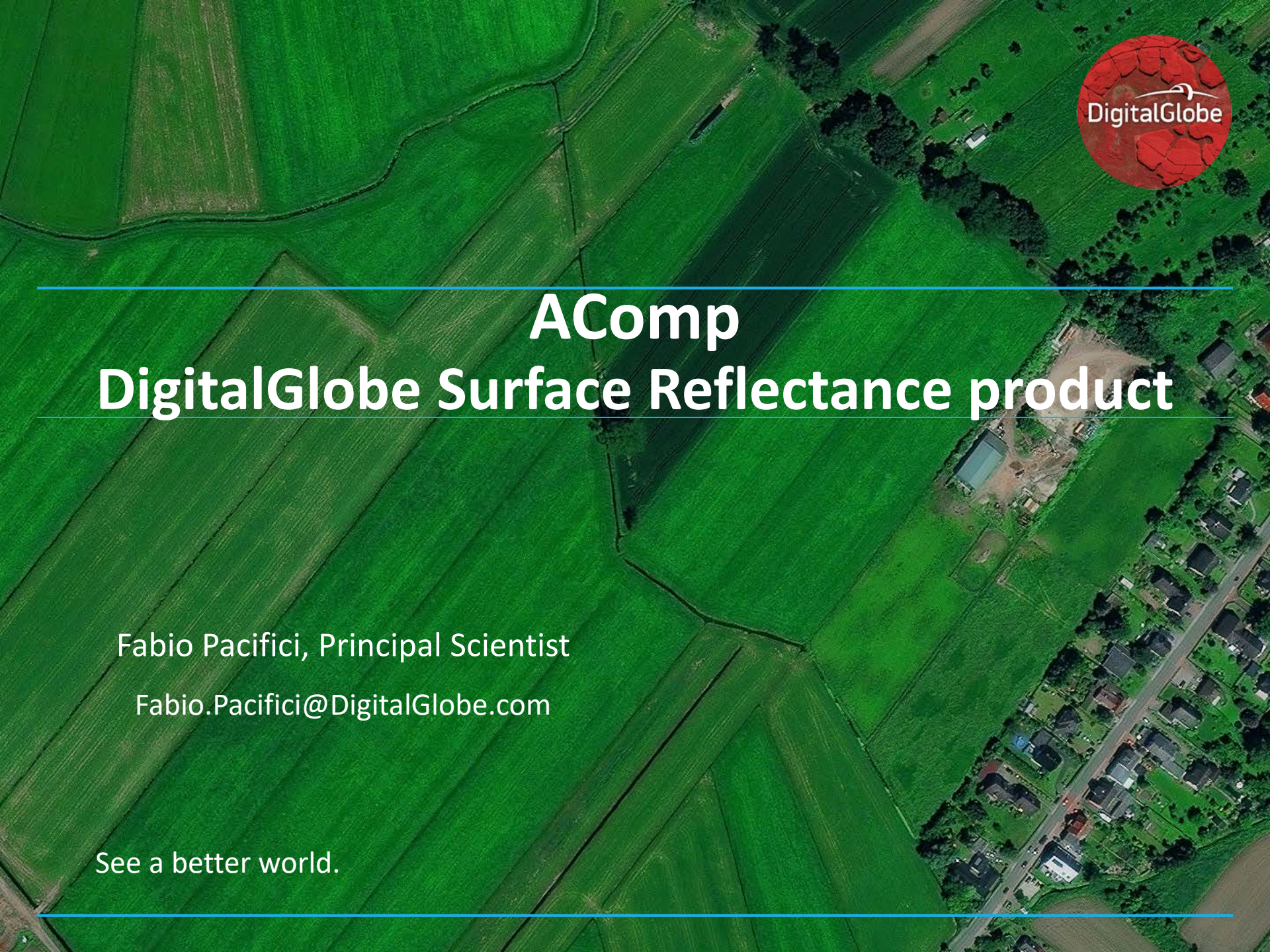


AComp
DigitalGlobe Surface Reflectance product

Fabio Pacifici, Principal Scientist

Fabio.Pacifici@DigitalGlobe.com

See a better world.

