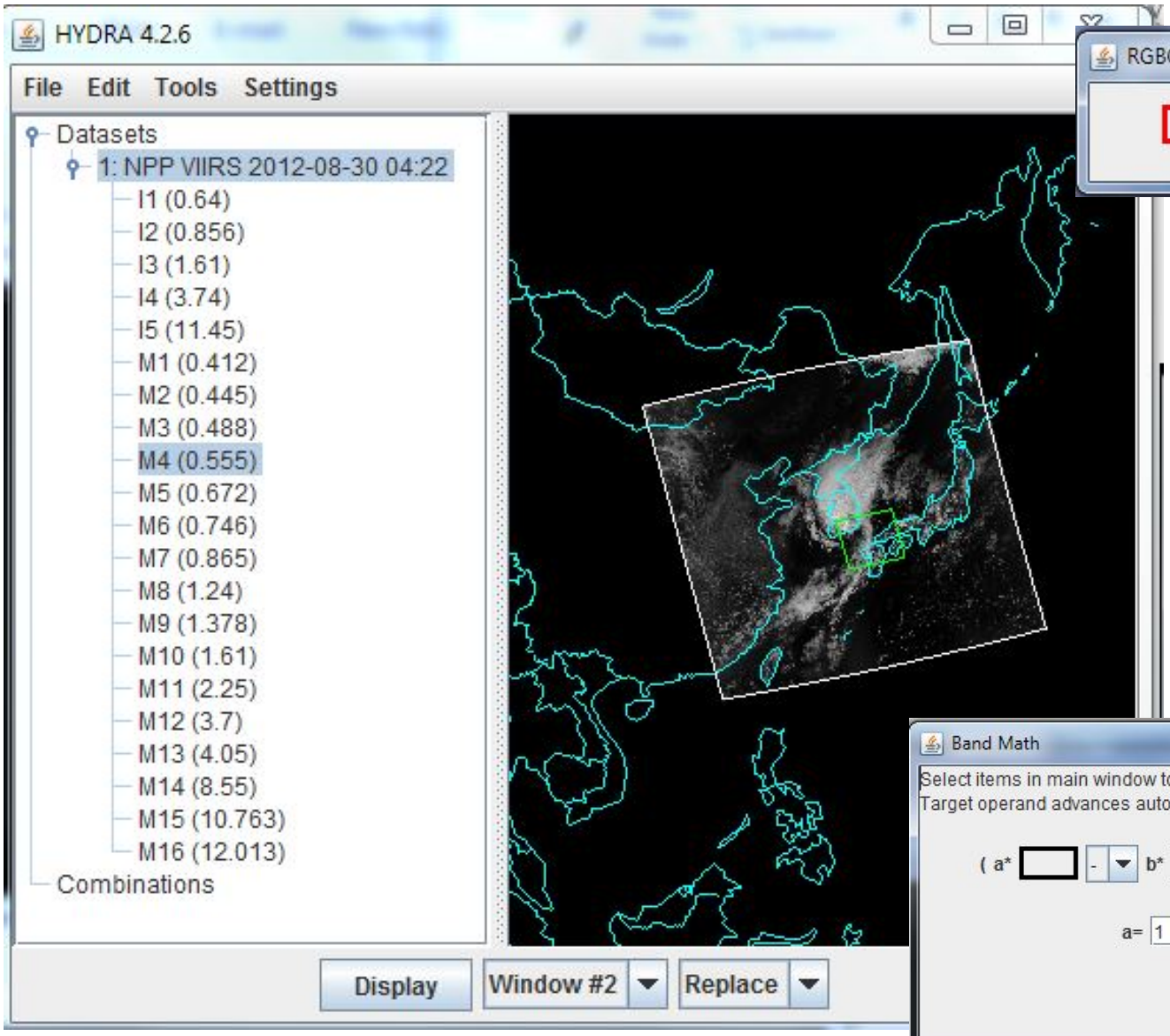
The HYDRA2 Main Window

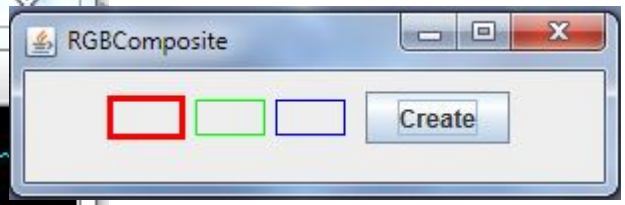


Tools
- **RGB Composite**
- **BandMath**

Settings
- **RegionMatching**
- **ReProjectMode**
- **ParallelCompute**

The HYDRA2 Main Window





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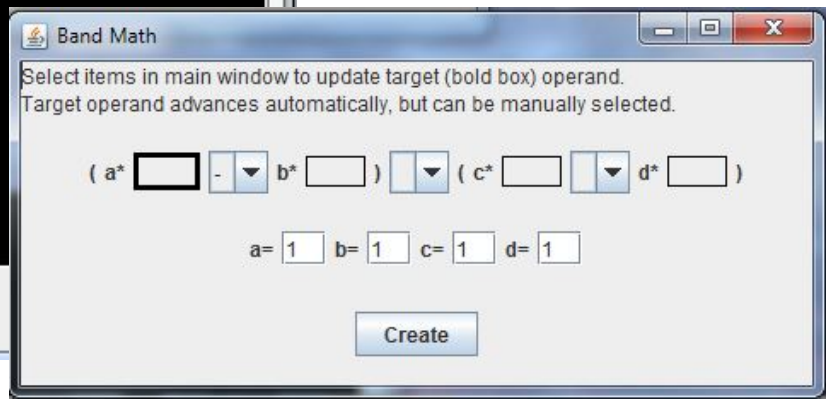
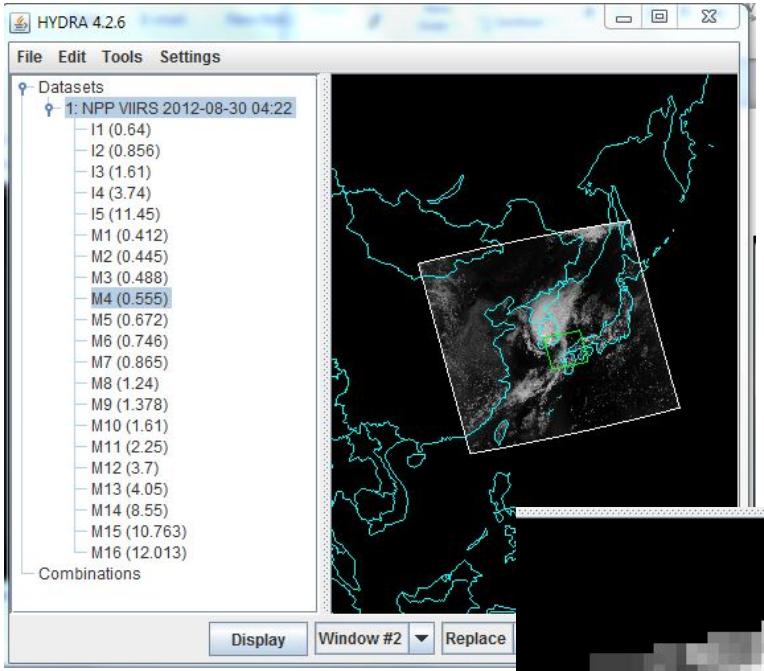


The HYDRA2 Main Window



Tools
- **RGB Composite**
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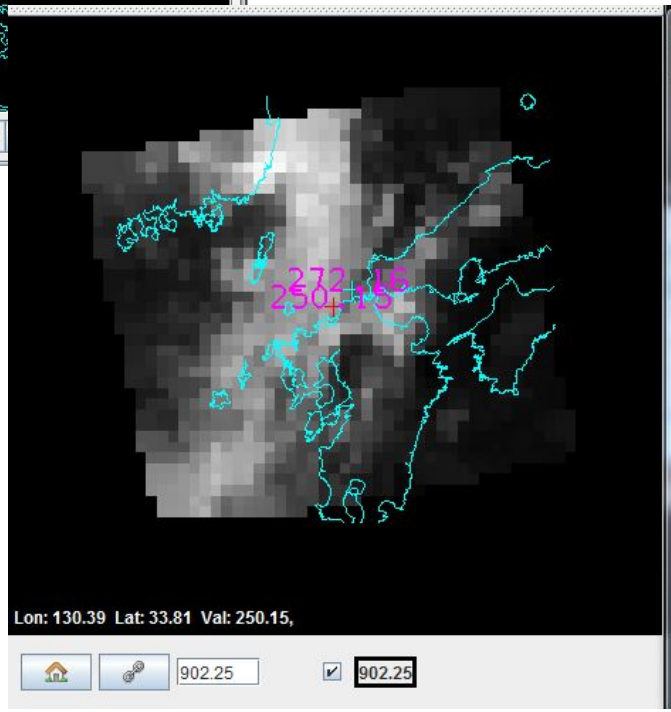
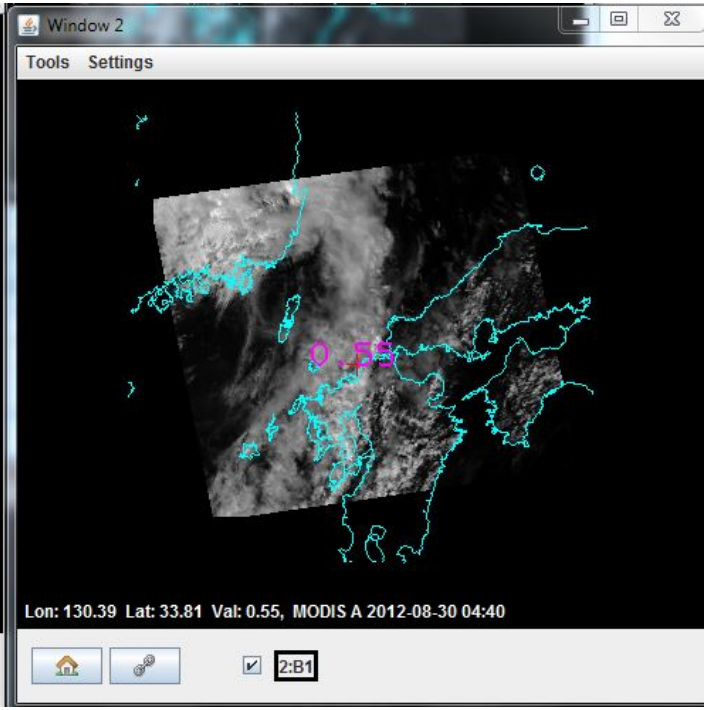
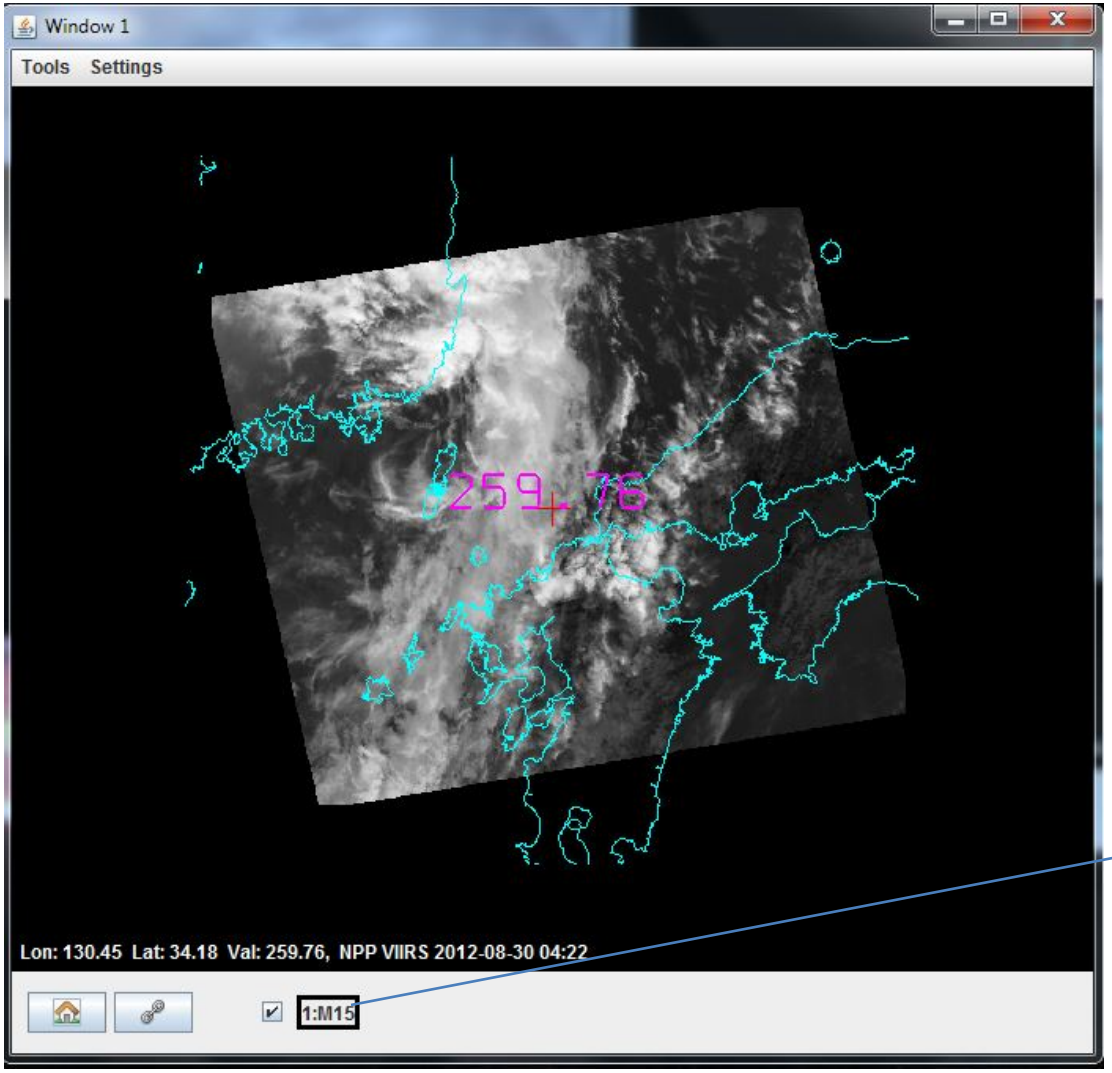
CrIS



