MODIS Active Fire Product Status

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MODIS Science Team Meeting

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Contents

- Products and Algorithm
- Instrument Performance
- Example Products
- Current Status
- Data availability issue

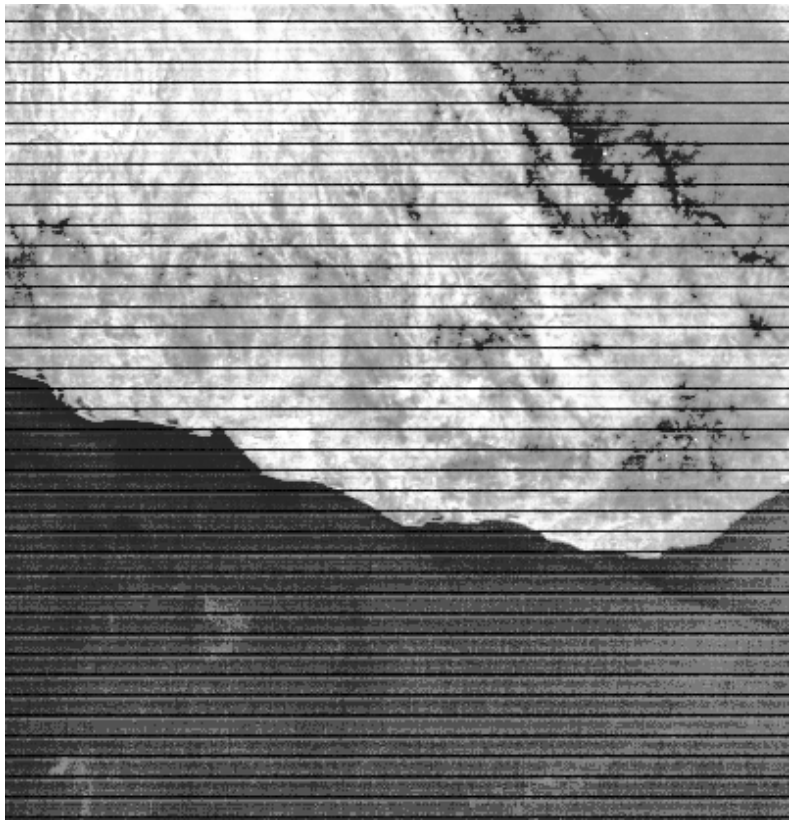
MODIS Fire Products

- Active-fire detection (location & timing)
  - L2 (swath)
  - L2G
  - **1 km gridded L3 (daily and 8-day)**
  - **5 km daily daytime global browse (for QA)**
  - L3 CMG (monthly composite @ 10km)
  - Experimental Burned Area Product (8 day 1km)

