



Jet Propulsion Laboratory
California Institute of Technology

Visible / Shortwave Infrared Imaging Spectroscopy at JPL: Instruments and Algorithms

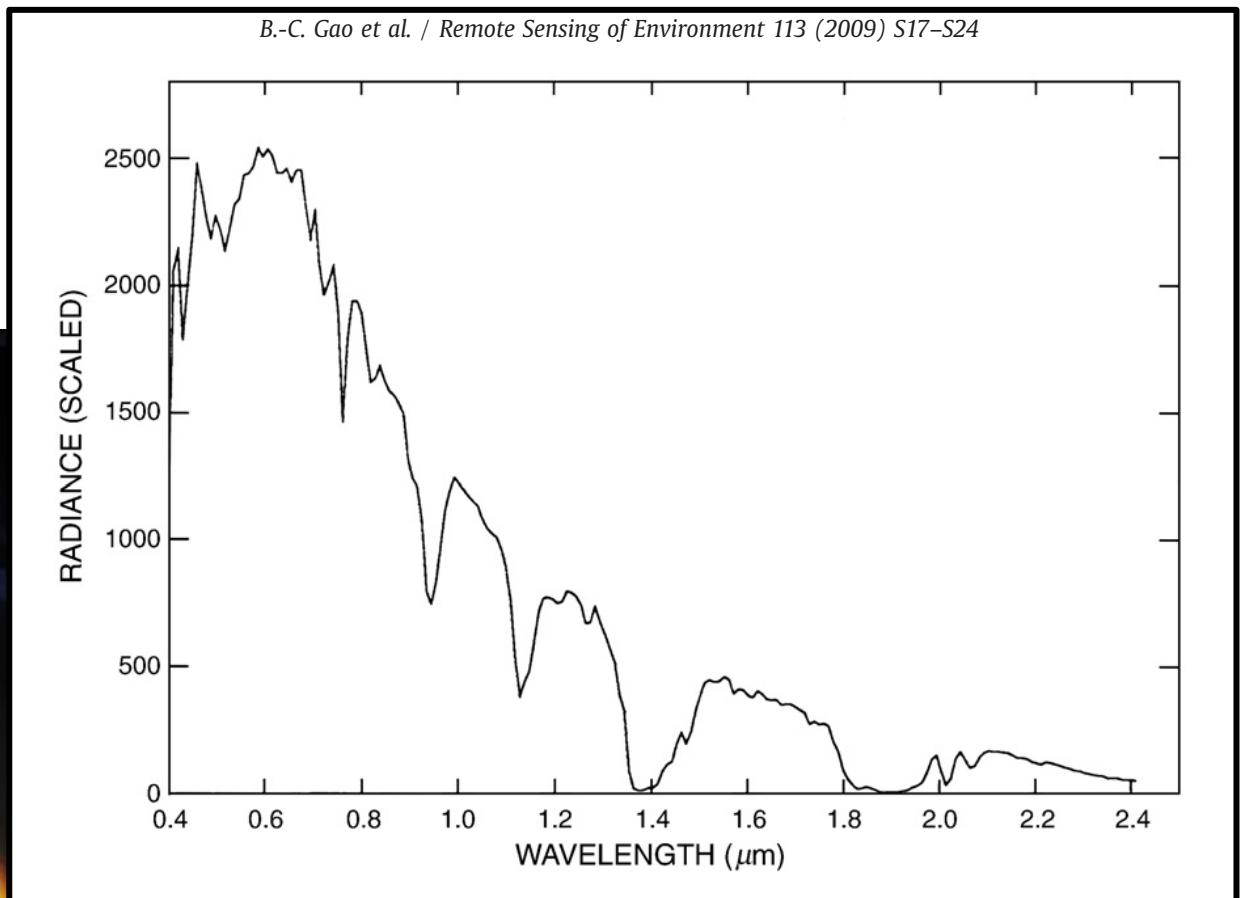
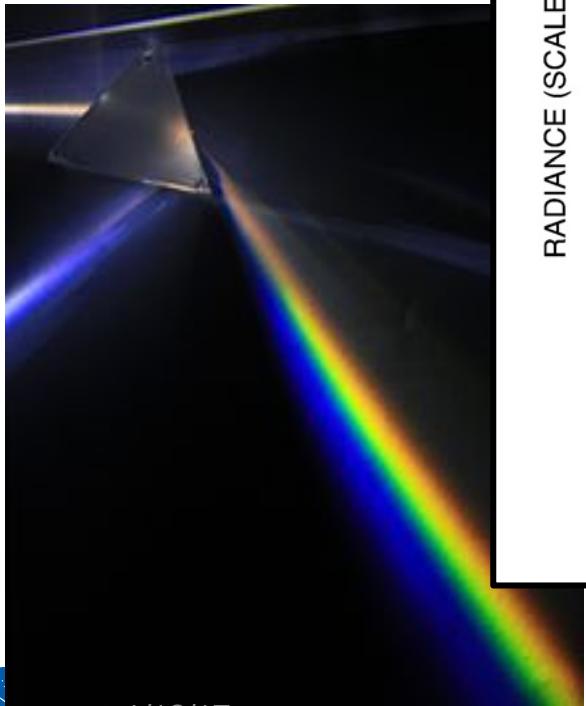
David R. Thompson, Robert O. Green, Michael Eastwood,
and the AVIRIS team

Jet Propulsion Laboratory, California Institute of Technology

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US Government Support Acknowledged.