DigitalGlobe Constellation

IKONOS

0.82 meter
1999 - 2015

QuickBird

0.65 meter
2001 - 2015

WorldView-1

0.50 meter
2007

GeoEye-1

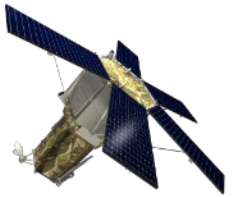
0.46 meter
2008

WorldView-2

0.46 meter
2009

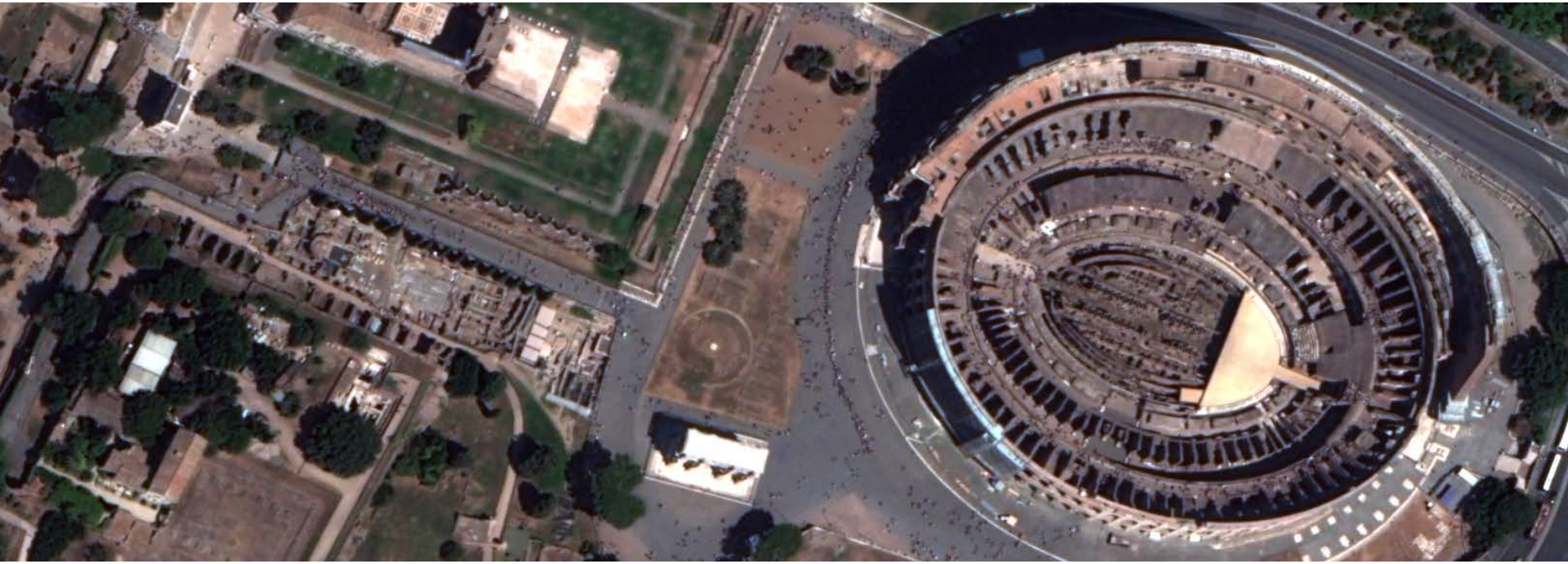
WorldView-3

0.30 meter
2014



WorldView-4

0.30 meter
2016



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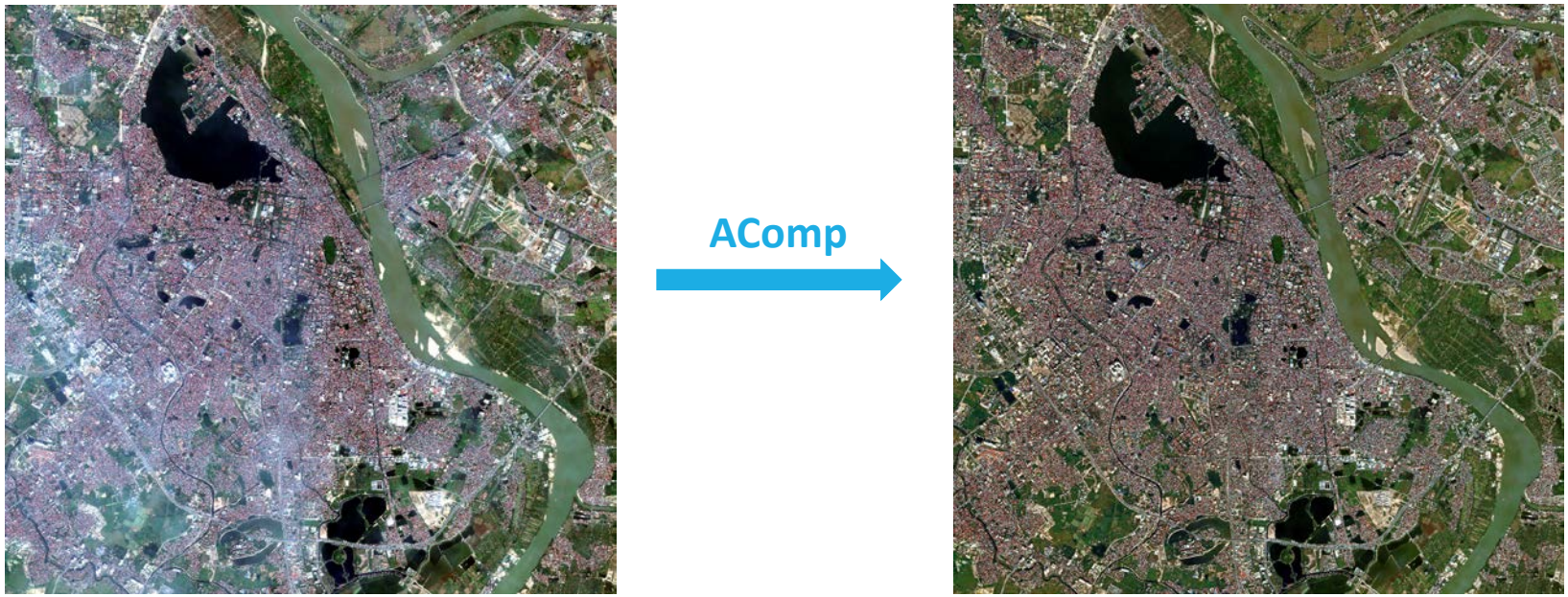
AComp

- AComp is a fully automated framework for atmospherically compensating very high spatial resolution panchromatic, VNIR, and SWIR images
- AComp derives both aerosol optical depth and water vapor using only the VNIR bands, and it does not use any other ancillary data



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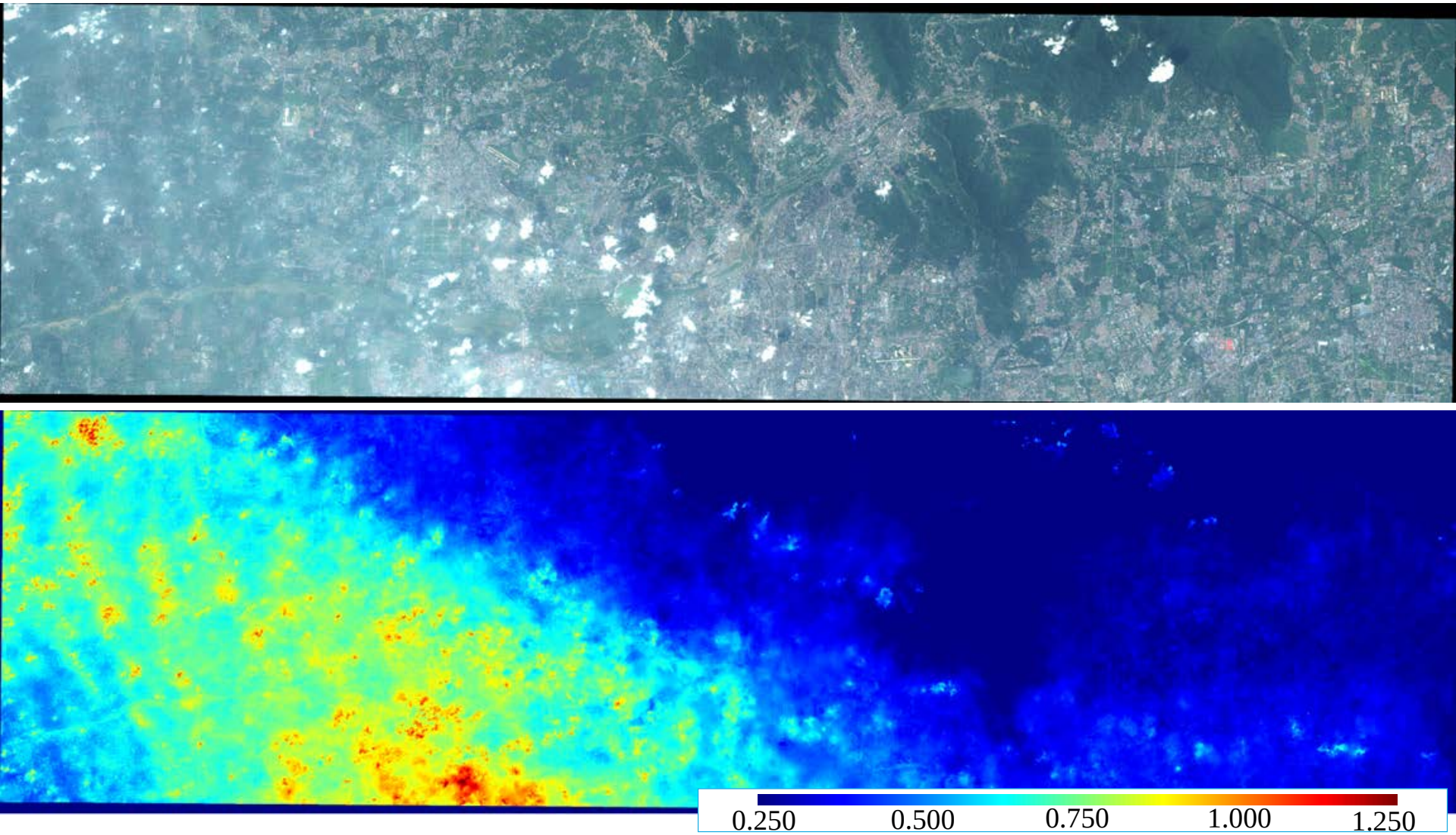
Pixel-based Approach!

Beijing (China) - August 12, 2012: original image



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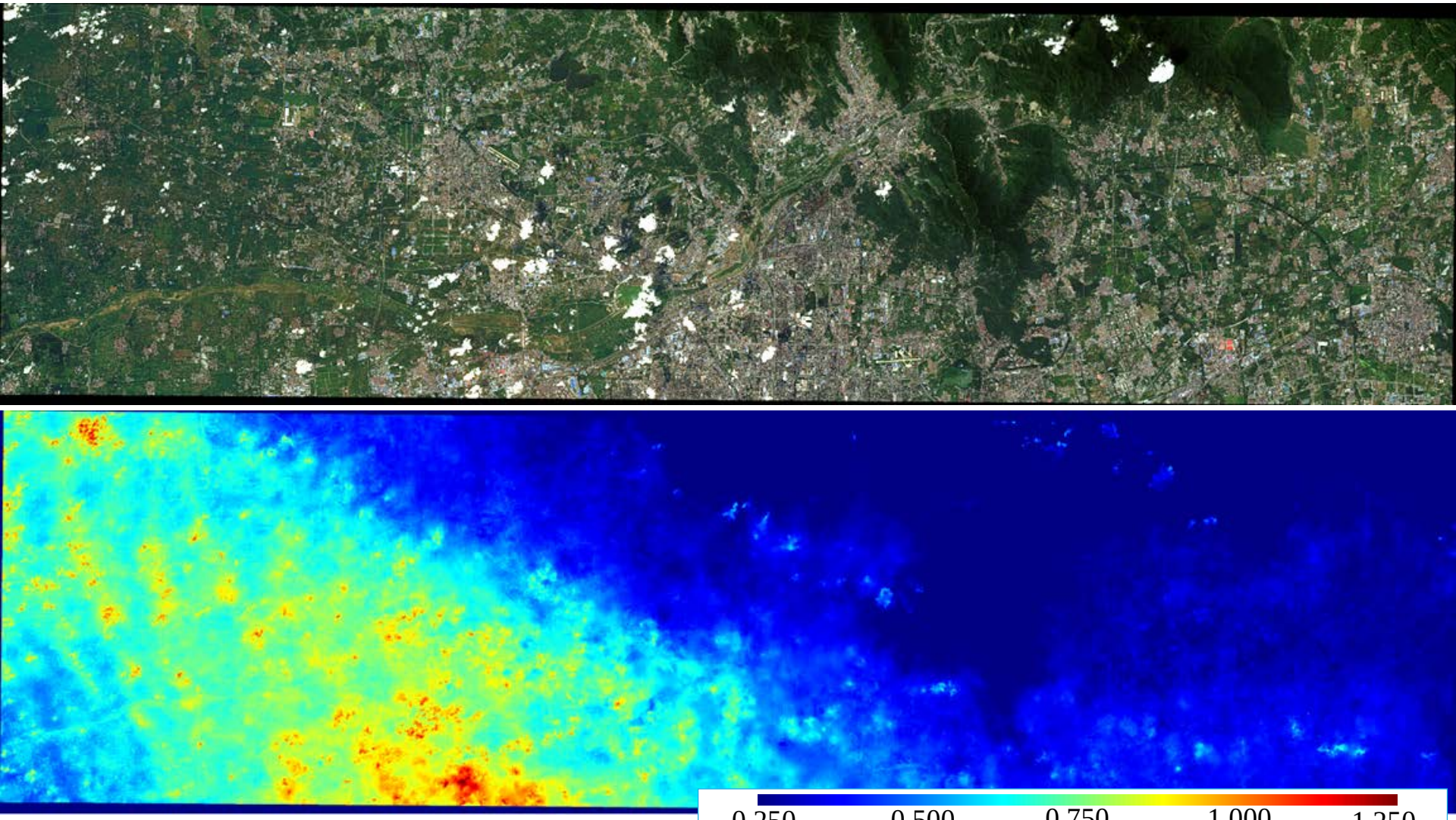
Pixel-based Approach!

