

# Wildfire TQ2

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# Overarching Science Question

What is the impact of global biomass burning on the terrestrial biosphere and atmosphere, and how is this impact changing over time?

# Science Subquestions

- How are global fire regimes (fire location, type, frequency, and intensity) changing in response to changing climate and land use practices? *[DS 198]*
- Are regions becoming more fire prone? *[DS 196]*
- What is the role of fire in global biogeochemical cycling, particularly atmospheric composition? *[DS 195]*
- Are there regional feedbacks between fire and climate change?

With respect to the contribution from remote sensing, answering these questions requires:

coarse resolution active-fire observations  
(MODIS, VIIRS, etc.)

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high resolution active-fire observations  
(ASTER, Landsat)

ideally with synchronized overpasses.

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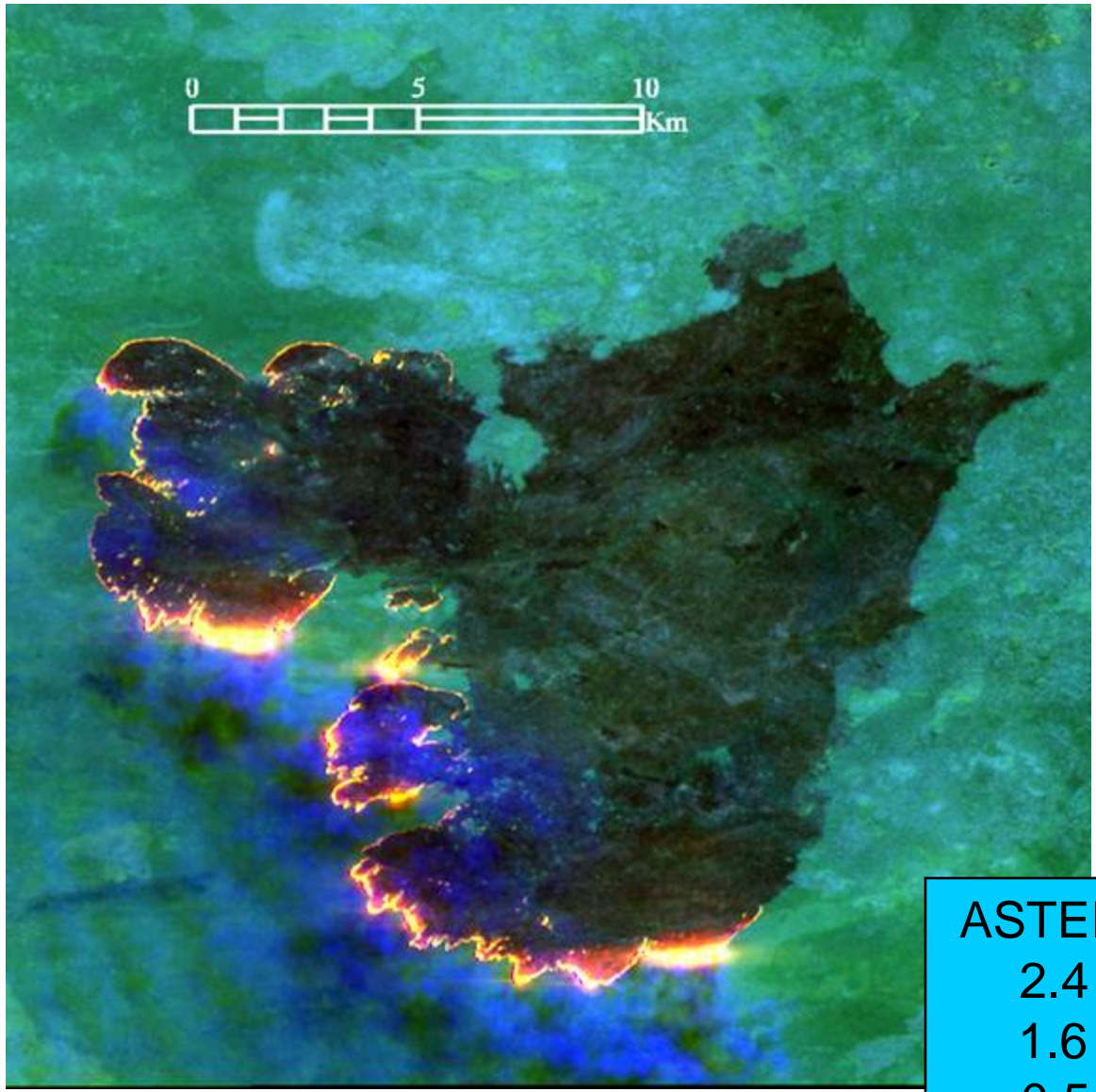
high resolution active-fire observations  
(ASTER, Landsat)

