

Use of MODIS for Understanding Fire Regime

Each year the Alaska Interagency Coordination Center (AICC) actively monitors wildland fires throughout Alaska. At the conclusion of each fire year the AICC compiles the yearly data into fire specific information. Historically this information has proven useful to scientists studying the historical effects of fire but has fallen short when it comes to studying seasonal aspects of fire occurrence i.e. start date, end date and duration of fires. Until recently the AICC was the only source where fire occurrence information could be obtained. Moderate Resolution Imaging Spectroradiometer (MODIS) satellites AQUA and Terra pass over the same location several times a day capturing information about the landscape with every pass. This increased temporal resolution can be used to look at seasonal aspects of fire occurrence, information that the AICC data fails to capture.

Data: MODIS Rapid Response Fire Data

MODIS detects fires using the fire detection algorithm based on algorithms developed for the AVHRR and TRMM VIRS (Giglio et al., 2003). It was developed for the need of the fire community for MODIS fire data shortly after acquisition to aid in fire management. It has a resolution of 1 km. The fire detection algorithm is:

$$4 \mu\text{m channel} > 360\text{K}$$

or

$$4 \mu\text{m channel} > 330\text{K and}$$

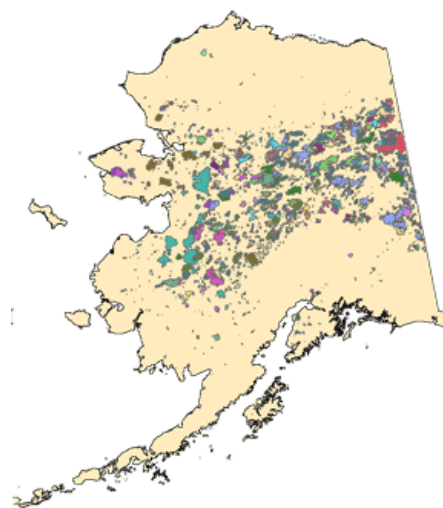
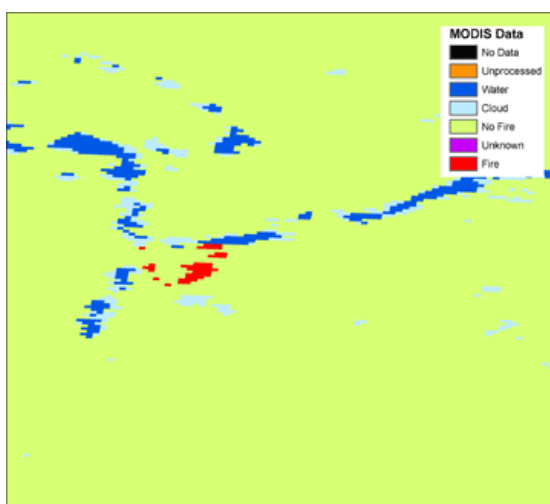
$$4 \mu\text{m channel} - 11\mu\text{m channel} > 25\text{K}$$

Data: AICC Fire Polygons

- Vector based fire boundaries
- Historical coverage: 1950 – present
- Can be linked to Start/End date information for fires starting in 2001

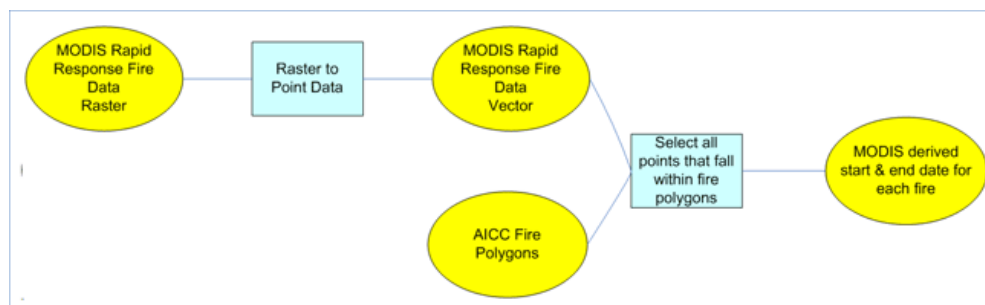
Left: Example of a MODIS fire product with classification

