

EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Applications and Economic Benefits (5)

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INTEGRATED SPACE APPLICATIONS IN THE EARLY DETECTION AND MANAGEMENT OF  
BUSHFIRES

**Abstract**

The severity and threat of bushfires in Americas, Australasia, and Europe has increased in pace with global warming. The development of technology to assist fire-fighters and help emergency control centres detect and deploy assets has not kept pace with human need. The most recent developments in fire detection are remote sensing technologies which focus on infrared. These complex systems use quite sophisticated software to recognise both flames and smoke, and yield limited of information.

One of the newest accessible platforms to prove itself as potentially viable is space, however to date the cost of designing and launching specific hardware has always been high. To date there are currently less than half a dozen satellites which have the necessary sensors capacity to be classified for fire detection and management role. Development of a cheap, compact, and power efficient sensor is an imperative for a cost effective constellation. This in turn allows a viable solution to designing specific satellites to carry out the same task. Traditionally satellites have employed IR/visual means, similar but more advanced than those used in ground based systems, for monitoring fires. When looking at a range of technologies available one technology which stands out from the rest is radar.

Radar is also commonly utilised instruments in satellites however their intent has always been to measure a magnitude of different spectral bands or for imaging purposes. These forms of radar can detect the scarring which fire leaves behind however there spectral resolution is far lower than that which would be required for an active fire detection and management system. Looking at less complex forms of radar it is clear that similar technology utilised in standard weather surveillance radar may hold the key to unlocking a viable solution. With some adjustments and additional hardware it provides a unique alternative to expensive multi-spectral radiometers.

The potential benefits radar can bring to not only fire detection but also fire management are vast, and have to recently been viable thanks to advancement in mobile and computer technology. Currently employed systems can be classified as 2D systems only working in a plan form view. In this modern day 3D environments have become a norm for most computer users. The use of 3D environment significantly advances the way fires are tracked. Radar is the only system which can provide sufficient data to yield 3D mapping.