A Typical Radiance Spectrum

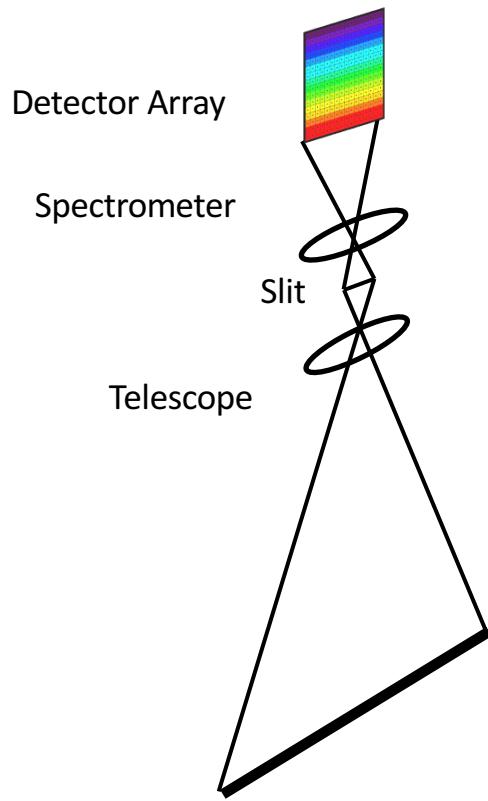
Typical units are
 $\text{W m}^{-2} \text{sr}^{-1} \text{nm}^{-1}$



1/12/17

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Imaging spectroscopy – 100s of parallel spectrometers

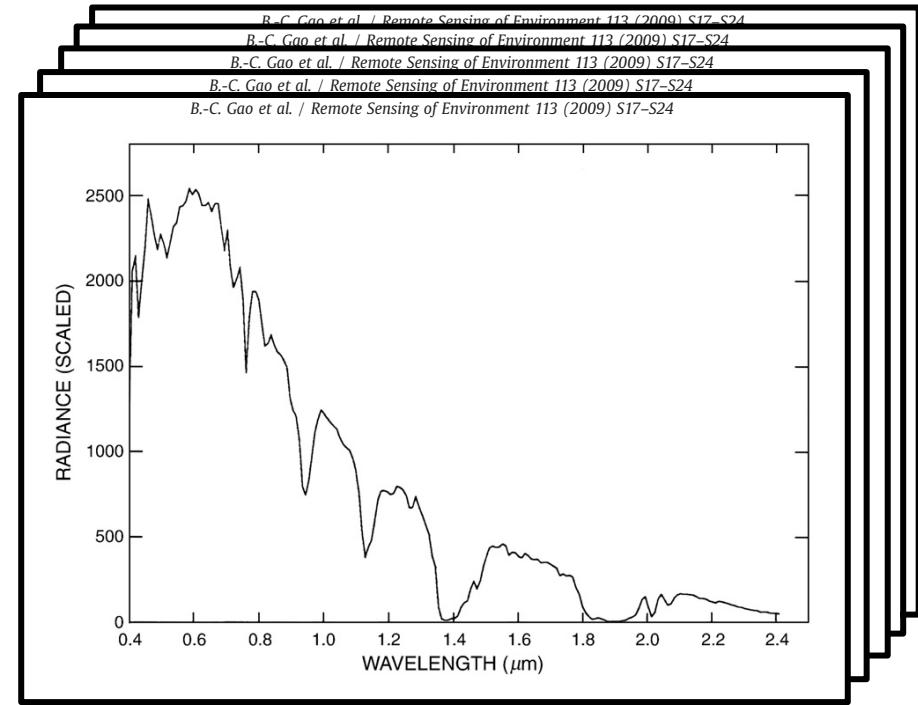
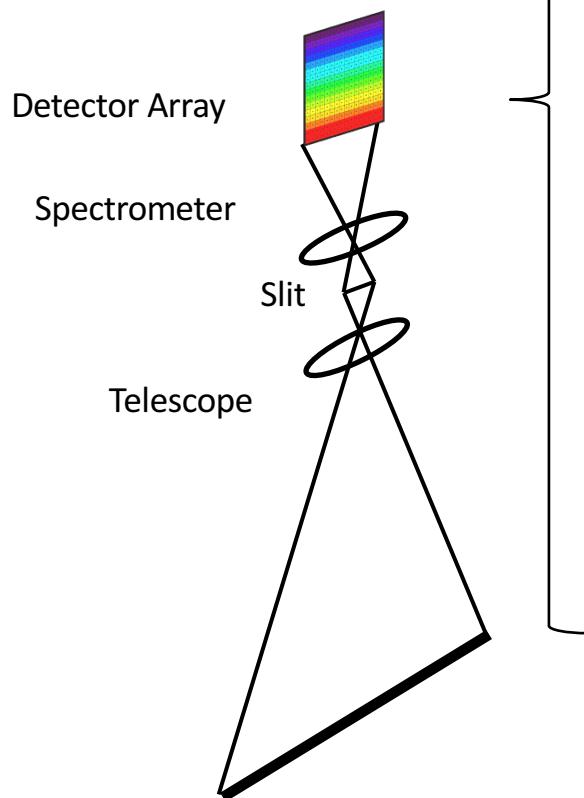


