Large Area Validation of Himawari-8 Fire Active Fire products

Simon Jones, Karin Reinke, Bryan Hally, Chathura Wickramasinghe, Luke Wallace

School of Science, RMIT University, Melbourne, Australia

Bushfire and Natural Hazards Cooperative Research Centre, Melbourne, Australia

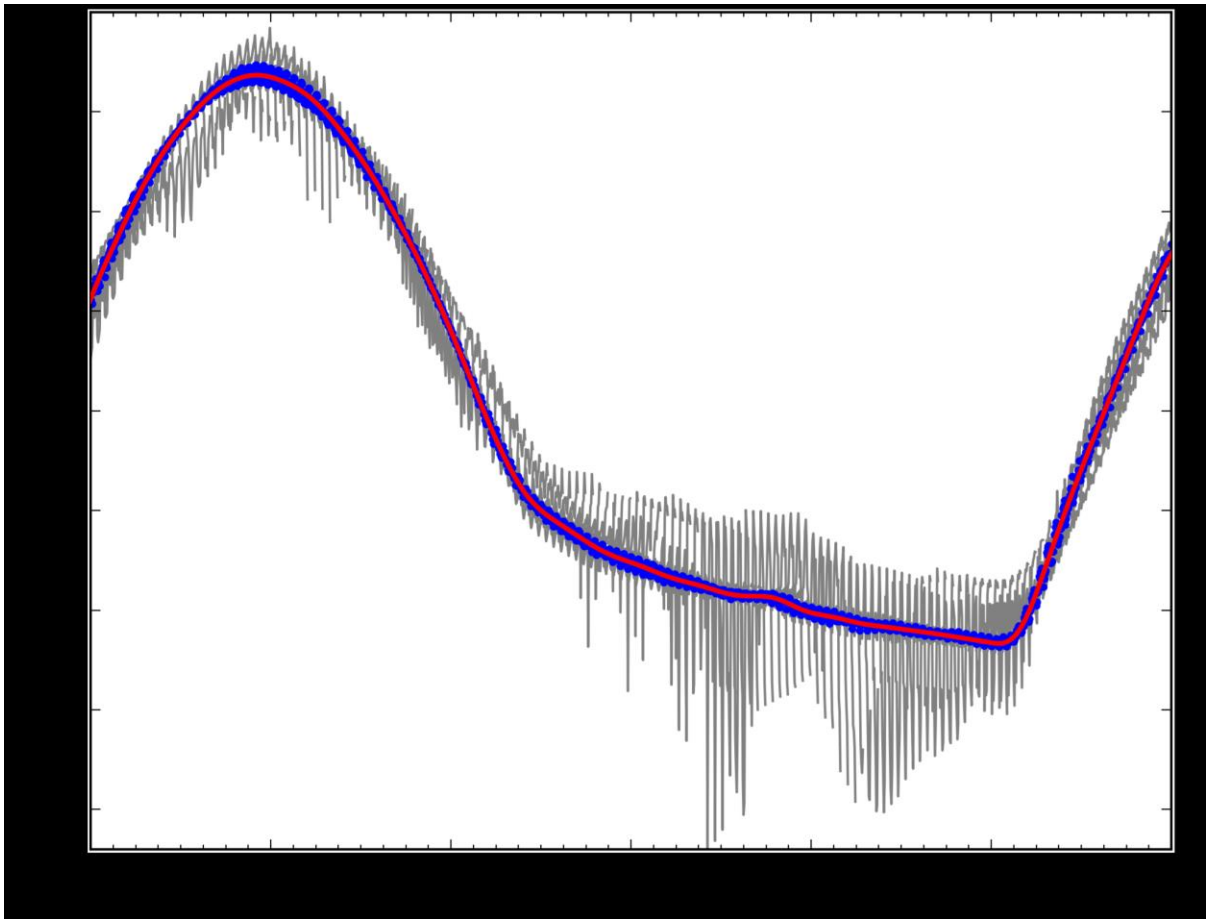
The utility of Geostationary active fire detection and surveillance has recently been supplemented by two new algorithms developed by our group: the AHI-FSA (Advanced Himawari Imager - Fire Surveillance Algorithm) and the Broad Area Training (BAT) method (Wickramasinghe et al., 2016, Hally et al., 2017). Here we present results from a large area validation of these products to support wildfire surveillance and mapping using the geostationary Himawari-8 satellite.