Beijing (China) - August 12, 2012: AComp



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Non-DigitalGlobe Satellite Platforms

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AComp supports third-party data

Because AComp only uses the VNIR bands, it can process data from almost any satellite in orbit:

- ESA Sentinel-2
- USGS Landsat
- Planet RapidEye, Doves, and SkyBox
- Airbus Pleiades and SPOT
- UrtheCast Deimos
- other..

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Sentinel-2: North/East Italy (original data)

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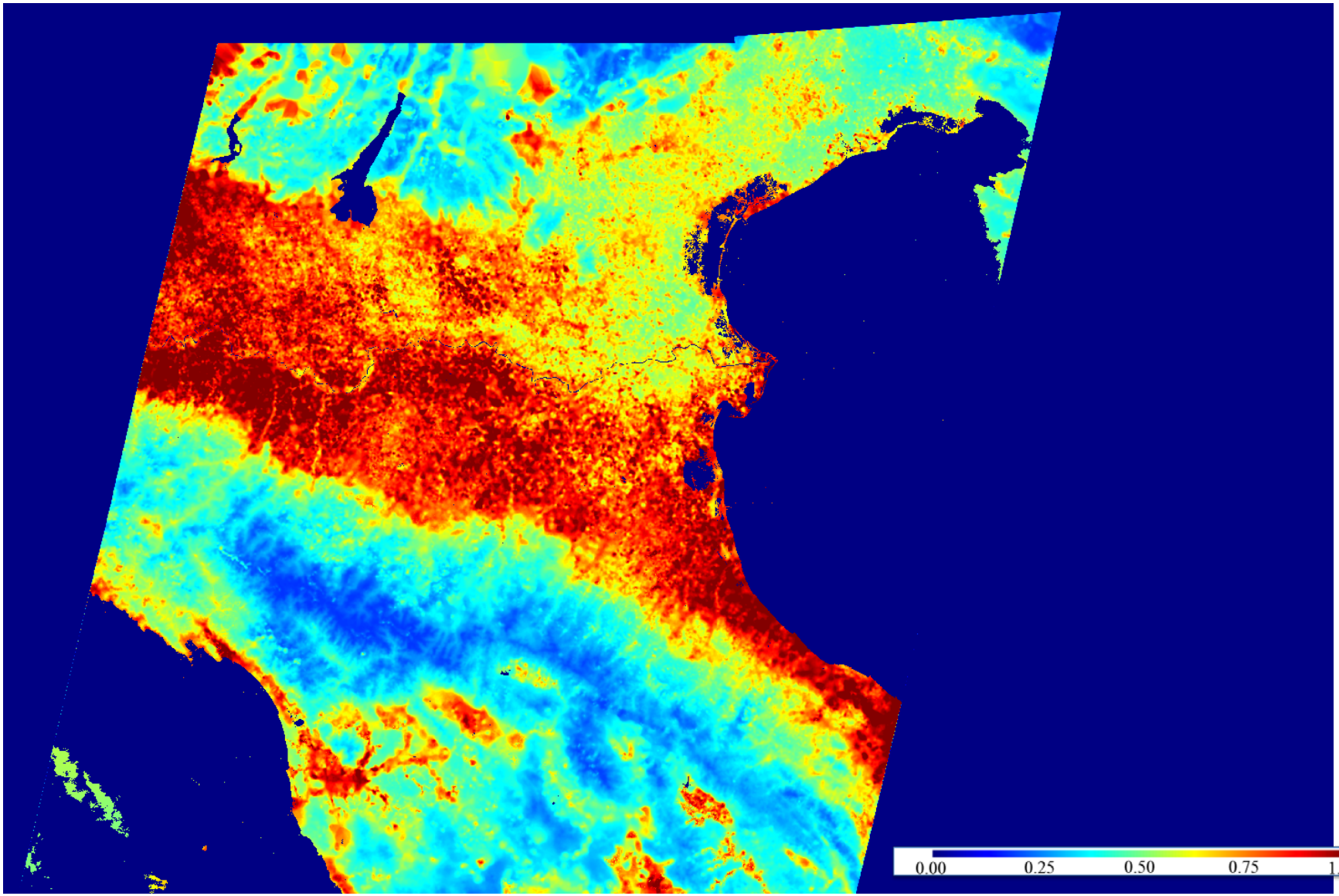
AComp Aerosol Optical Depth (from Sentinel-2)



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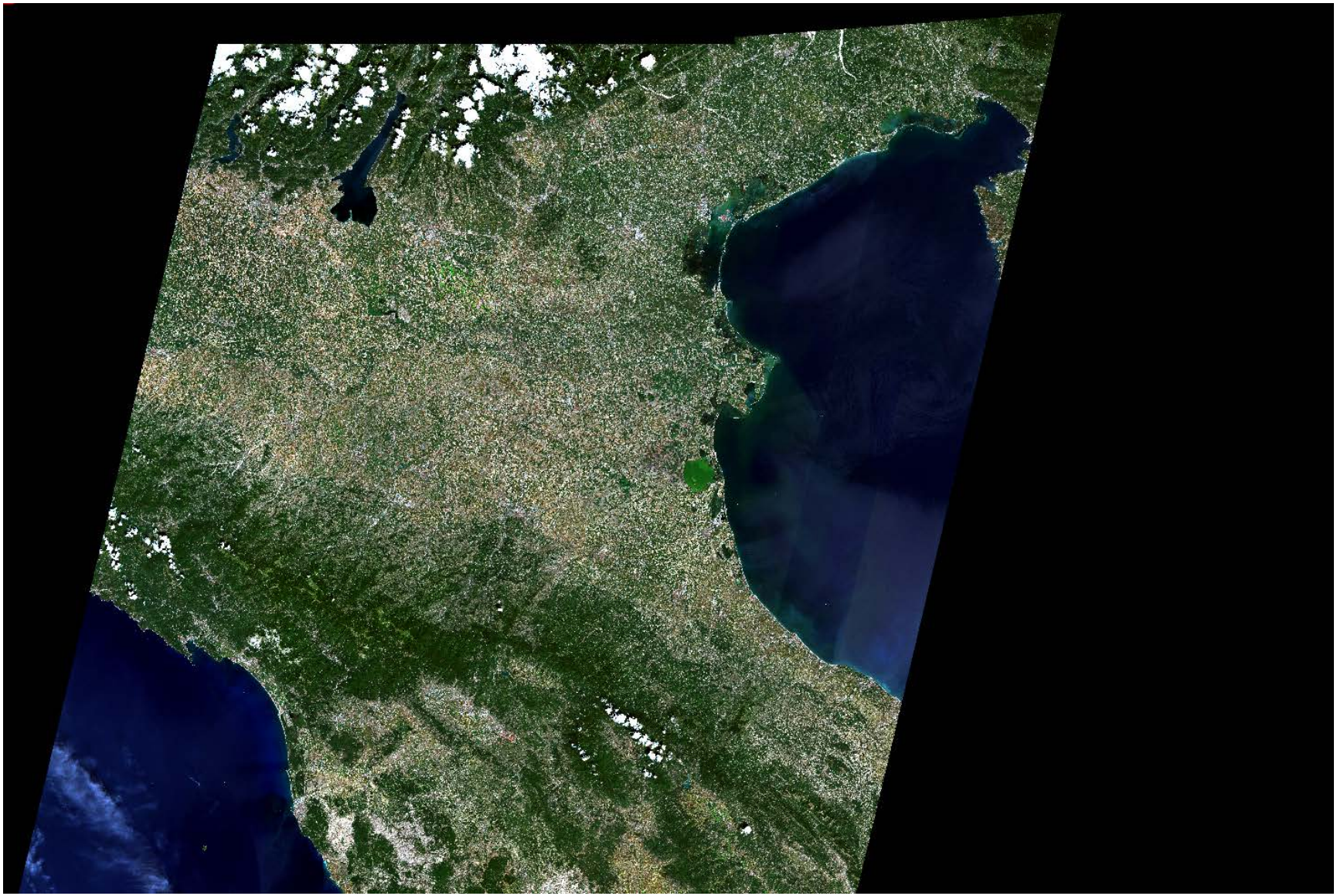
AComp Sentinel-2: North/East Italy