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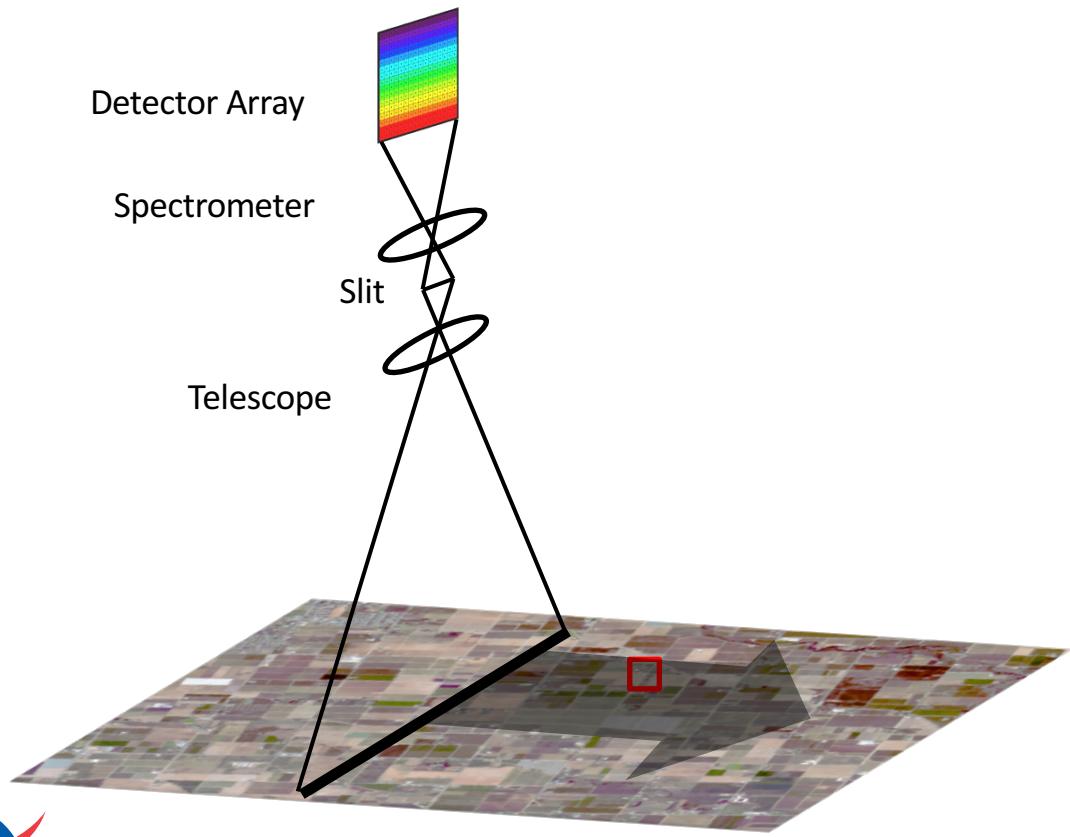
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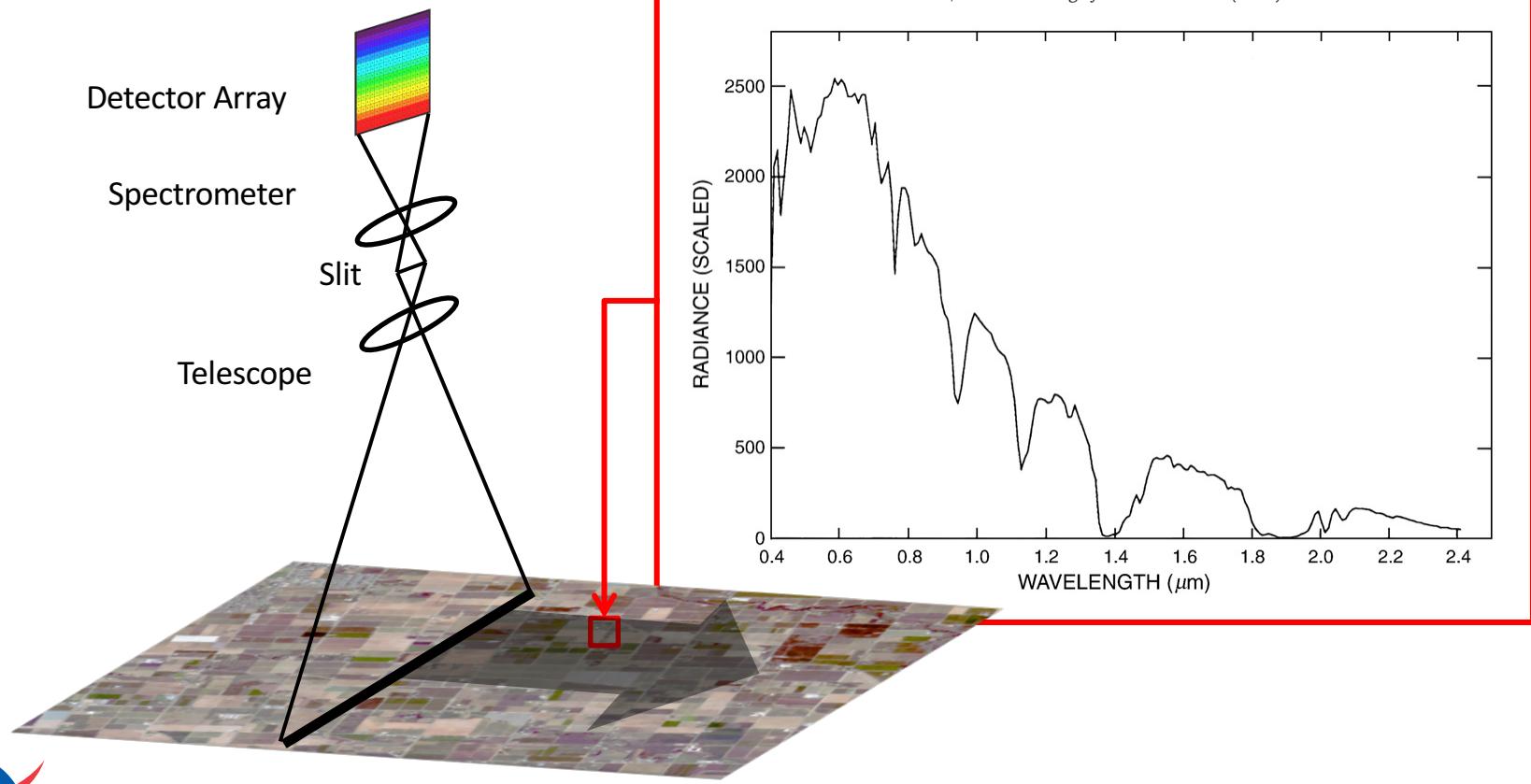