VIIRS



The HYDRA2 Display Window

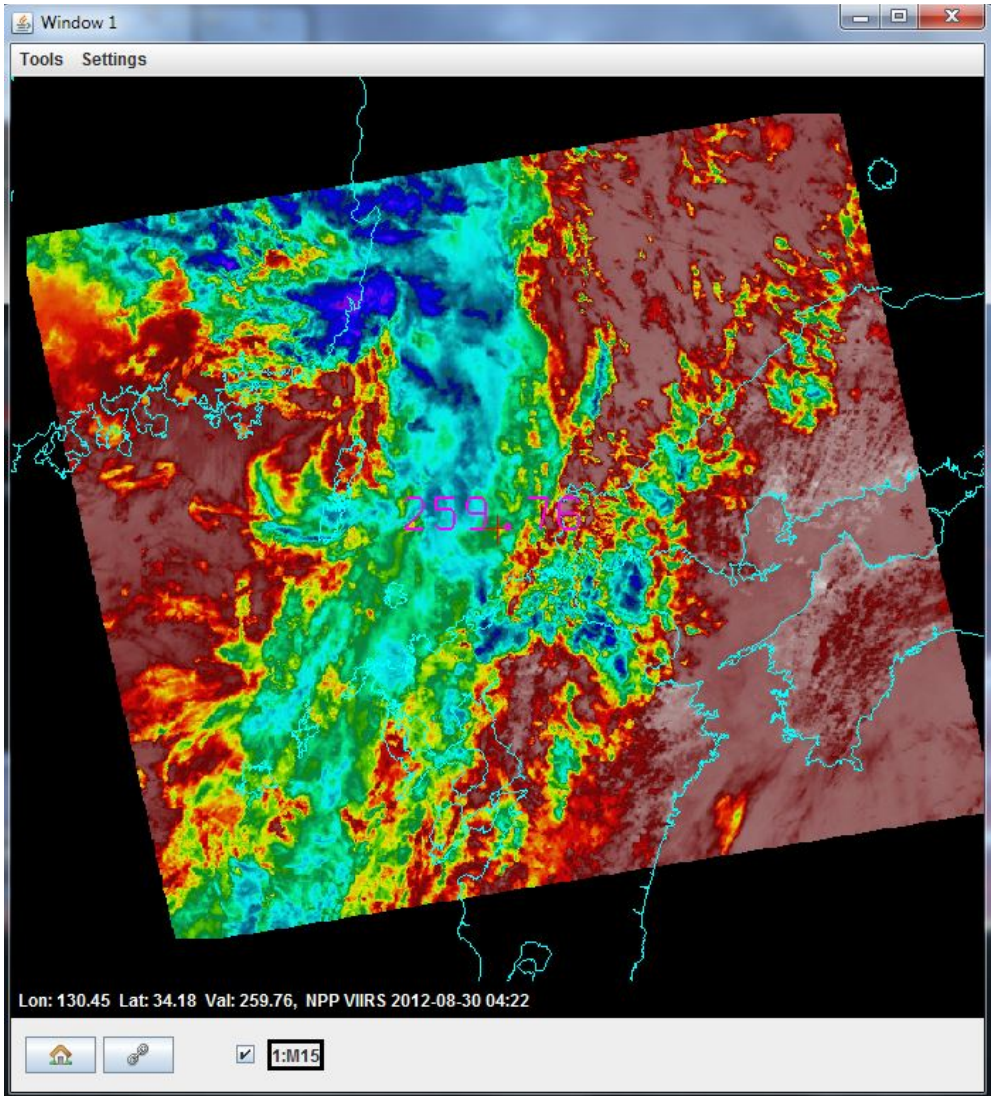


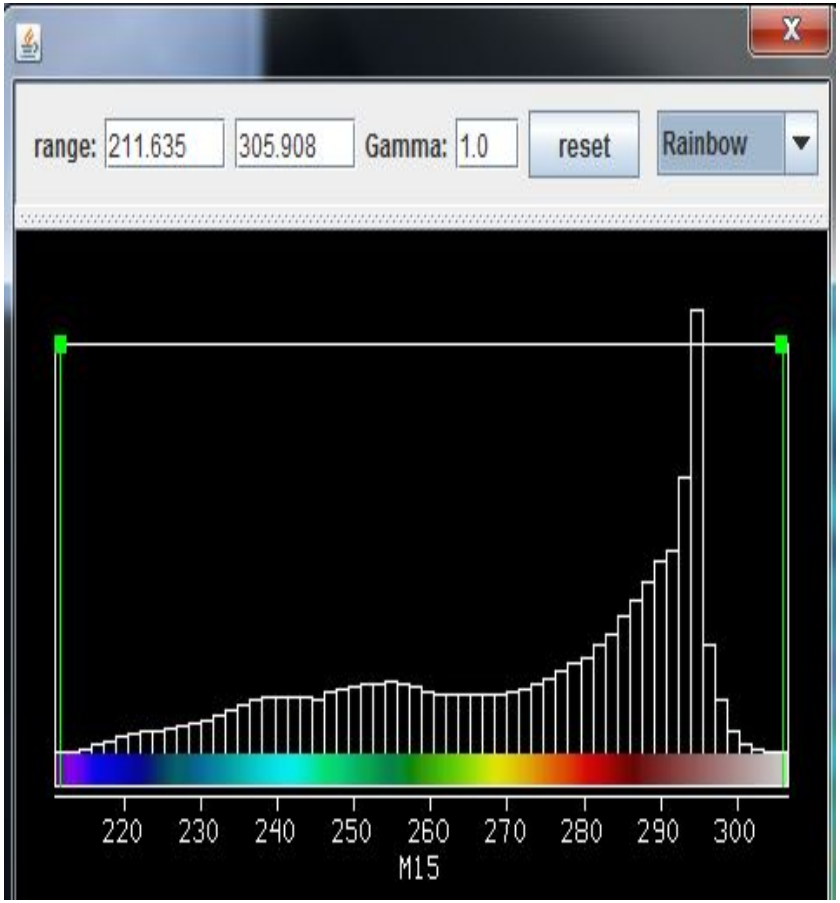
Tools
- Transect
- Scatter
- Spectra

Settings
- Coastlines
- Min-Max
- Probe Readout
- ColorScale

Enhancements
- Range
- Gamma
- Bits to BW or Color
  - InvGray
  - Gray
  - Rainbow
  - InvRainbow
  - Heat

