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.)
- high resolution active-fire observations (ASTER, Landsat)
- ideally with synchronized overpasses.
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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 µm R
1.6 µm G
0.5 µm B
ASTER SWIR Artifacts

- Frequent saturation
- Blooming
- Spikes
- Folding of digital counts
Daytime Fire Sensitivity

Giglio et al. (2008)
Benefits of HyspIRI 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