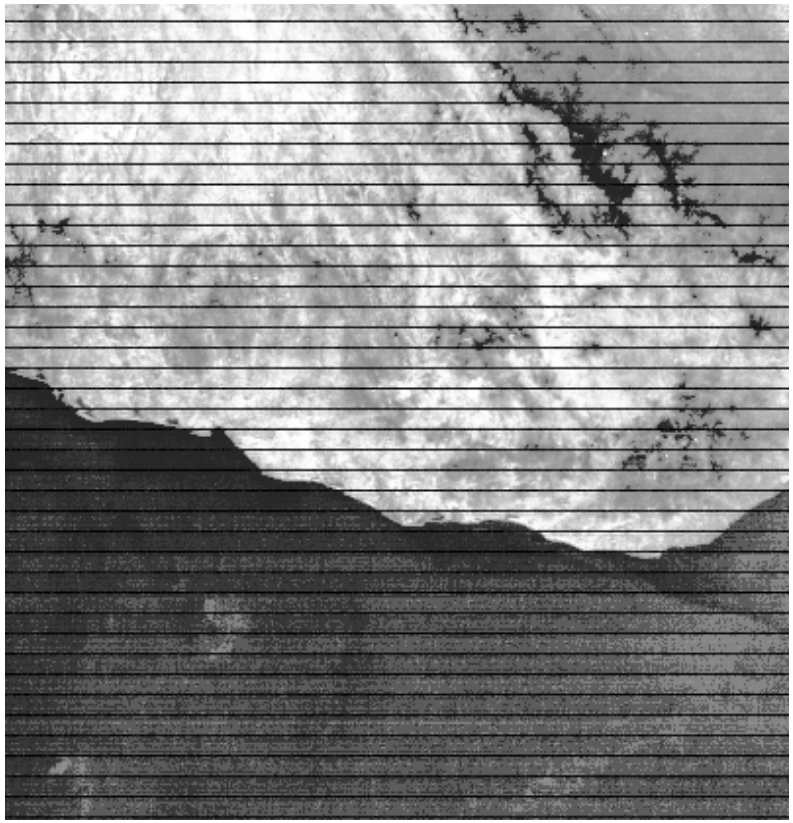
MODIS Bands used for the Fire Product

- MODIS Fire Algorithm
  - Absolute and Difference Thresholds for Bands 21,22, 31
  - Also uses:
    - Difference with background brightness temperatures (21/22/31)
    - Standard deviation of surrounding pixel brightness termperature
    - Mod 35 - Cloud Mask
    - Geolocation
    - Bands 1 and 2 for glint and QA flags
- Channel 21
  - Dead detector #9
  - More noise than expected
  - Not yet calibrated beyond 330K (LV2 will take this up to 400K)
  - Mirror side effect visible – impact tbd
- Channel 22
  - Dead detector #4
  - Noisy detectors #7,8
- Channel 31
  - Some striping (currently no impact seen on fire detection)

Channel 21: Current State



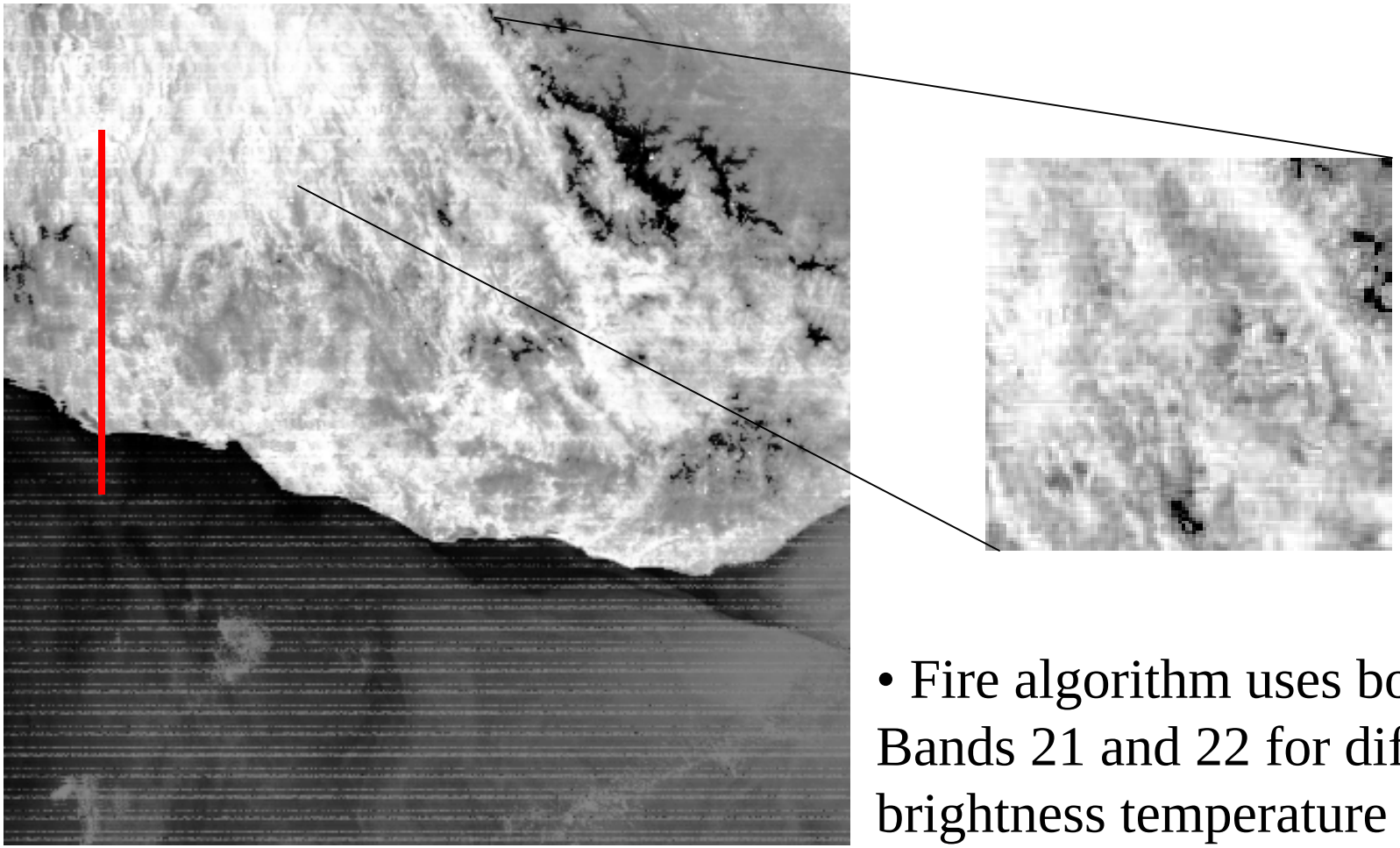
Current 1B Product



MCST Updated Calibration
(applied manually)