**HyspIRI TIR Sensor**

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# Limitations of Existing High-Resolution Sensors

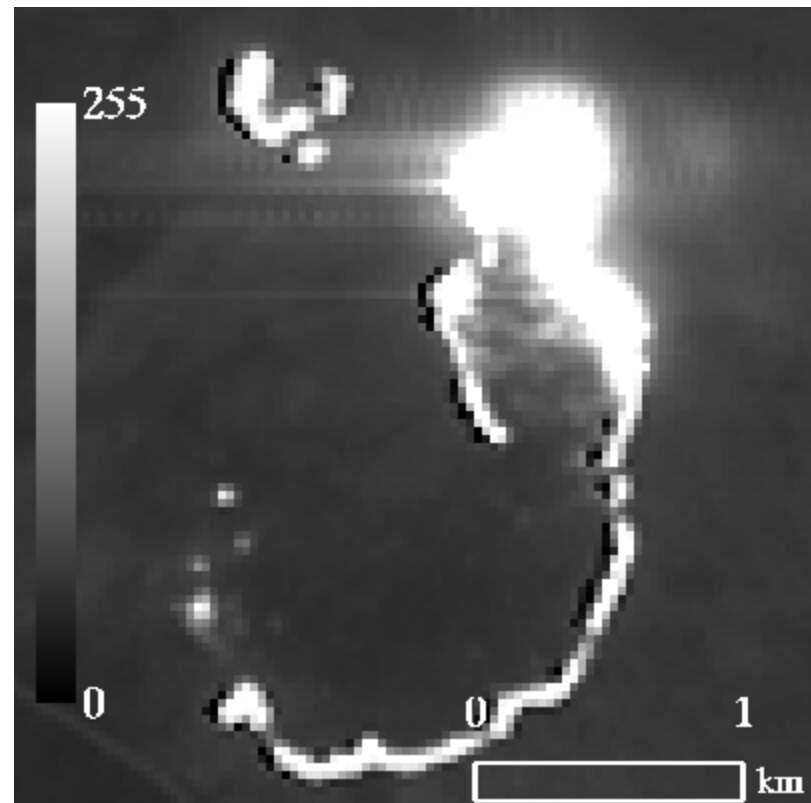
- Sub-optimal placement of bands
  - None in middle-infrared
- Insufficient dynamic range
- Saturation-induced artifacts
- Confounds retrieval of sub-pixel fire characteristics
  - fire radiative power (FRP)
  - temperature and area
- Limited spatial and temporal coverage



ASTER Scene  
2.4  $\mu\text{m}$  R  
1.6  $\mu\text{m}$  G  
0.5  $\mu\text{m}$  B

