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*Modeling and assimilation of microwave and optical
remote sensing data for fire detection*

By: Sujay V. Kumar, John Bolten

About Me



Brief Bio, include job title & Organization: Sujay Kumar is a research physical scientist in the Hydrological Sciences Lab at NASA Goddard Space Flight Center. He received a M.S. in environmental engineering and a PhD in civil and computer aided engineering from North Carolina State University. Sujay's expertise is in the areas of land surface hydrology and land data assimilation systems. He is the lead for the NASA Land Information System (LIS; lis.gsfc.nasa.gov), a comprehensive system for land surface modeling and data assimilation. His research aims to explore novel ways of exploiting the information from observations in modeling and to transition the research advancements for water availability applications that are critical for society.



Work focus areas: Land surface modeling, remote sensing, data assimilation, earth system modeling, machine learning, high performance computing



Team members for your idea (including NASA scientists, if any): Dr. John Bolten, Dr. Thomas Holmes, Dr. Christa Peters-Lidard, Dr. Jessica Erlingis-Lahmers

The Idea

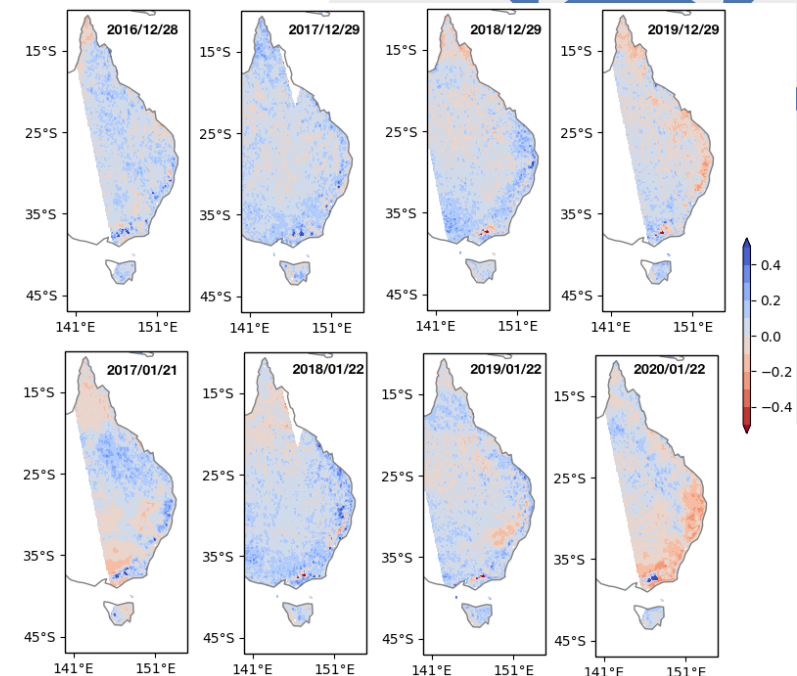
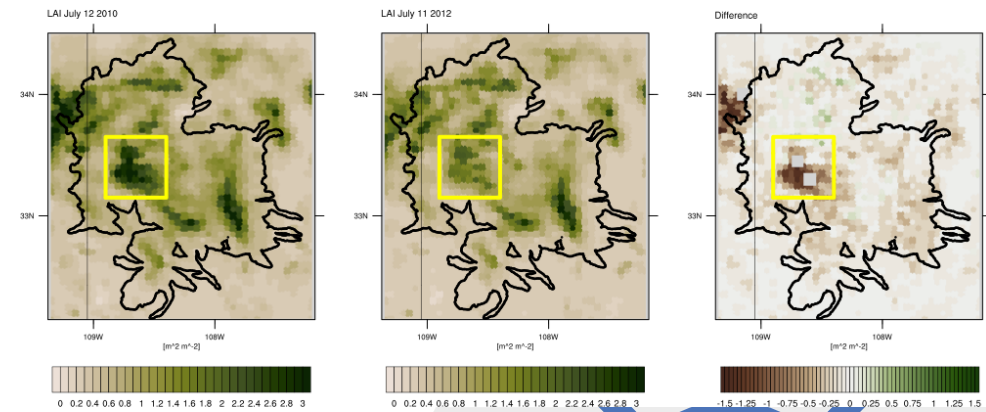


- **Title of Proposed Idea: Modeling and assimilation of microwave and optical remote sensing data for fire detection**
- **Scope of Idea (local, regional, National): local, regional, National**

The Idea

- Title of Proposed Idea: Modeling and assimilation of optical and microwave remote sensing data for fire detection
- Abstract of idea - Recent work at the hydrological sciences lab at NASA GSFC has demonstrated the viability of using modeling, remote sensing, data assimilation, and machine learning with the NASA Land Information System (lis.gsfc.nasa.gov) for the detection, recovery, and impacts of fires. The demonstrated techniques include a use of a combination of both optical and microwave remote sensing. While the optical remote sensing measurements provide high resolution coverage, they are limited by sensing limitations under cloud cover and infrequent temporal revisits. The use of microwave remote sensing data can effectively mitigate these issues, enabling timely detection of fire events.

Gila national forest (MODIS LAI)

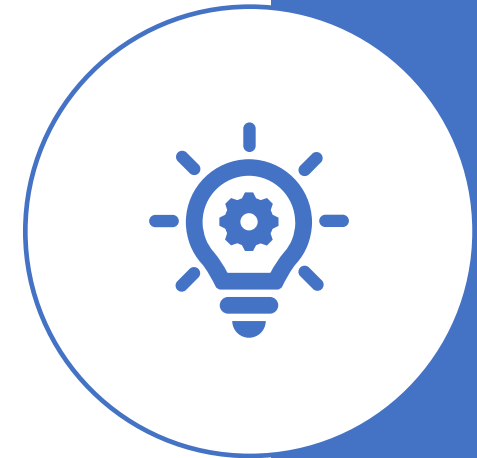


Australian bushfires (SMAP VOD)

Issue(s) being addressed

- Wildfire hazard
- Fuel loading
- Wildfire impacts
- Forest health
- Climate and drought
- Soil moisture
- Vegetation mapping
- Carbon emissions and flux

The Idea



Issues Addressed

What EO data does your idea utilize?

- Landsat
- Sentinel-1
- Sentinel-2
- MODIS
- VIIRS
- SMAP

The Idea



The Idea – Outcomes / Societal Benefits



- Expected management and/or decision support outcomes: The combined use of microwave and optical vegetation data helps in improving the timely detection and monitoring of fires. The use of data assimilation environments further help in assessing the impact of vegetation disturbances on water budget (evapotranspiration, runoff) and carbon fluxes.
- How does this idea benefit the Forest Service and other land management agencies? Though coarser, microwave data can be used to improve the spatio-temporal coverage of remotely sensed vegetation datasets.



Thank You!

