CALIBRATION OF NEON'S AIRBORNE IMAGING SPECTROMETERS

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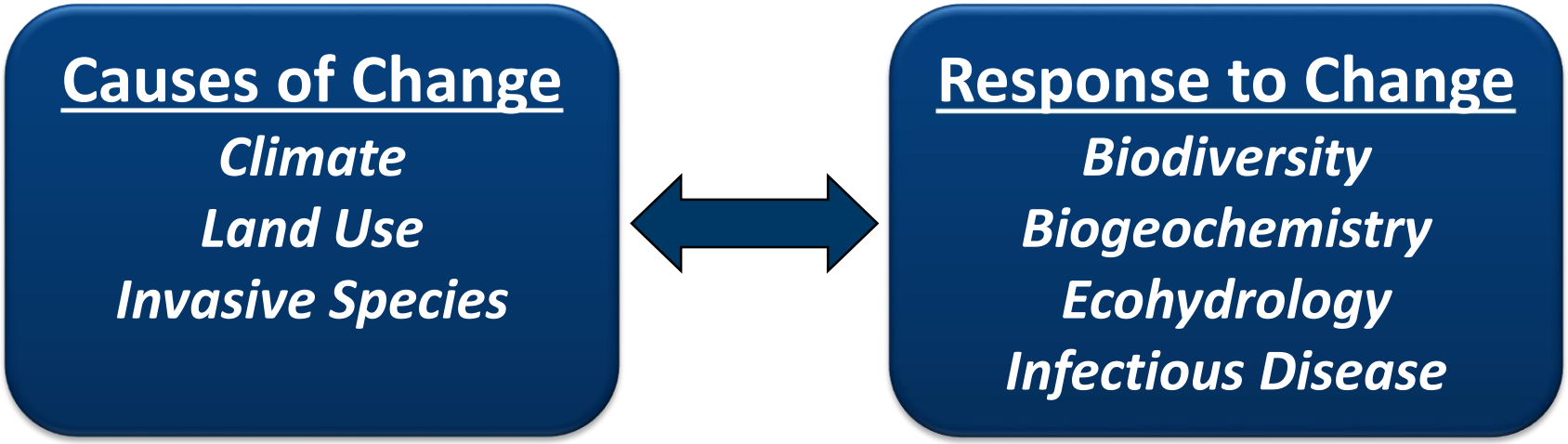
Funded by the National Science Foundation to…

… to *enable understanding* and *forecasting* of the *impacts* of *climate change, land use change* and *invasive species* on *continental-scale ecology*

…by providing infrastructure to support research, education and environmental management in these areas

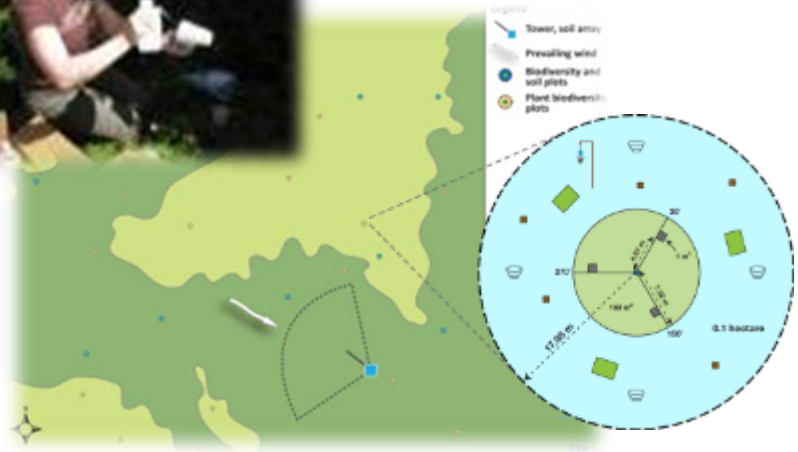


NEON Observation Platforms

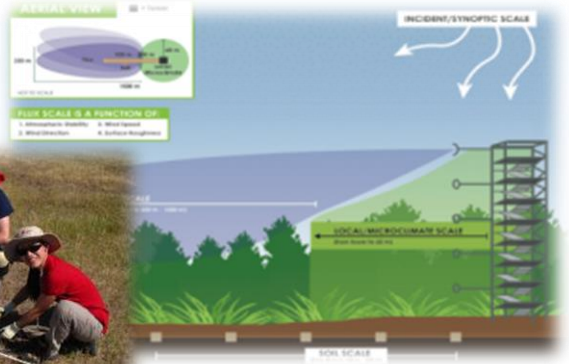
AOS/AIS

AOP

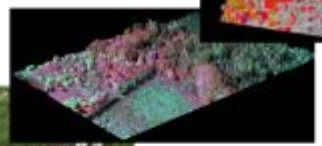
TOS

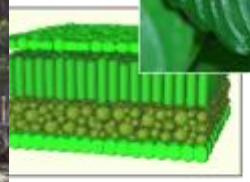


TIS

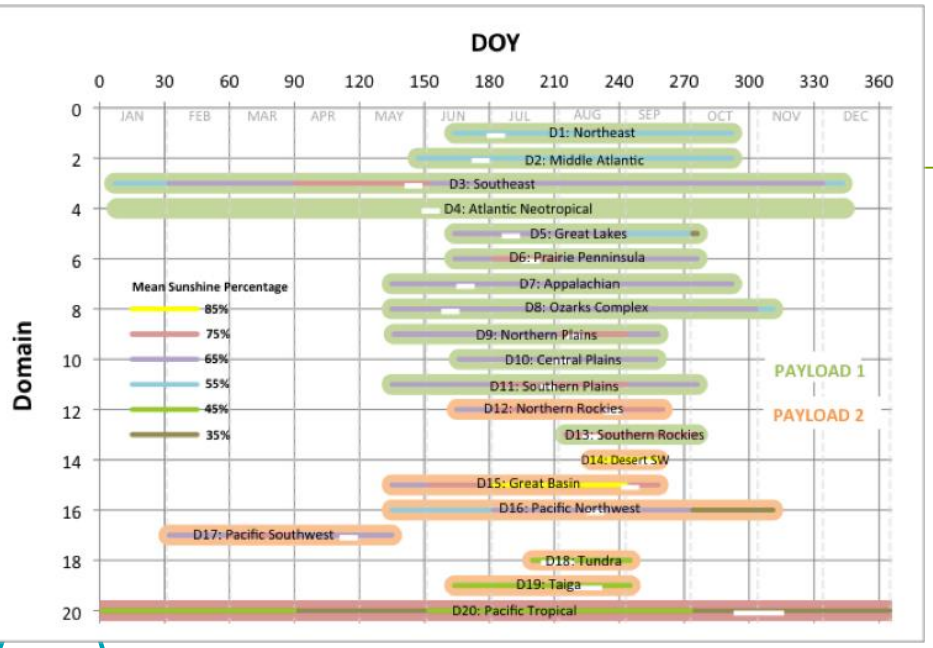


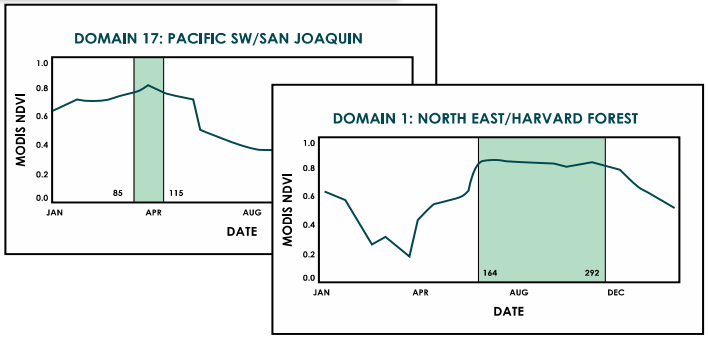
Capture of Data at Multiple Spatial Scales



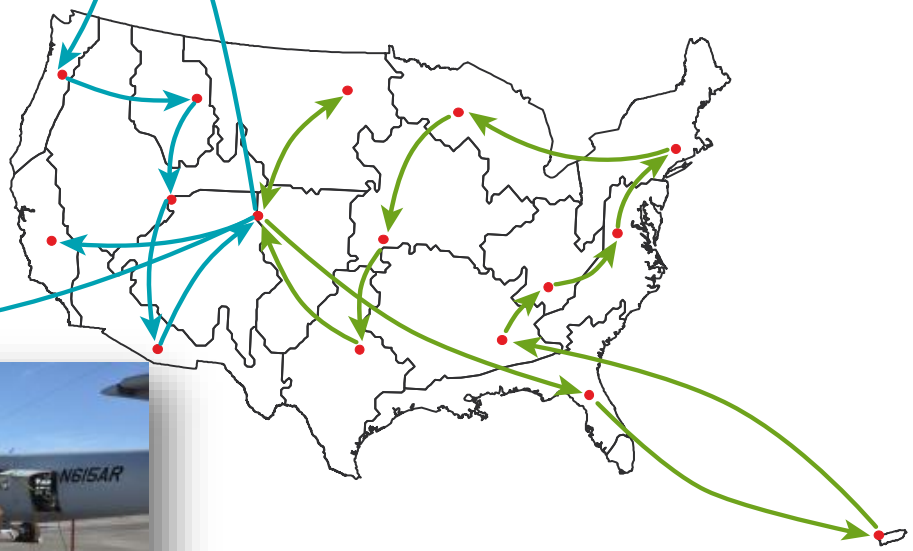


AOP Flight Concept

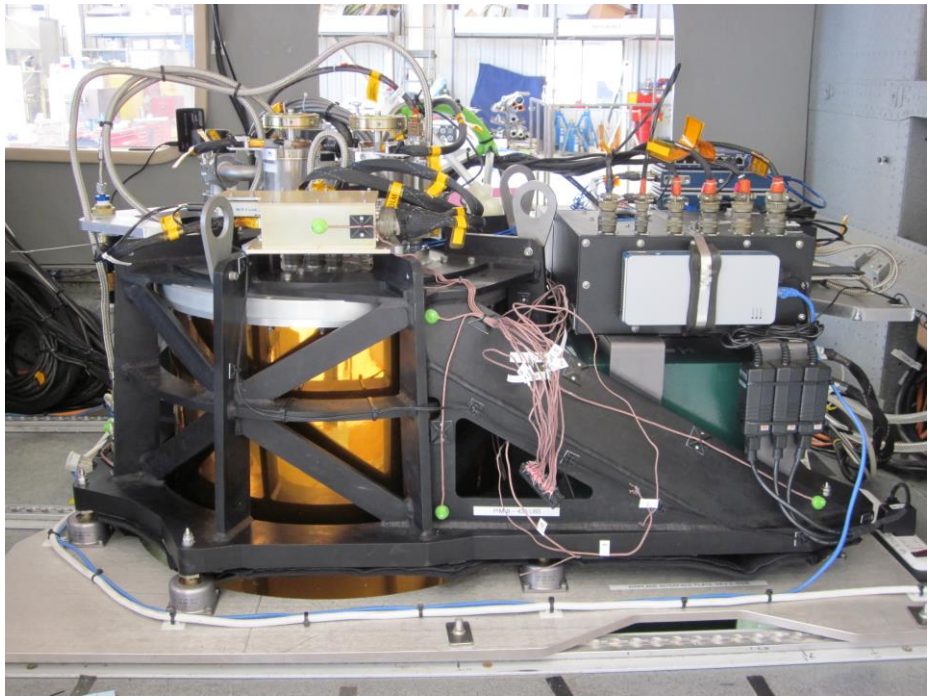


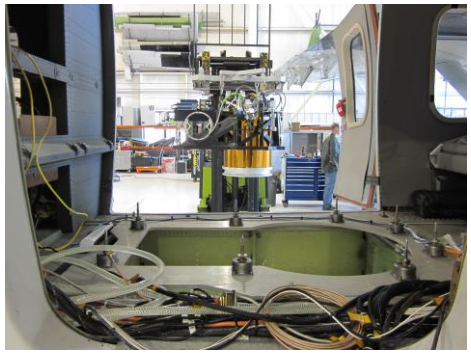


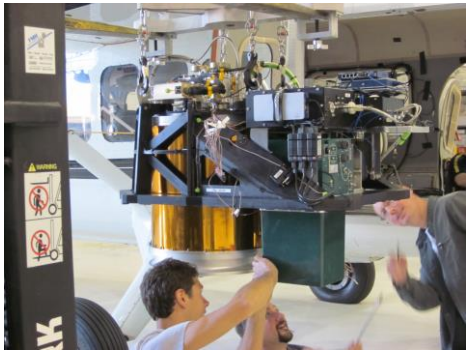
NDVI data determines the annual flight window for each domain.