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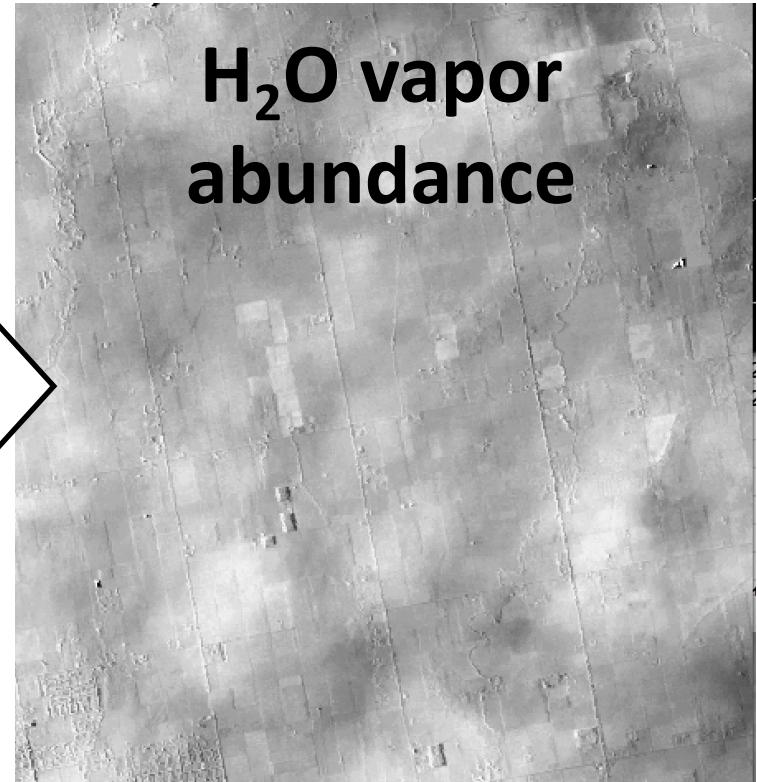
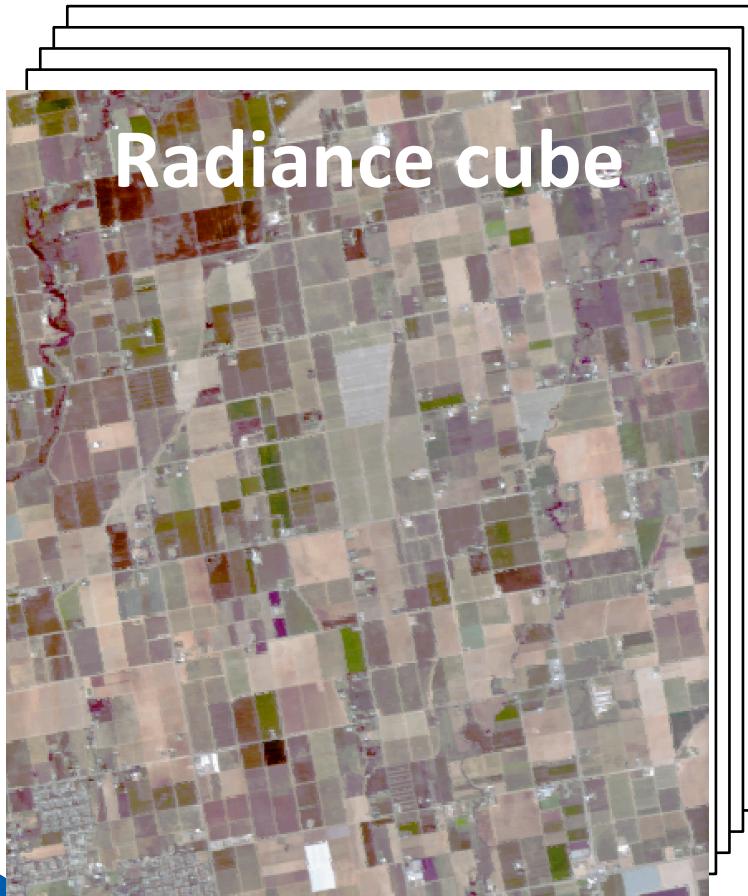
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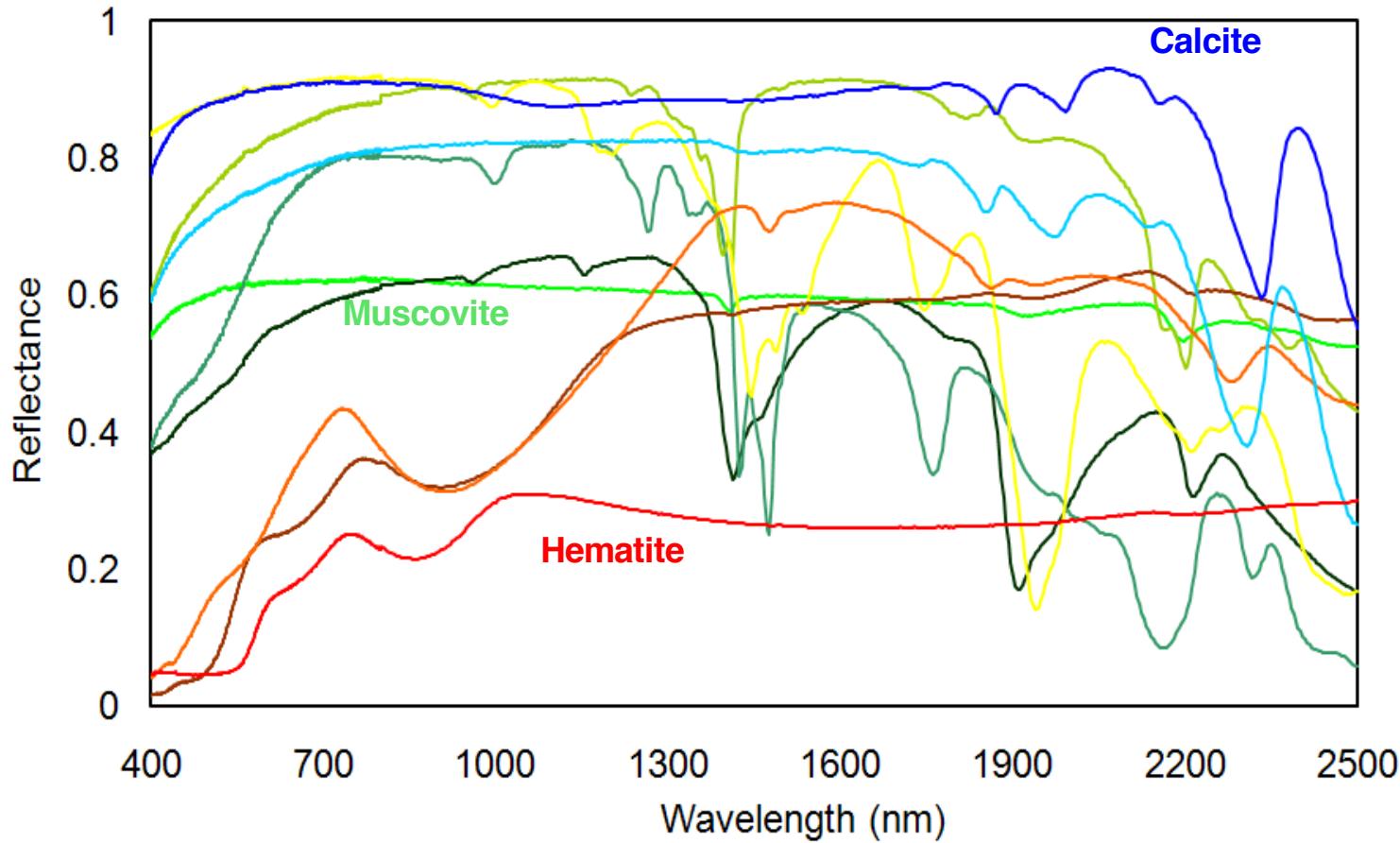
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Reflectance enables quantitative measurement of surface properties