Gulf of Guinea, April 17th

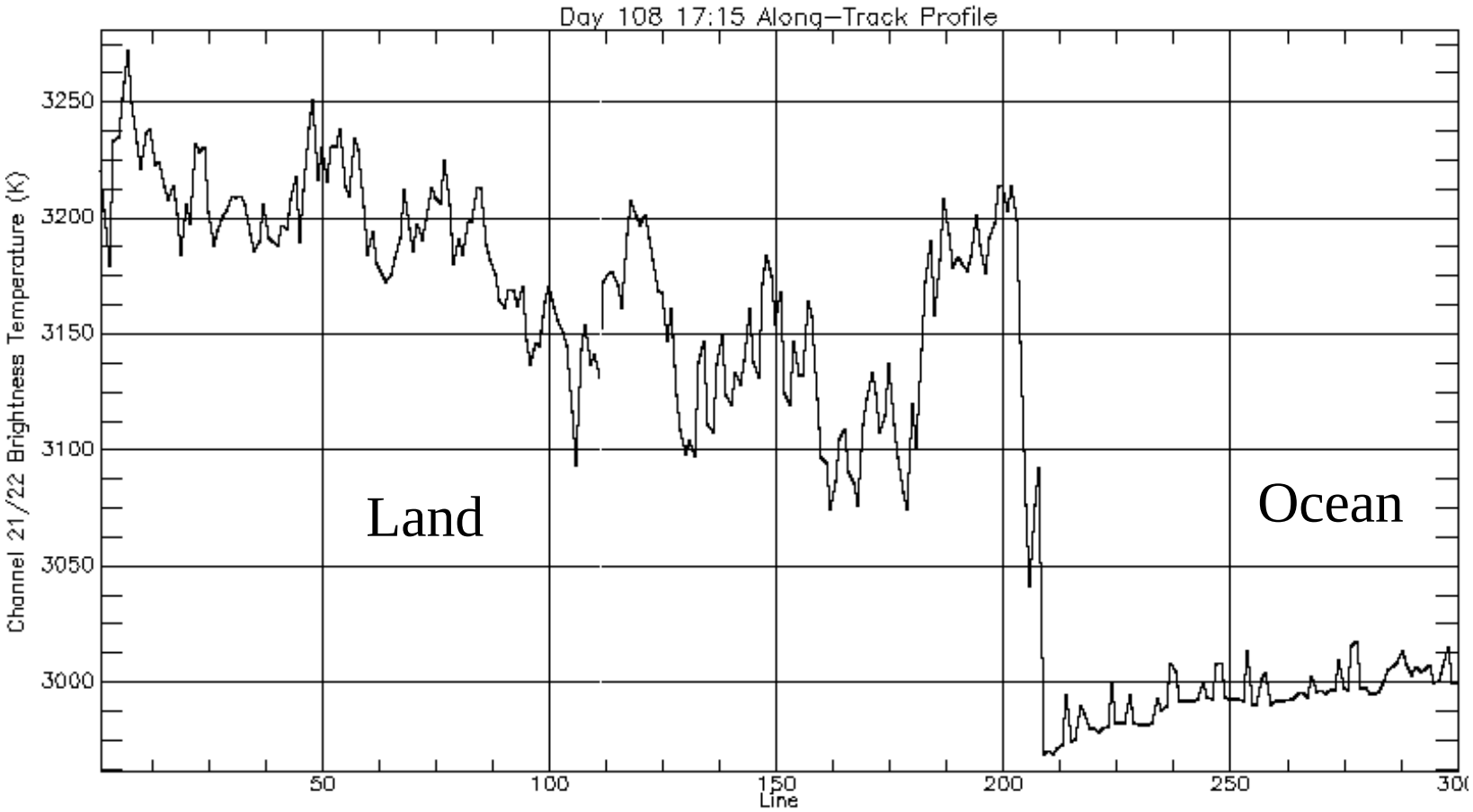
Channel 21/22 Composite



- Fire algorithm uses both Bands 21 and 22 for different brightness temperature ranges
- Dead detectors removed but striping evident over land