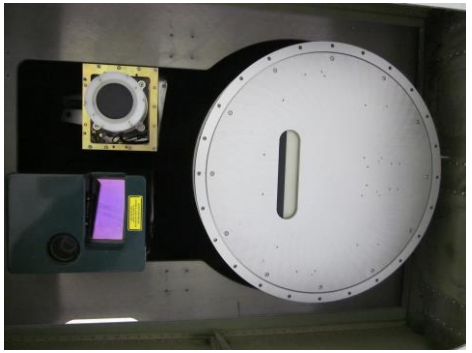


NEON Airborne Payload

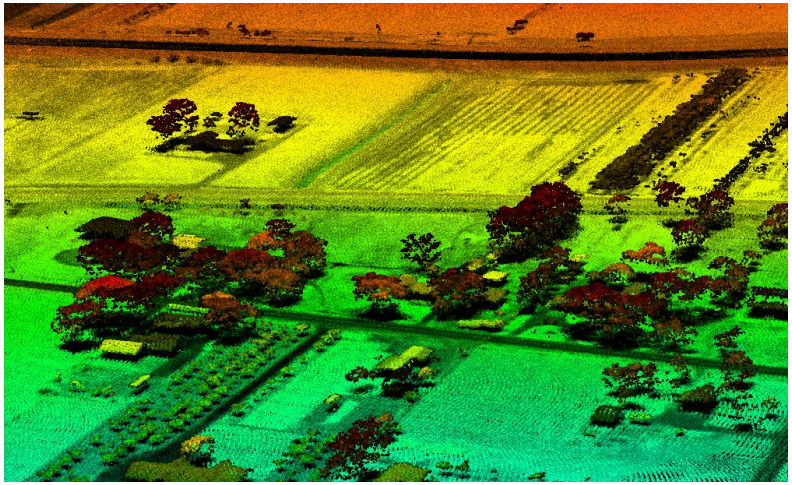








AOP Data



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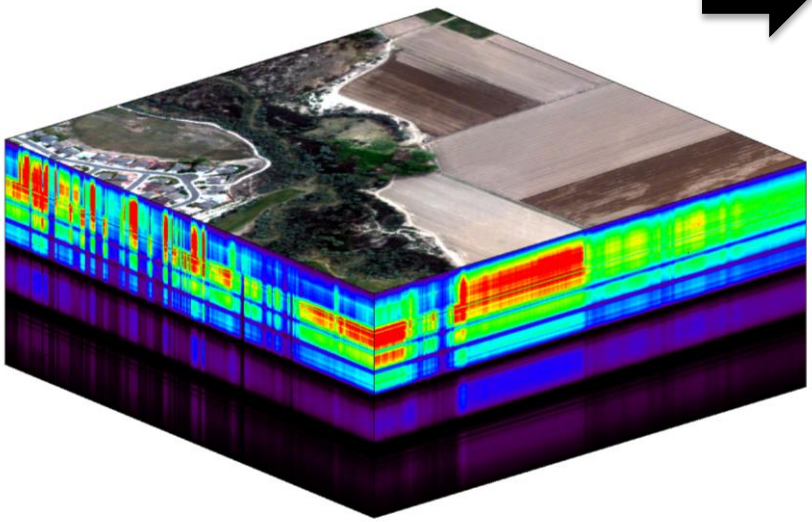
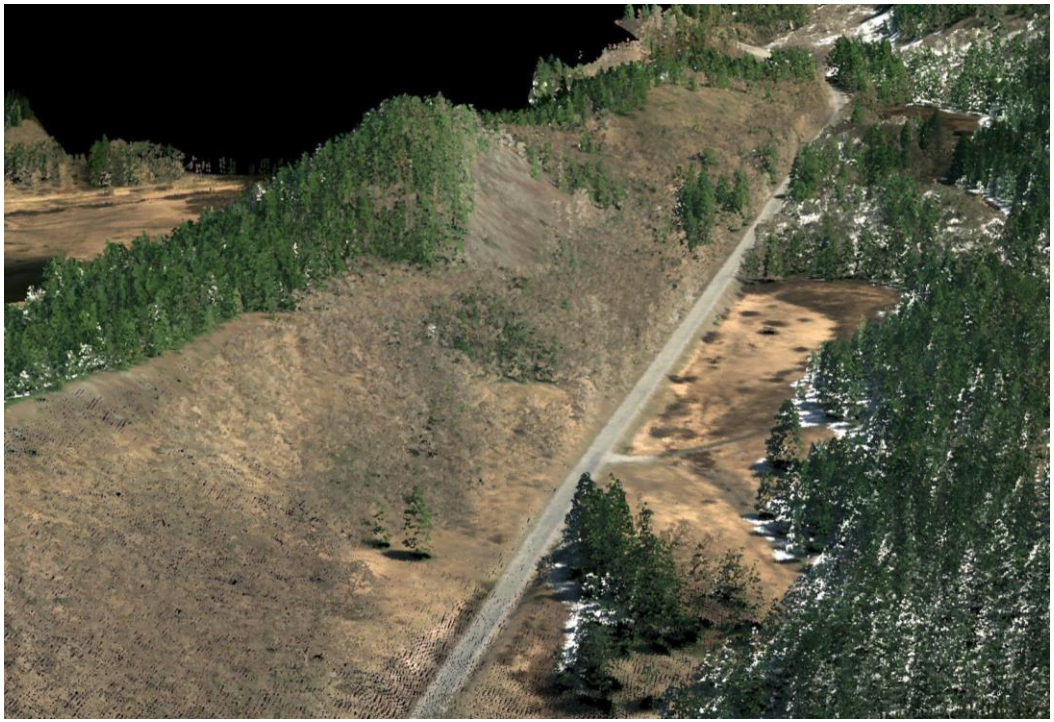
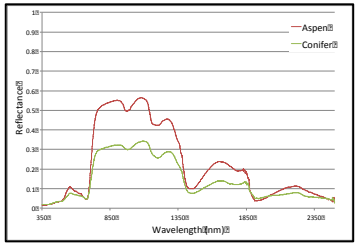
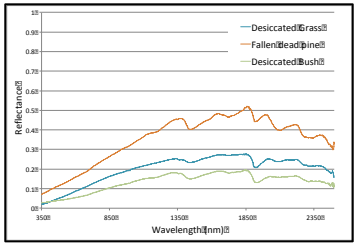
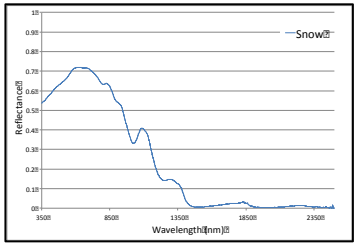




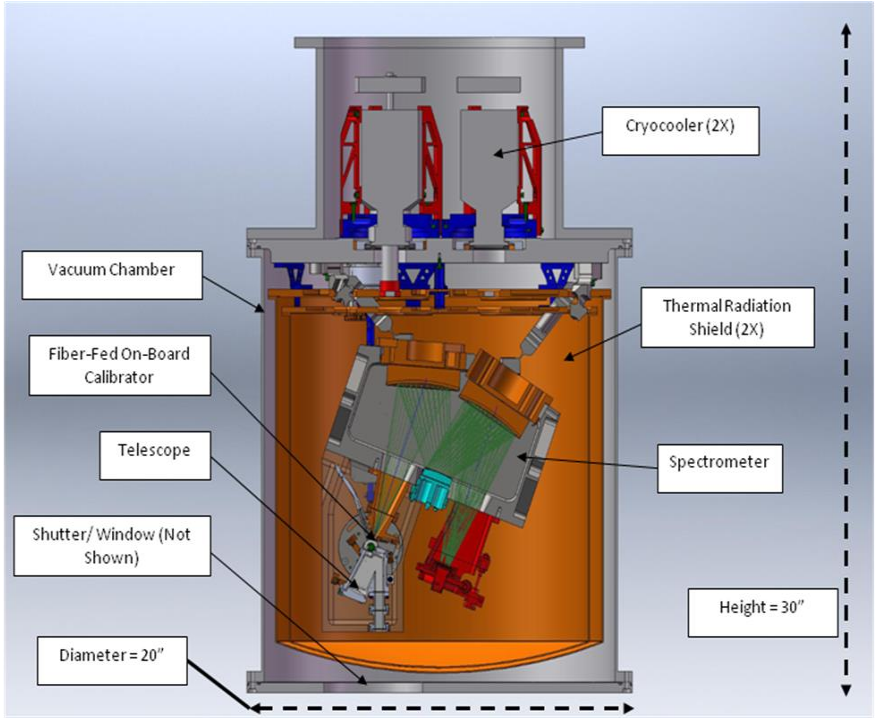


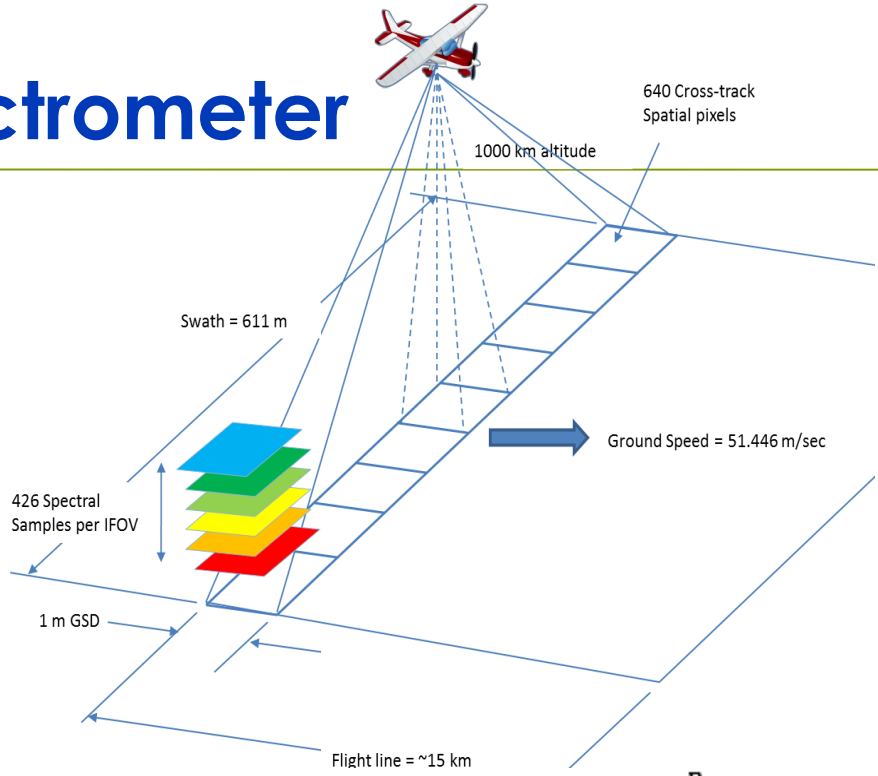


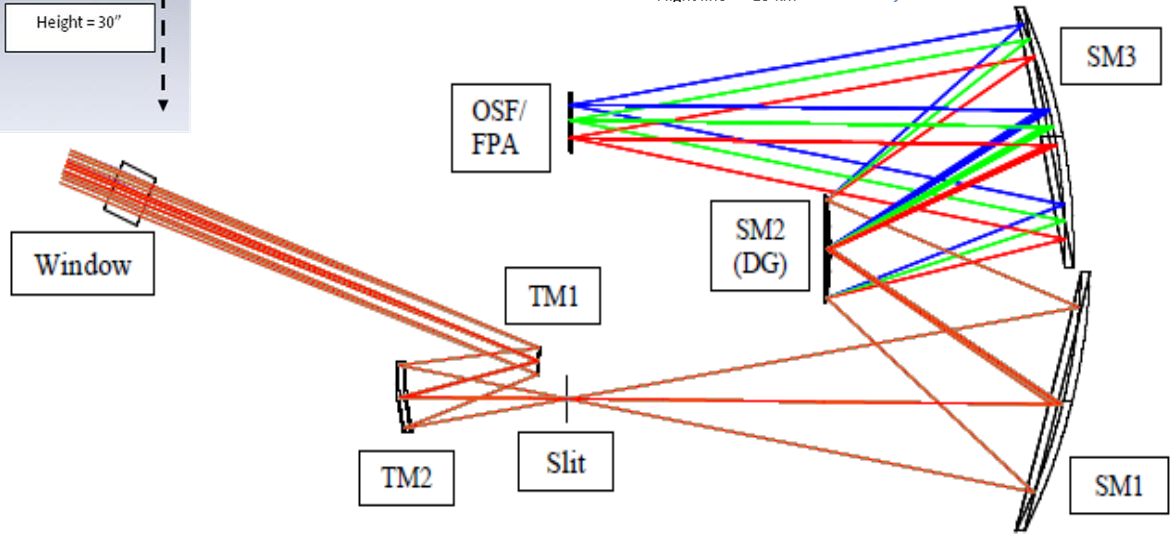


Aspen & Pine Dead Grass Snow

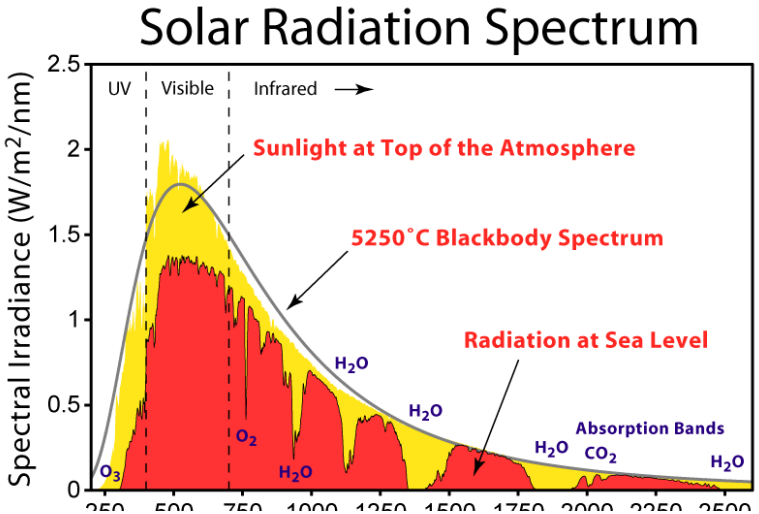
The NEON Imaging Spectrometer

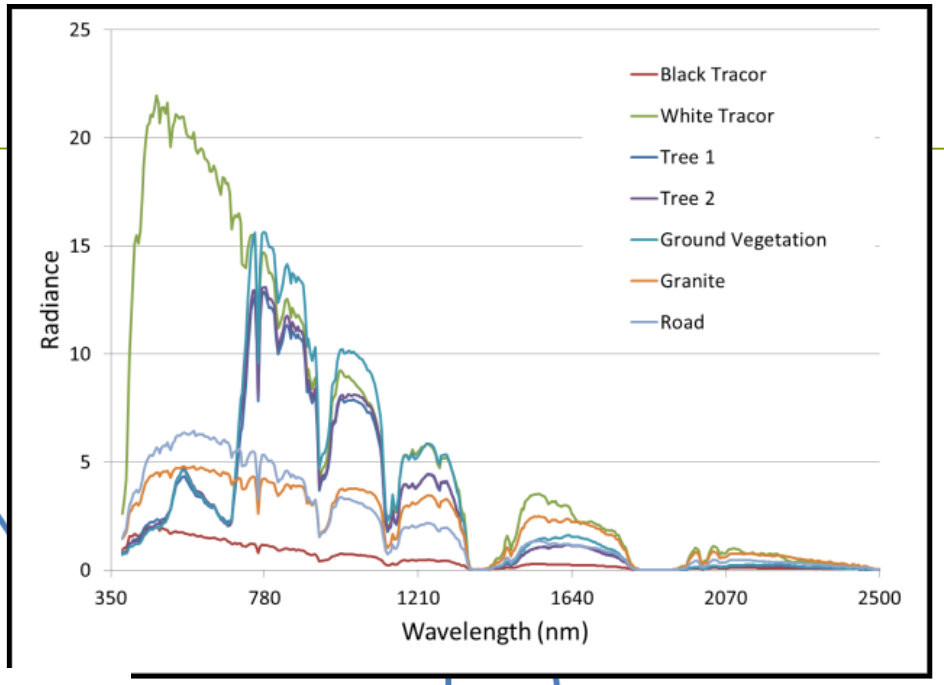


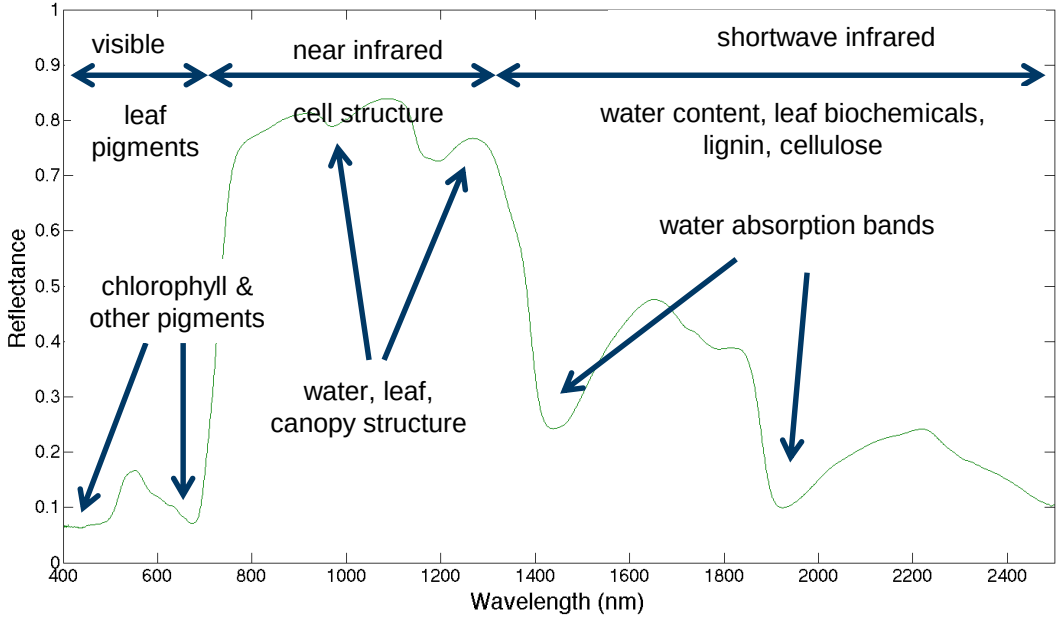


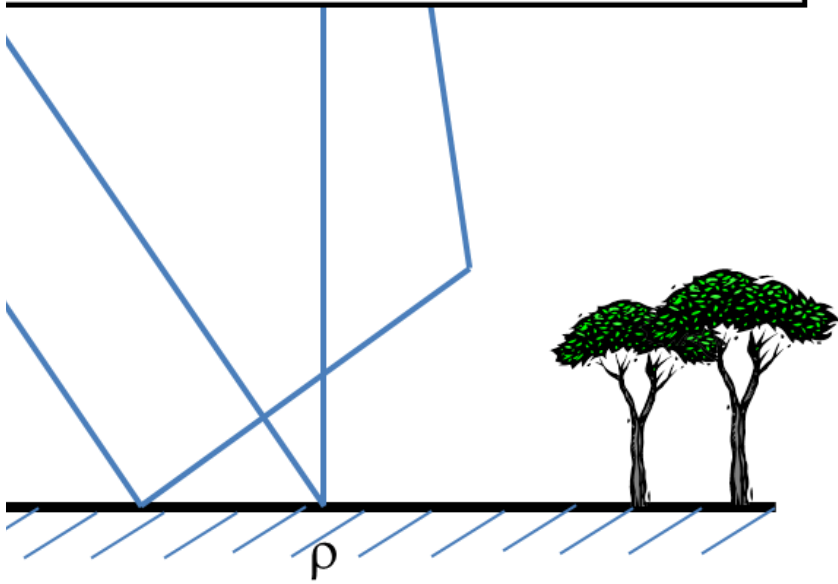


Why Calibration?