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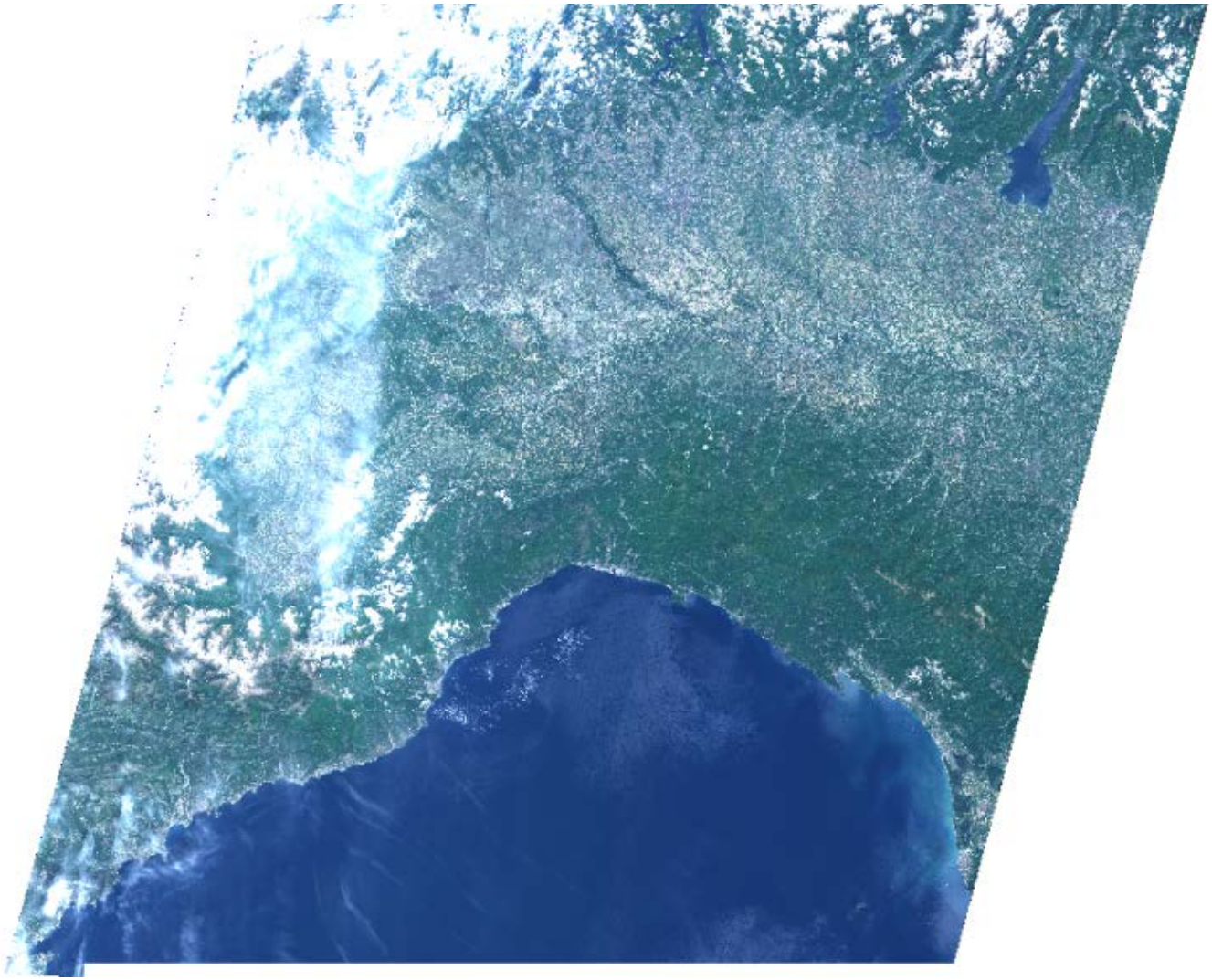
Sentinel-2: North/West Italy (original data)



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AComp Sentinel-2: North/West Italy

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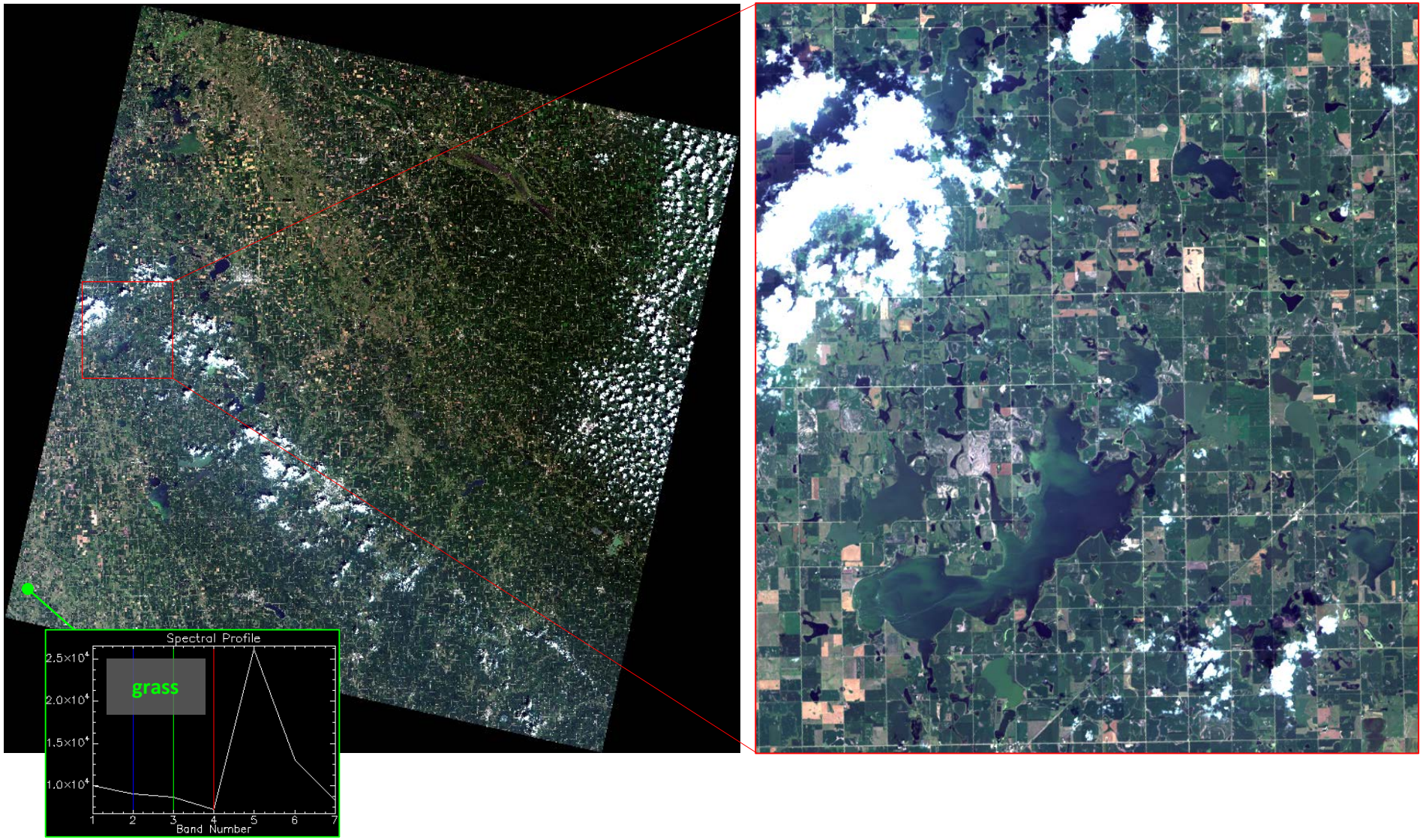
Landsat 8: Brookings, SD (original data)