Gulf of Guinea, April 17th

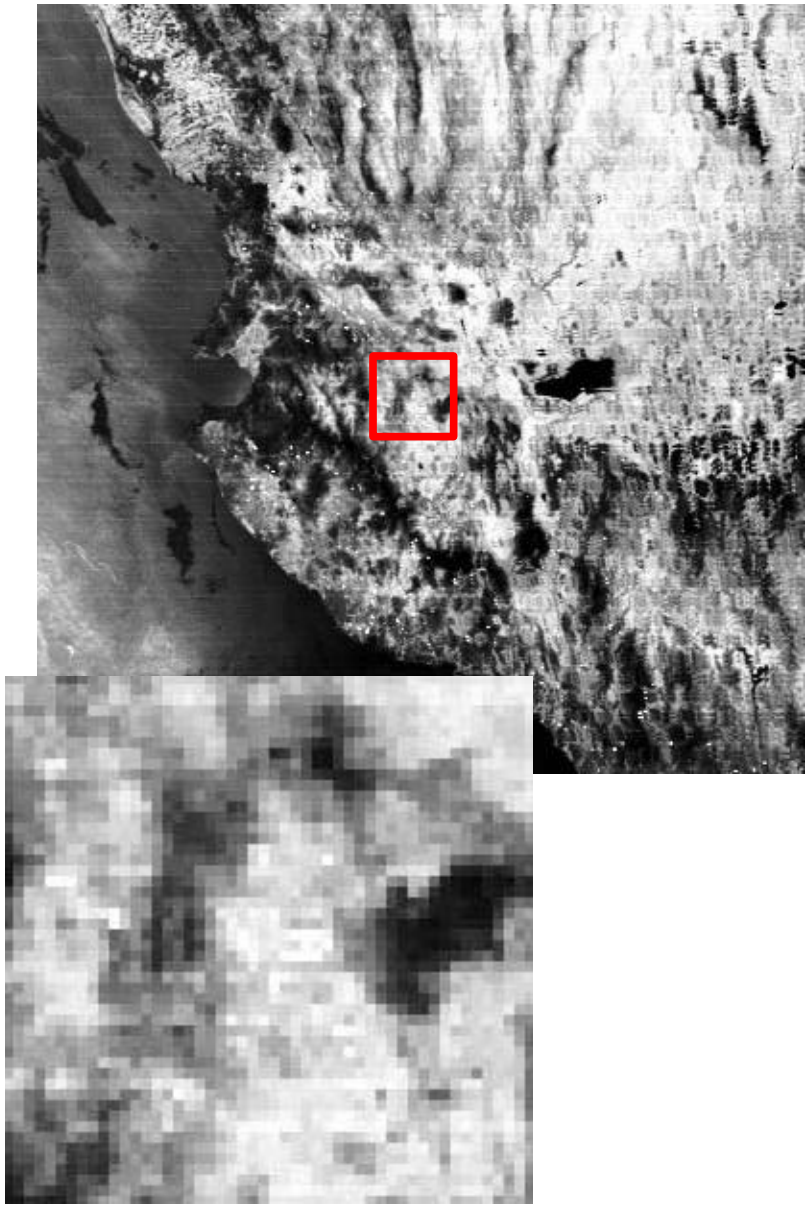
Channel 21/22 Composite Profile



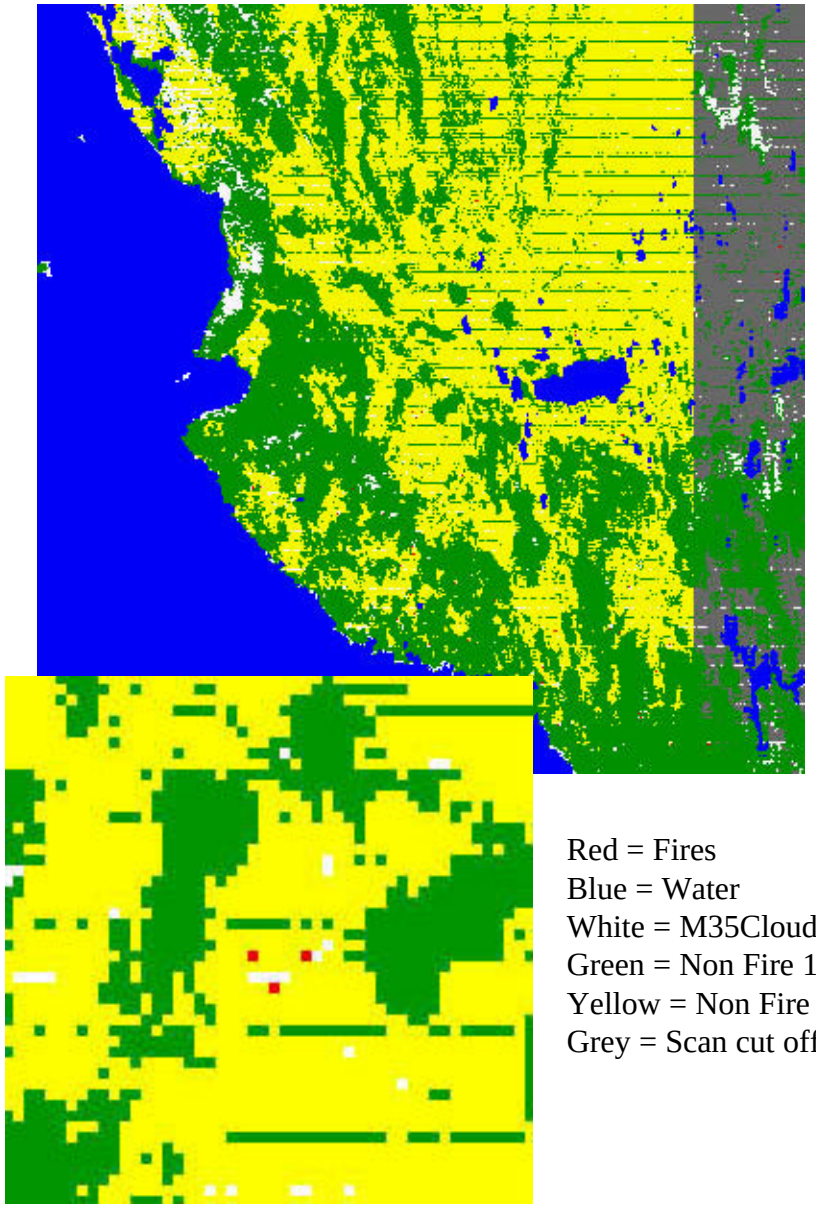
•Striping in each band – both have a 10 line periodic signal