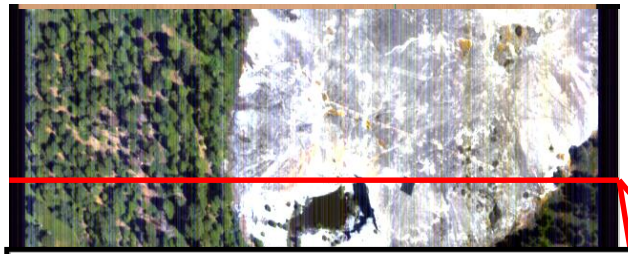






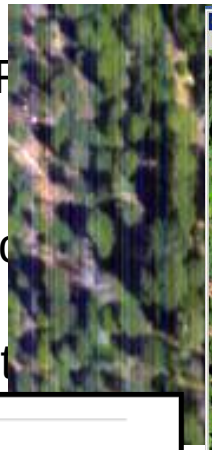


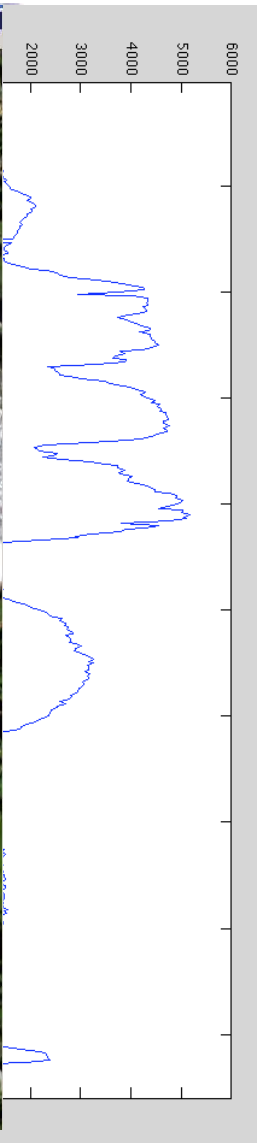
NIS Raw Flight Line Sequence

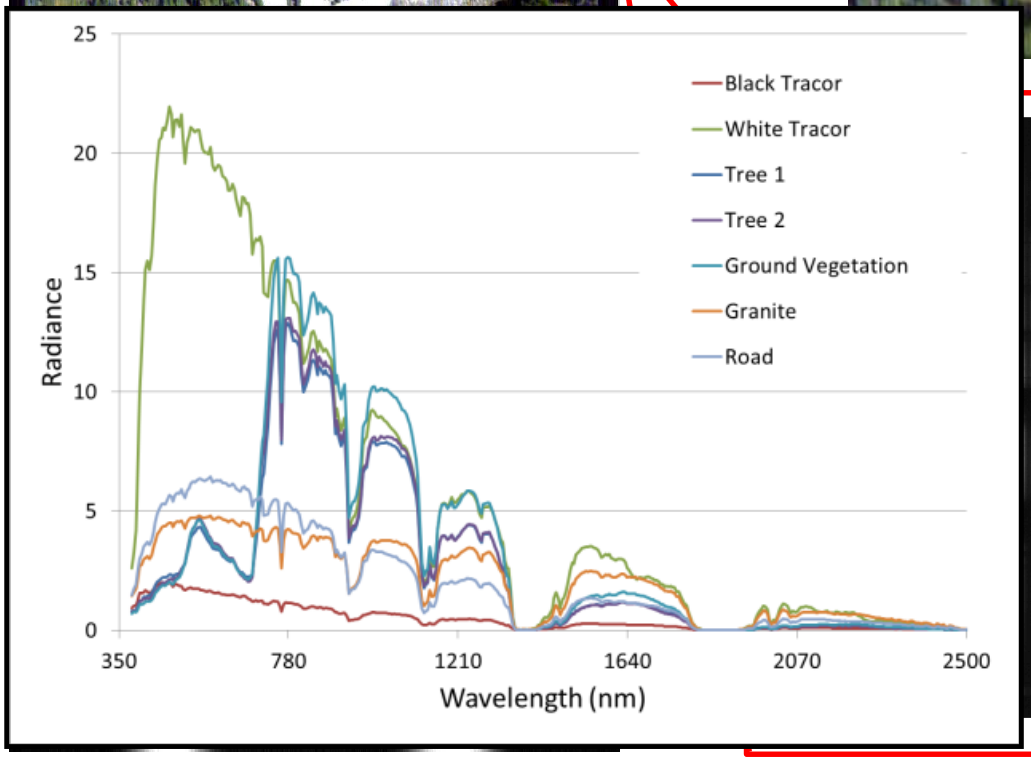


Dark F

Scienc
case,
collect







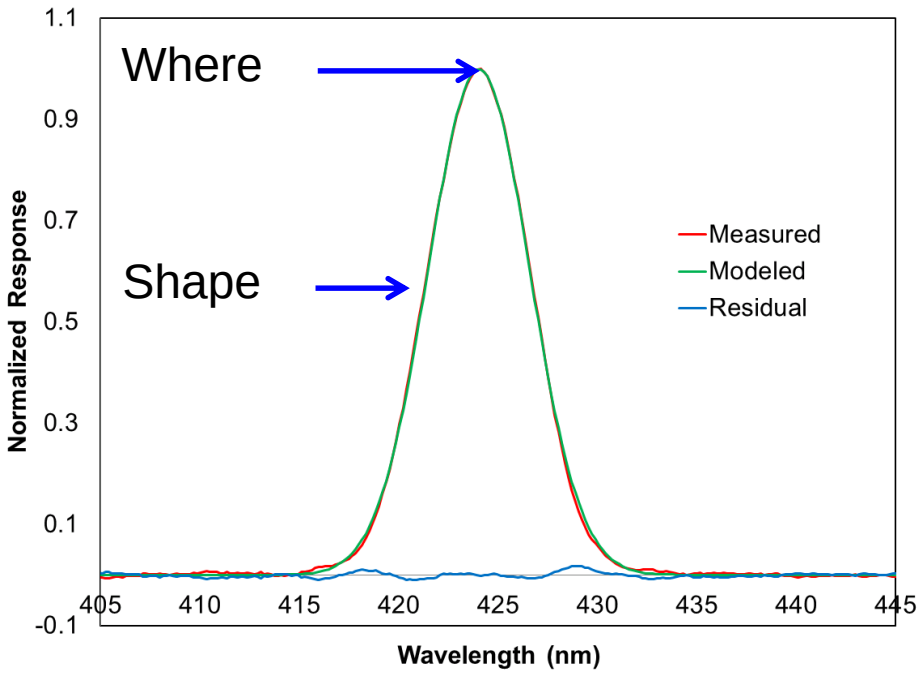
Spectral Calibration

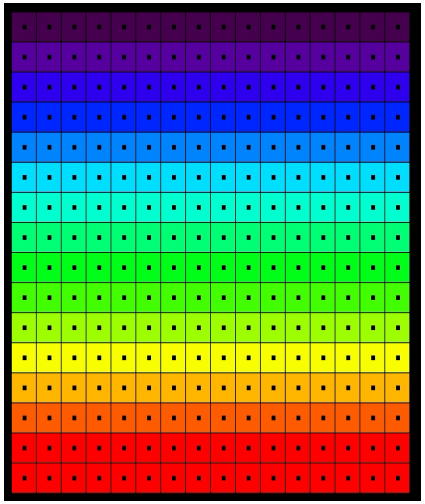
For EACH Pixel (All 255,944 of them),

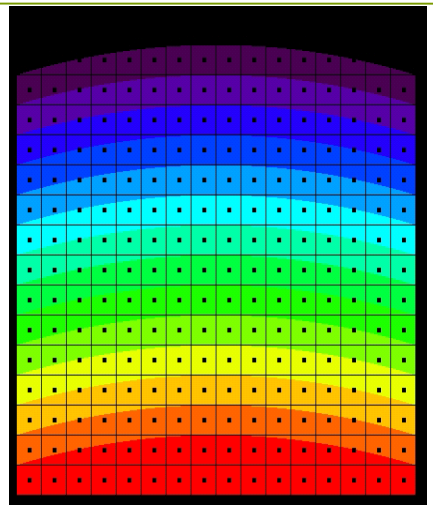
We need to know or model the

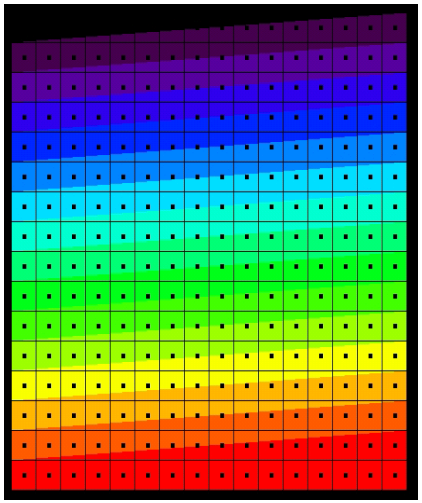
- Location
- Shape

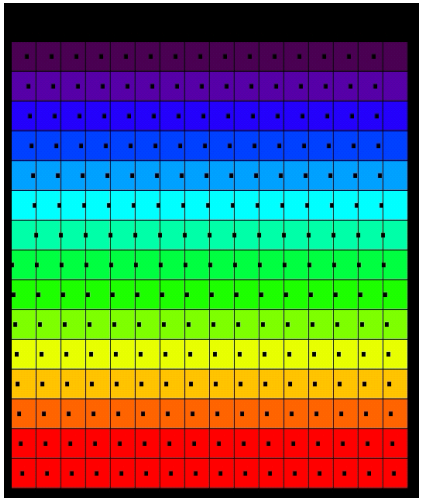
of the spectral response functions (SRF)



