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FIRE DETECTION AND FIRE GROWTH MONITORING FROM SATELLITE MONITORS

Abstract

To date, the detection and tracking of active fires from space based assets has not been an integral part of the design of any in-orbit mission. Fire detection from space has made use of measurements taken for other objectives. For instance, fire detection is feasible through the MODIS instruments on Aqua and Terra mission, the coarse pixel resolution restricts the use of the instrument in early warning systems. For this a higher resolution system is required.

These fire data products are of interest, but the full benefit of fire monitoring from space is yet to be realised other than the BIRD demonstration programme. Remote sensing can contribute to all phases of fire management, from detection, to growth monitoring, up to post-fire damage assessment.

The spectral windows wherein fire detection would be effective are the MIR window (3 – 5 m) and the TIR window (8 – 12 m). The MIR window is generally where the peak emission of fires will lie so will be applicable for absolute thresholding for fire detection. A common thresholding algorithm also takes into account the difference between MIR and TIR brightness temperatures. The TIR window data also feeds into discrimination of false signals caused by clouds.

As current sensors were not designed for fire detection, the temporal and spatial resolution requirements that would allow sufficient information for appropriate decision making and fire extinguishing/control have not been addressed. In temporal terms, the observation frequency requirement is important as this determines the data utility for real time detection. This clearly drives the observation (and data dissemination) repeat time. In spatial terms, the size of the radiometric footprint of a fire drives the choice of detector pixel size.

SSTL and King's College, London will establish the requirements for a small satellite mission, and subsequently concept a design in order to address the limits of fire detection and monitoring from space borne instruments.