•Algorithm sensitive to background variability – reducing detection of smaller /cooler fires

MODIS Fire Product Mexico, May 18th



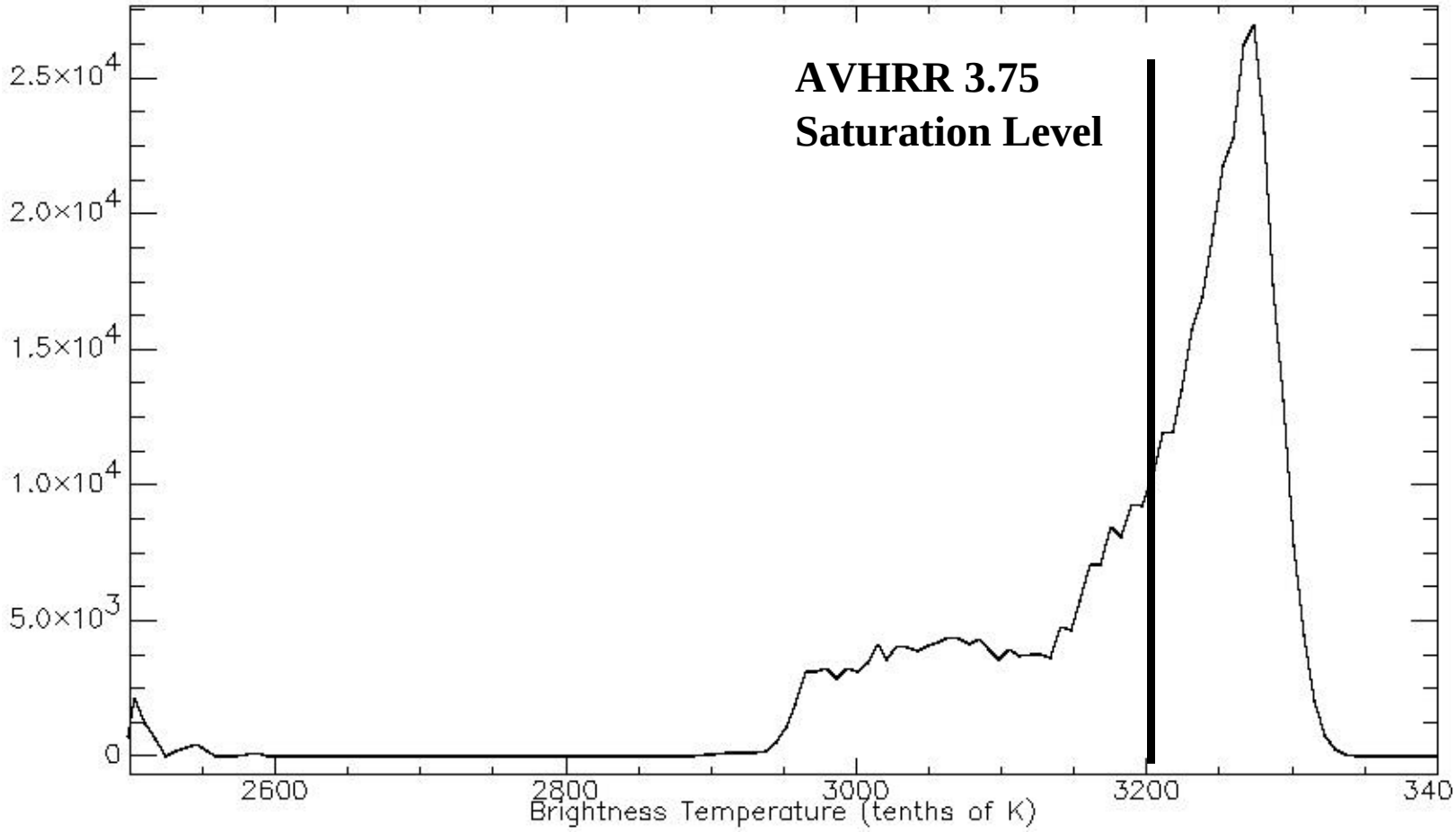
Composited Band 21/22 (updated 21 cal)