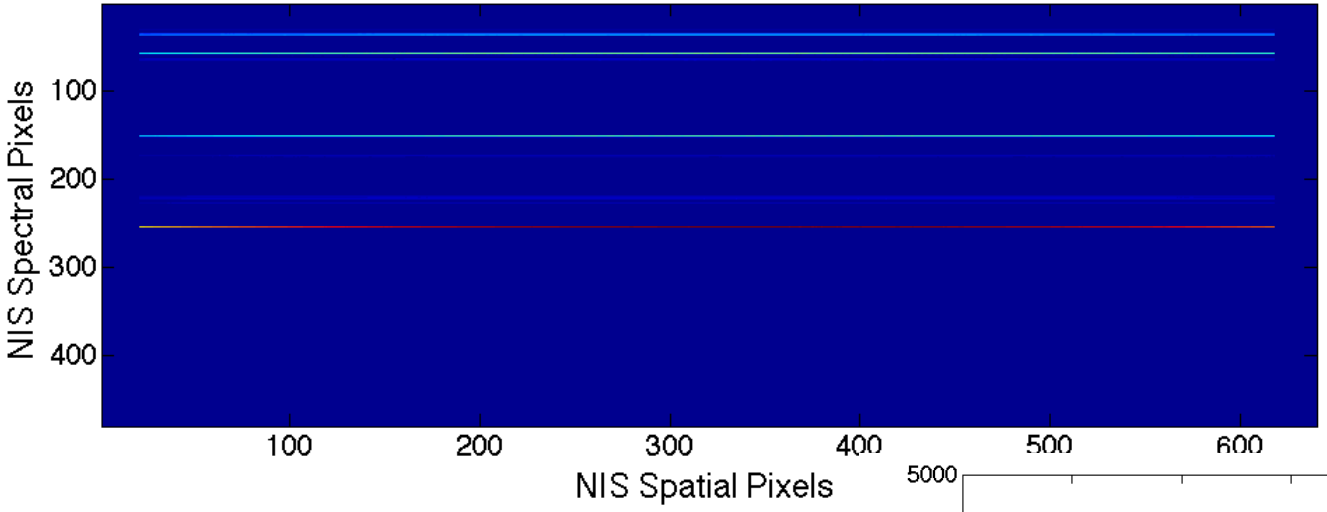


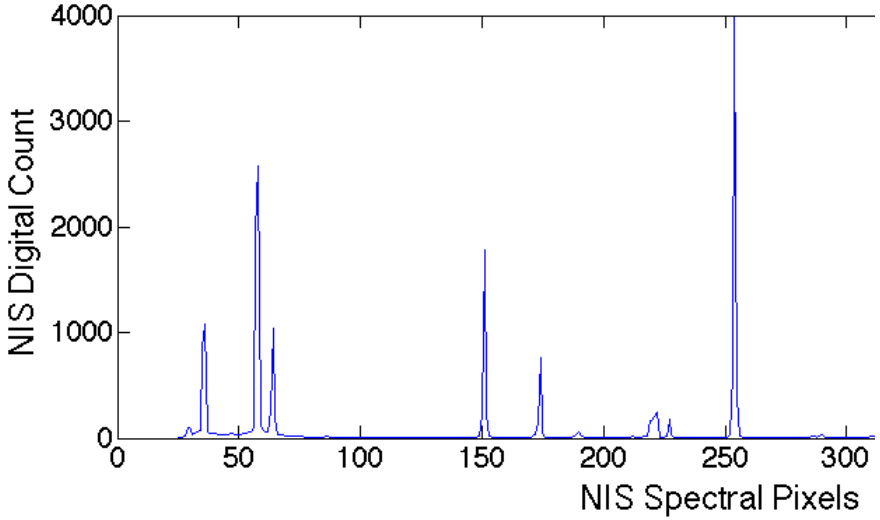


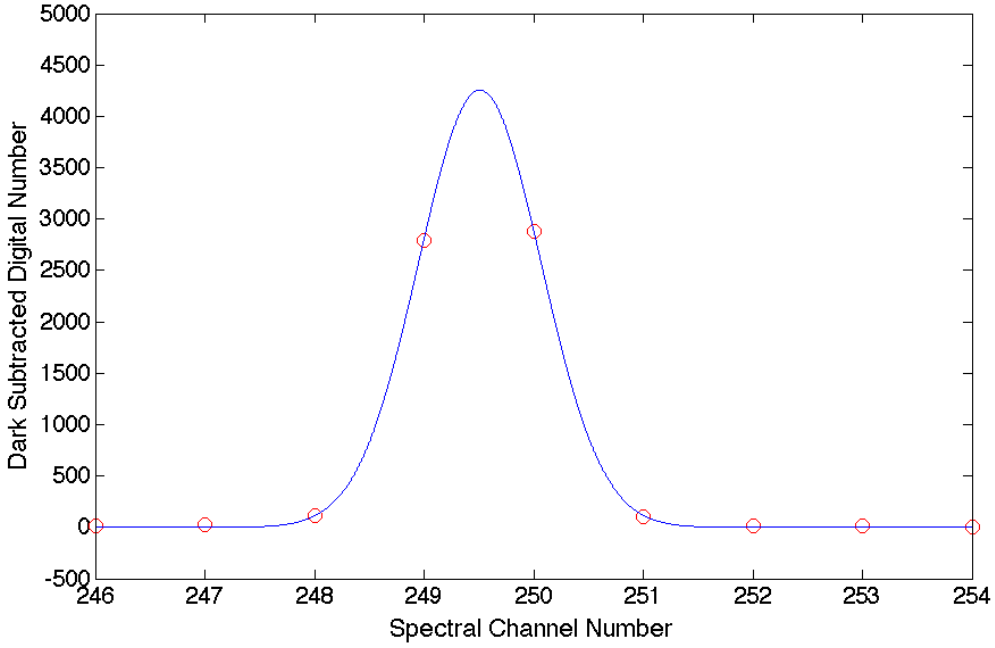




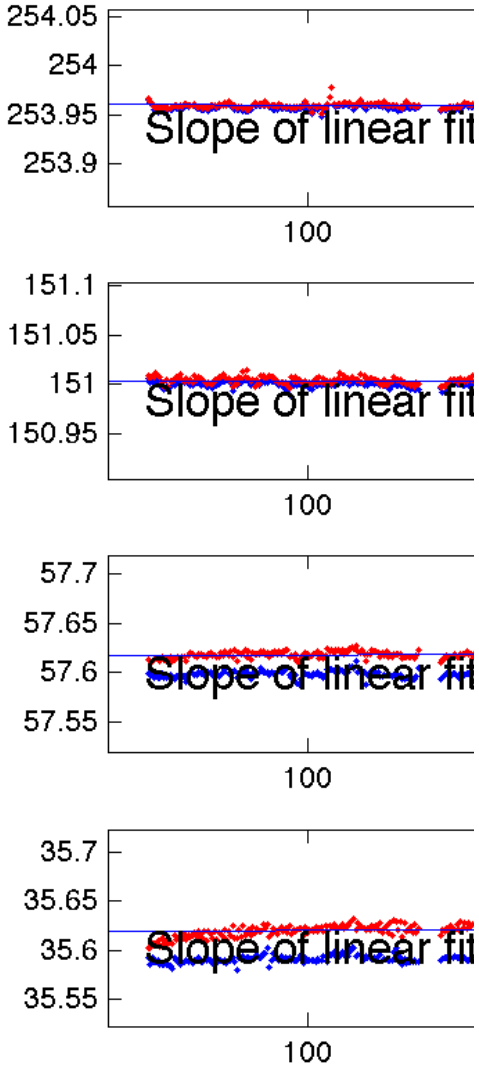
Spectral Calibration

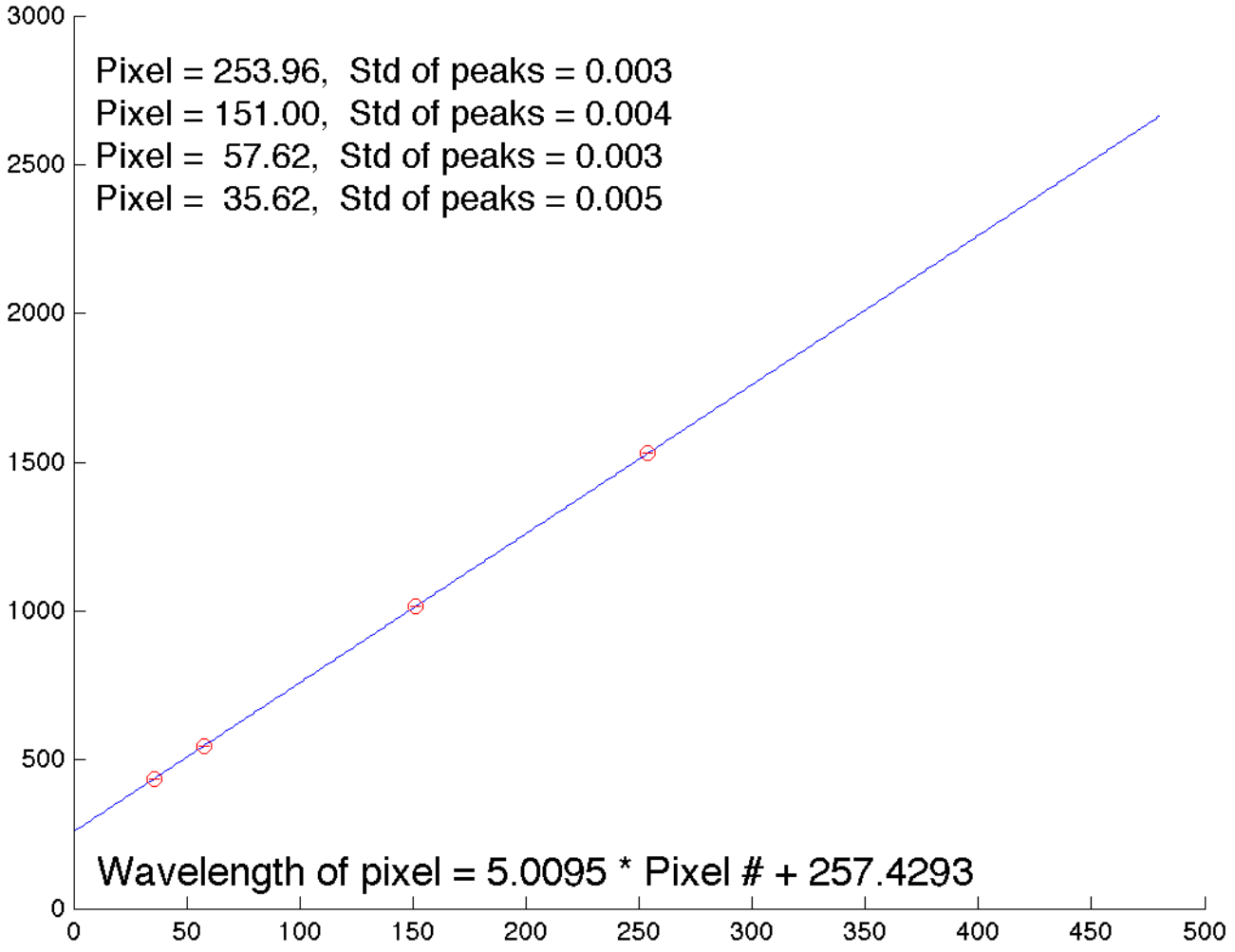






Spectral Calibration



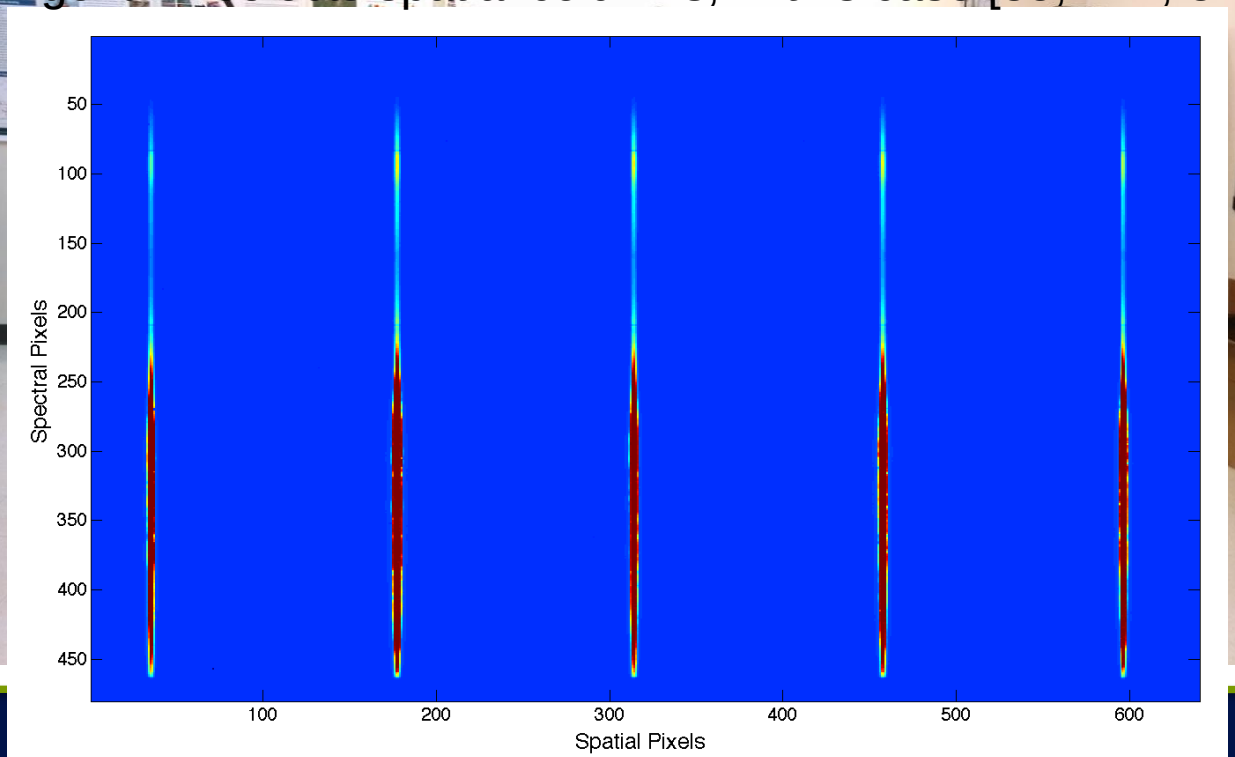


Spectral Calibration

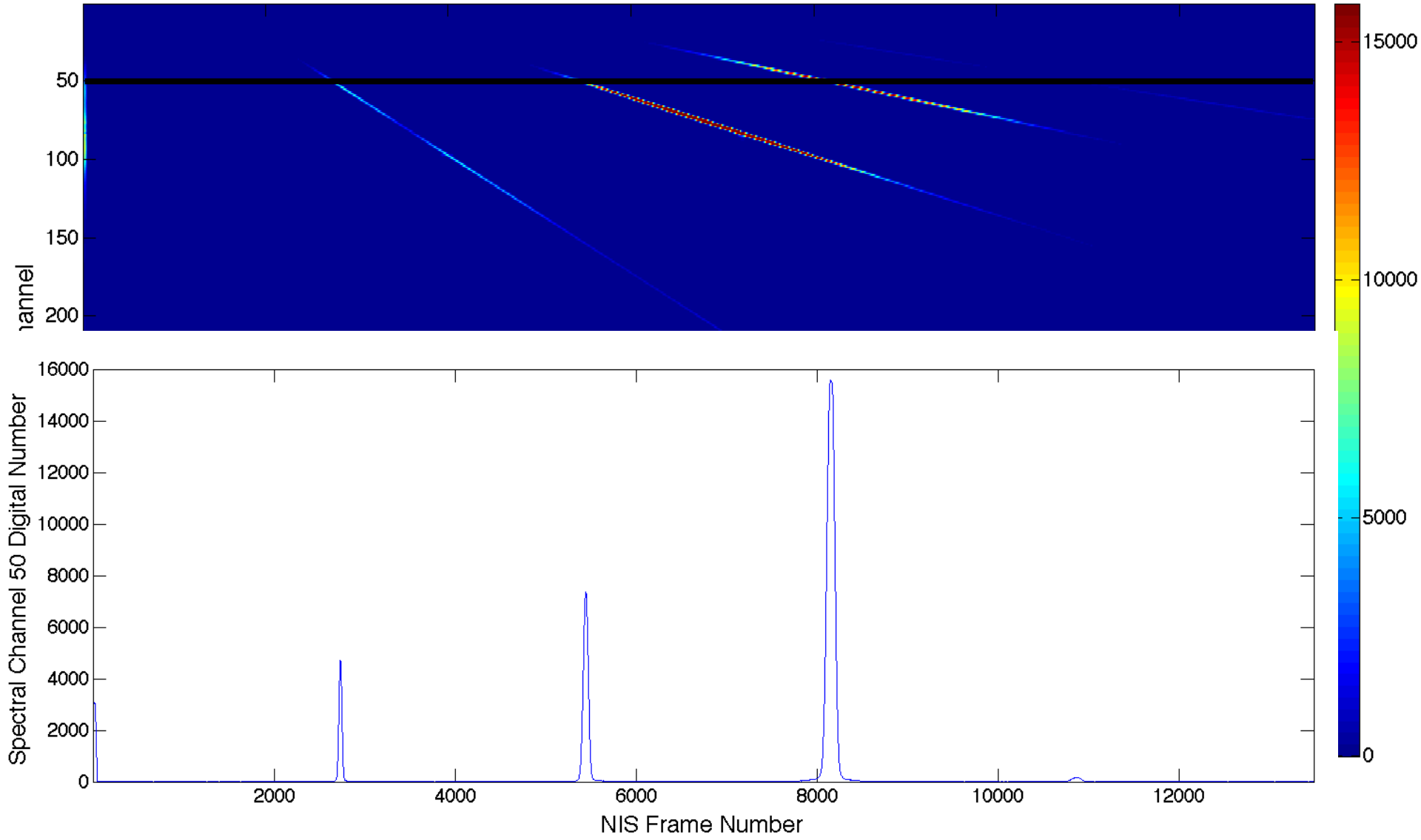
Raw NIS-1 image collected on BIP/SCIP

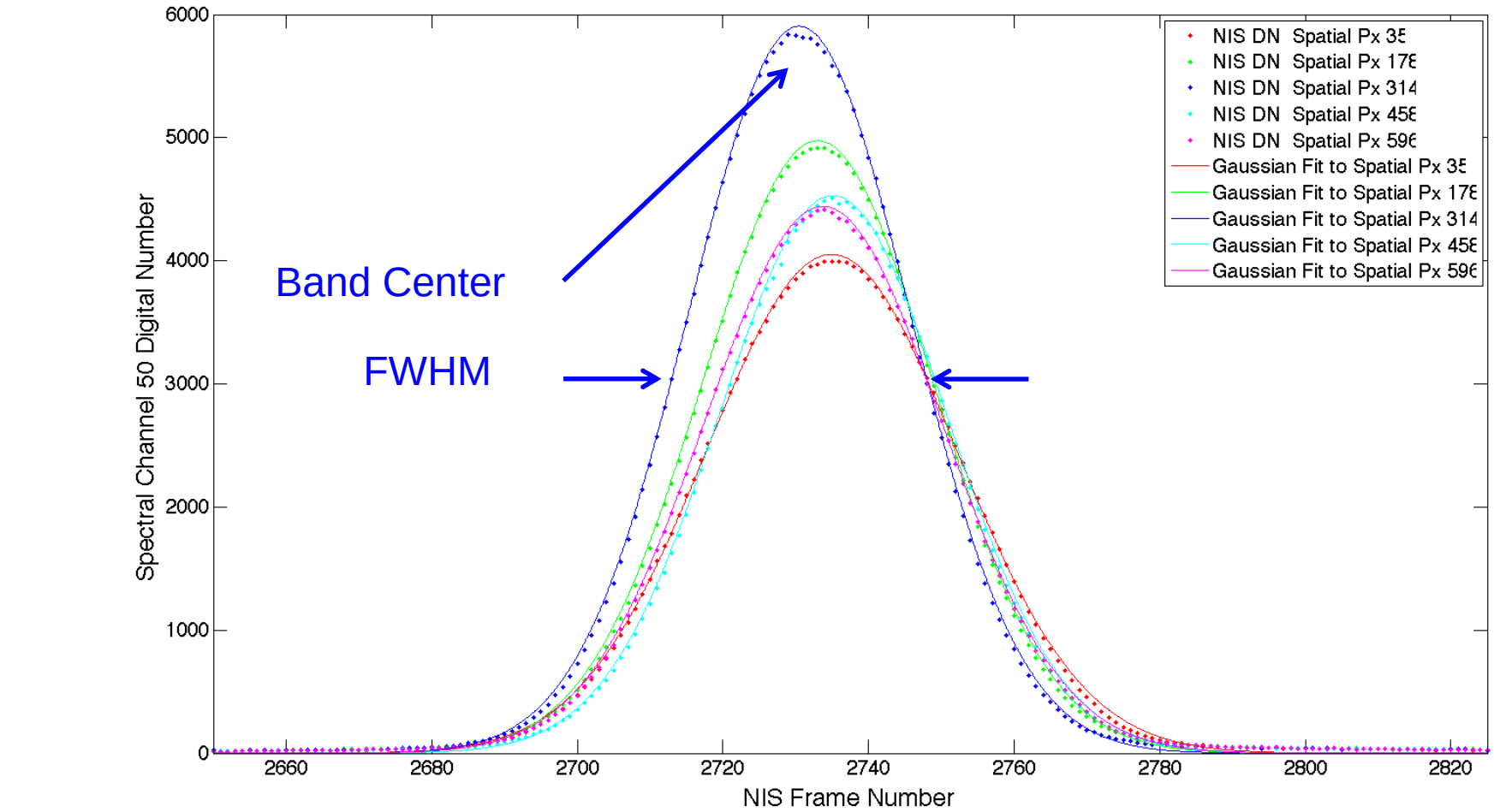
- BIP/SCIP illuminates 5 spatial pixel locations
- Zero-order light collected at start
- RGB show up in RGB image of collect

Algorithm selects spatial columns, in this case [35, 177, 314, 457, 596]



Spectral Calibration




Band Center