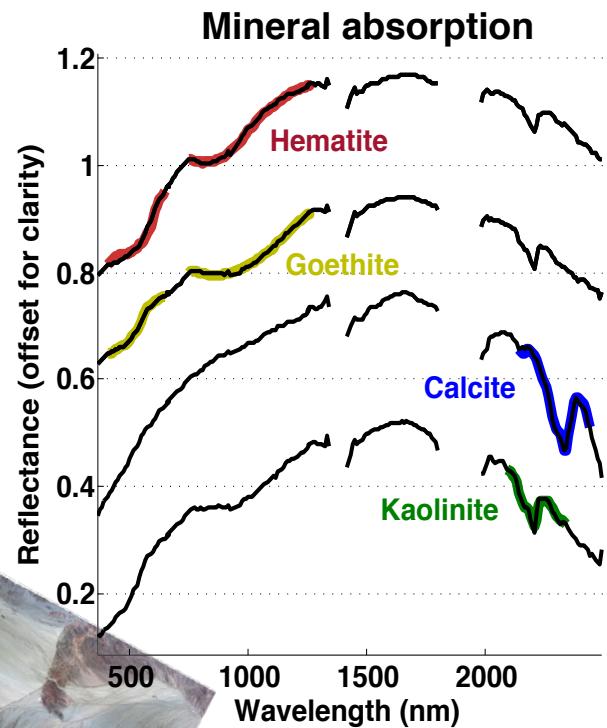
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Continuum-interpolated absorption fits