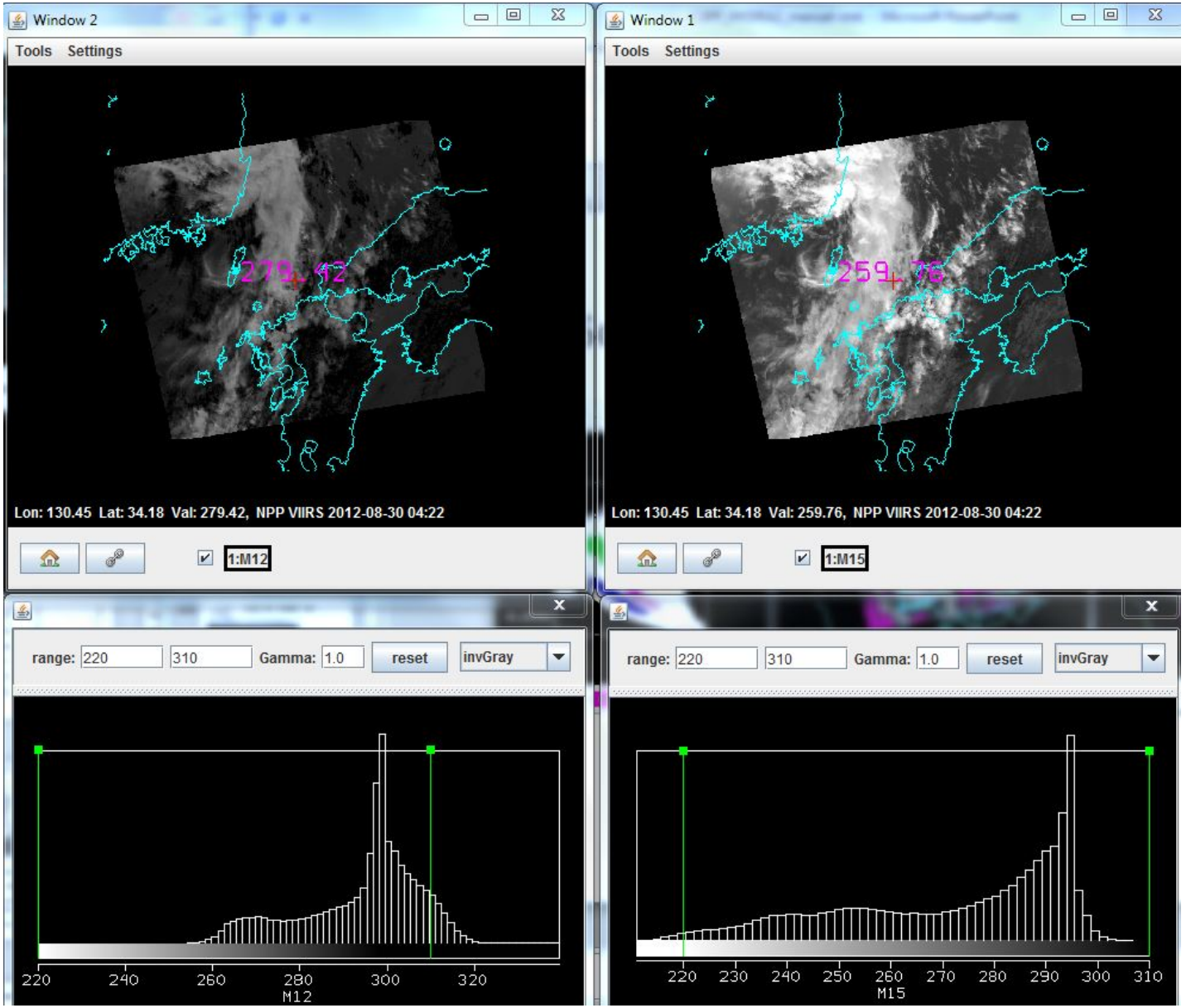
Using Rainbow Enhancement



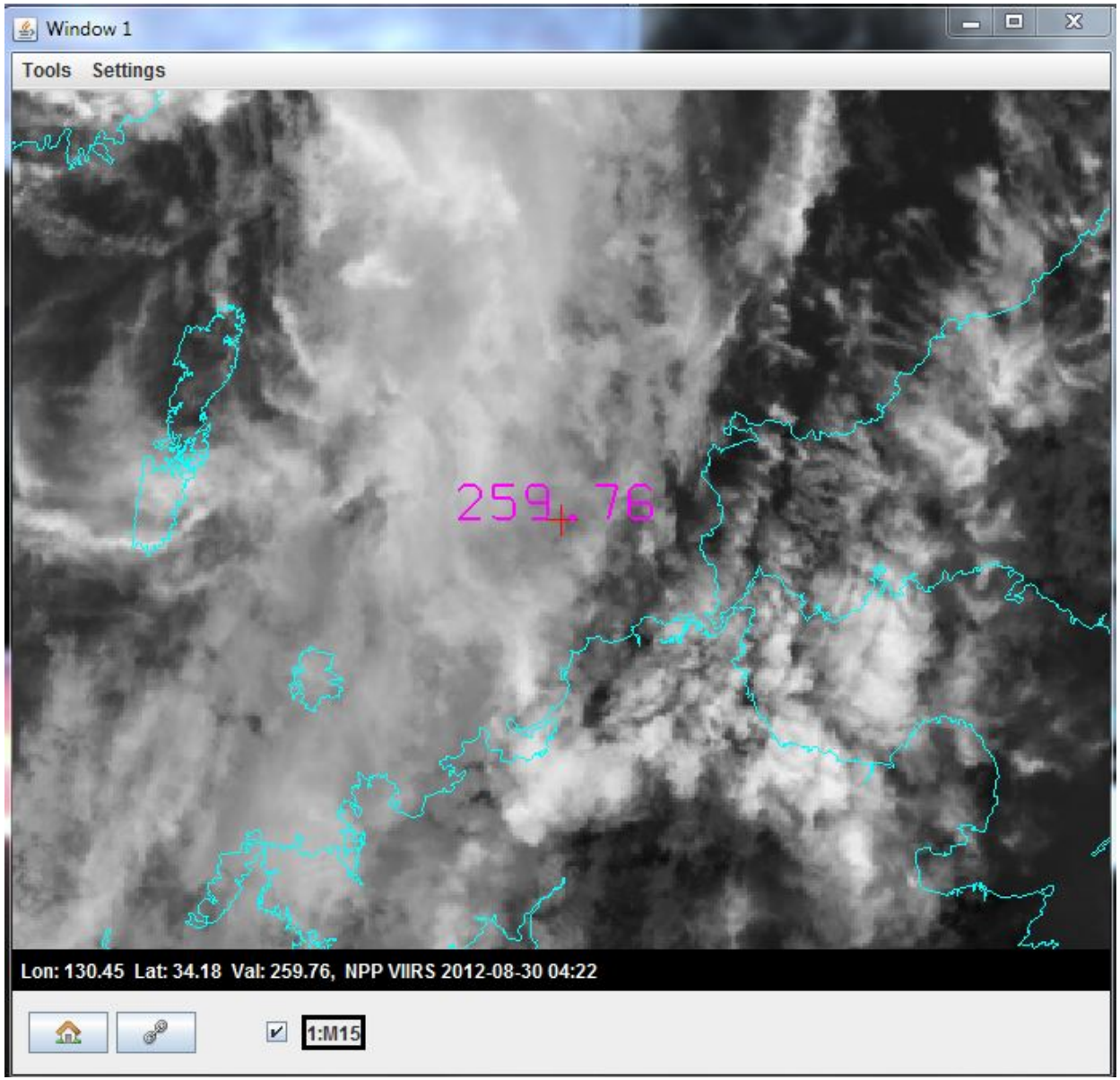


Demonstrating BT4 vs BT11 differences

using same enhancement scale

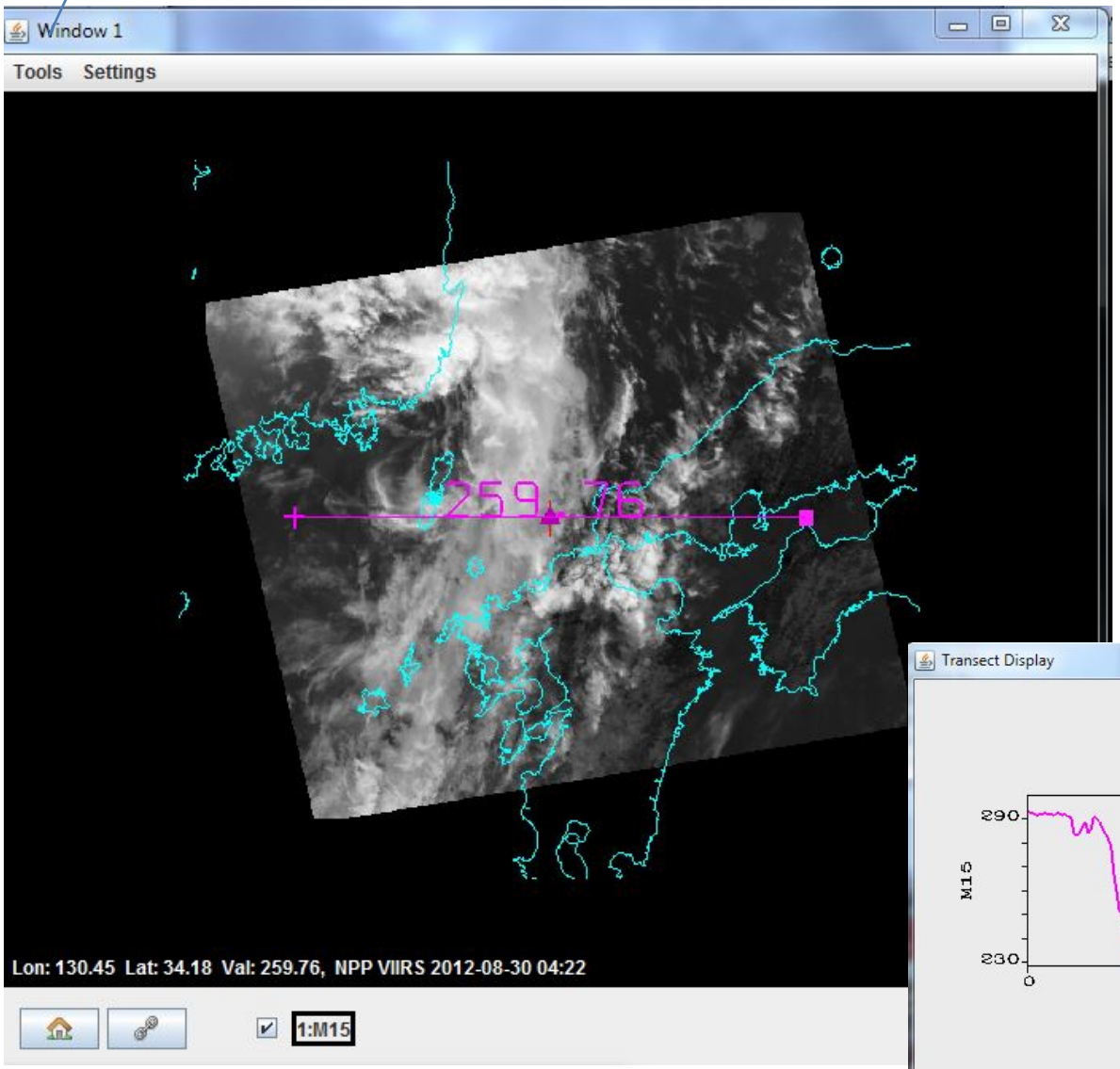


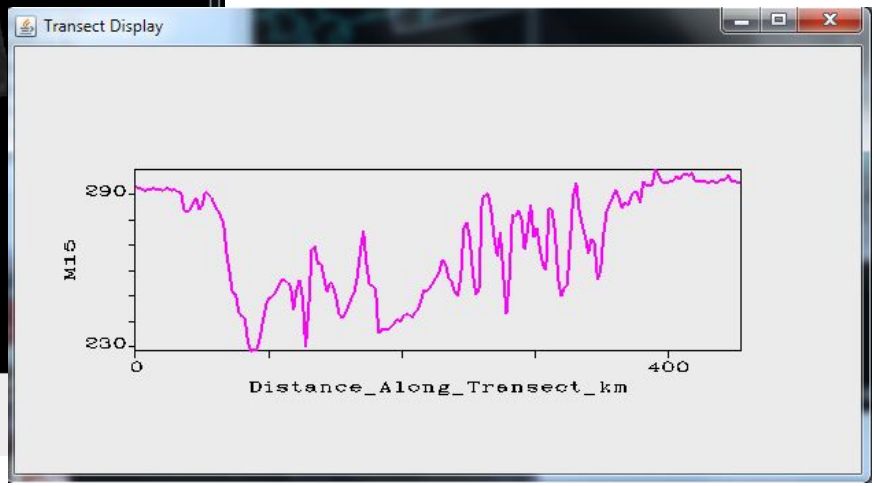
Zooming in the VIIRS IRW



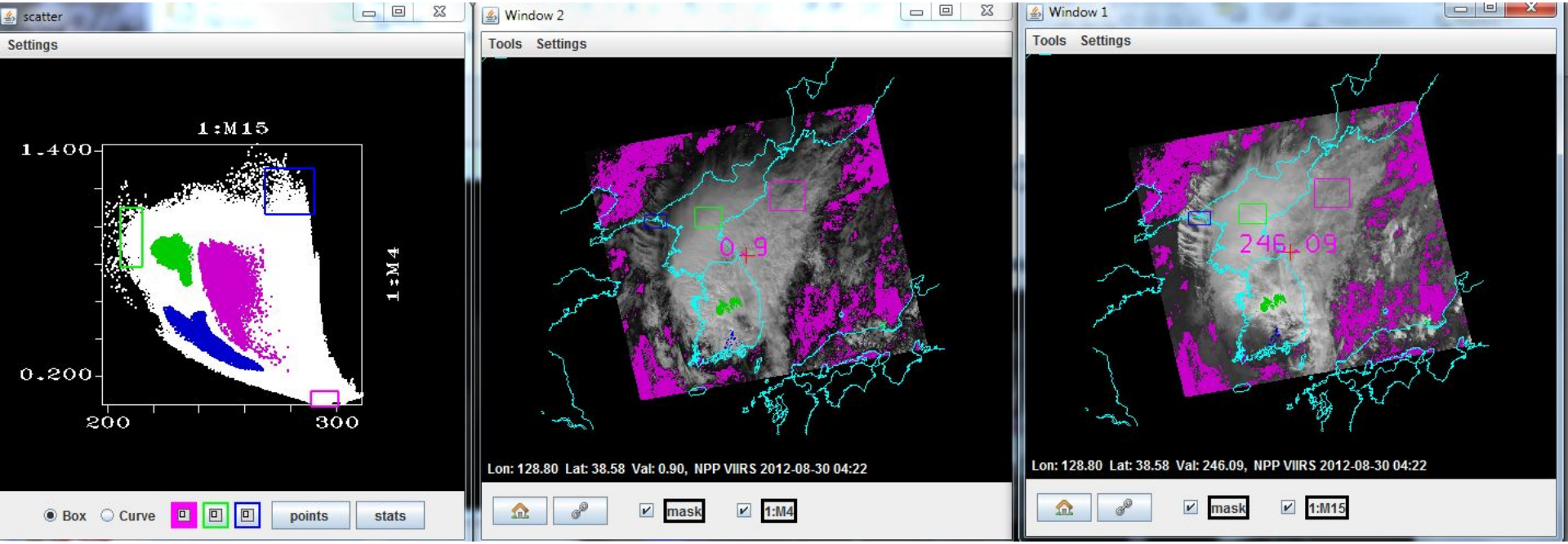
Tools
Transect
Scatter
Spectra

Using the Transect Tool





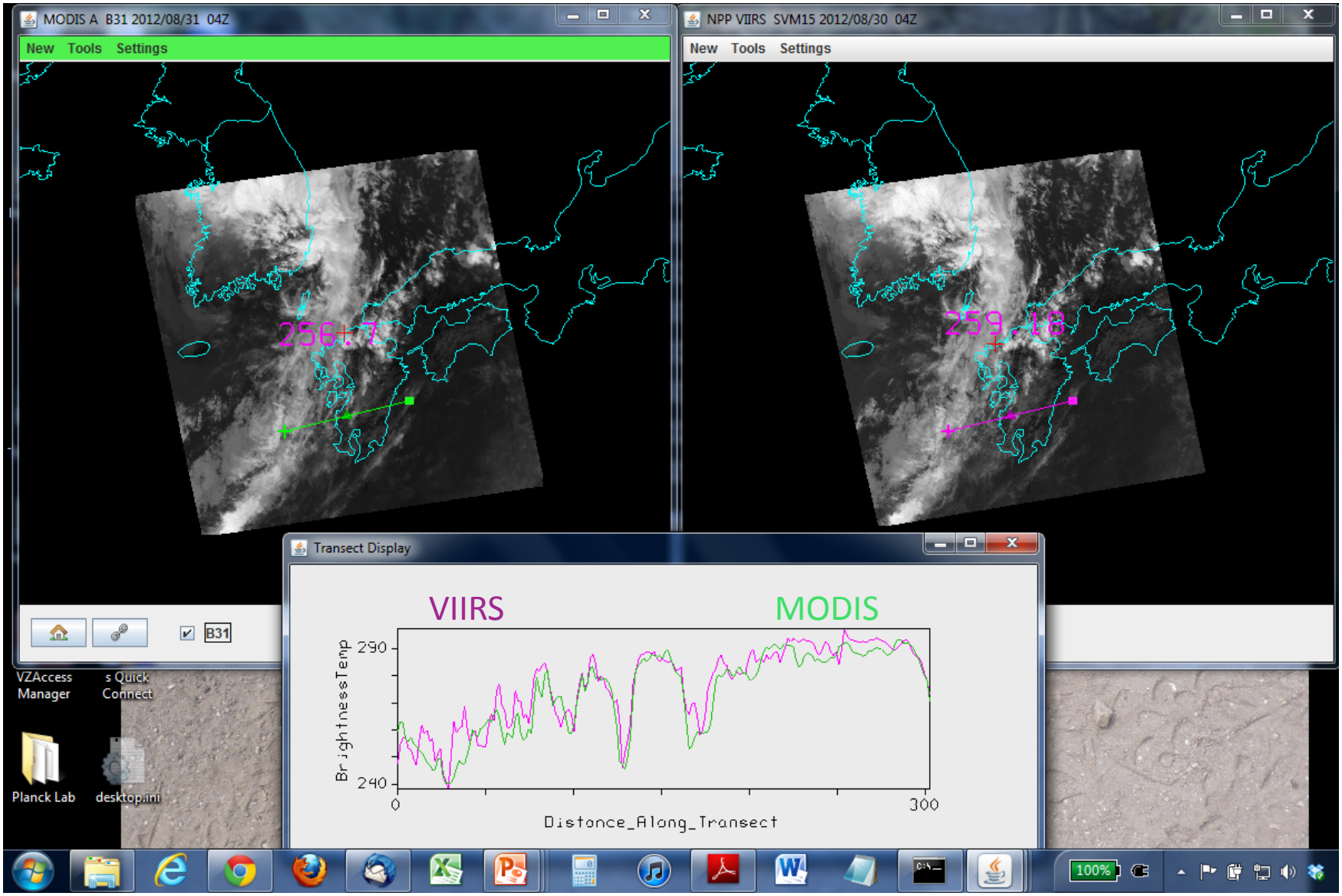
Analyzing a VIIRS scene with a Scatter plot of vis (y-axis) and IRW (x-axis)