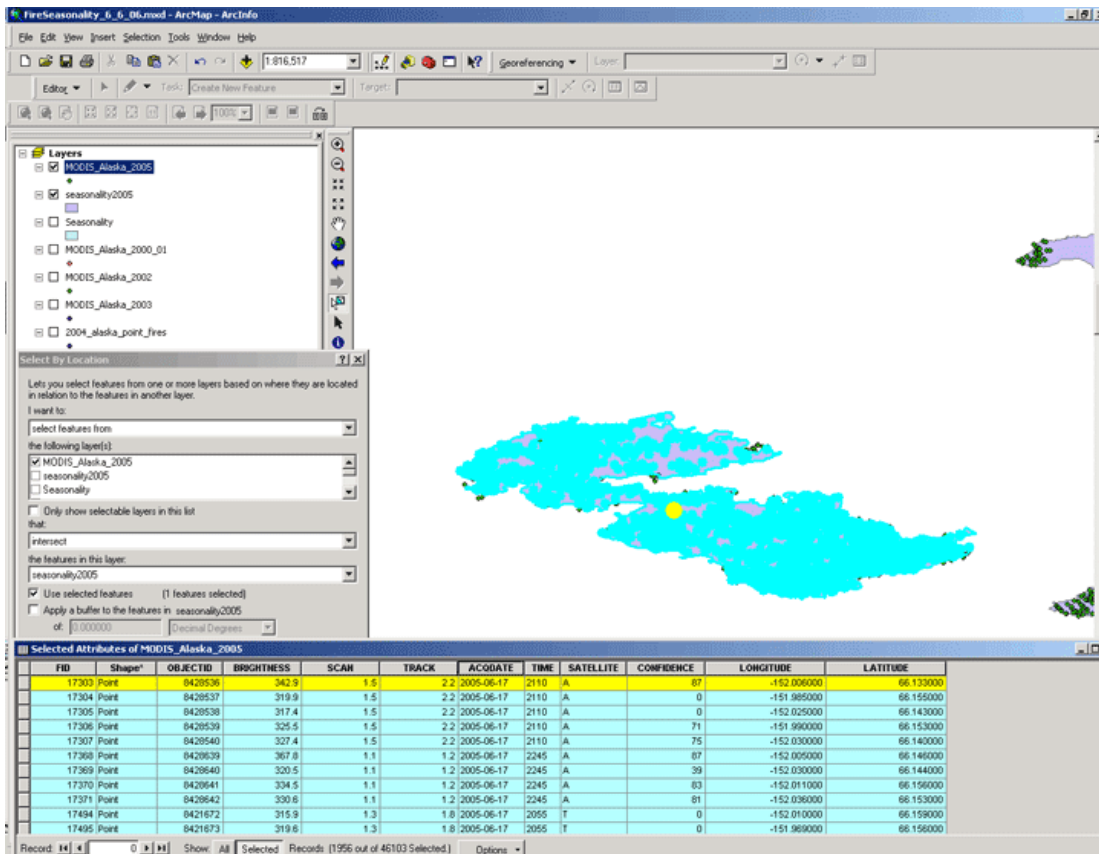
Right: Example of the AICC fire polygons historical coverage. Each year is a different color.



[Back to top ^](#)

Methods: GIS Workflow



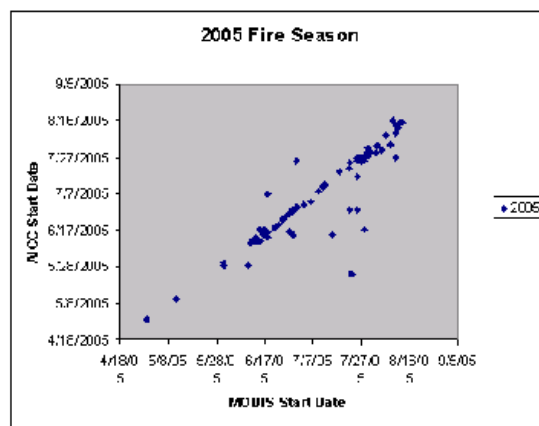
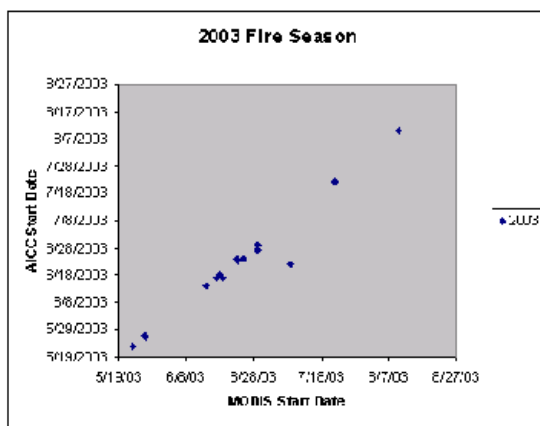