Red = Fires
Blue = Water
White = M35Cloud
Green = Non Fire 1
Yellow = Non Fire 2
Grey = Scan cut off

MODIS Fire Product

MODIS Band 21 Histogram

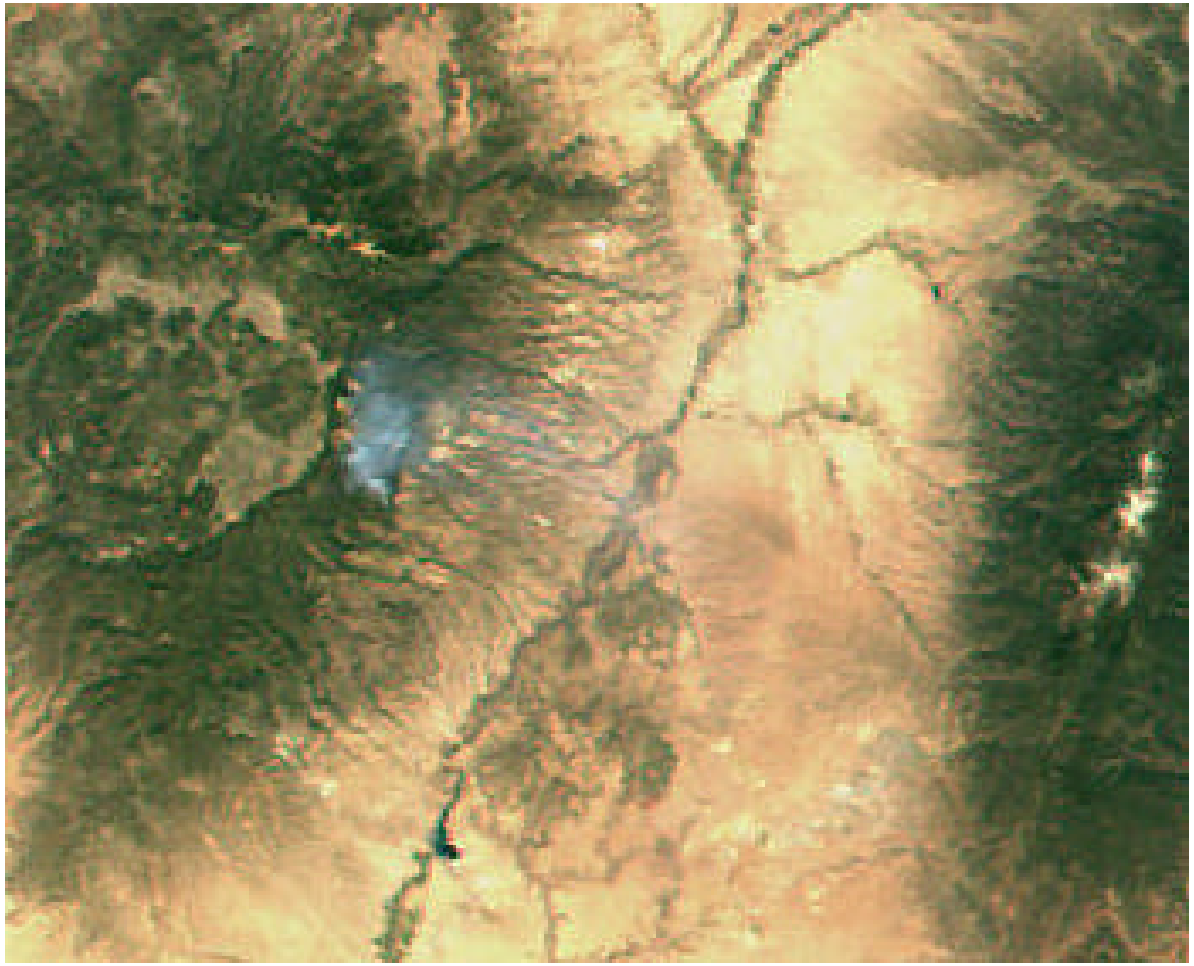


Algorithm Implications of Instrument Problems

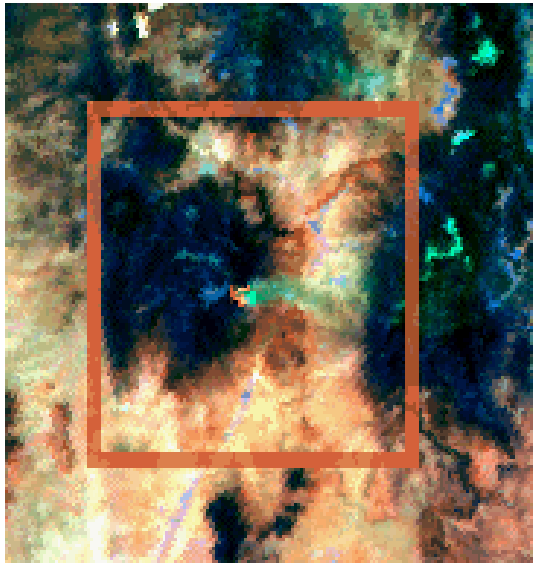
- Degraded ability to detect small/cool fires
  - 50+ % of scans affected
- Degraded ability to detect large/hot fires
  - ~10% of scans affected
- Striping in L2 fire product