FWHM
NIS DN Spatial Px 35
NIS DN Spatial Px 175
NIS DN Spatial Px 314
NIS DN Spatial Px 455
NIS DN Spatial Px 596
Gaussian Fit to Spatial Px 35
Gaussian Fit to Spatial Px 175
Gaussian Fit to Spatial Px 314
Gaussian Fit to Spatial Px 455
Gaussian Fit to Spatial Px 596
Spectral Channel 50 Digital Number
NIS Frame Number
0
1000
2000
3000
4000
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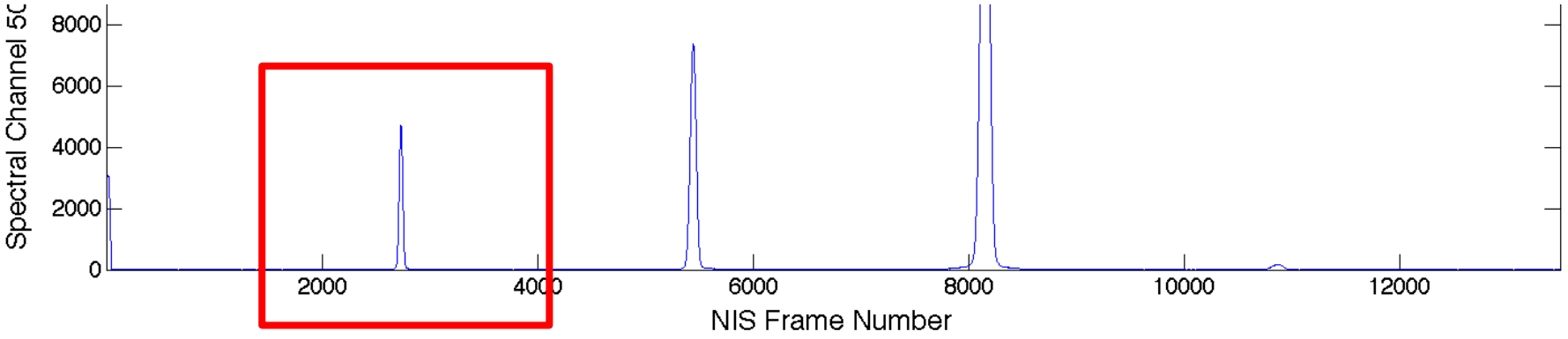
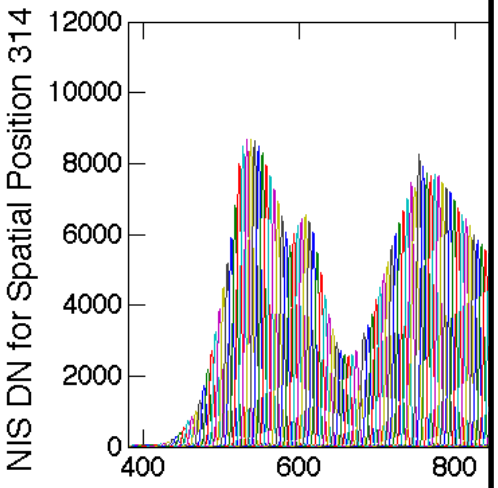
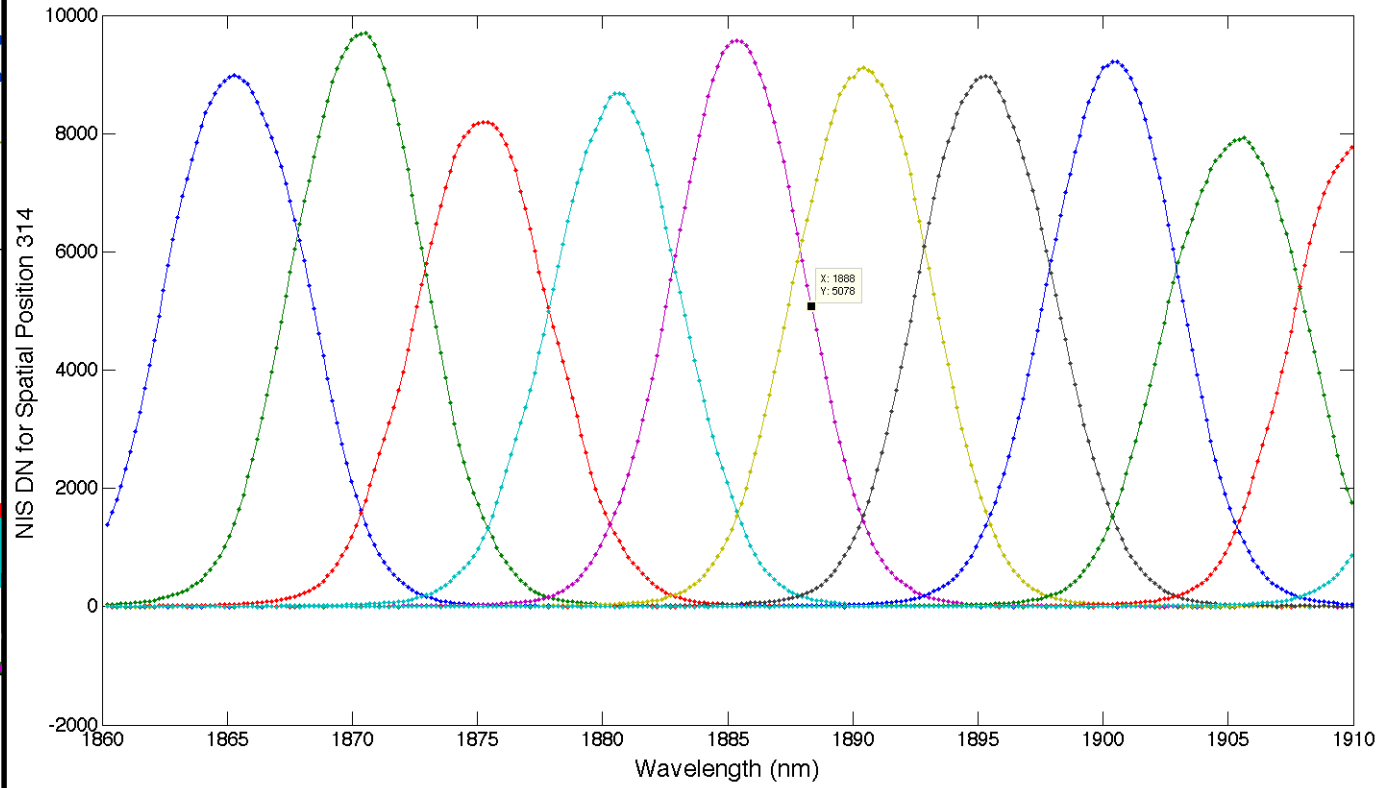
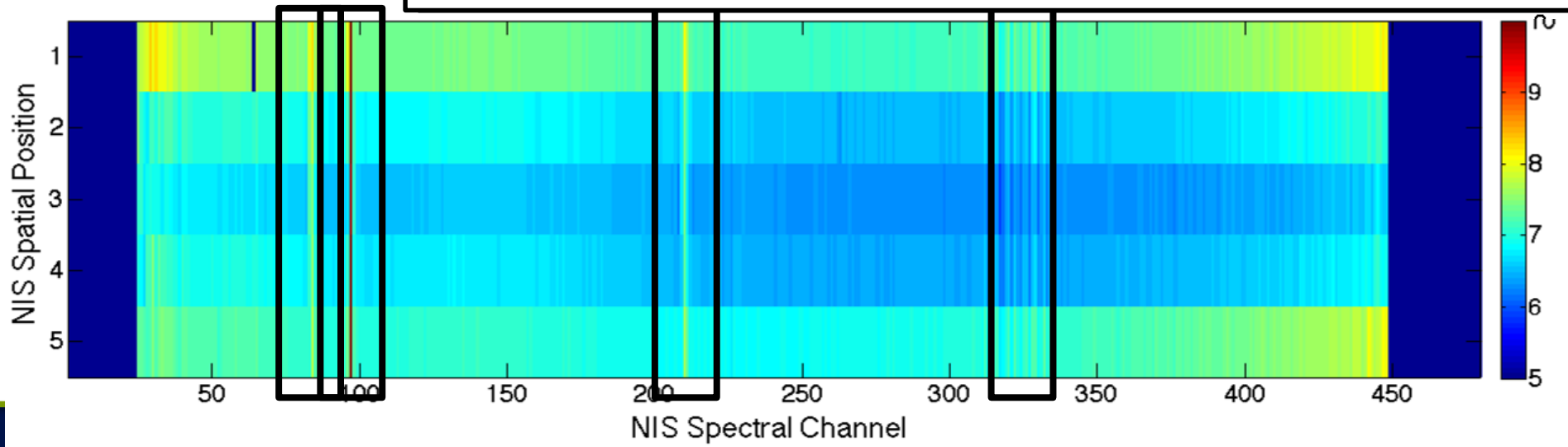
2700
2720
2740
2760
2780
2800
2820


Spectral Channel 50
NIS Frame Number
0
2000
4000
6000
8000
2000
4000
6000
8000
10000
12000