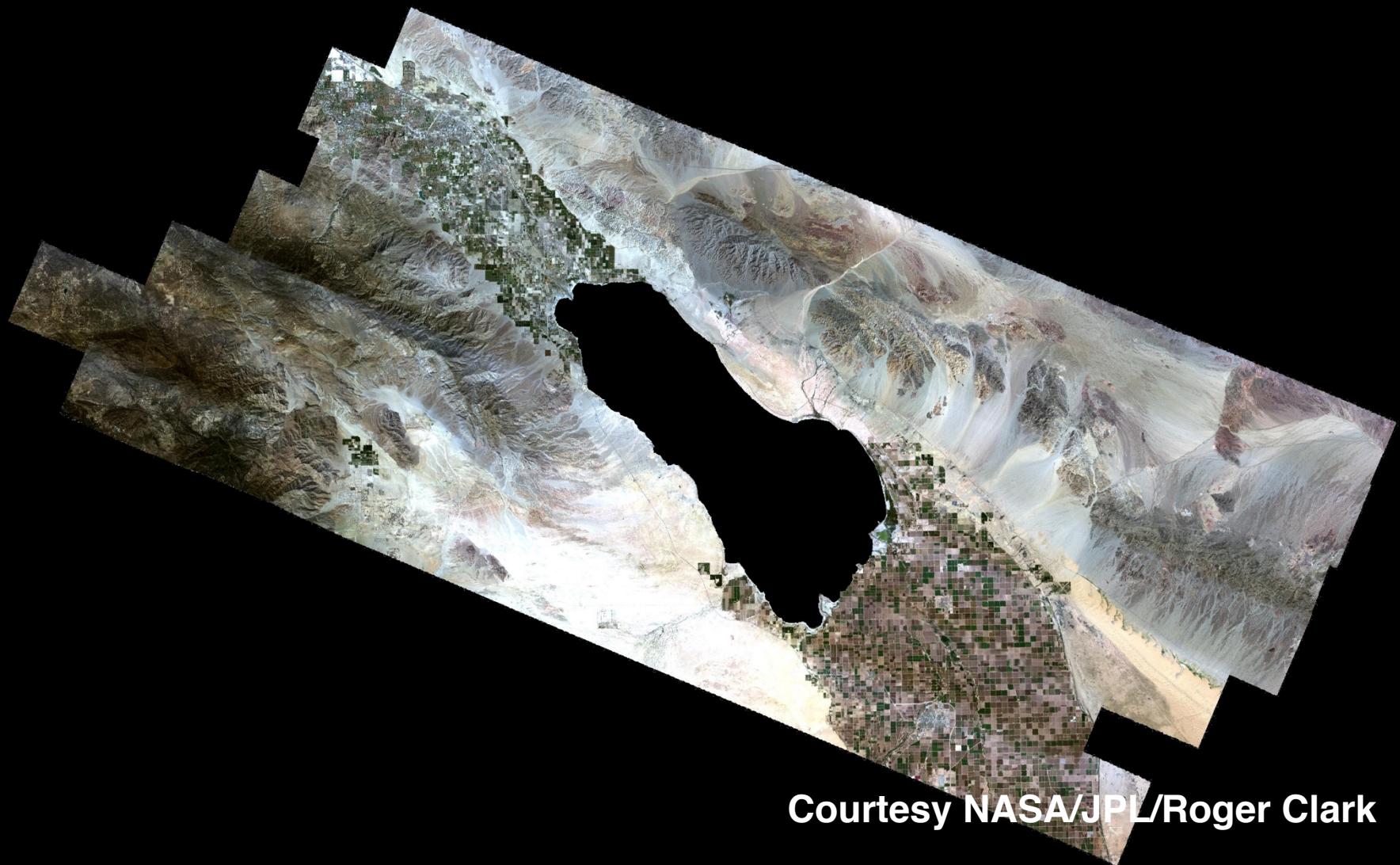
Surface Reflectance
(Salton Sea, CA)