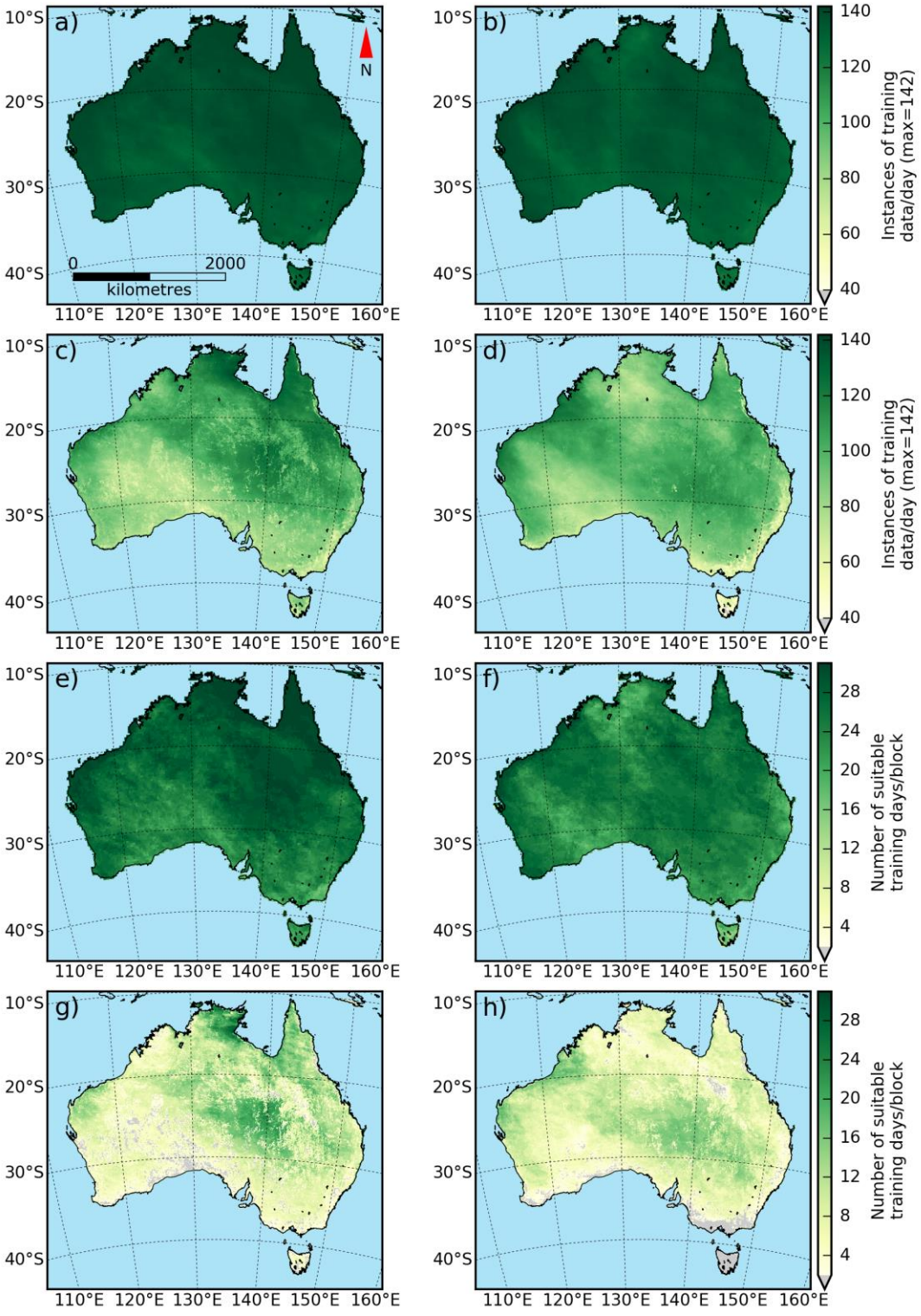
Presently, the AHI-FSA/BAT algorithms have only been tested on a number of case study areas in Western Australia. Initial results demonstrate a high potential as a wildfire surveillance algorithm providing high frequency (every 10 minutes) fire-line detections. However, the AHI-FSA and BAT products need to be validated over a large area to quantify the performance of the algorithms. This paper validates their performance in the Northern Territory of Australia (1.4 million km2) over a 10 day period by comparing AHI-FSA/BAT to well-established products from LEO satellites: MODIS (Moderate Resolution Imaging Spectroradiometer) and VIIRS (Visible Infrared Imaging Radiometer Suite). This paper also discusses difficulties in validating high temporal resolution products with existing low temporal resolution LEO satellite products. Results indicate that the multi-resolution approach developed for AHI-FSA/BAT significantly improve the fire detection. When compared to the MODIS thermal anomaly products, AHI-FSA/BAT omission error was only 2%. High temporal frequency data results in AHI-FSA/BAT detecting fires, at times, three hours before the MODIS overpass with much-enhanced detail on fire movement.