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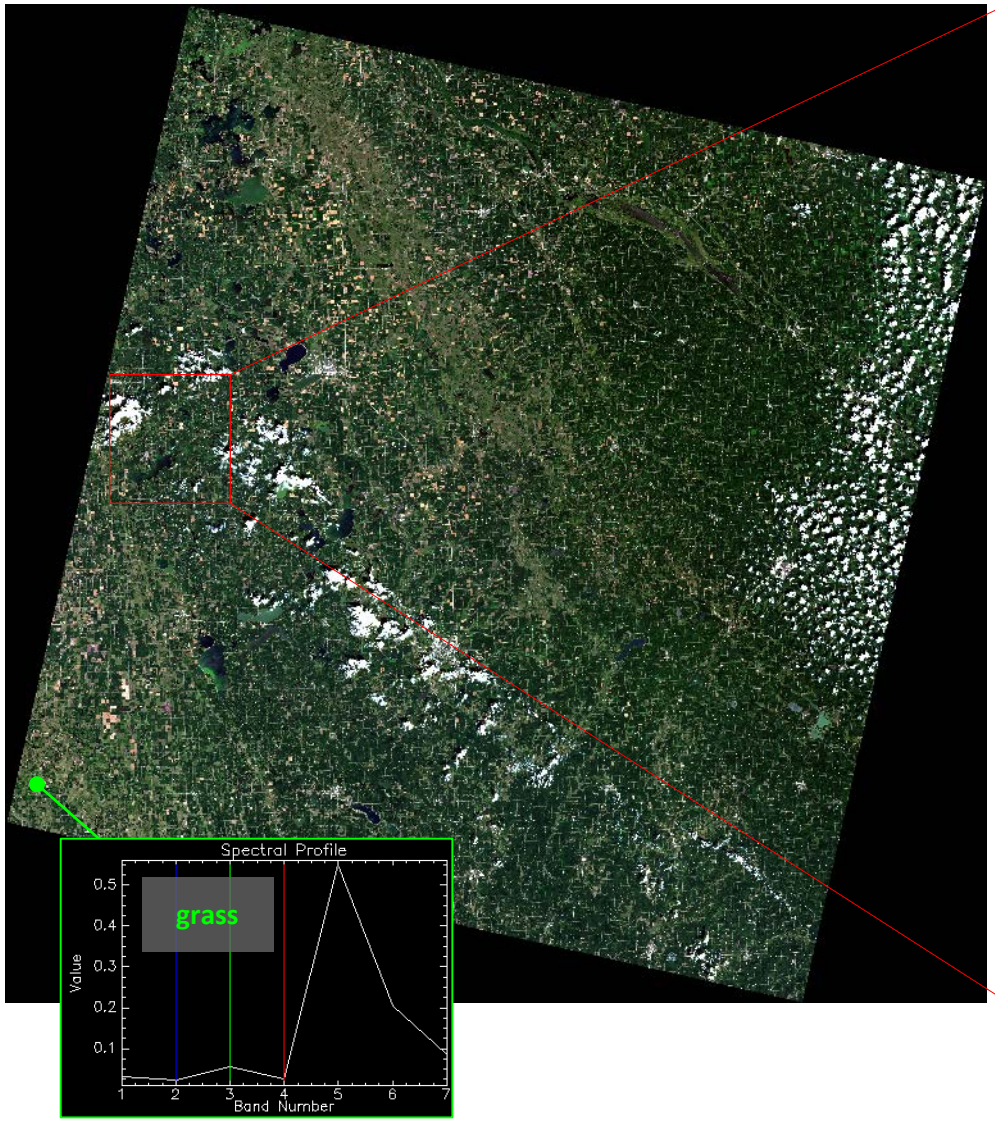
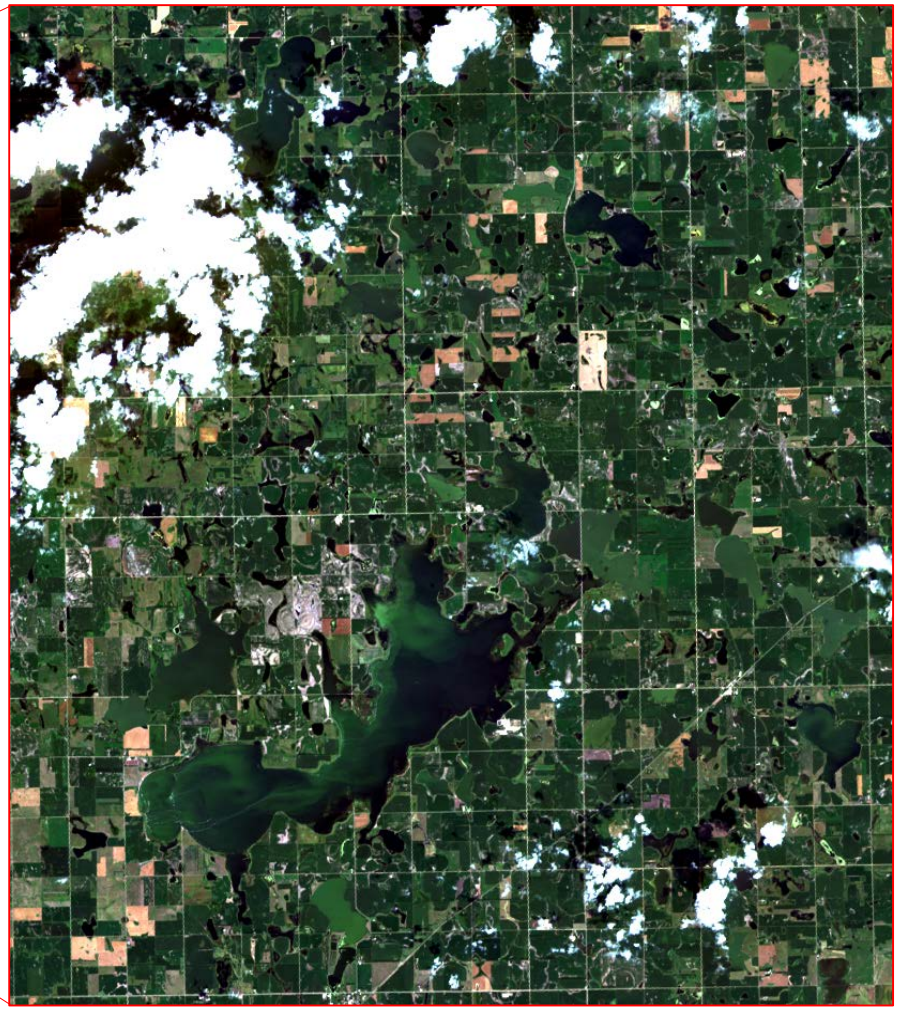
AComp Landsat 8: Brookings, SD