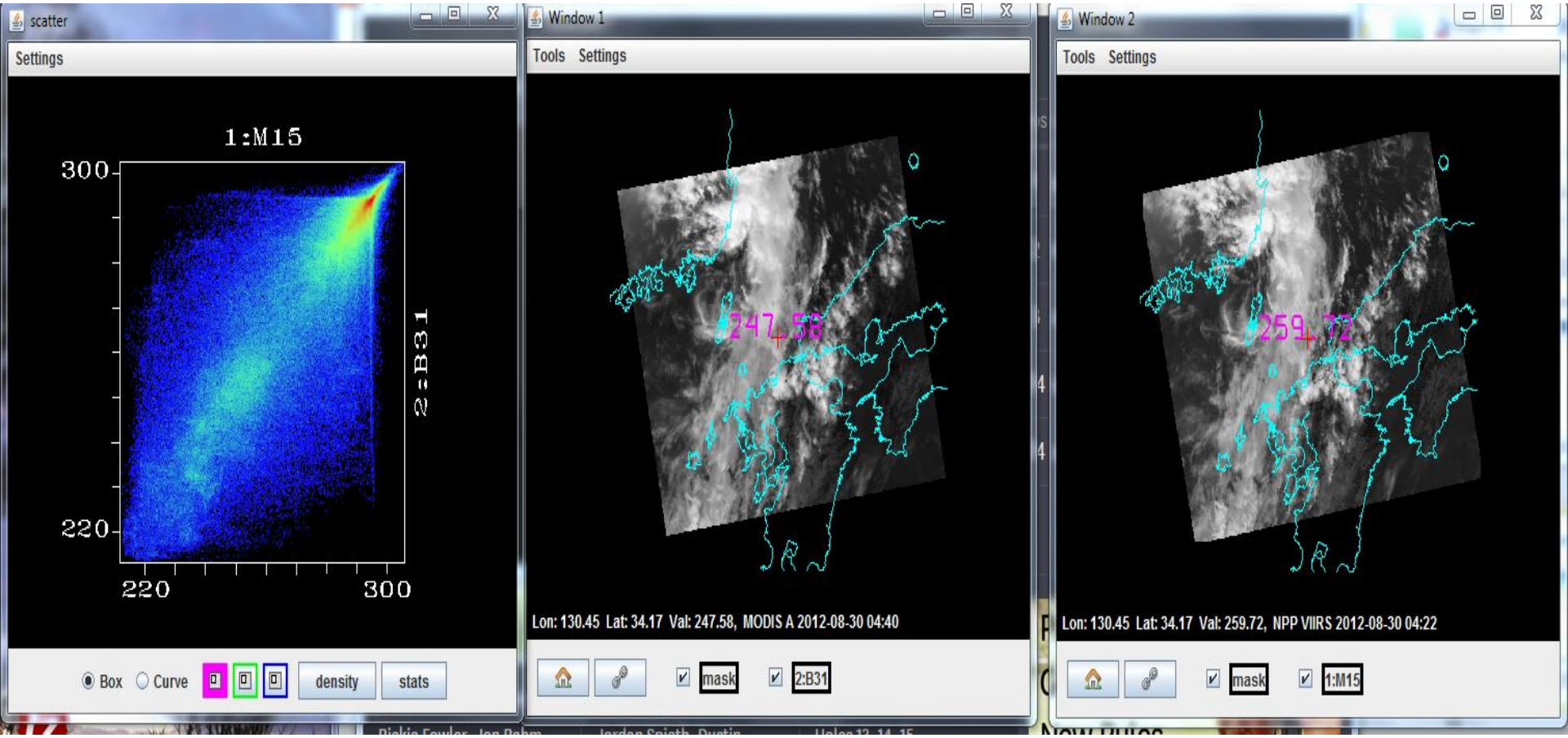
VIS

IRW

Comparing MODIS and VIIRS

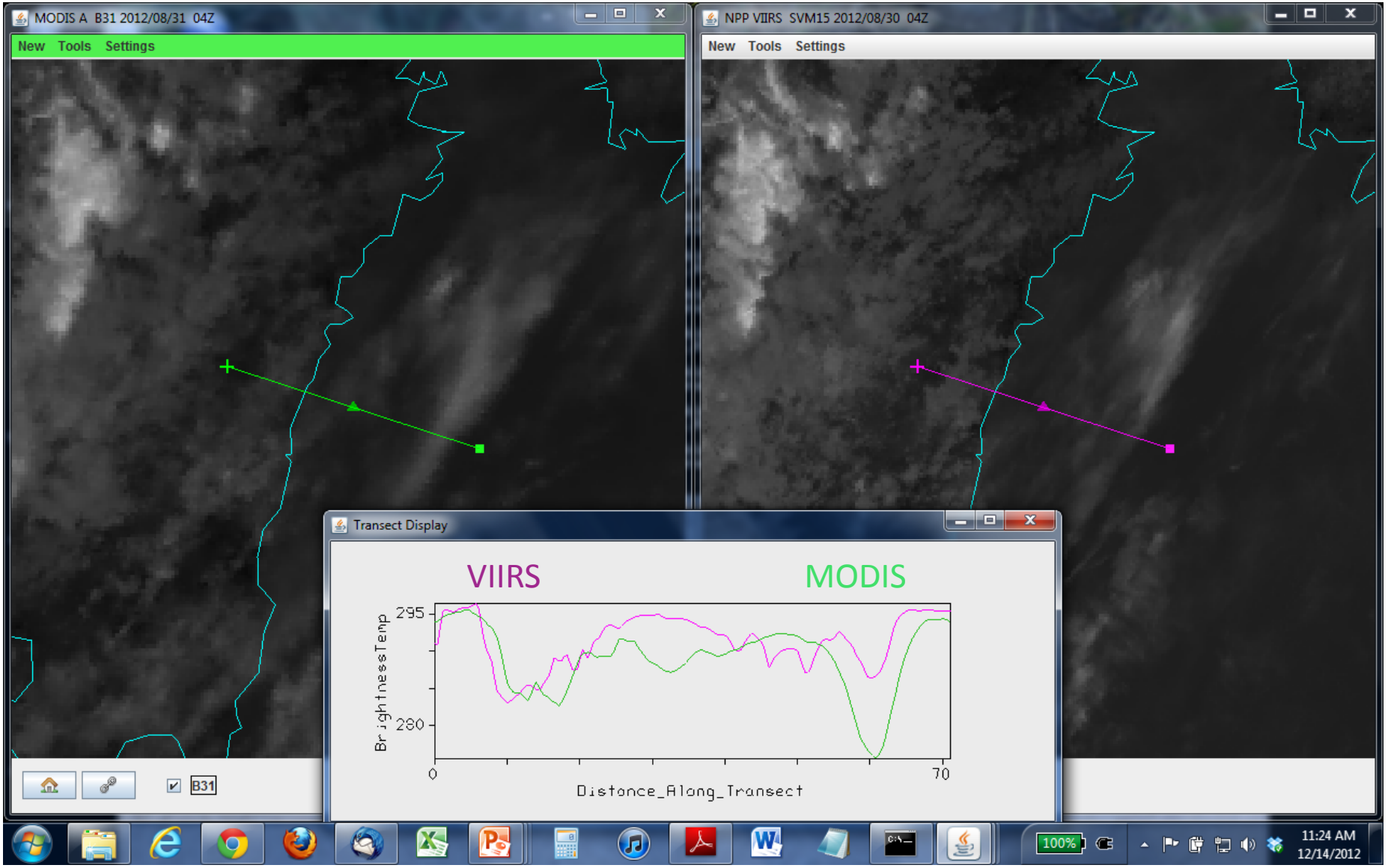


Comparing MODIS and VIIRS IRWs



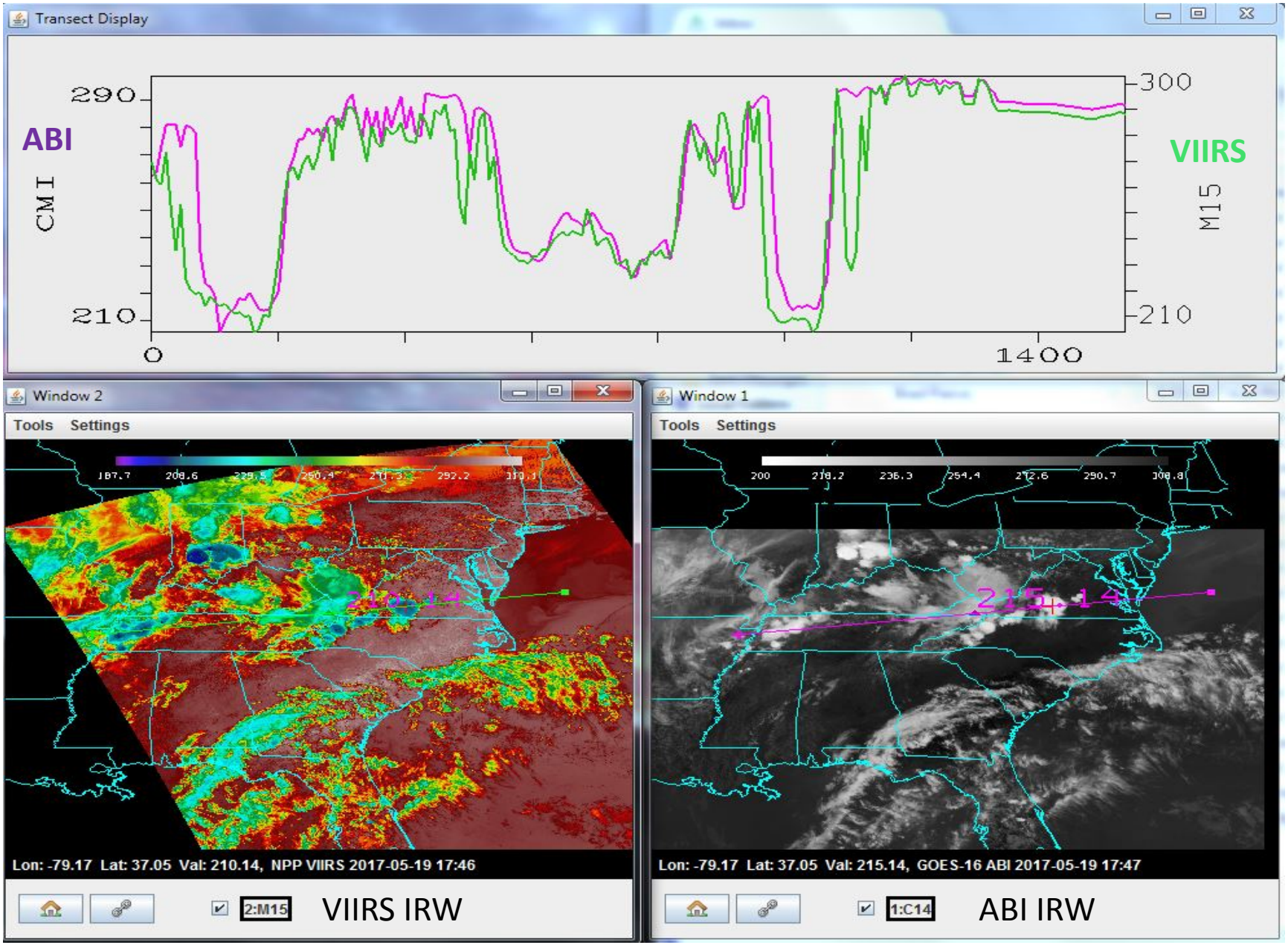
MODIS VIIRS

Zooming in on MODIS and VIIRS

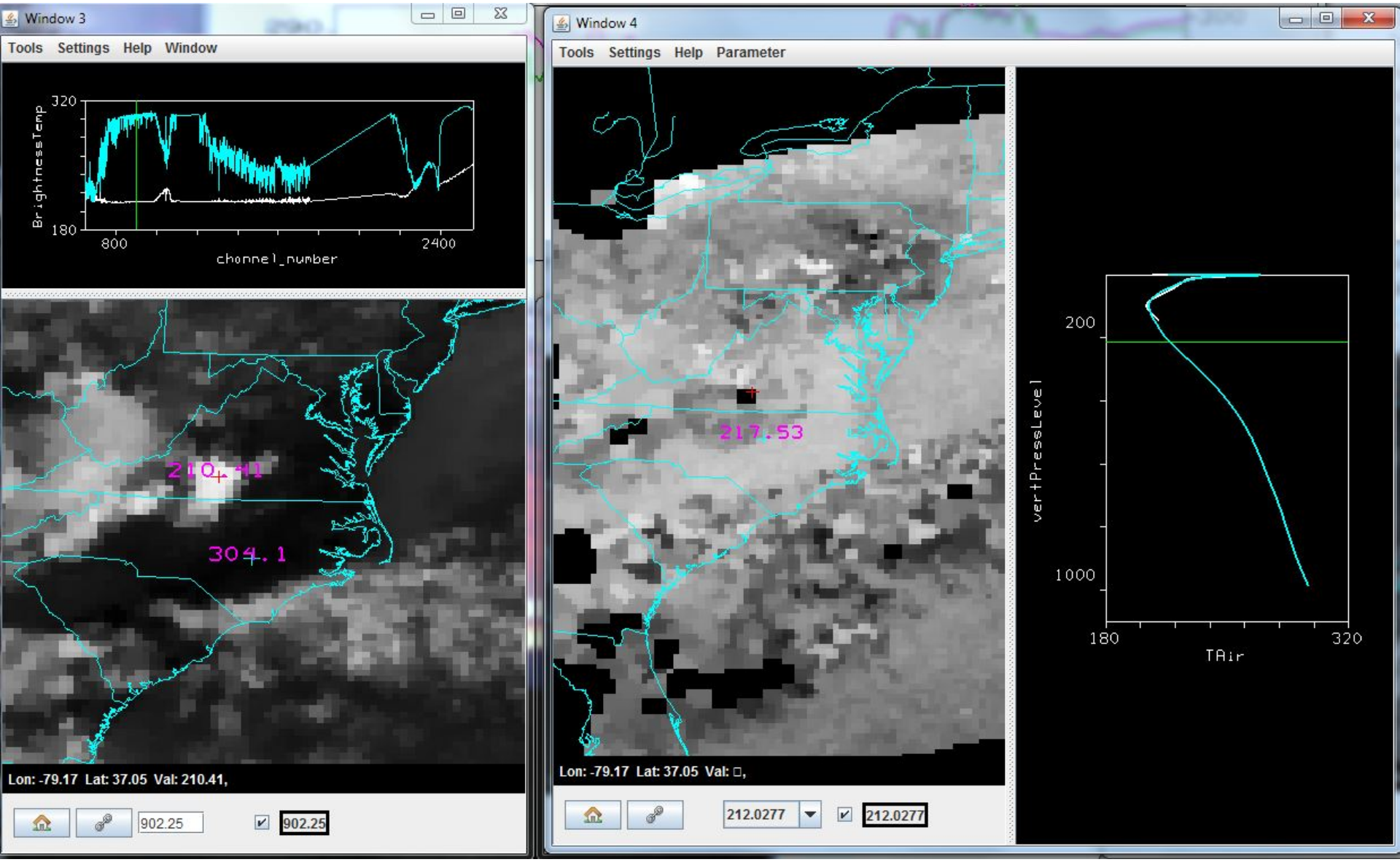


