Characterizing and Understanding the Differences Between GOES WF_ABBA and MODIS Fire Products

Jay P. Hoffman[*1], **Elaine M. Prins**[1], **Christopher C. Schmidt**[1], **Steven A. Ackerman**[1], and **Jeffrey S. Reid**[2]

CIMSS/University of Wisconsin, Madison, Wisconsin[1]   Naval Research Laboratory, Monterey, California[2]

jay.hoffman@ssec.wisc.edu[*]

SATELLITE SIMILARITIES AND DIFFERENCES
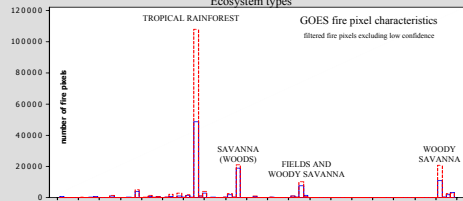
- **Orbit**
  - Spatial coverage
  - Temporal coverage
  - Polar v Geostationary orbit
- **Instrument design**
  - Saturation thresholds
  - Spectral sensitivity
  - Resolution

- **Fire detection algorithm**
  - 4 μm temperature and 4 μm and 11 μm temperature difference thresholds
  - Dynamic contextual background calculations
  - Cloud, water, and land type masks
  - Surface emissivity, atmospheric attenuation, and solar reflectivity correction
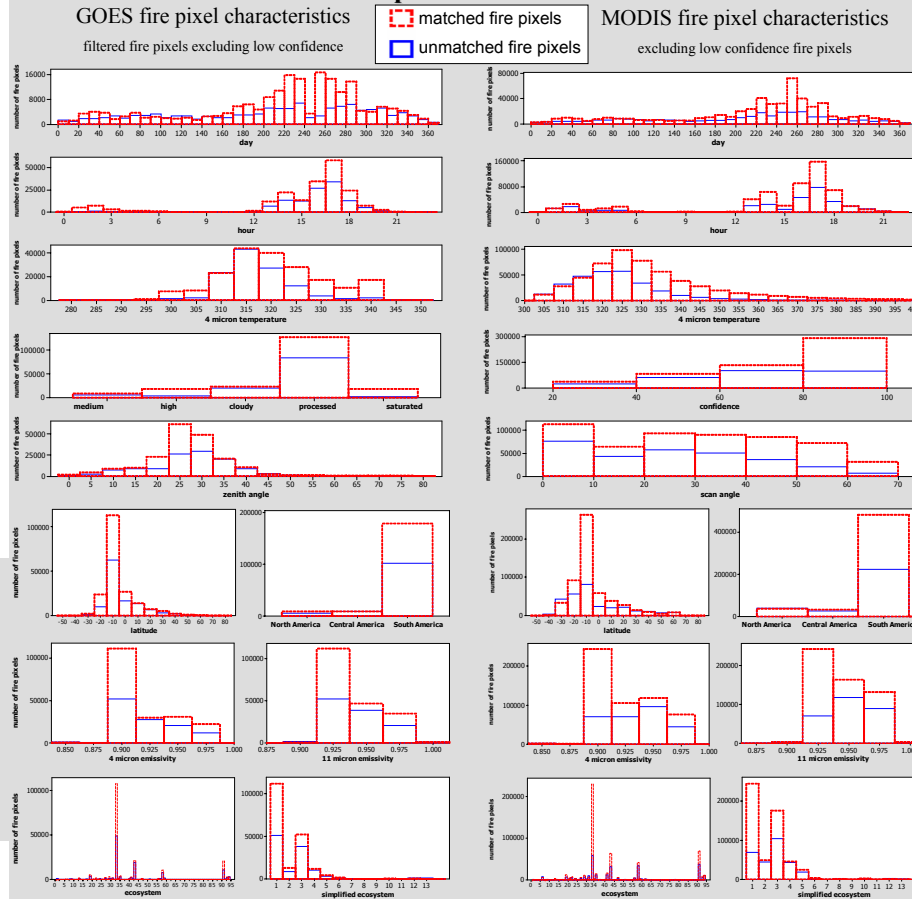
CONCLUSIONS

- Fire pixels with a match have different characteristics than fire pixels with no match
- Fire pixel characteristics can be used to forecast fire pixel matches
- Collocated fire pixels are not exactly collocated; spatial and temporal criteria is important