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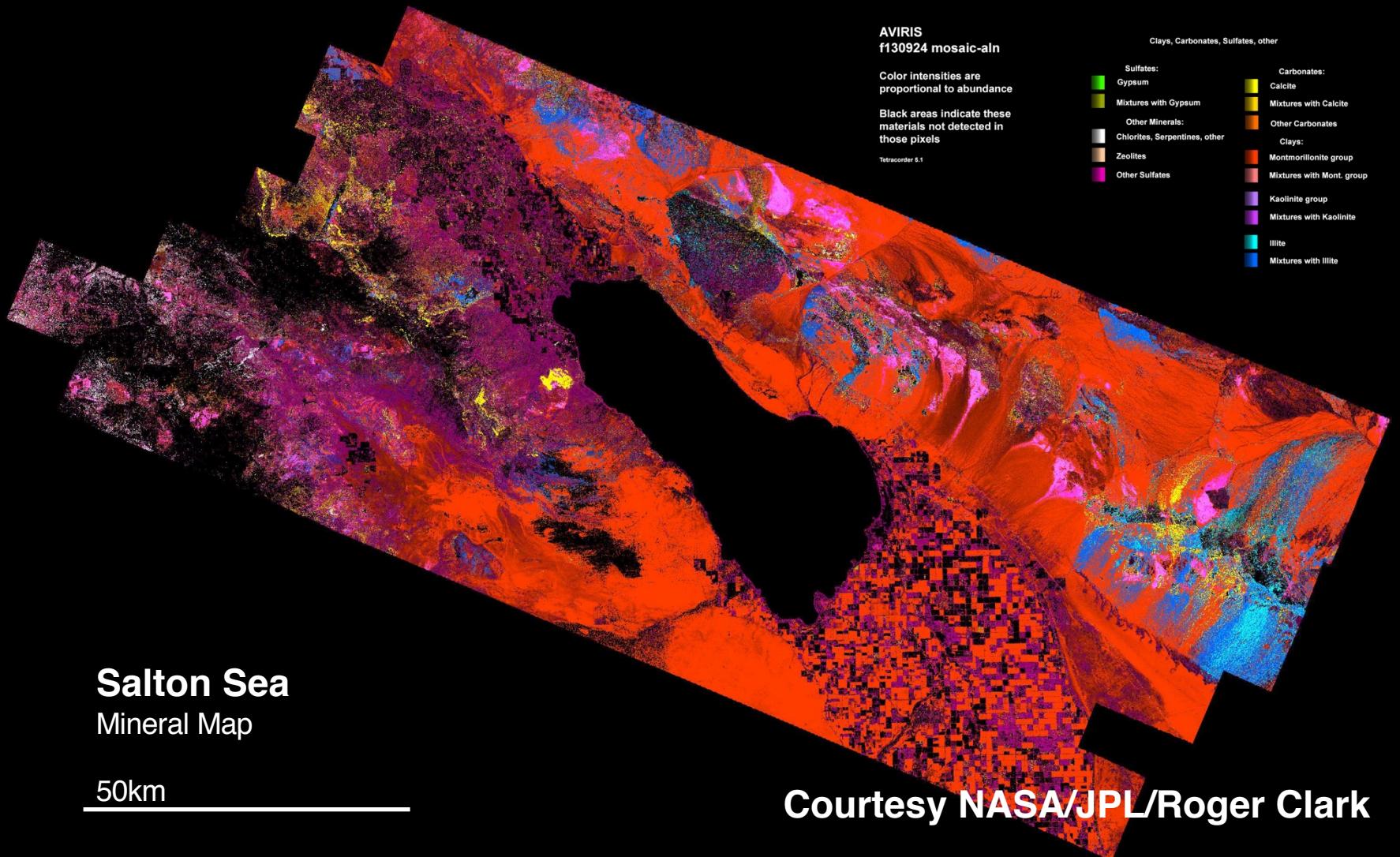
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Salton Sea, CA (AVIRIS instrument)