Analyzing ABI, CrIS, and ATMS data

Comparing ABI and VIIRS 19 May 2017

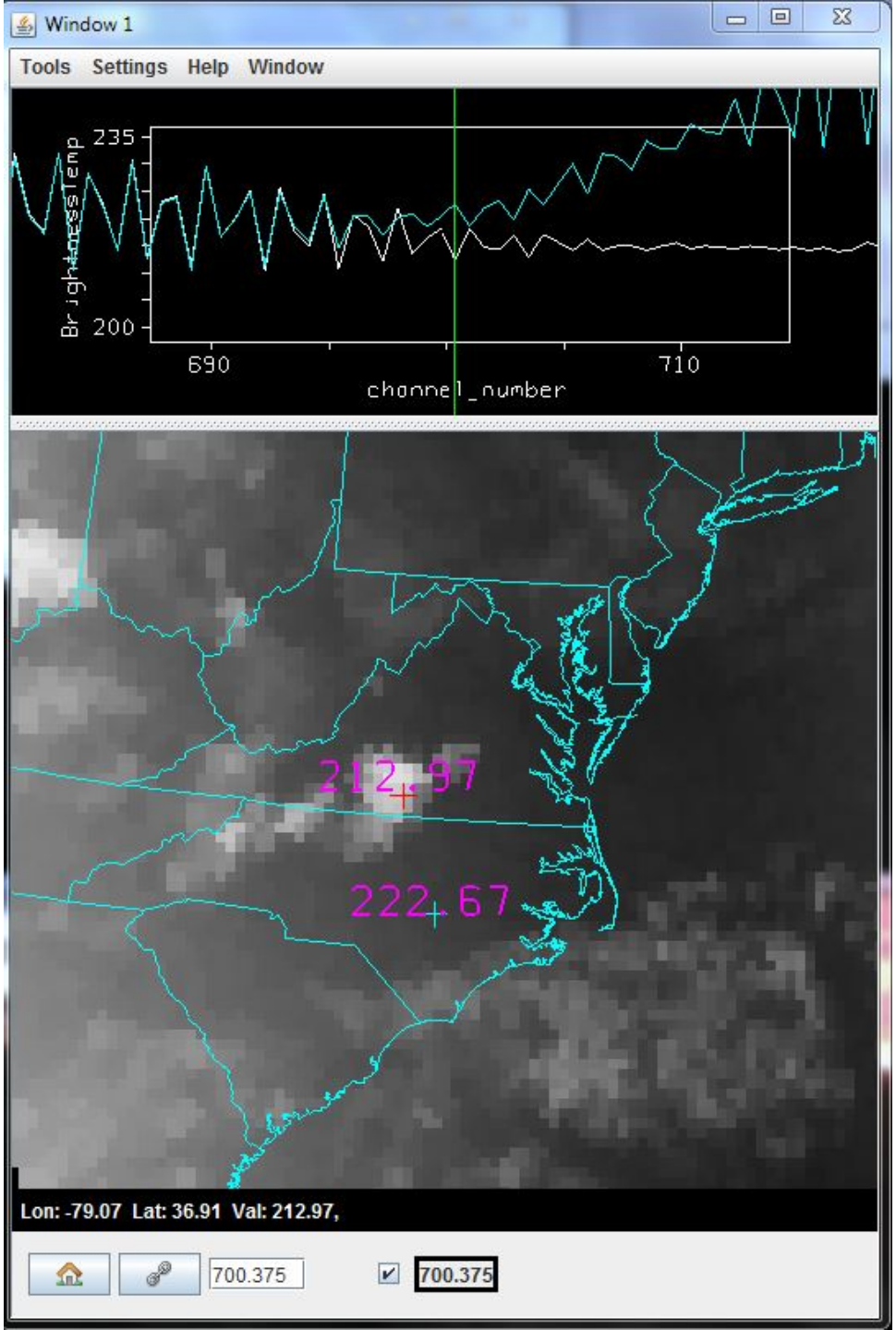


Comparing CrIS clear and cloudy FOVS



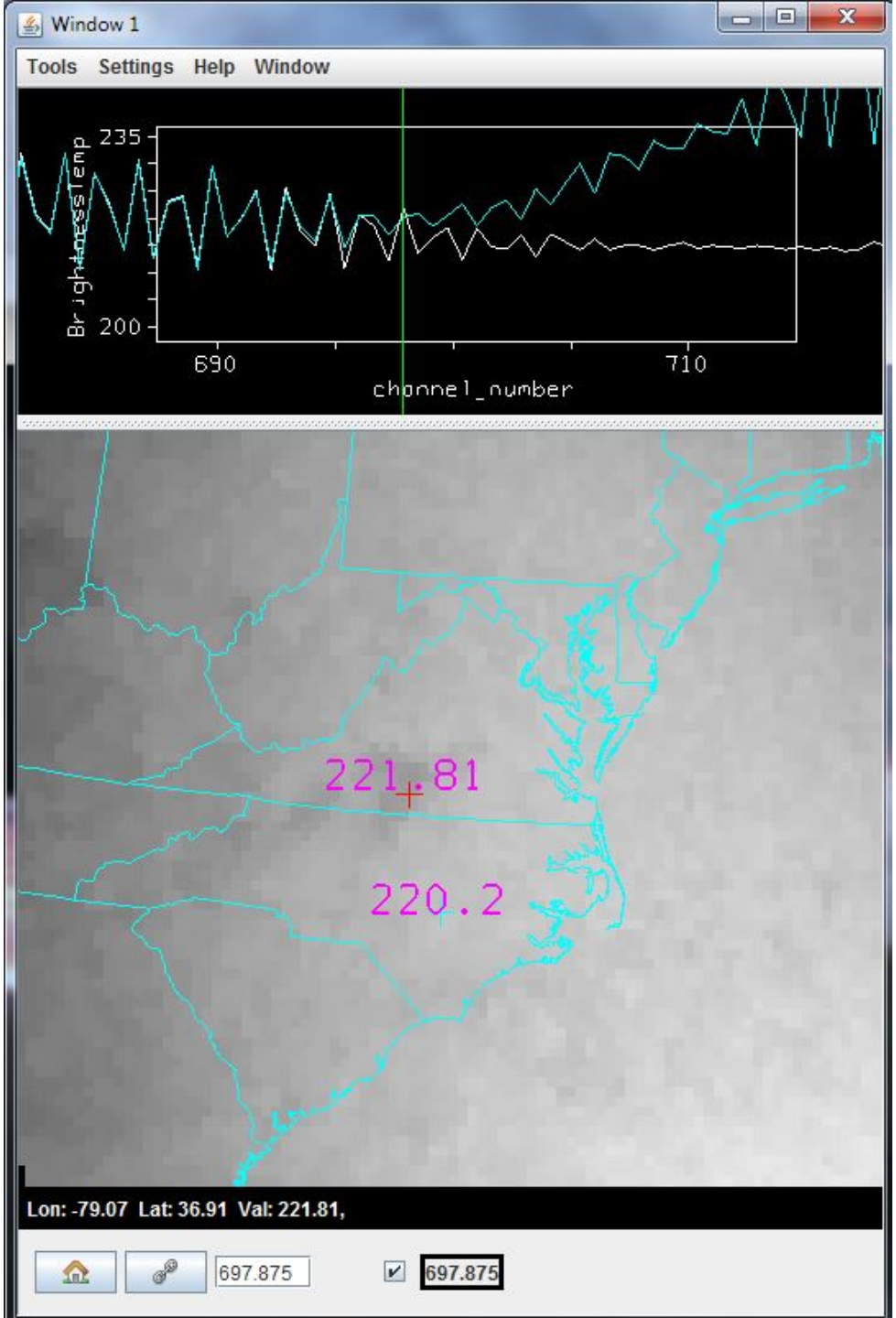
Spectral separation in clear vs cloudy FOVs

