**Near-Real-Time Detection and Monitoring of Intense Pyroconvection from Geostationary Satellites**

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**Abstract**

Intense fire-triggered thunderstorms, known as pyrocumulonimbus (or pyroCb), can alter fire behavior, influence smoke plume trajectories, and hinder fire suppression efforts. PyroCb are also known for injecting a significant quantity of aerosol mass into the upper-troposphere and lower-stratosphere (UTLS). Near-real-time (NRT) detection and monitoring of pyroCb is highly desirable for a variety of forecasting and research applications. The Naval Research Laboratory (NRL) recently developed the first automated NRT pyroCb detection algorithm for geostationary satellite sensors. The algorithm uses multispectral infrared observations to isolate deep convective clouds with the distinct microphysical signal of pyroCb. Application of this algorithm to 88 intense wildfires observed during the 2013 fire season in western North America resulted in detection of individual intense events, pyroCb embedded within traditional convection, and multiple, short-lived pulses of activity. Comparisons with a community inventory indicate that this algorithm captures the majority of pyroCb. The primary limitation of the current system is that pyroCb anvils can be small relative to satellite pixel size, especially in in regions with large viewing angles. The algorithm is also sensitive to some false positives from traditional convection that either ingests smoke or exhibits extreme updraft velocities. This algorithm has been automated using the GeoIPS processing system developed at NRL, which produces a variety of imagery products and statistical output for rapid analysis of potential pyroCb events. NRT application of this algorithm has been extended to the majority of regions worldwide known to have a high frequency of pyroCb occurrence. This involves a constellation comprised of GOES-East, GOES-West, and Himawari-8. Imagery is posted immediately to an NRL-maintained web page. Alerts are generated by the system and disseminated via email. This detection system also has potential to serve as a data source for other NRT environmental monitoring systems. While the current geostationary constellation has several important limitations, the next-generation of geostationary sensors will offer significant advantages for achieving the goal of global NRT pyroCb detection.