Keywords: Himawari, Fire detection, Wild fire surveillance, validation

Hally B.; Wallace, L.; Reinke KJ. and Jones SD. (2017) A Broad-Area Method for Estimation of Upwelling Medium Wave Infrared for Fire Detection, Remote Sensing: 9, 167; doi:10.3390/rs9020167

Wickramasinghe CH.; Jones SD.; Reinke KJ. and Wallace, L. (2016) Development of a Multi-Spatial Resolution Approach to the Surveillance of Active Fire Lines Using Himawari-8, Remote Sensing: 8, 932; doi:10.3390/rs8110932




a)
b)
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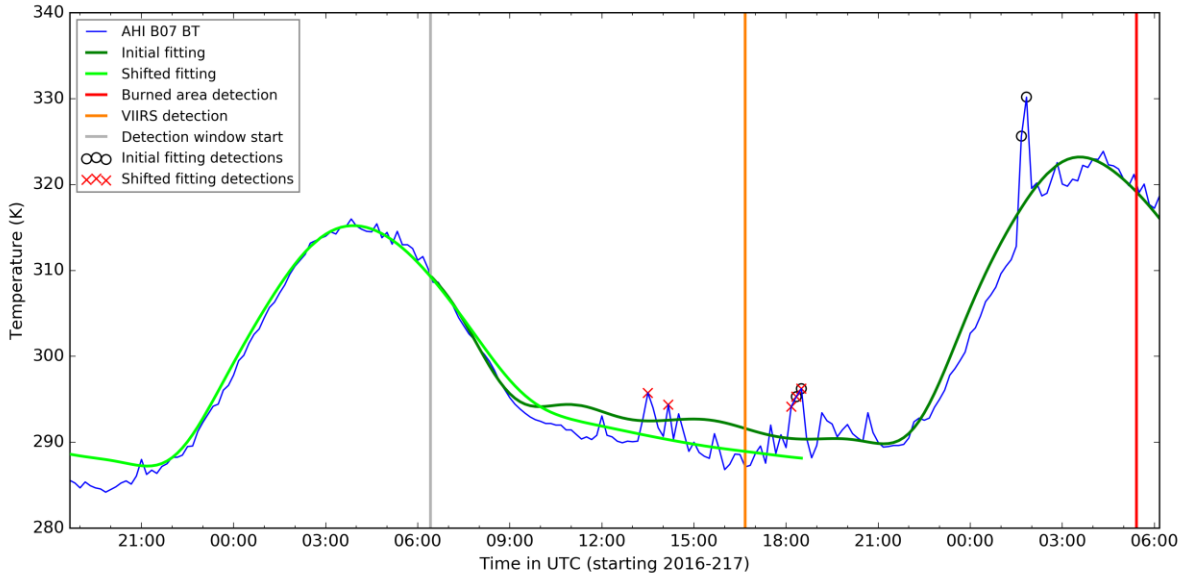
N
0
2000
kilometres
10°S
20°S
30°S
40°S
110°E
120°E
130°E
140°E
150°E
160°E
Instances of training data/day (max=142)
140
120
100
80
60
40
Number of suitable training days/block
28
24
20
16
12
8
4


AHI B07 BT
Initial fitting
Shifted fitting
Burned area detection
VIIRS detection
Detection window start
Initial fitting detections
Shifted fitting detections
Temperature (K)
340
330
320
310
300
290
280
21:00
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
03:00
06:00
Time in UTC (starting 2016-217)