At 700.4 cm-1

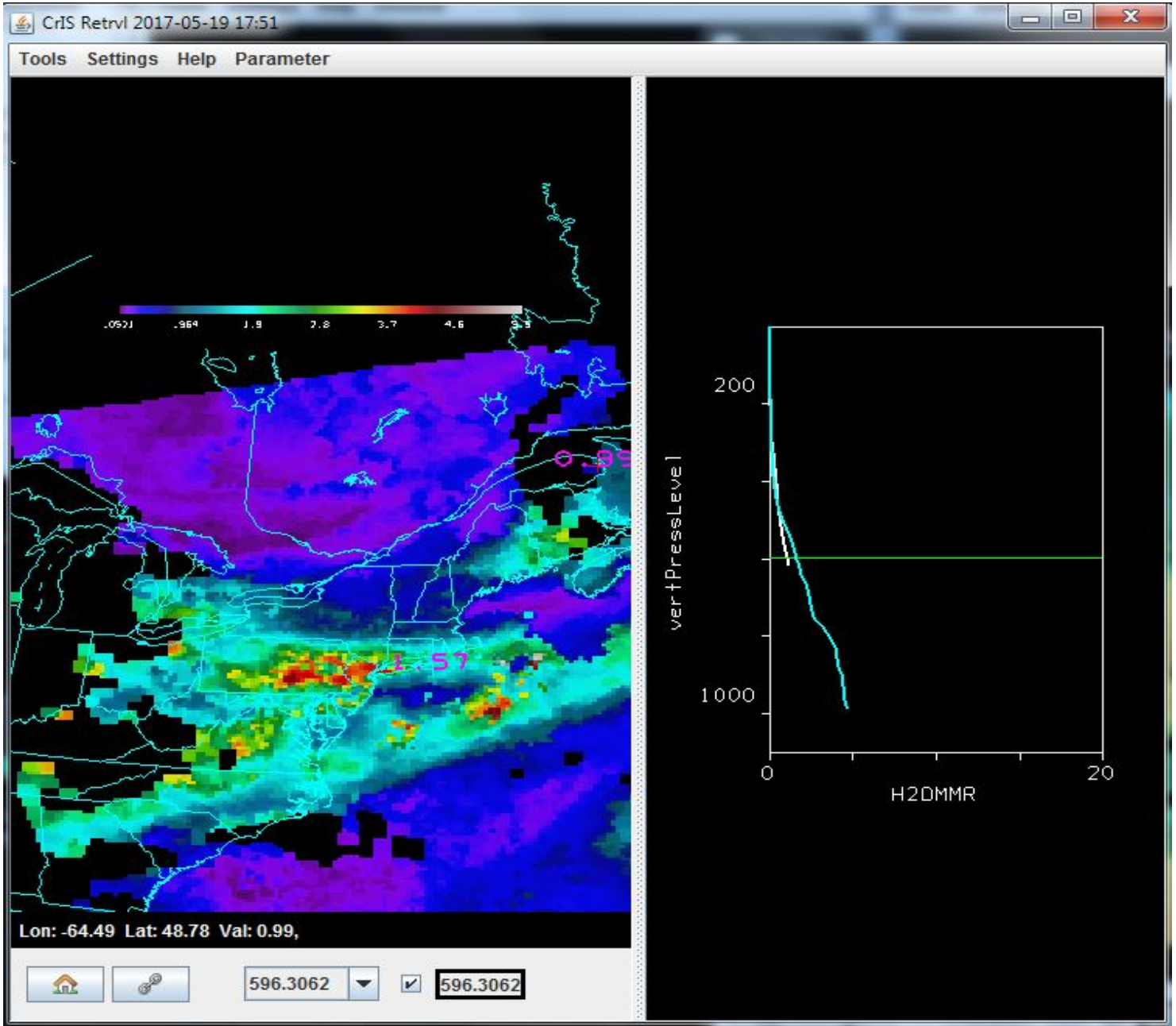


Spectral separation in clear vs cloudy FOVs

At 697.9 cm-1

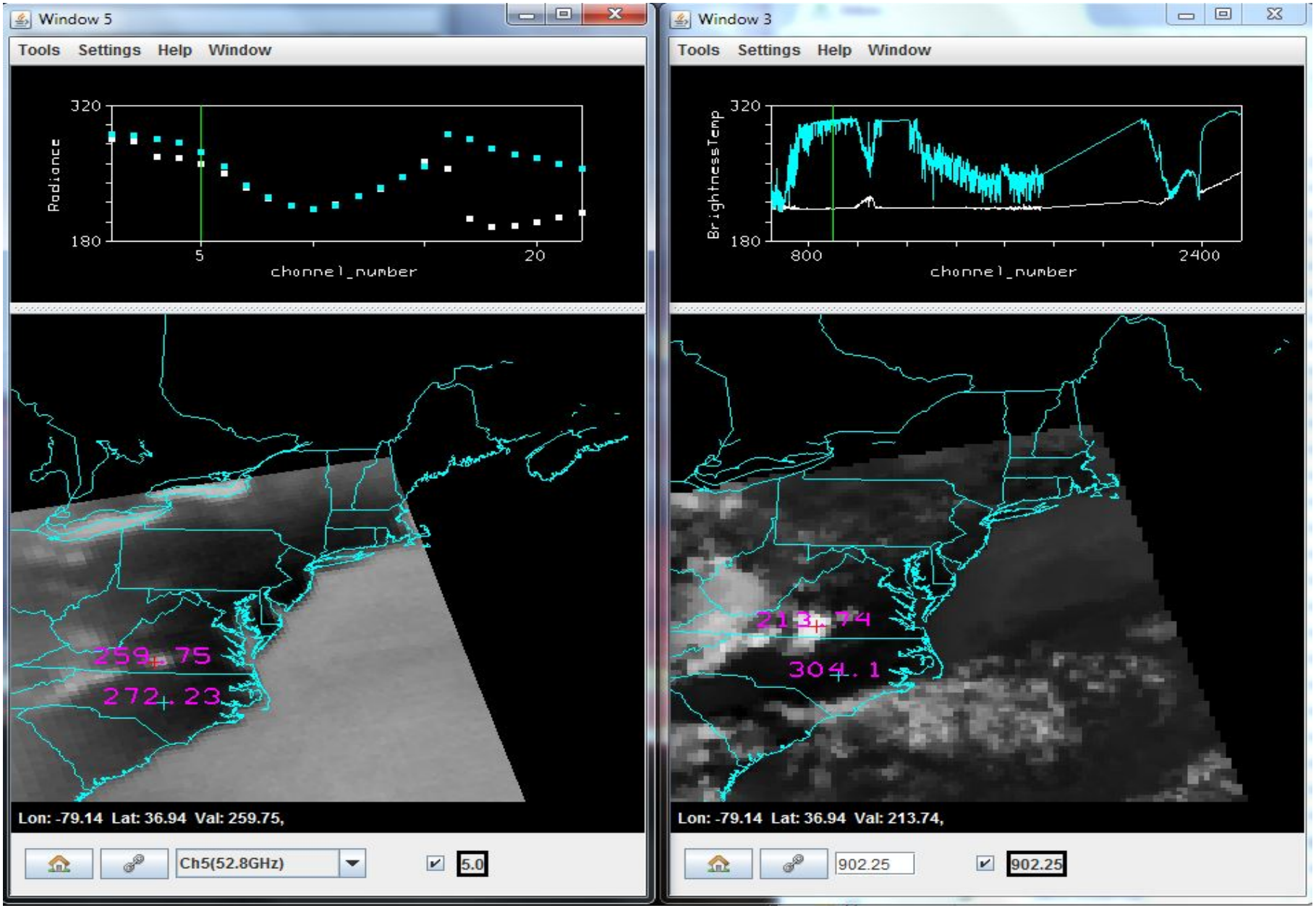


CrIS clear vs cloudy moisture retrievals

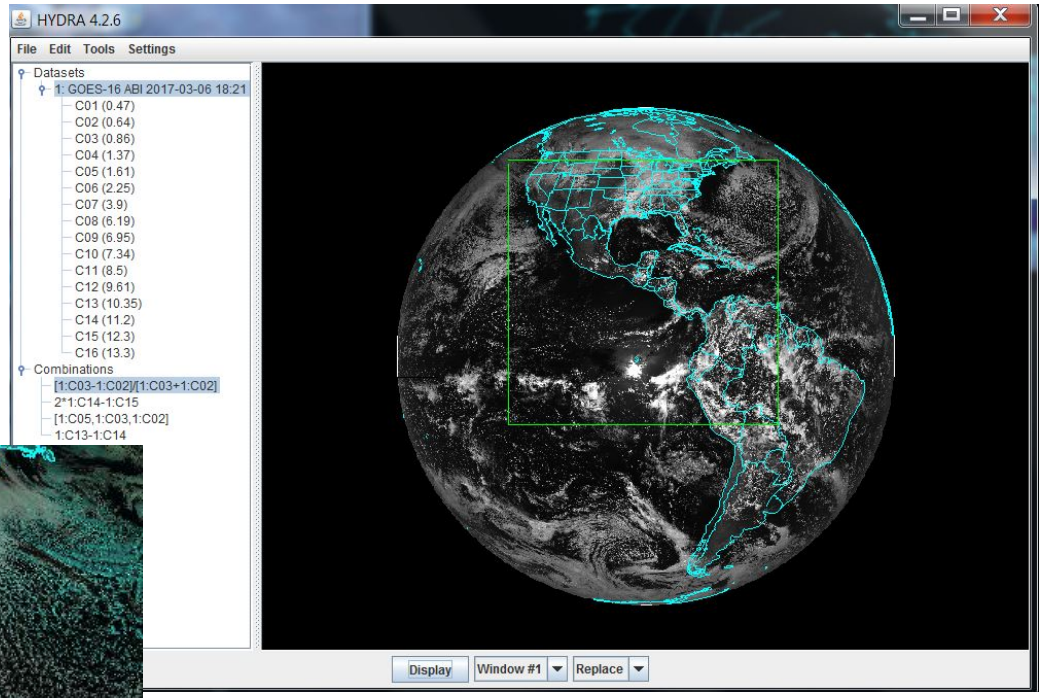


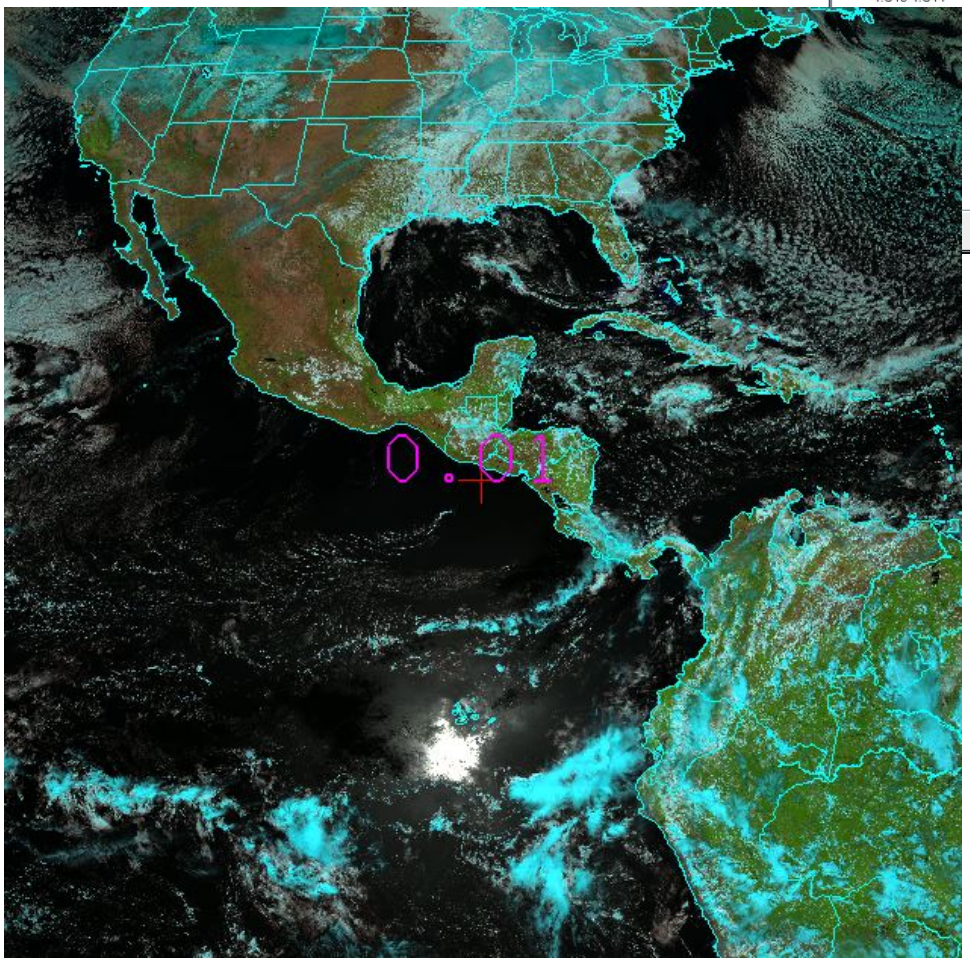
600 hPa

Comparing CrIS & ATMS clear & cloudy spectra