  - Can propagate up through L3 products
- Unable to retrieve properties for ~ 10% of fire pixels
- Noise in Band 21- better calibration needed
- Noisy detectors in Band 22 – better calibration needed
- Use 22 for dead detectors in 21
- Use 21 for saturated pixels and dead detectors in 22

Los Alamos Fire

An Example of Murphy's Law applied to MODIS Data Availability



AVHRR 1km
(GLCF/UMd)

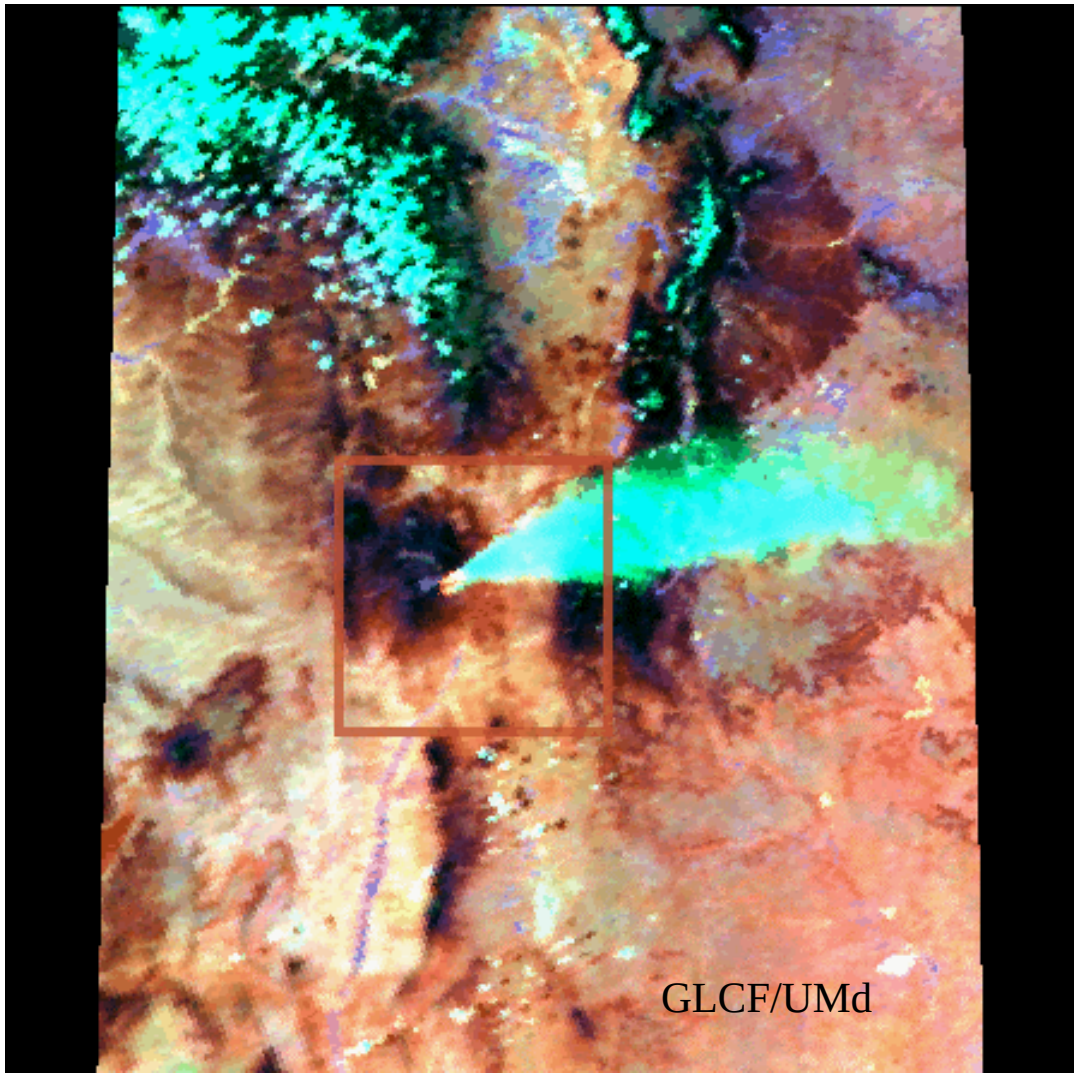


MODIS Surface Reflectance 250m – May 9th (Day 130)