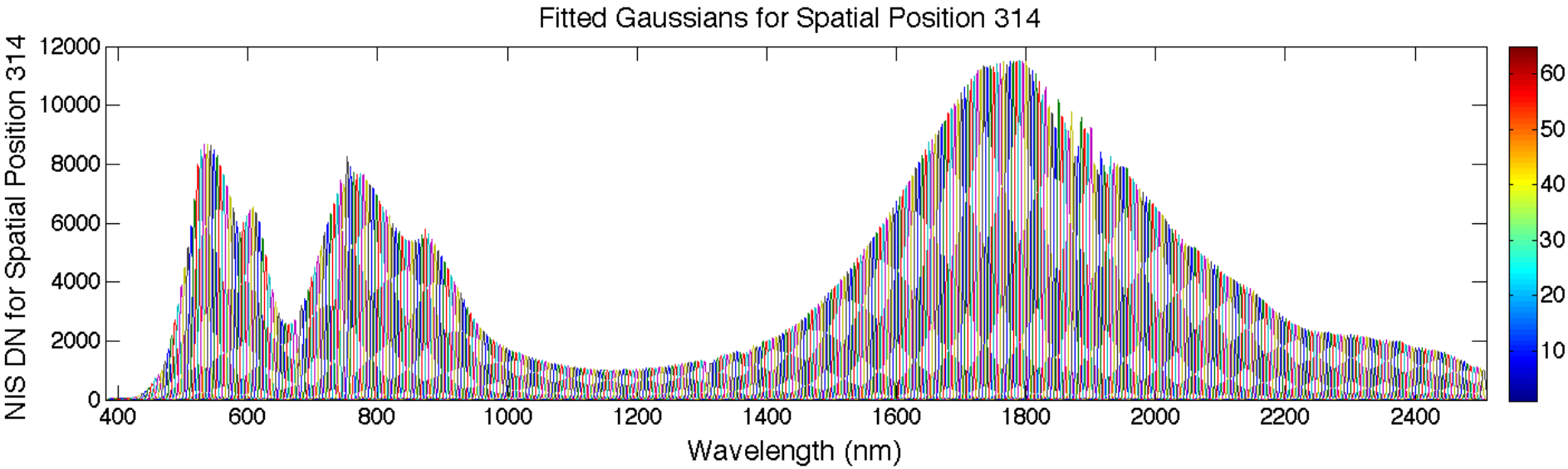
Spectral C

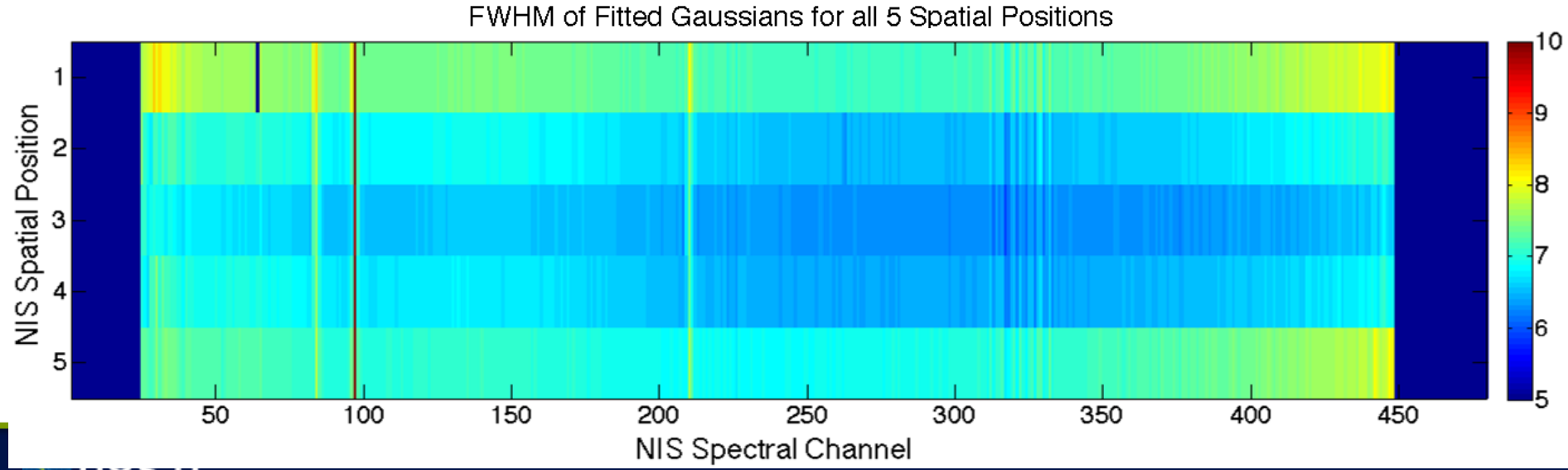




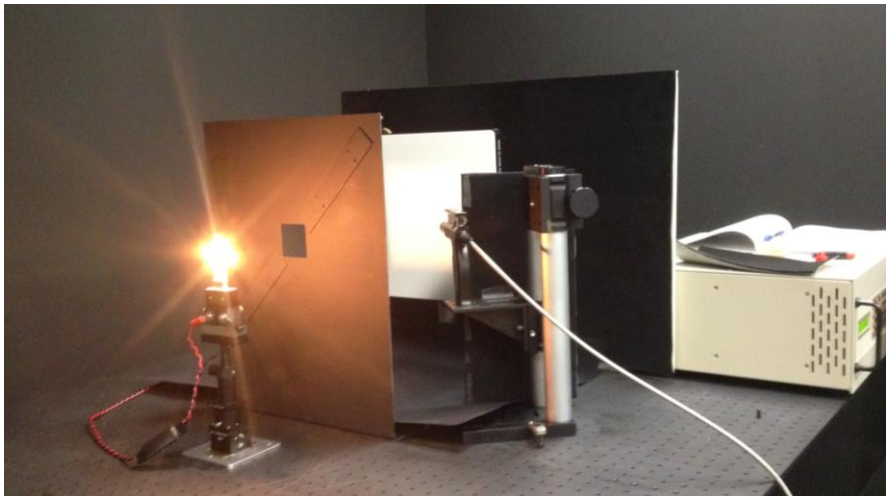


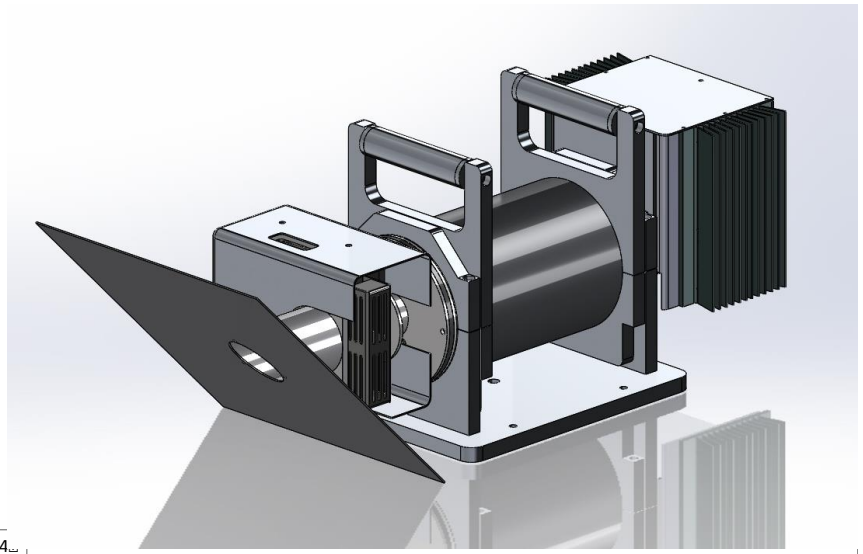
Spectral Calibration

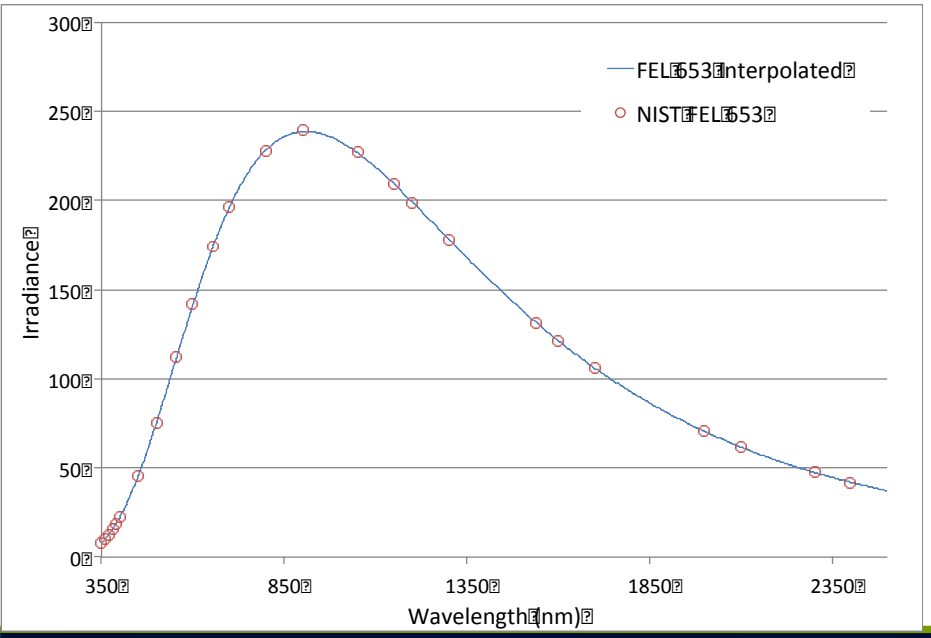


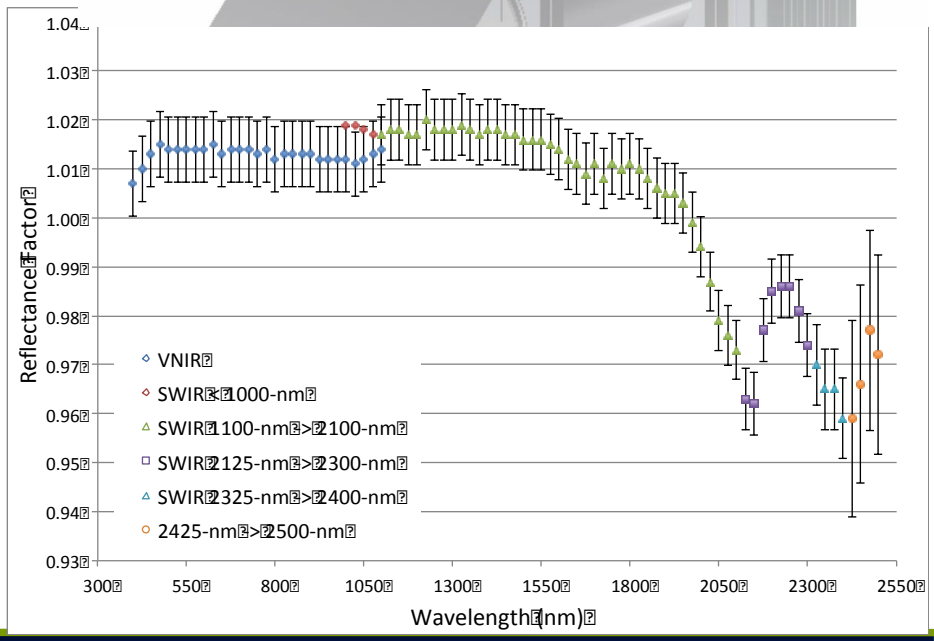


Radiometric Calibration

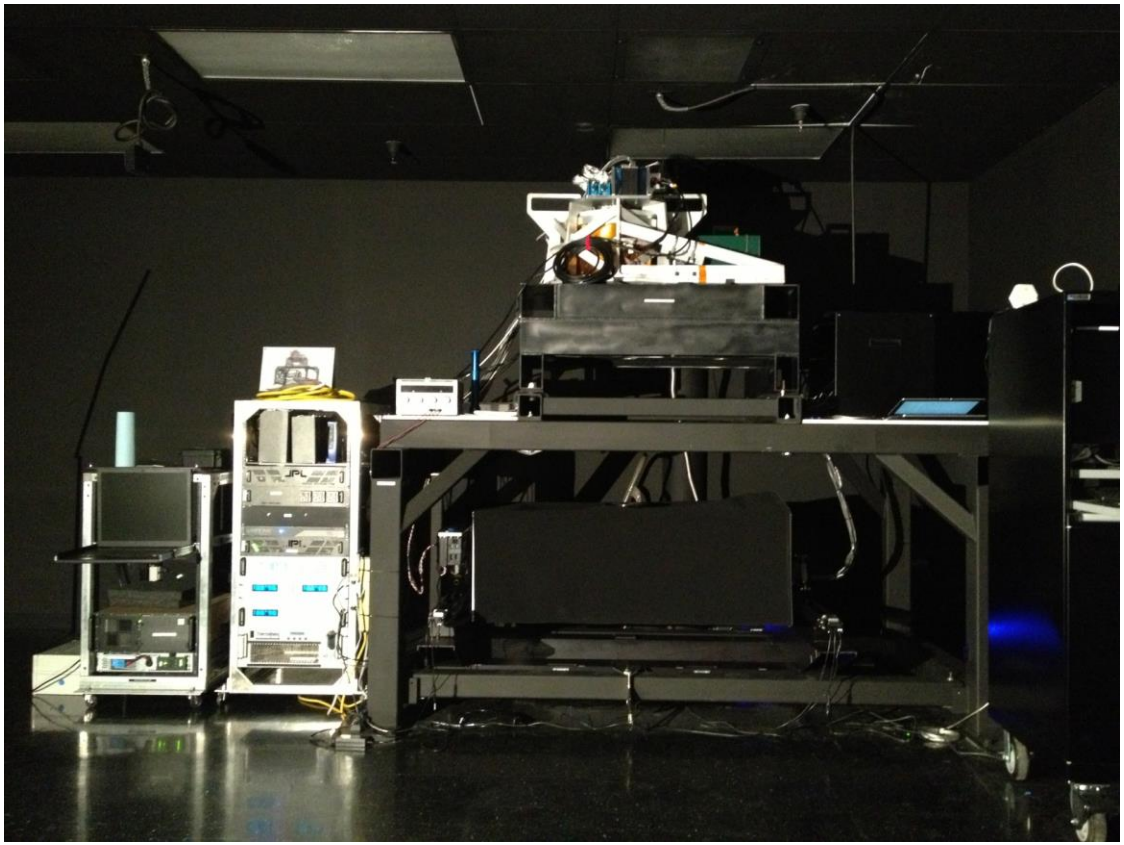




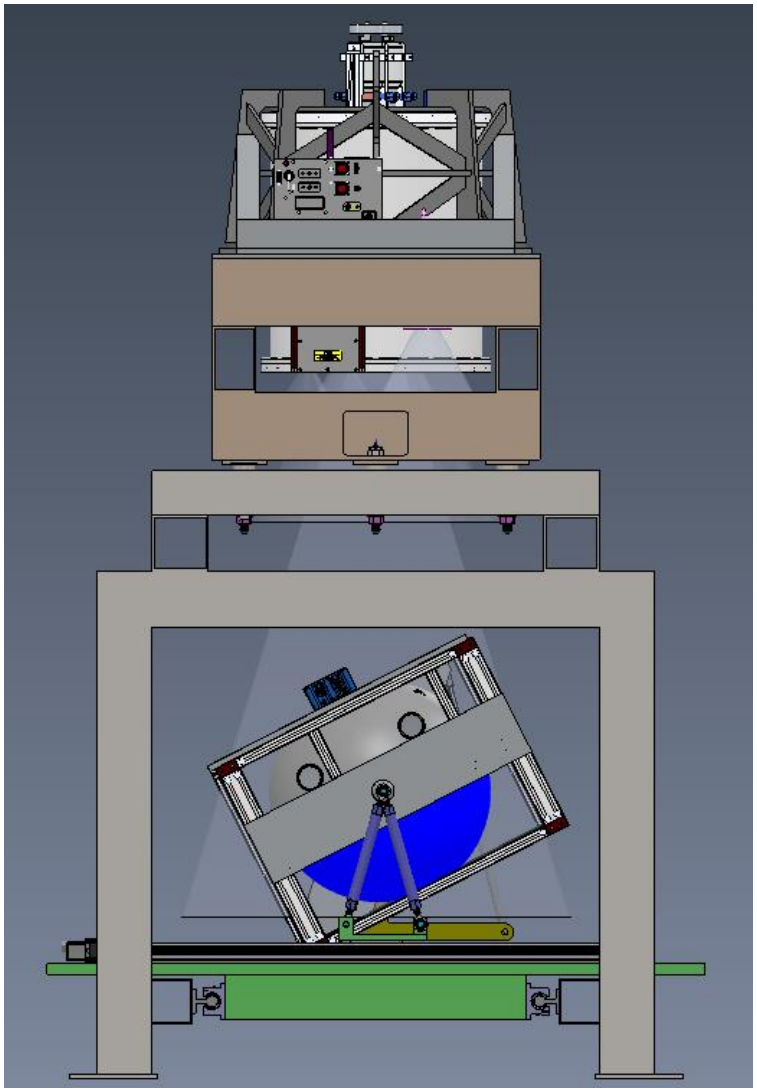




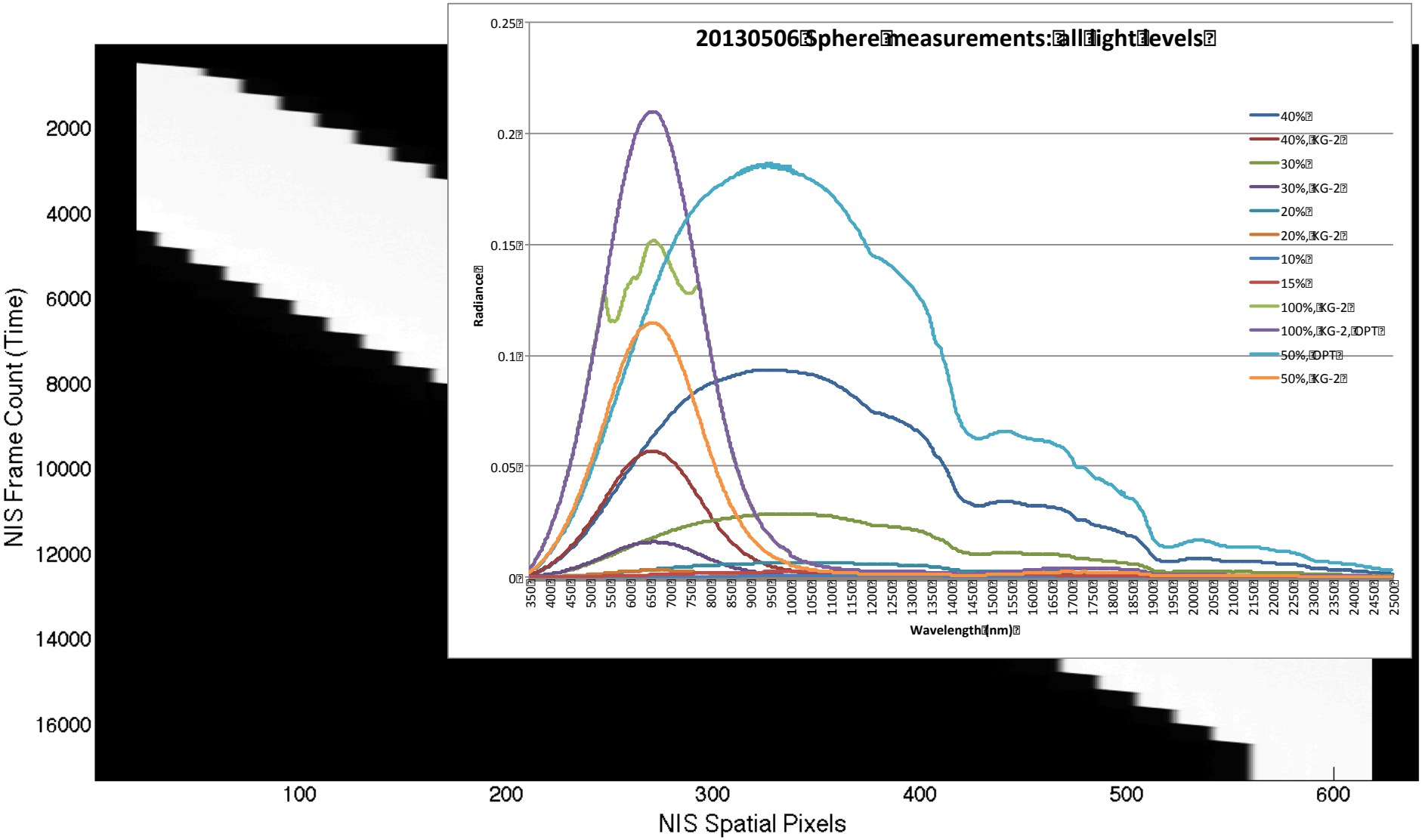