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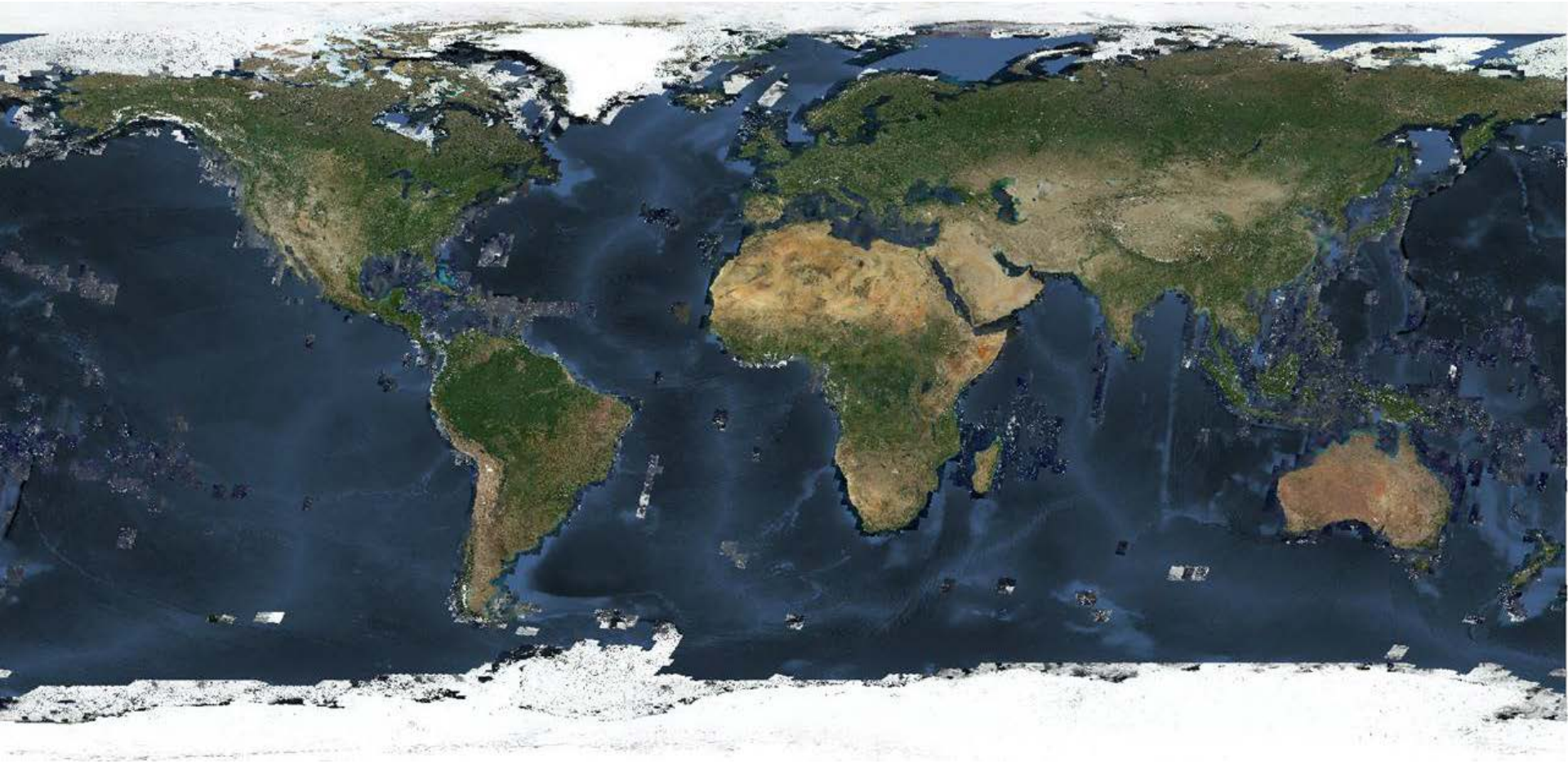
AComp/Landsat-8 mosaic



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Validation Methodology

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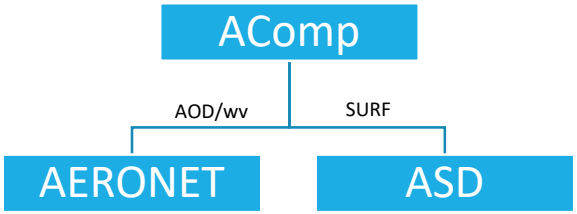
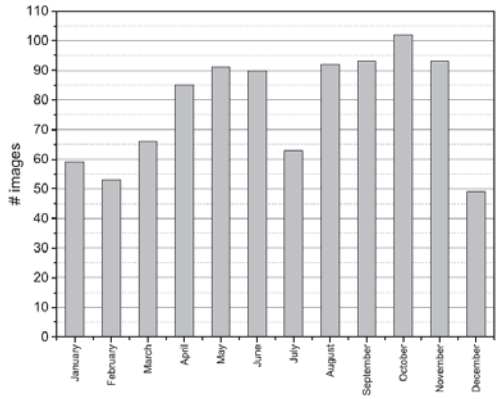
Two-way validation

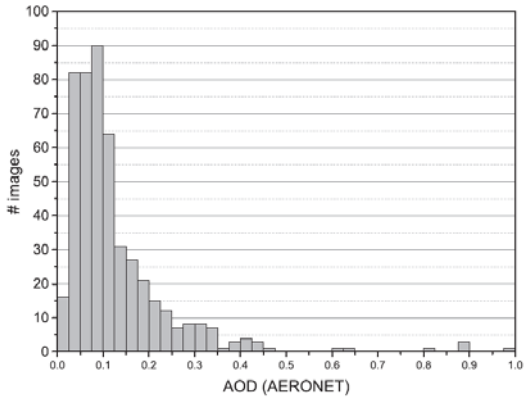
- In addition to **ASD** measurements over 14 different targets, aerosol optical depth and water vapor values from **AERONET** stations were used to measure the accuracy of the AComp retrievals



- 6 locations with different climates:
  - rural (Fresno, CA, Longmont, CO, Halifax, Canada)
  - urban (Washington D.C.)
  - semi-arid (Phoenix, AZ)
  - semi-tropical (Jacksonville, FL)

- 5 years of data: 2010-2014
  - ~1,000 WorldView-2 images





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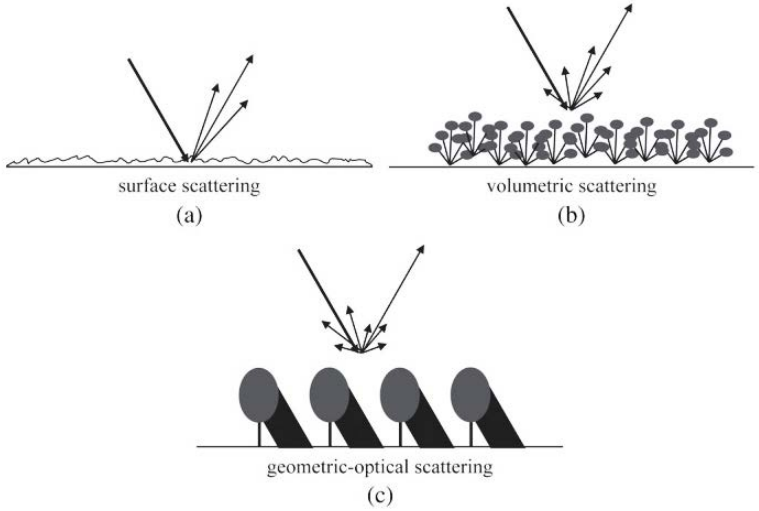
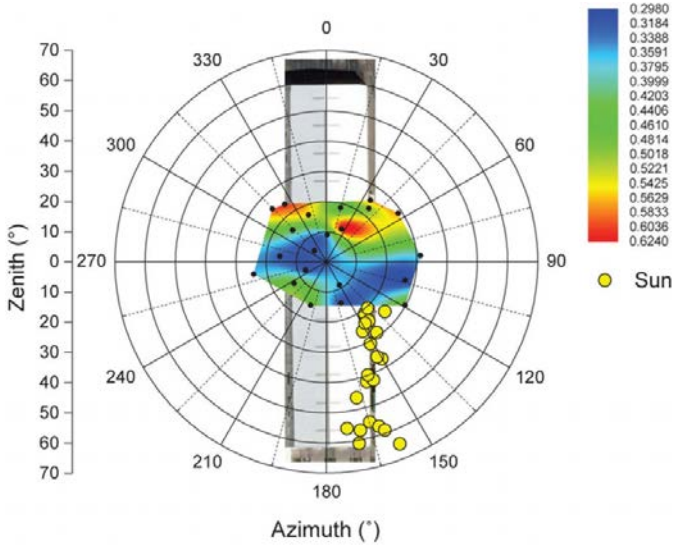
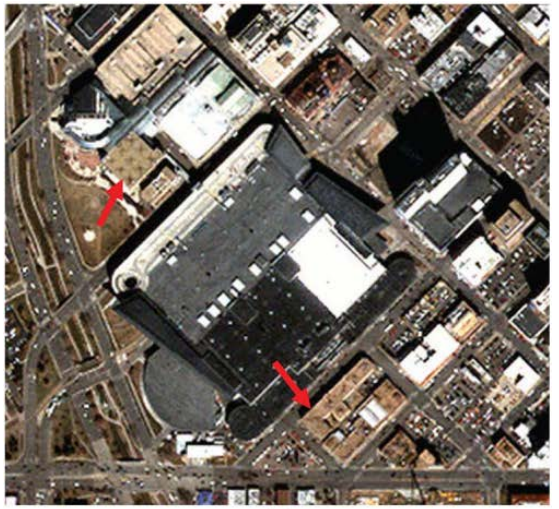
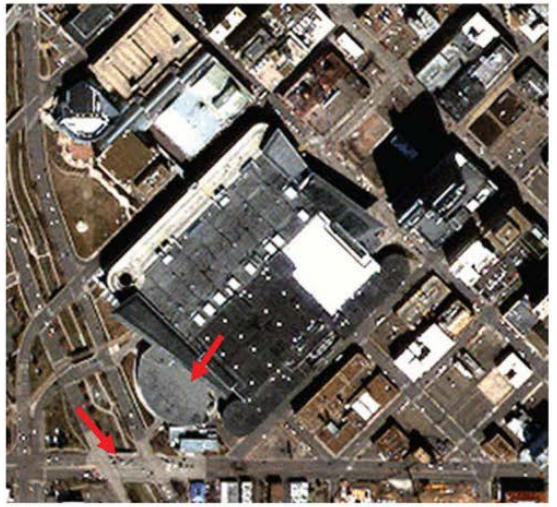
Satellite Agility = BRDF






