



# Research update and further perspectives from JPL

Sander Veraverbeke, S.J. Hook



# Short recap of activities



- Burned area mapping

Remote Sensing of Environment 115 (2011) 2702-2709



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Evaluating spectral indices for burned area discrimination using MODIS/ASTER (MASTER) airborne simulator data

S. Veraverbeke <sup>a,\*</sup>, S. Harris <sup>a,b</sup>, S. Hook <sup>a</sup>

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Article

- Fire severity, combustion completeness and emissions

**Evaluating Spectral Indices for Assessing Fire Severity in Chaparral Ecosystems (Southern California) Using MODIS/ASTER (MASTER) Airborne Simulator Data**

Sarah Harris <sup>1,2</sup>, Sander Veraverbeke <sup>2,\*</sup> and Simon Hook <sup>2</sup>

Remote Sensing of Environment 123 (2012) 72-80



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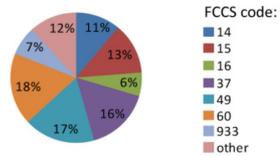
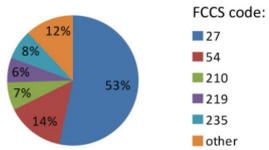
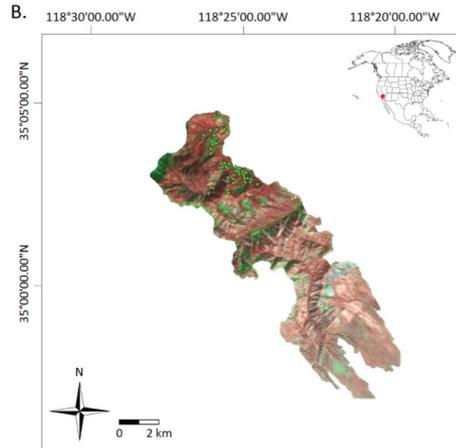
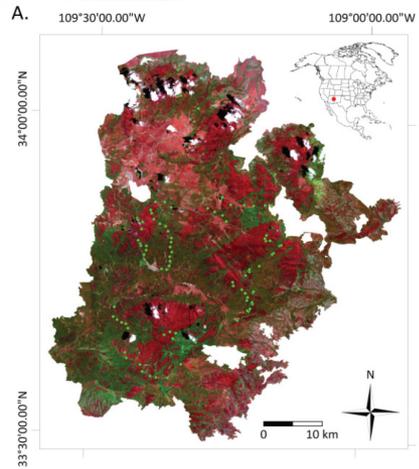


An alternative spectral index for rapid fire severity assessments

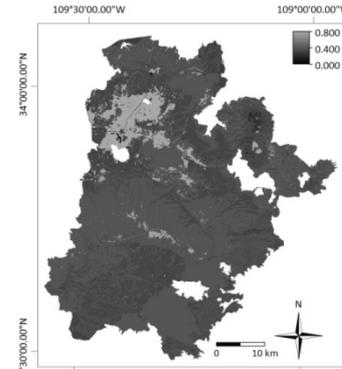
S. Veraverbeke <sup>\*</sup>, S. Hook, G. Hulley



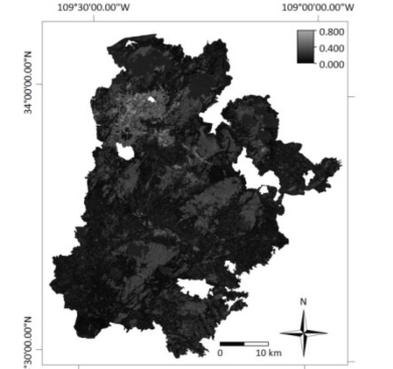
# Short recap of activities



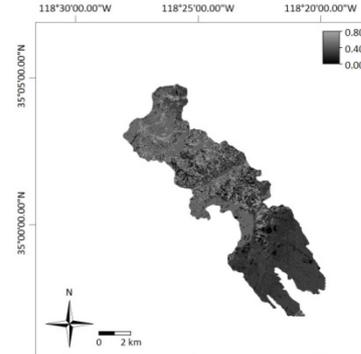
A. CC estimated from Consume 3.0 (Wallow fire)



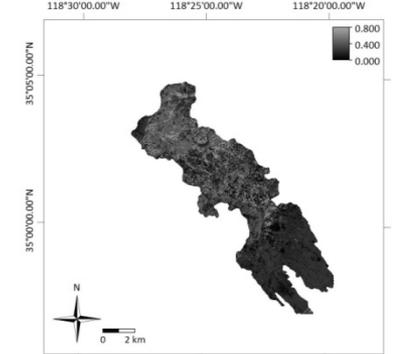
B. CC estimated from Consume 3.0 and RS (Wallow fire)