ABI 6 Mar 2017

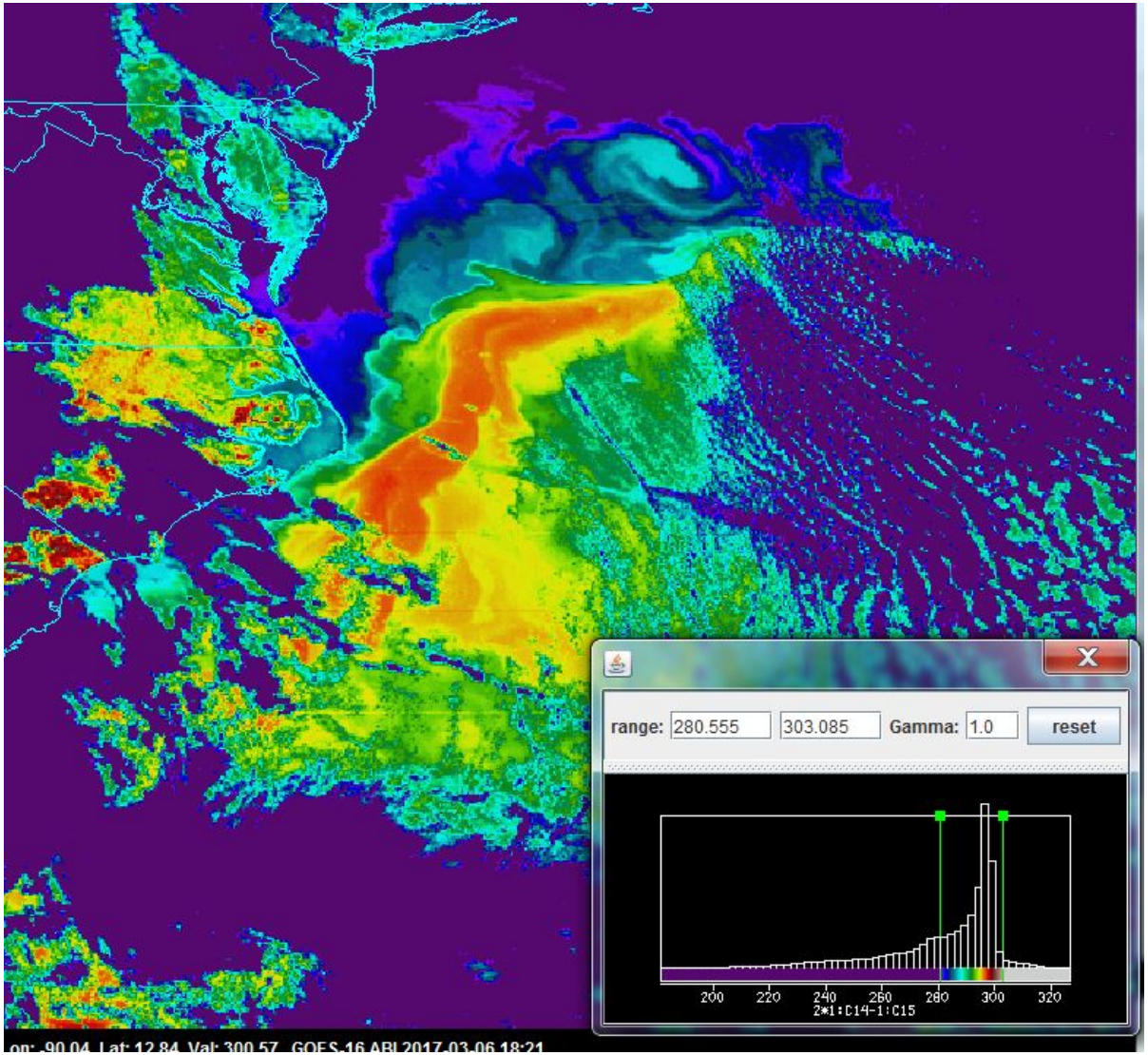




RGB 1.6, 0.8, 0.6 µm

Displaying Gulf Stream SST

(Using BandMath to generate 2*BT11.2-BT12.3)



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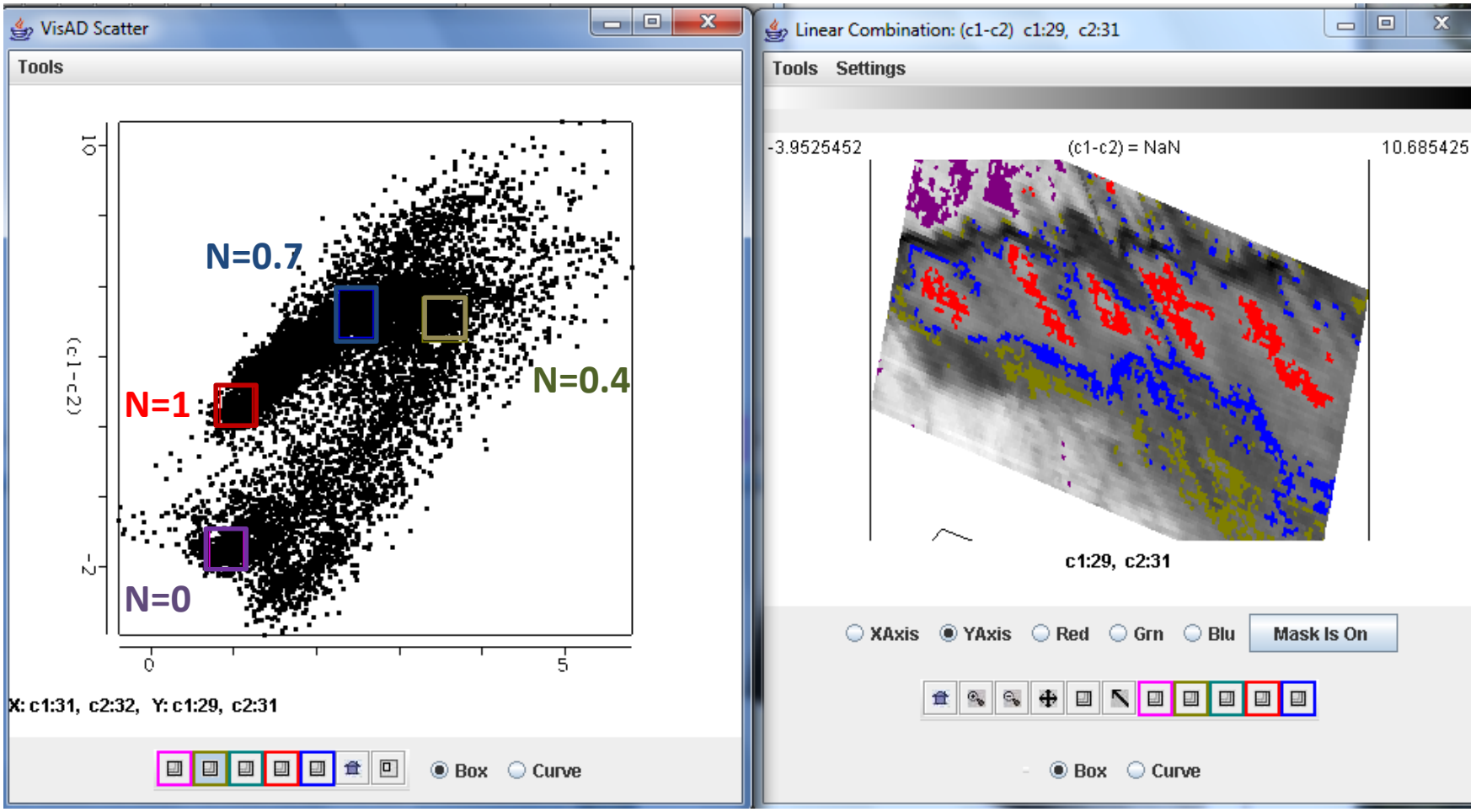
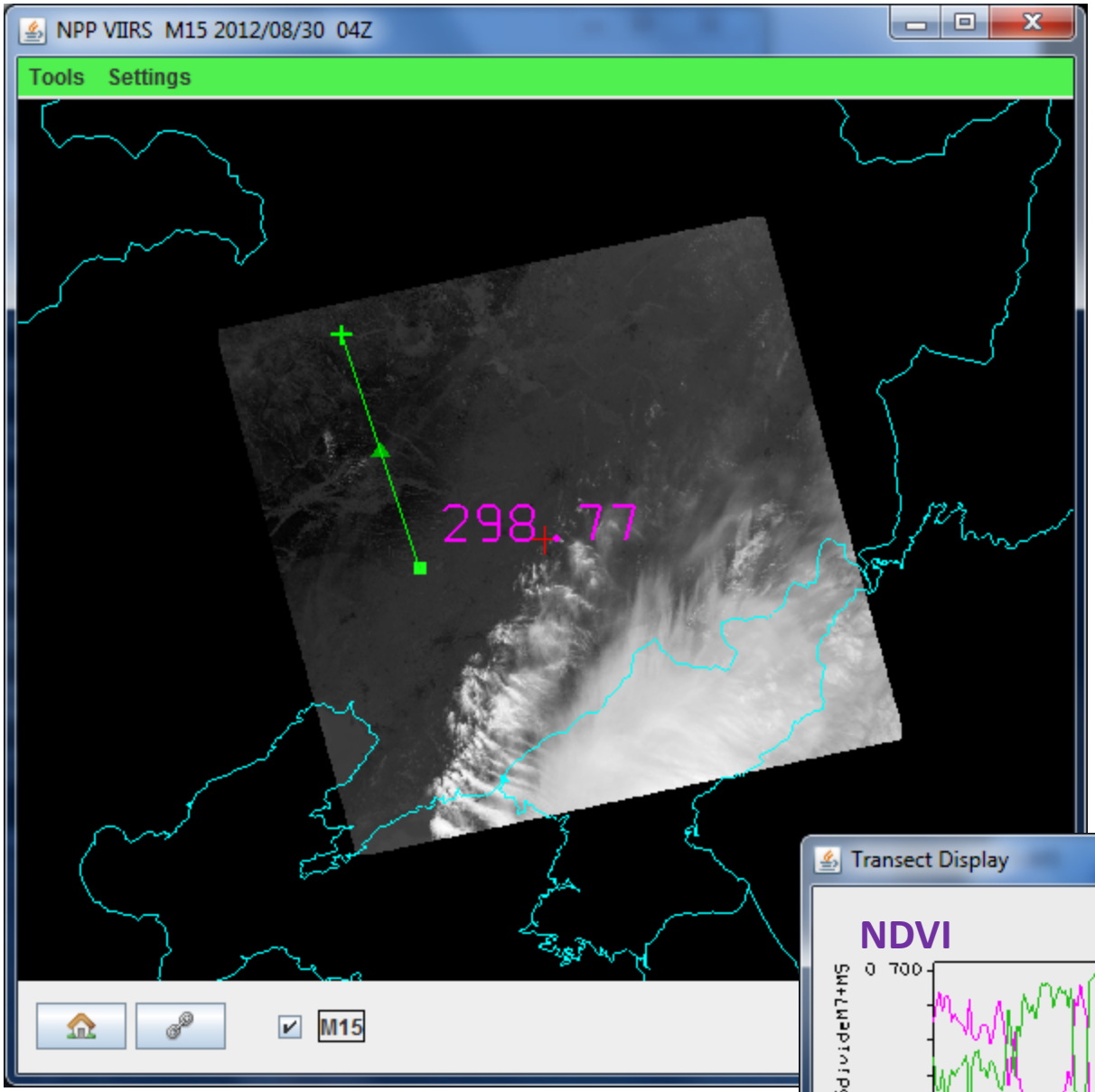
Some Examples from Lab Exercises