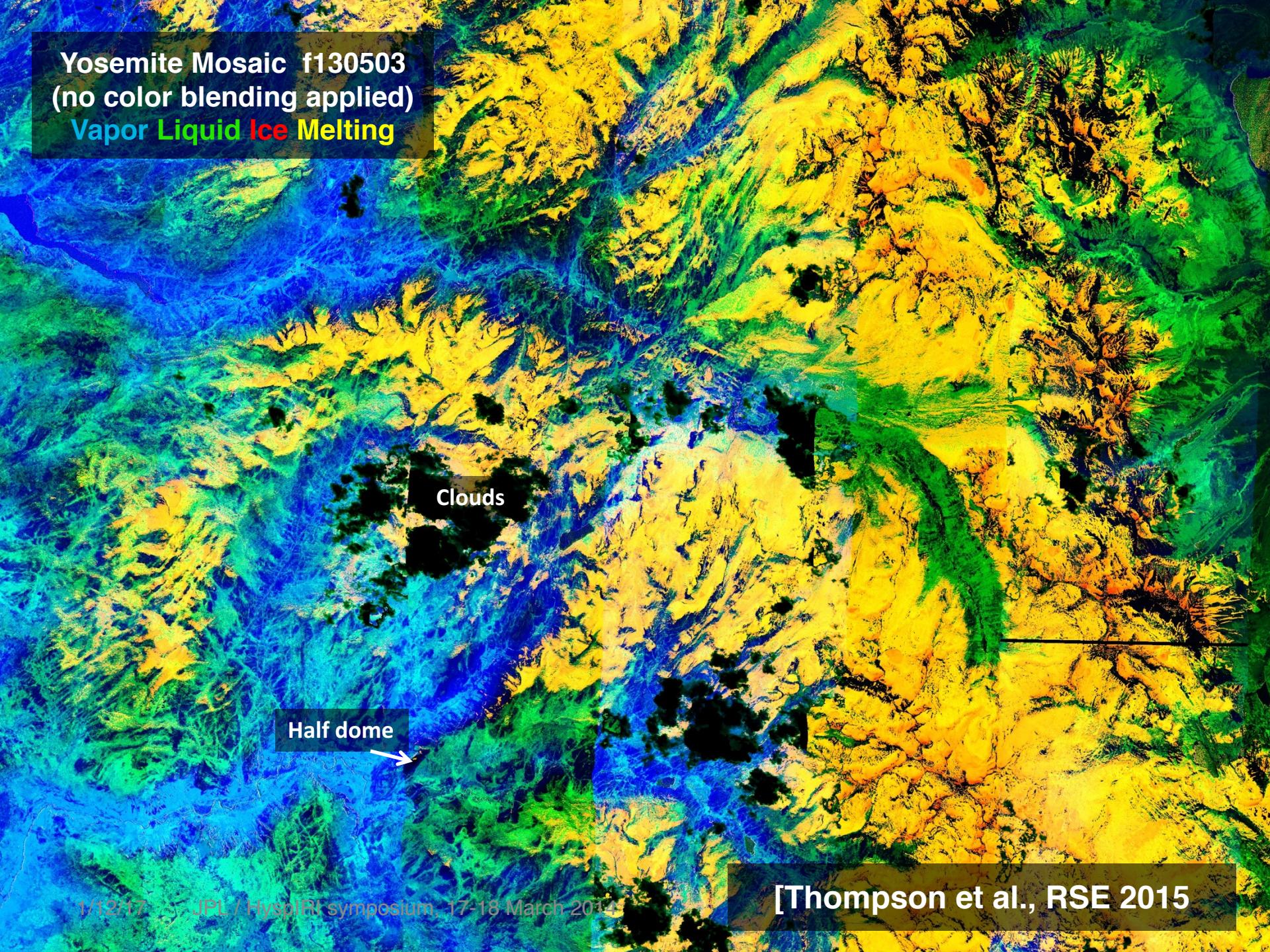


Courtesy NASA/JPL/Roger Clark

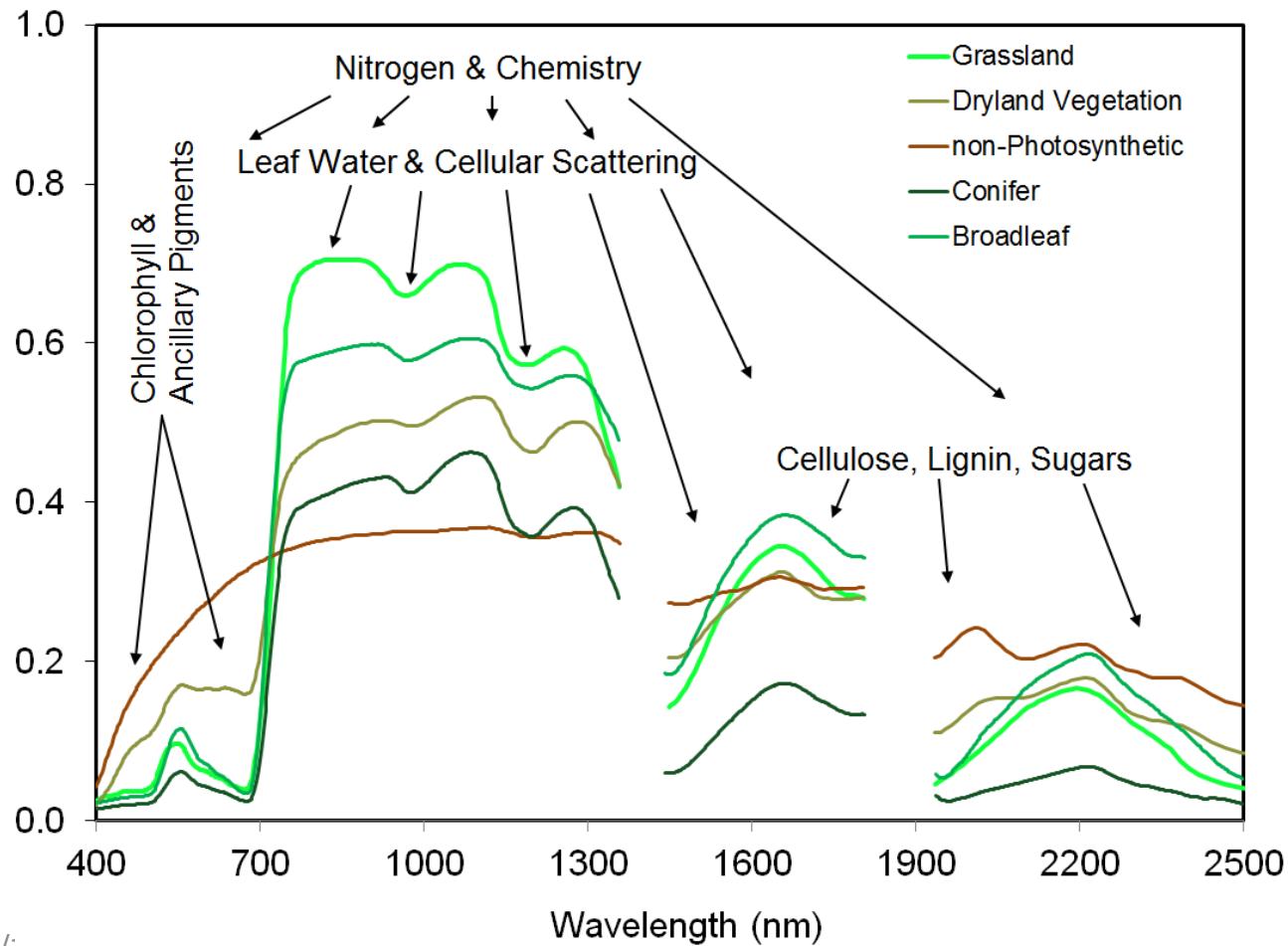
Salton Sea, CA (AVIRIS instrument)



Yosemite Mosaic f130503
(no color blending applied)
Vapor Liquid Ice Melting



Vegetation absorption features



Earth Science Applications

- Map terrestrial ecosystem composition and health
- Characterize and map aquatic ecosystems such as coral reefs, phytoplankton
- Geologic maps
- Find and quantify greenhouse point sources
- Urban studies
- Agriculture
- Cryosphere, water quality and resource studies



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Information Science Collaborations

Next-generation remote sensing algorithms
bridging physically-based models with
learned components

Bayesian statistical treatments for rigorous
end-to-end uncertainty propagation

Synergy with radar and other sensing
modalities

Scaling to the future HyspIRI mission



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