Above: MODIS Rapid Response Fire points selected by AICC fire polygons. Earliest fire pixel (highlighted) becomes start date.

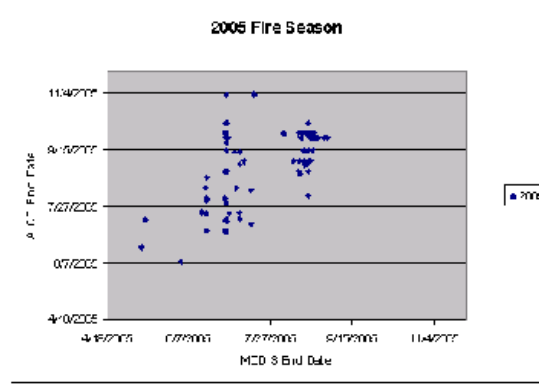
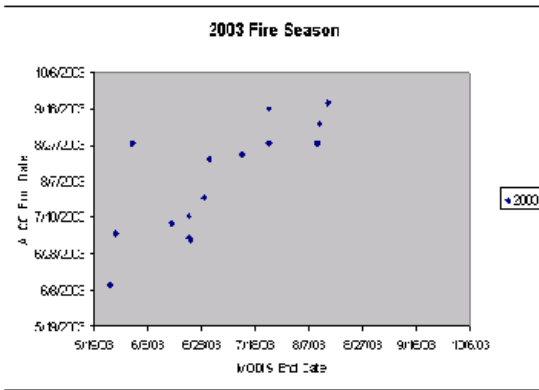
[Back to top ^](#)

Results:

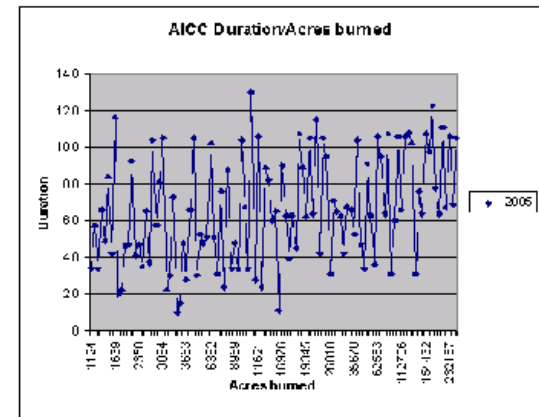
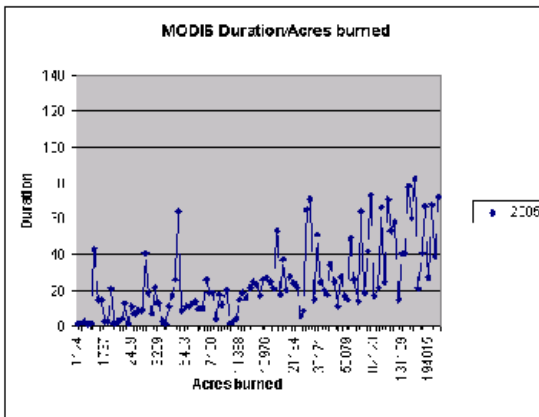
MODIS & AICC Start Date Comparisons



MODIS & AICC End Date Comparisons



MODIS & AICC Fire Duration by Acres Burned Comparisons



Above left: $F = 70$ a functional relationship between variables

Above right: $F = -108$ No functional relationship between variables

Results show that MODIS derived fire data and AICC fire data yield similar start dates but fail to yield similar end dates for all years studied. From these results we can conclude that the end date discrepancies are not determined by the intensity of the fire year i.e. monitoring resources spread to thin, but rather by regulatory and bureaucratic issues i.e. funding timelines, that influence AICC fire data end dates.

[Back to top ^](#)