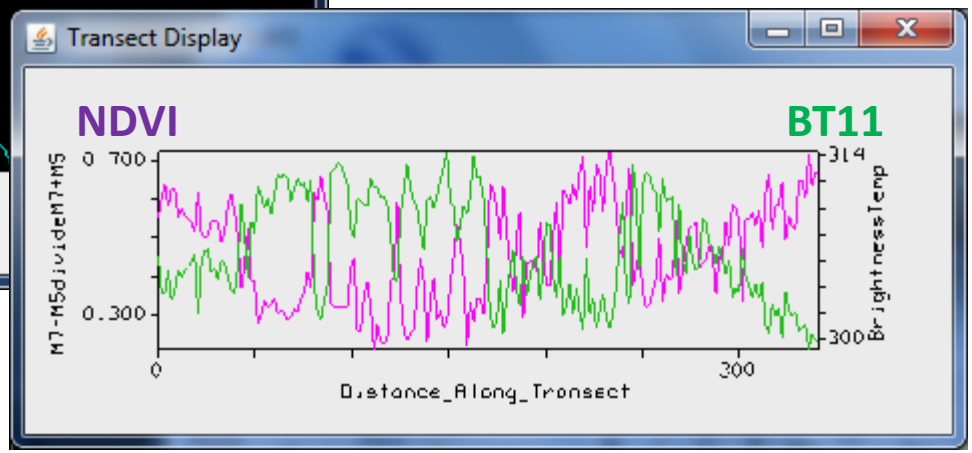


Using BandMath to plot BT11-BT12 (y) versus BT8.6-BT11 (x) and verifying dependence on cloud fraction



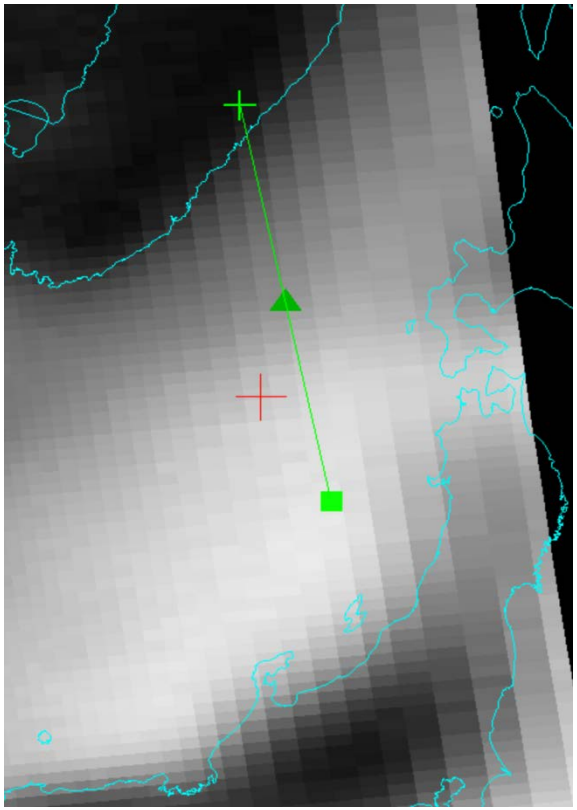
Using BandMath to create NDVI comparison with BT11 in vegetated & barren areas

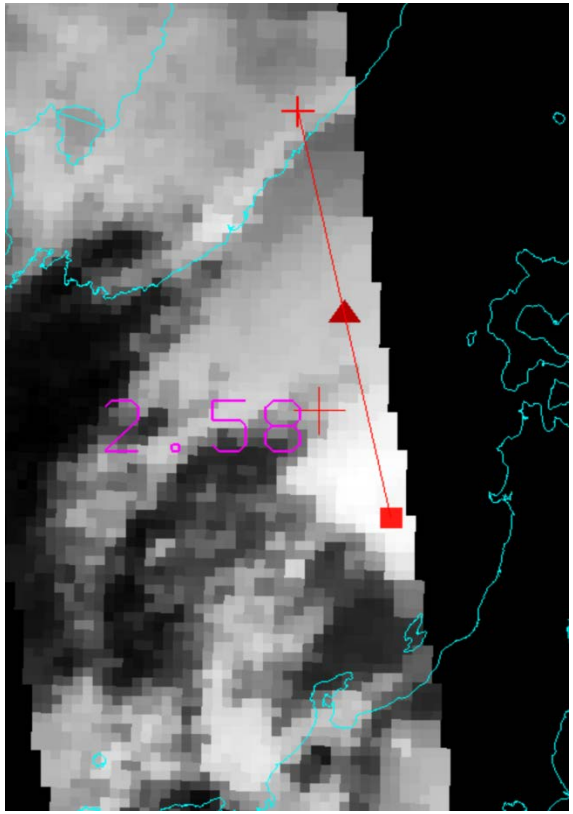
BT11 cooler in vegetation

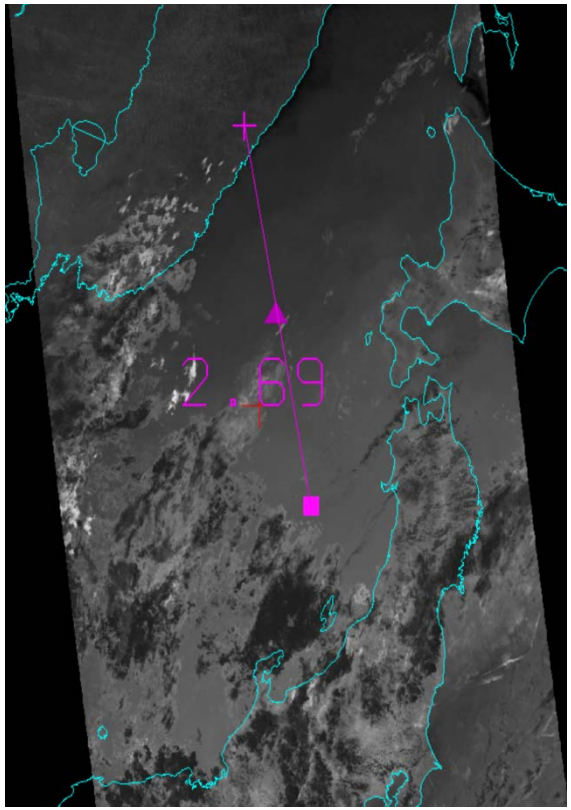


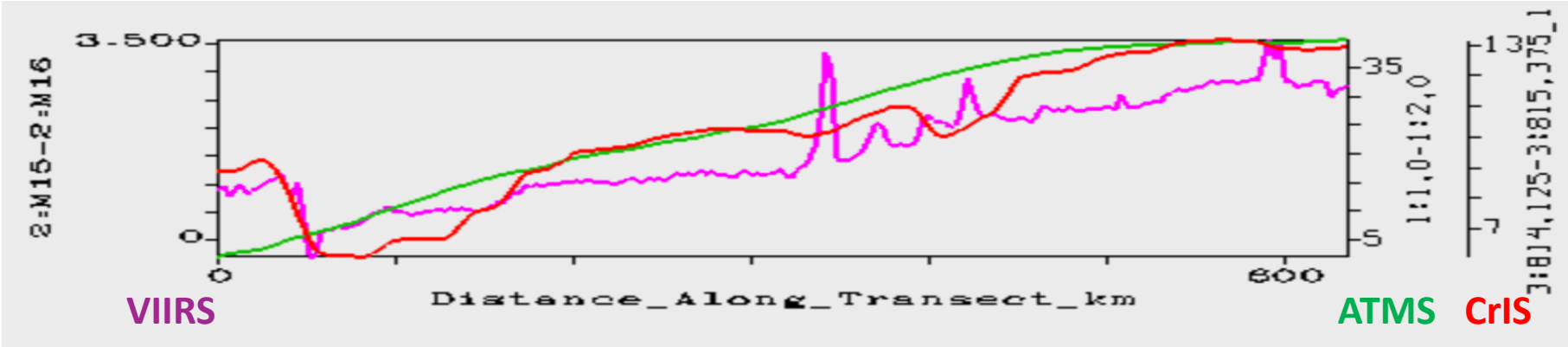
NDVI = [r0.86-r0.66]/ [r0.86+r0.66]

Comparing Split-Window BT differences for ATMS, CrIS, & VIIRS over ocean in clear skies









Investigating ABI, SNPP, & EOS data

HYDRA2 offers tools for

- Image display (zoom, overlay, enhancement, …)
- Sensor intercomparison (radiances, products)
- Transects
- Scatter plots (isolate pixels in scatter or image)
- RGB Composite
- BandMath

More description can be found in
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or
CSPP_IMAPP_HYDRA2_Multispectral_Analysis_Toolkit.pdf
at http://cimss.ssec.wisc.edu/cspp/npp_hydra2_v2.0.shtml