Los Alamos Fire

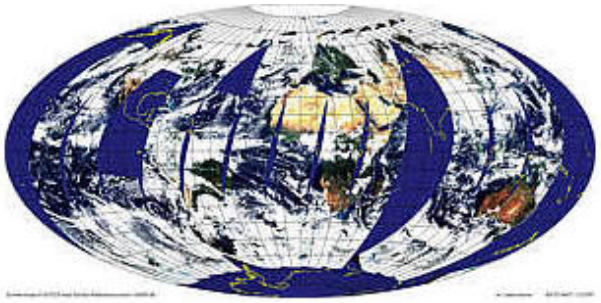
May 9th
Landsat ETM

Los Alamos Fire

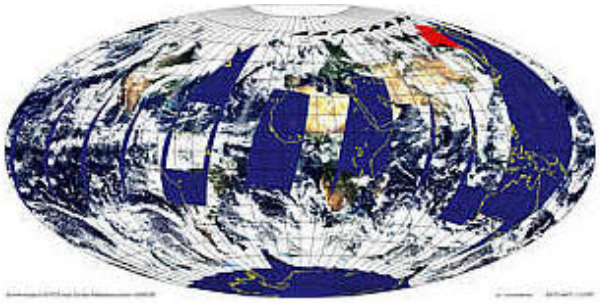


AVHRR May 10
DAY 131

MODIS Coverage
8 days (137-141)

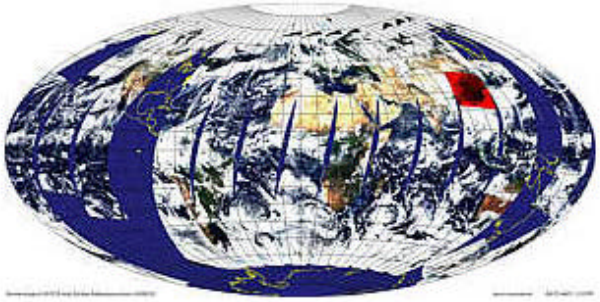


2000141

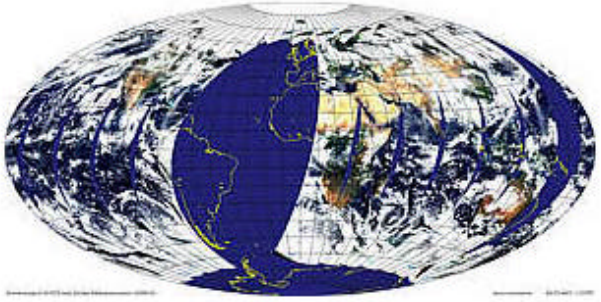


2000140

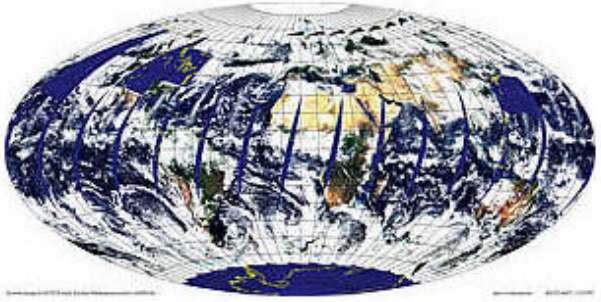
2000142



2000143



2000144



2000137-2000144

Near-term issues

- **Algorithm improvements being made:**
  - **Code patches currently in I and T, in Ops next week**
  - **Additional algorithm tweaking needed to reduce false alarms**
  - **Need to examine fire/cloud mask problems**
- **Need next MCST 1B code delivery to:**
  - **flag dead and noisy detectors - (keep actual value ?)**
  - **apply updated calibrations for bands 21/22**
- **Improved calibration needed to remove/reduce striping in Channel 21 and Channel 22**
- **Validation Campaign w. SAFARI (starts July runs through Sept.)**
- **AQUA gain change:**
  - **AQUA overpass time is important for fires**
  - **Open to any gain changes needed for Band 32**
  - **Saturation in 31 is a real concern – would compromise to 340K (360K preferred) – needed for 1) Detecting Fires 2) Land Surface Temperature product**

MODIS Fire Product
Phased Release Schedule

- **Beta release 8 day composite (July ‘00)**
- **Global Fire Browse (July ‘00)**
- **Daily 1km Product (August/Sept ‘00)**
- **CMG at first reprocessing – (sample products beforehand)**

- **Need to develop an expedited service for ‘media events’- without breaking production**