Different ecosystems are more likely to contain fire pixels with a match than other ecosystems
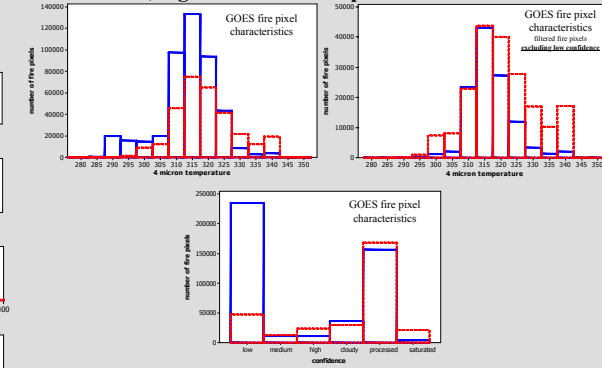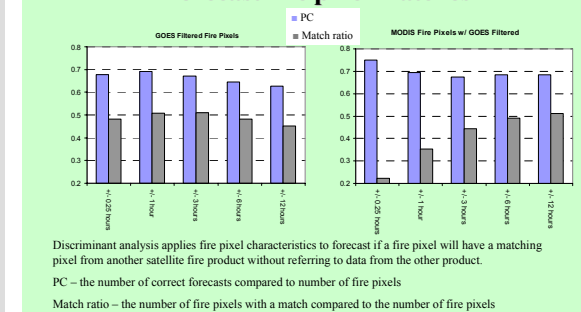

Collocated fire pixels are not exactly collocated.

12 October 2005
GOES filtered and MODIS fire pixels
low confidence fire pixels excluded
match __within 10 km__ and +/- 12 hours

Fire pixels with a match have different characteristics than fire pixels with no match

GOES fire pixel characteristics
filtered fire pixels excluding low confidence

matched fire pixels
unmatched fire pixels

MODIS fire pixel characteristics
excluding low confidence fire pixels

Allowing more time to pass between fire detections increases the number of matching fire pixels, but the number of unmatched fire pixels increases faster

24 April 2004
match within +/- 12 hours and 10 km
GOES filtered and MODIS fire pixels
low confidence fire pixels excluded

GOES-12 WF_ABBA filtered fire pixels: no possible match (0)
GOES-12 WF_ABBA filtered fire pixels: no match (460)
GOES-12 WF_ABBA filtered fire pixels: MODIS match (723)
MODIS fire pixels: no match (500)
MODIS fire pixels: GOES filtered match (796)

24 April 2004
match within +/- 0.25 hours and 10 km
GOES filtered and MODIS fire pixels
low confidence fire pixels excluded

GOES-12 WF_ABBA filtered fire pixels: no possible match (1061)
GOES-12 WF_ABBA filtered fire pixels: no match (20)
GOES-12 WF_ABBA filtered fire pixels: MODIS match (102)
MODIS fire pixels: no match (934)
MODIS fire pixels: GOES filtered match (362)

Cool, low confidence fire pixels often go unmatched
Warm, high confidence fire pixel often have a match

Fire pixel characteristics can be used to forecast fire pixel matches

Discriminant analysis applies fire pixel characteristics to forecast if a fire pixel will have a matching pixel from another satellite fire product without referring to data from the other product.

PC – the number of correct forecasts compared to number of fire pixels

Match ratio – the number of fire pixels with a match compared to the number of fire pixels
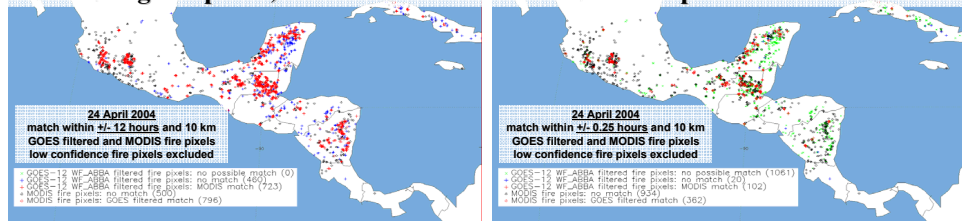
Data Products

- GOES WF_ABBA version 6.0 ASCII fire data along with the filtered product where temporal filtering helps to screen false detections.
- MODIS fire product, collection 4.

Excluding low confidence fire detections improves the match rate

24 May 2004
GOES and MODIS fire pixels
match within 10 km and +/- 12 hours

GOES-12 WF_ABBA fire pixels: no match (67)
GOES-12 WF_ABBA fire pixels: MODIS match (118)
MODIS fire pixels: no match (1)
MODIS fire pixels: GOES match (116)

24 May 2004
GOES __filtered__ and MODIS fire pixels
low confidence fire pixels excluded
match within 10 km and +/- 12 hours

GOES-12 WF_ABBA filtered fire pixels: no match (5)
GOES-12 WF_ABBA filtered fire pixels: MODIS match (109)
MODIS fire pixels: no match (2)
MODIS fire pixels: GOES filtered match (110)