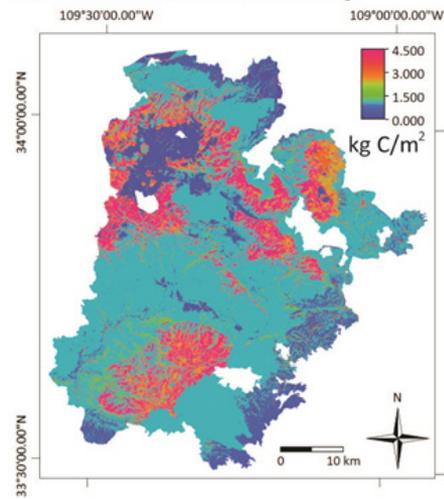
C. CC estimated from Consume 3.0 (Canyon fire)



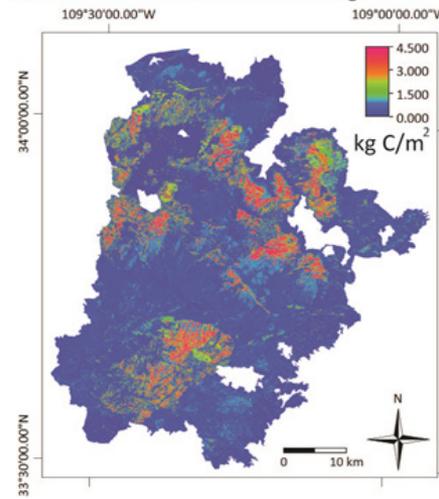
D. CC estimated from Consume 3.0 and RS (Canyon fire)



c. C emissions estimated from modeling



d. C emissions estimated from modeling and RS





# What's next?



Time series analysis of:

- 1) Burned area and number of fires
- 2) Fire severity
- 3) Emissions



# Data?



1) *Burned area and number of fires*

FRAP (19??-2011)

How consistent are these data over time?

2) *Fire severity*

Monitoring Trends in Burn Severity (1984-2010)

Use of raw data to derive vegetation mortality



3) *Emissions*



# Data for emissions?



$$\text{Emission} = \text{Burned area} \times \text{Fuel load} \times \text{Combustion completeness} \times \text{Emission factor}$$

## 1) Burned area

MTBS

## 2) Fuel load

**Dynamic** versus static?

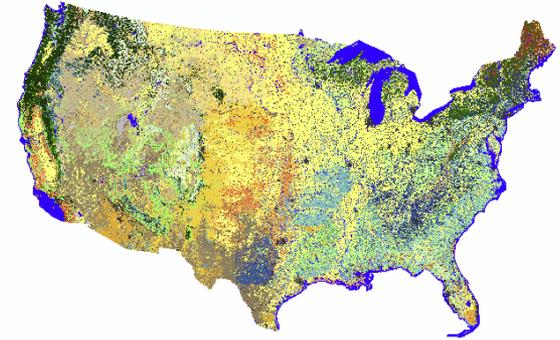
Static: Fuel Characteristic Classifications System

Dynamic: GFED-approach

Would it be possible to downscale the GFED-approach to the SoCal region?

Which data input-would be required?

FCCS



## 3) Combustion completeness

First estimate via modeling, further refined with fire severity data

**Dynamic** versus static modeling?

Static: Consume

Dynamic: GFED-approach

Would it be possible to downscale the GFED-approach to the SoCal region?

Which data input-would be required?



## 4) Emission factors

From Andreae and merlet (2001)



# Meteo-data?



- Temperature, precipitation and drought
- Temperature (mean, min, max) since 1895
- Precipitation since 1895
- Palmer Drought Severity Index since 1895

- Large scale patterns
- ENSO since 1856
- Pacific Decadal Oscillation since 1900
- Pacific North American index since 1950
- Other?

- Santa Ana weather

Which period has been modeled now?

Is it possible to cover the 1950-present range?

**Fifty-Seven-Year California Reanalysis Downscaling at 10 km (CaRD10).  
Part I: System Detail and Validation with Observations**

MASAO KANAMITSU AND HIDEKI KANAMARU

**Fifty-Seven-Year California Reanalysis Downscaling at 10 km (CaRD10). Part II:  
Comparison with North American Regional Reanalysis**

HIDEKI KANAMARU AND MASAO KANAMITSU



# More questions?



Is there going to be a focus on the 2003 and 2007 events?

As this is an interdisciplinary project, should we discuss data exchange?



# One more perspective



Study of Fire Radiative Power and burned area patterns in the MODIS-era

Differences between SA events and non-SA events

But also; how do fire regimes differ between SoCal and Baja California?

Huge point of disagreement between Keeley et al. and Minnich et al.

Minnich et al.:

Before fire management (before 1900): many small fires, no large fires

Presently, because of fire management: fewer small fires, more catastrophic fires

Keeley et al. rebut this:

Comparison with Baja is invalid

Large fires have always been part of SoCal ecosystems

Their frequency only increased due to increased human pressure