(a)


(b)

F. Pacifici, N. Longbotham and W. J. Emery, "The Importance of Physical Quantities for the Analysis of Multitemporal and Multiangular Optical Very High Spatial Resolution Images," in IEEE Transactions on Geoscience and Remote Sensing, vol. 52, no. 10, pp. 6241-6256, Oct. 2014.

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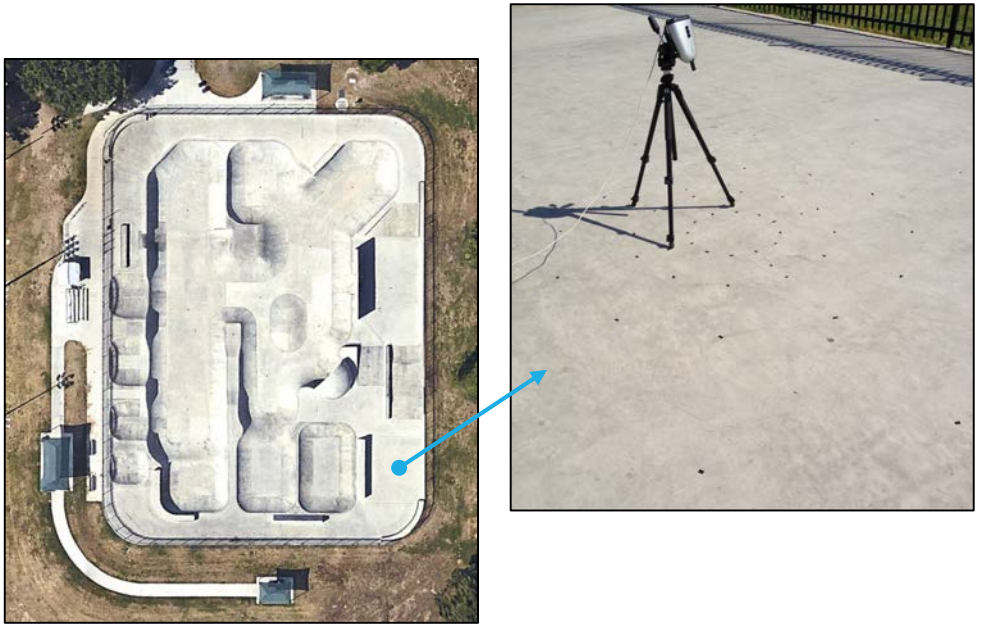
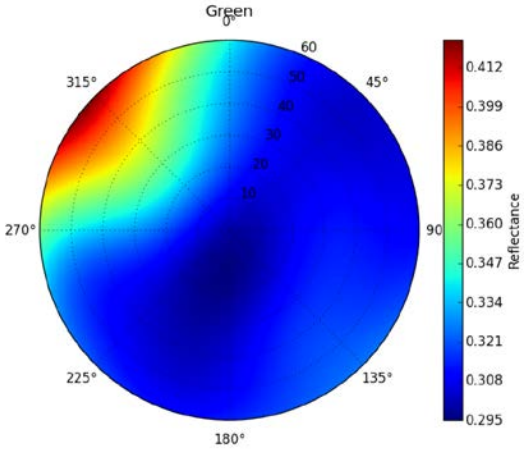
ASD measurements

- 5,000+ ASD measurements
- 14 BRDF targets
- BRDF measurements were taken at the equinox to minimize the effects of declination of the Sun
- Targets of interest included:
  - concrete and paved surfaces
  - tennis and basketball courts
  - sand





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Validation Results

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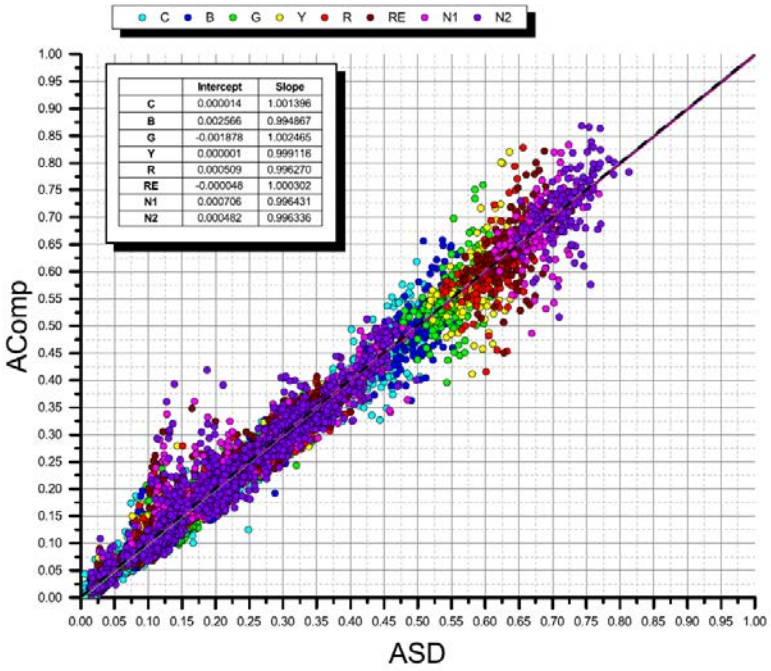
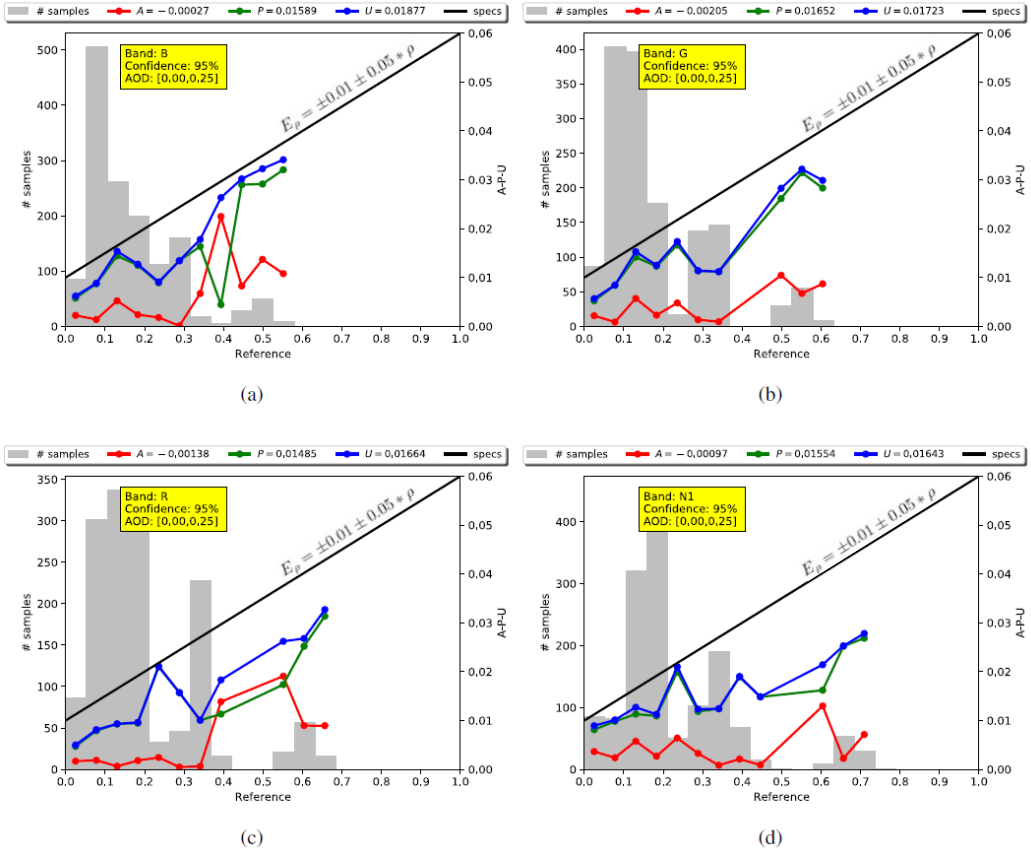
Scatter plot for “clear” images, AOD = [0.00,0.25]