Radiometric Calibration



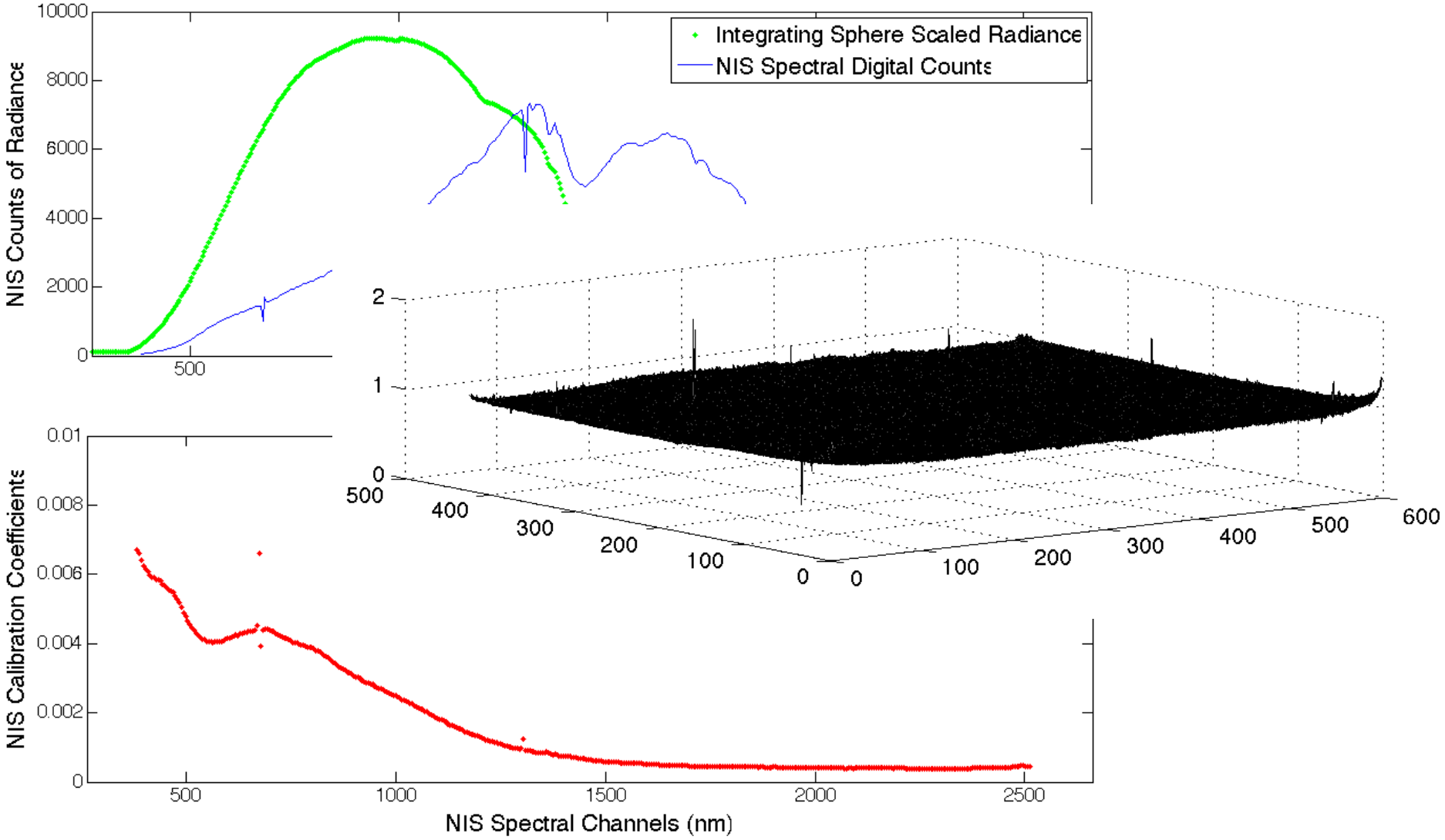
Integrating Sphere Test Station



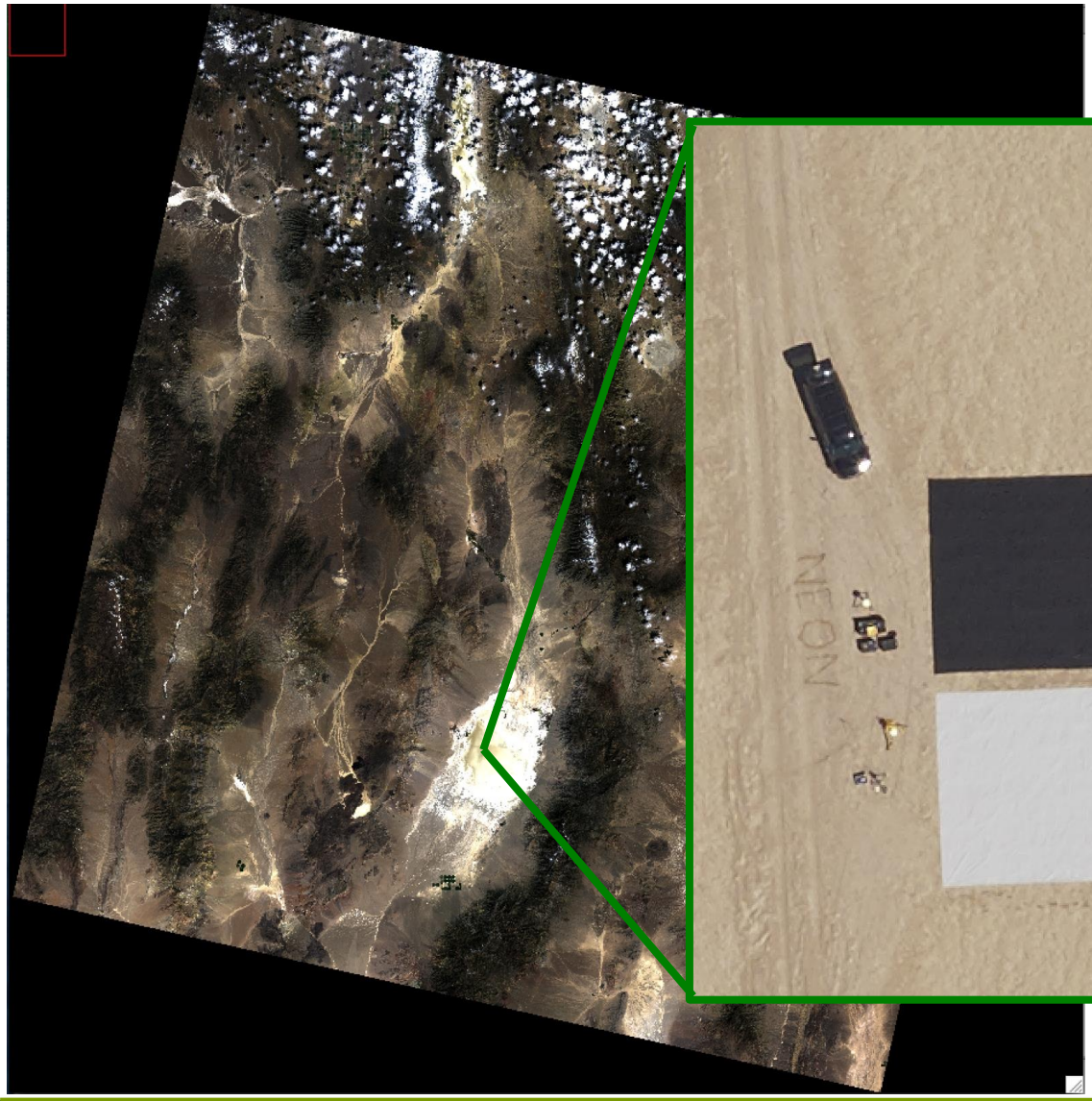
Radiometric Calibration

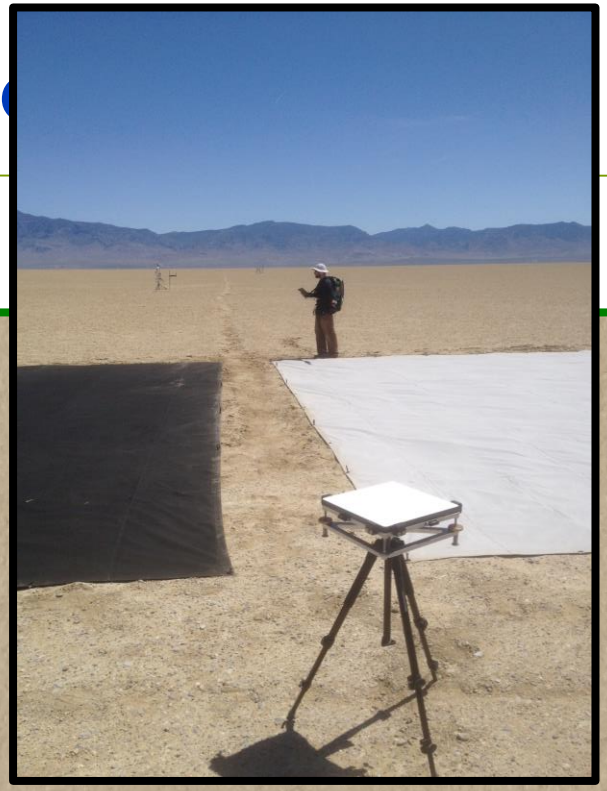


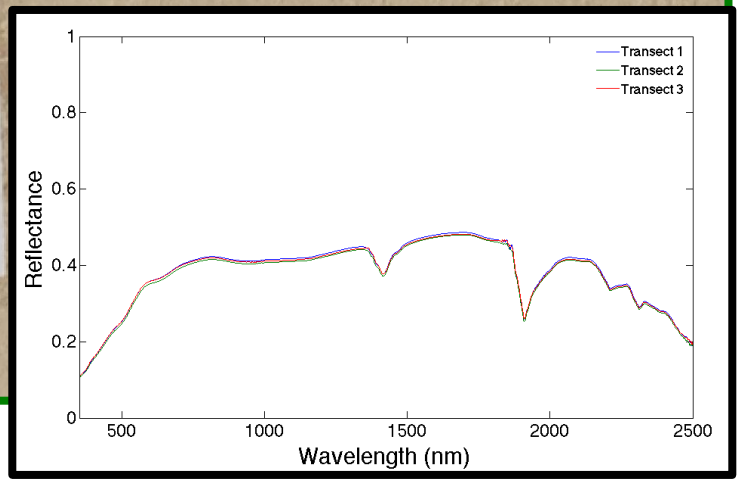
Radiometric Calibration



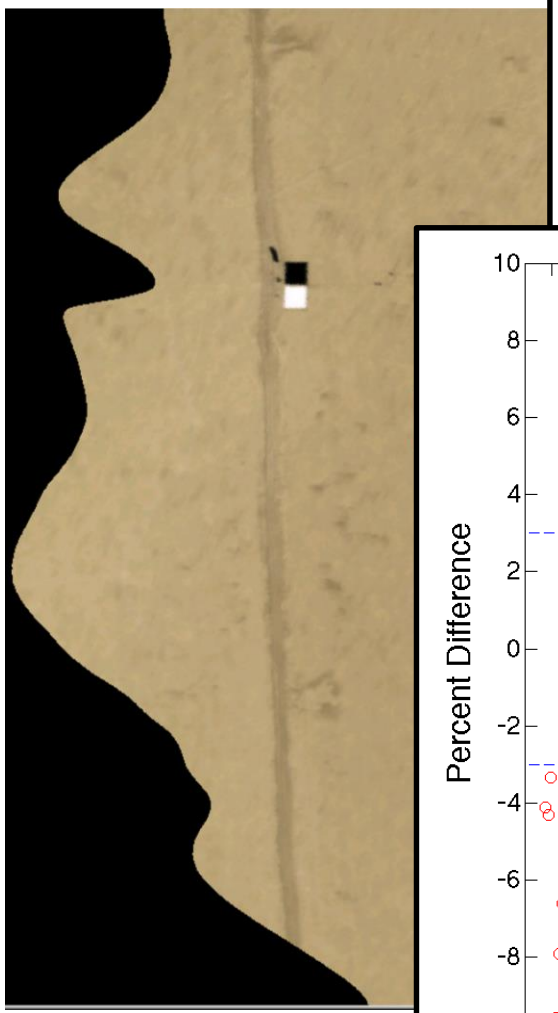
Vicarious Calibration at Railro

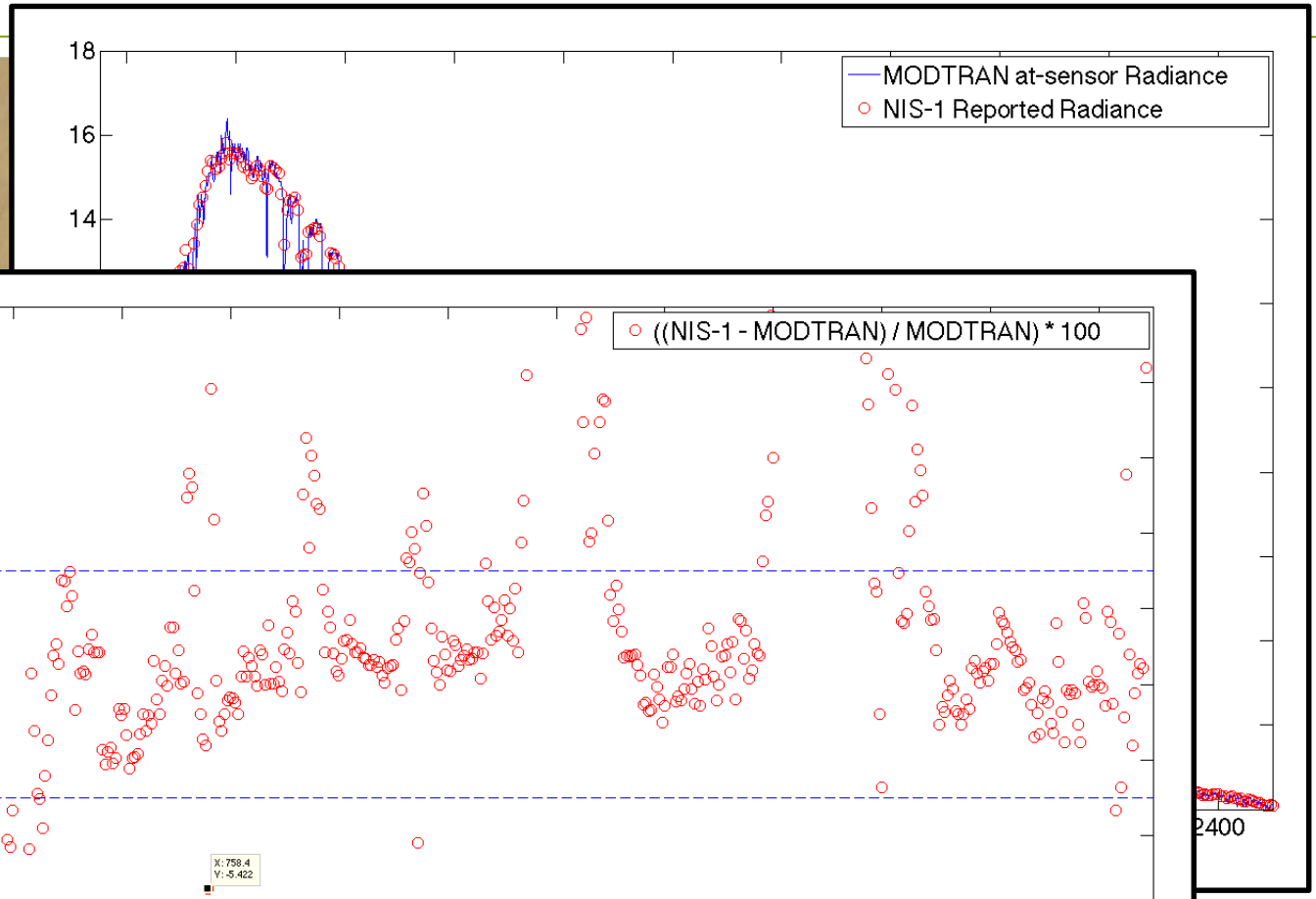




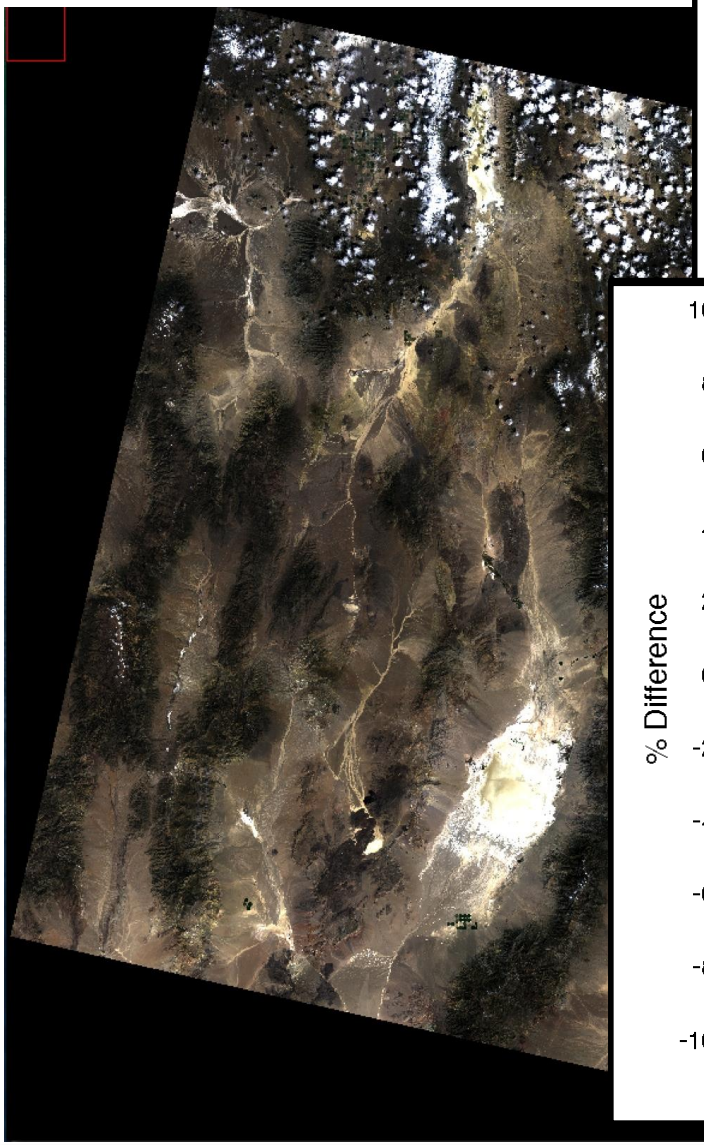