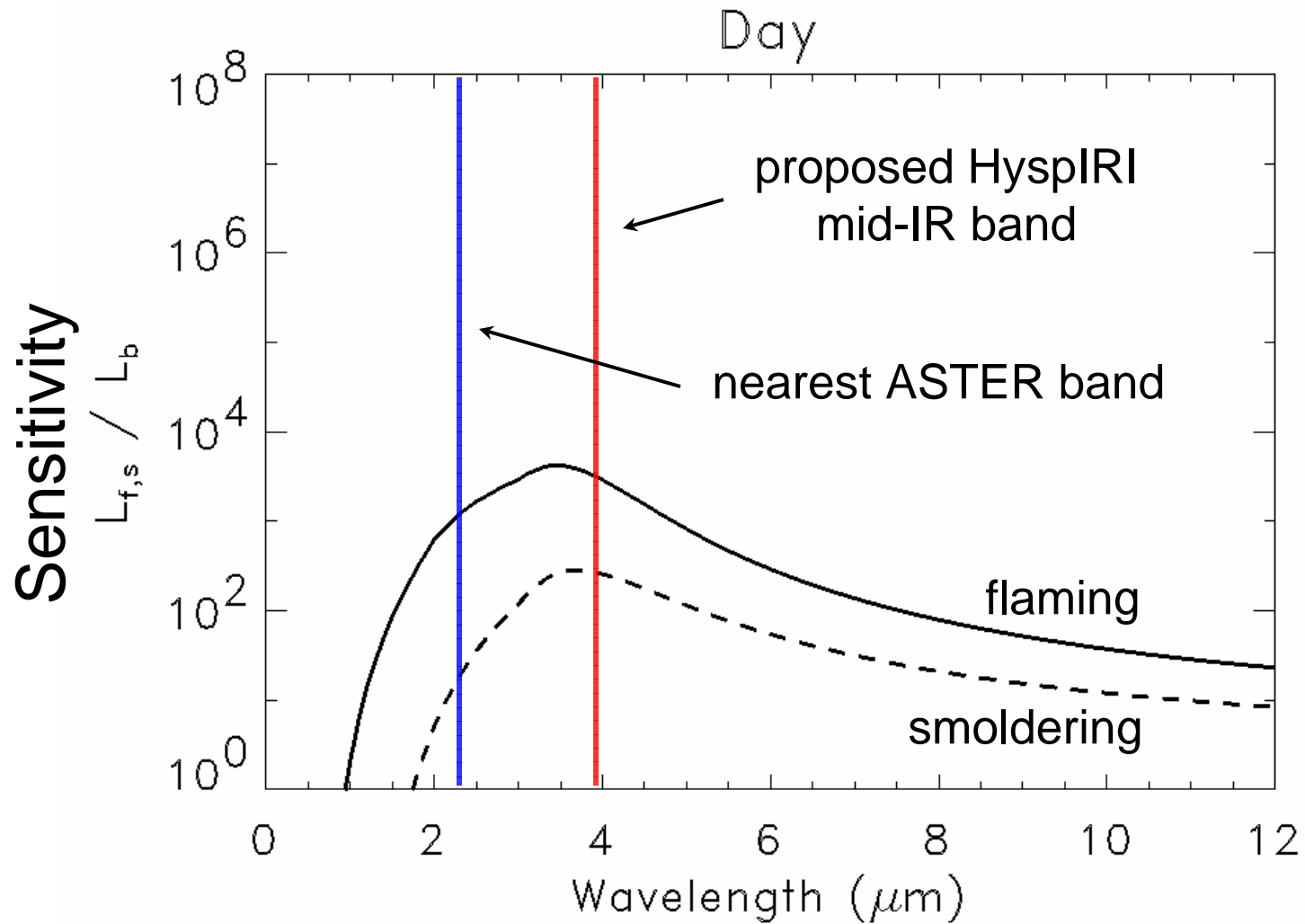
# ASTER SWIR Artifacts

- Frequent saturation
- Blooming
- Spikes
- Folding of digital counts





# Daytime Fire Sensitivity



Giglio et al. (2008)

# Benefits of HypsIRI TIR

- Unprecedented sensitivity to flaming and smoldering fires
  - Can easily detect small agricultural fires (difficult with coarser resolution sensors)
- Fewer false alarms
- Straightforward retrieval of fire radiative power
  - Single band vs. three or more bands with existing sensors
- Greatly expanded spatial and temporal coverage
- Will provide large samples of detailed fire characteristics useful for statistically modeling fires and their behavior