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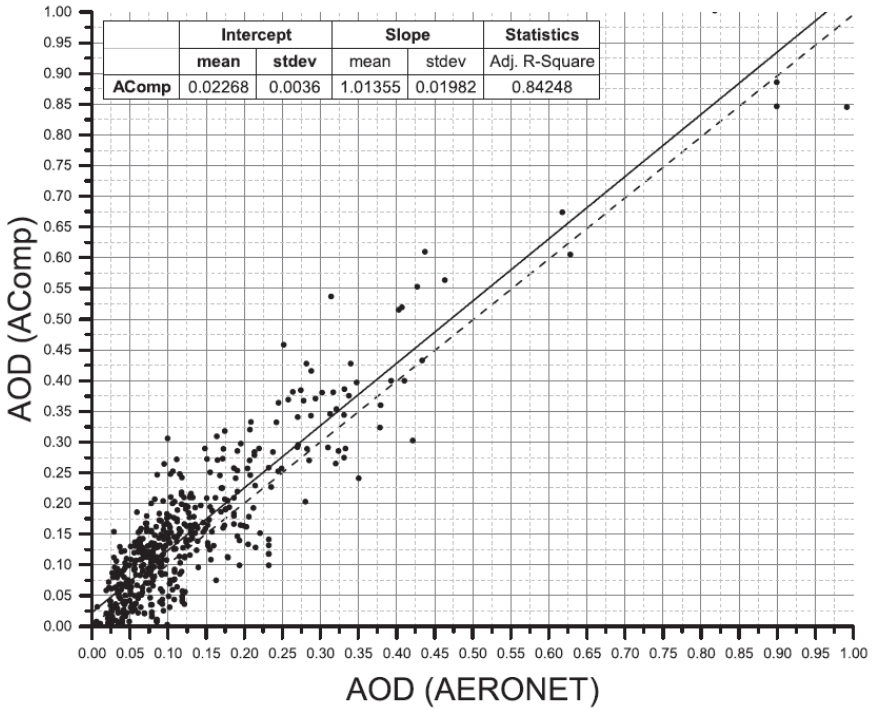
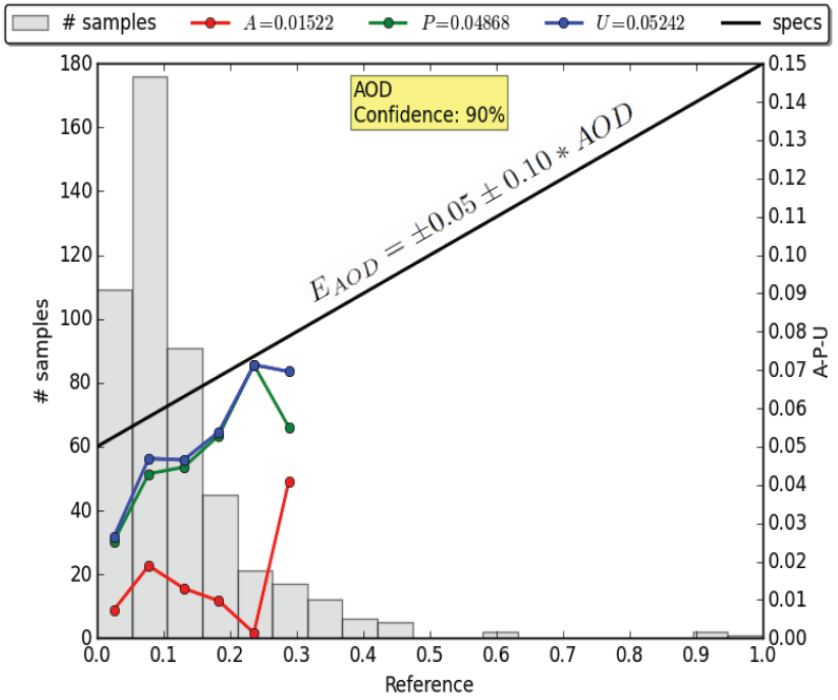
AOD: Comparison to AERONET (all measurements)





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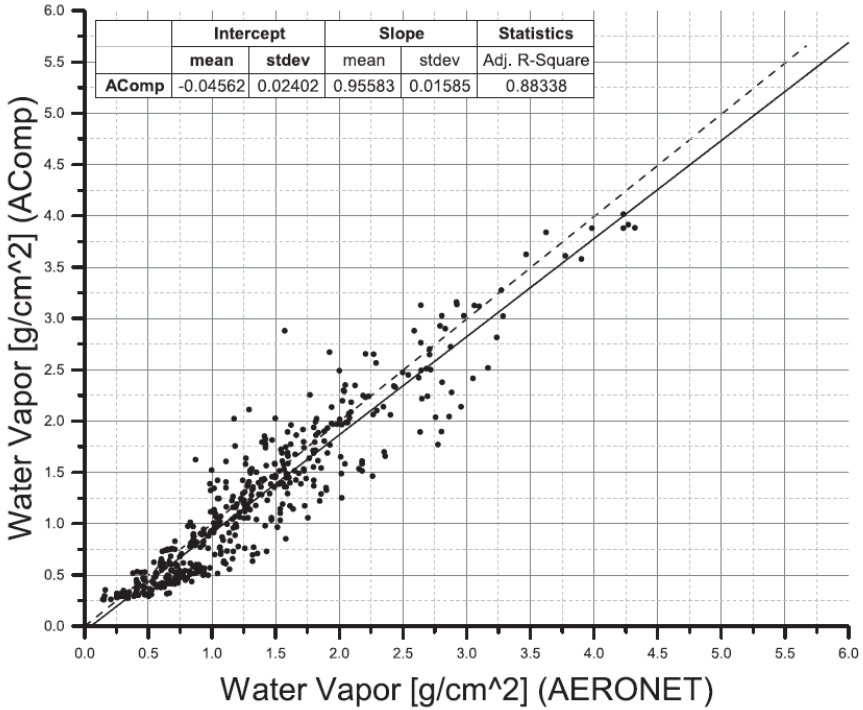
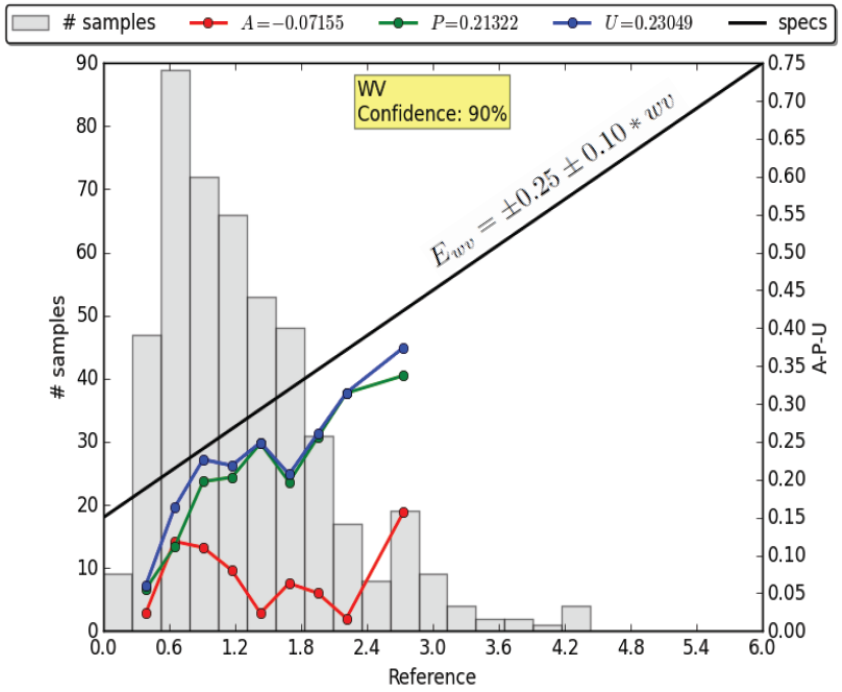
wv: Comparison to AERONET (all measurements)





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