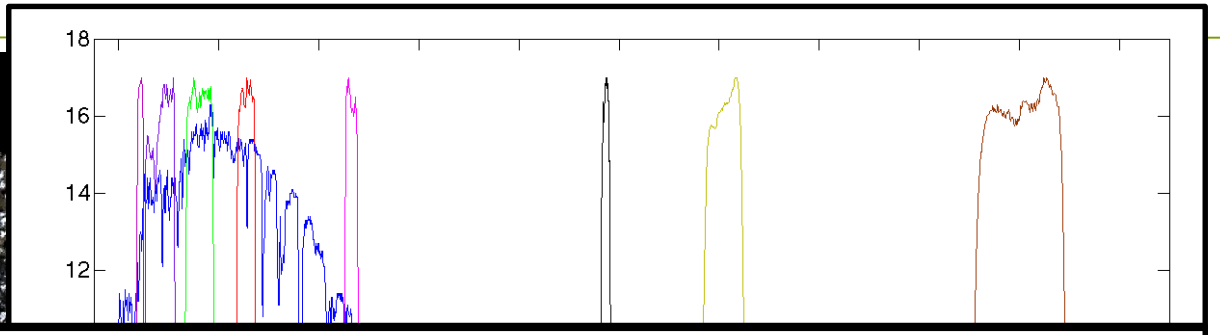
Vicarious Calibration at Railroad Valley

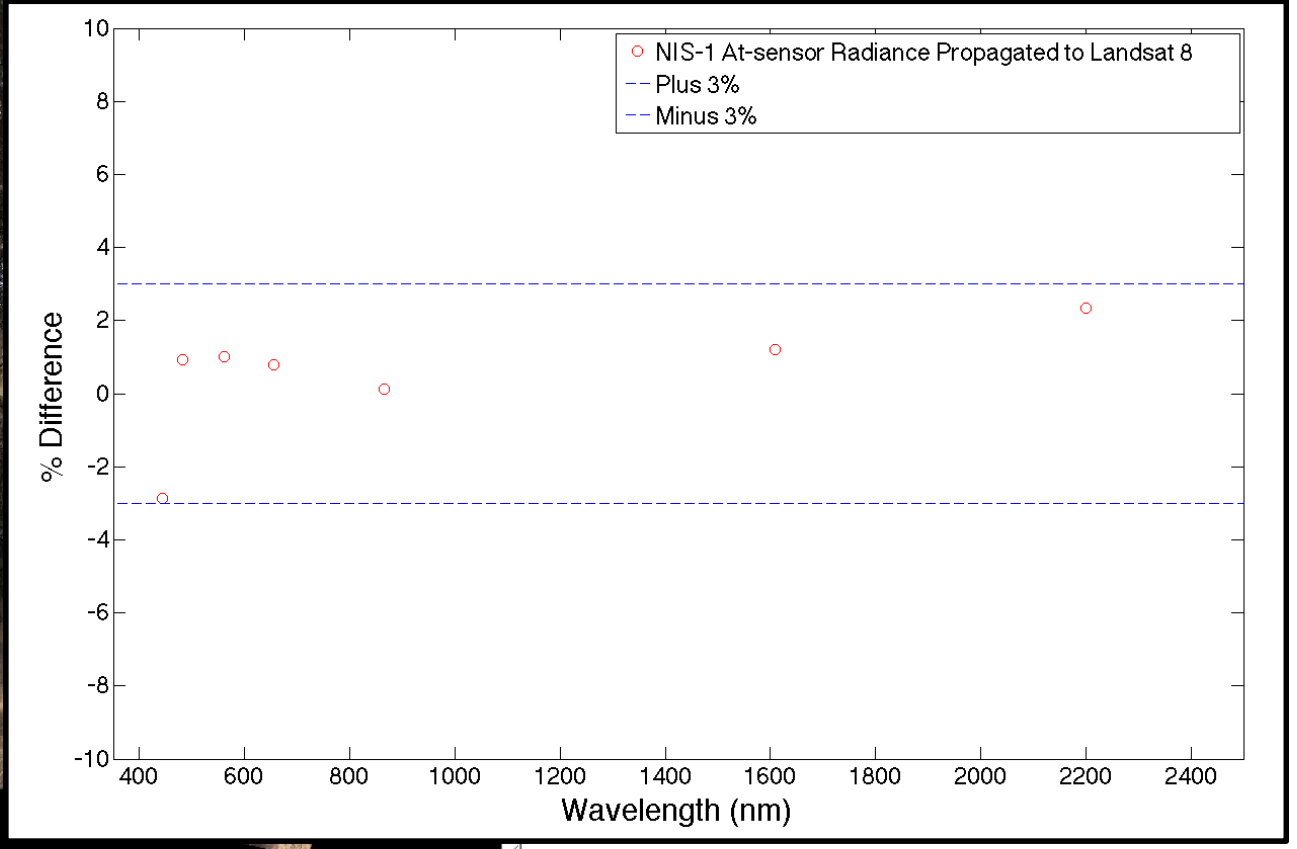




Vicarious Calibration at Railroad Valley

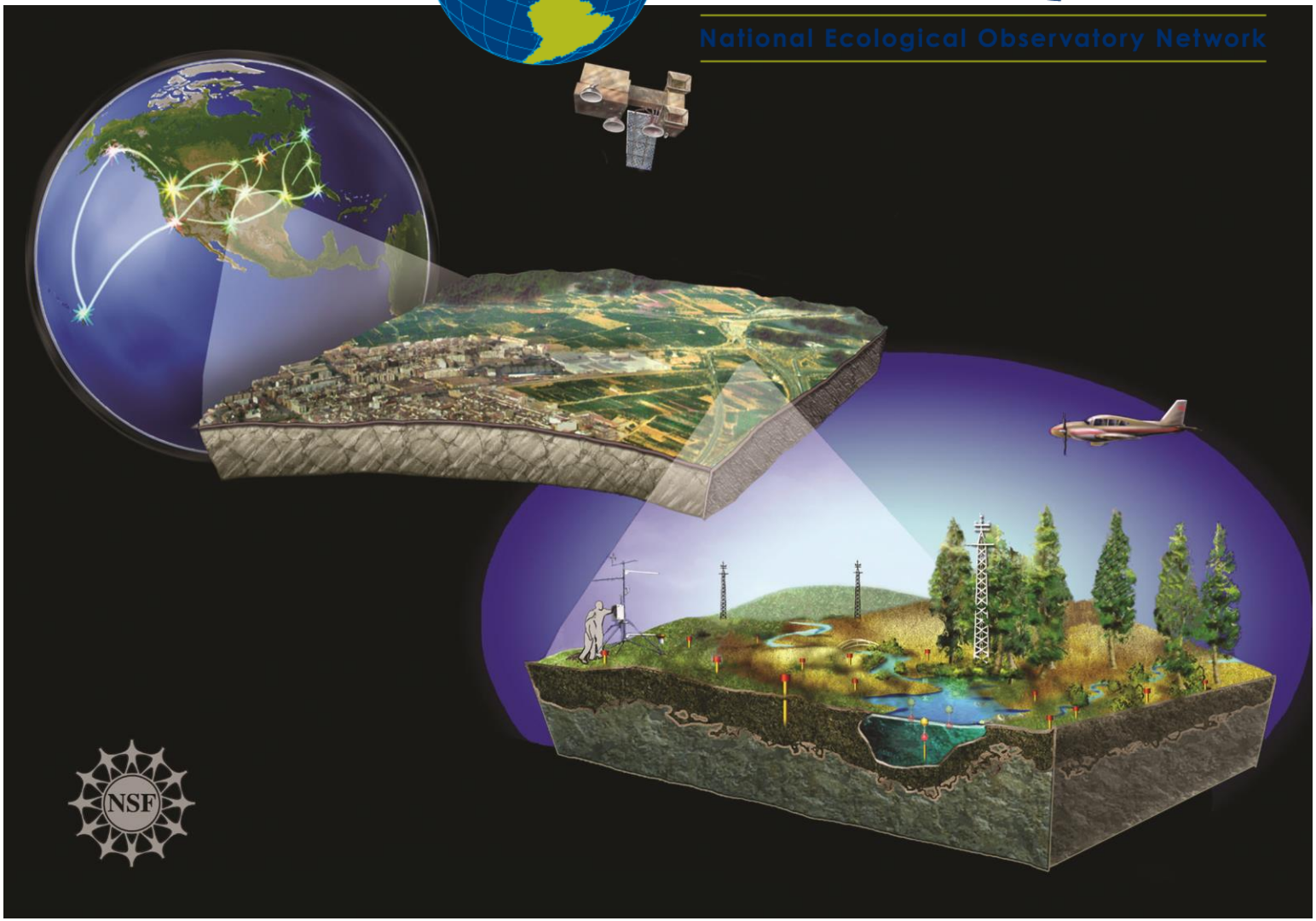






Conclusions

- Next steps
  - Improve Spectral Calibration
  - Continue calibration test set development
  - Incorporate precision Transfer Radiometers in calibration process
  - Continue development of QA/QC verification and reporting



Back-up slides