

Stream G – Invited keynote

Modelling the intensity of Victorian bushfire as observed by Himawari-9

Bart Pindor

*Country Fire Authority, Victoria, Australia
Email: pindor@cfa.vic.gov.au*

Abstract: Bushfires are a perennial natural hazard whose impact on people, communities, and ecosystems is likely to intensify in a changing climate. The ability to predict bushfire behaviour is crucial in planning operational response and in providing public warnings. This ability hinges upon Fire Behaviour Models (FBM) which combine information on fire fuels and weather conditions to predict key attributes of a given fire such as the Rate of Spread and Fireline Intensity. However, FBMs are typically derived from controlled, lower-intensity fires occurring under moderate conditions. Gathering accurate measurements of the most intense bushfires can be challenging in conditions where the safety of community members and firefighters must take precedence.

The geostationary Himawari-9 satellite provides continuous monitoring of all of Australia across numerous bands including the mid-infrared 3.9 micron band most sensitive to the thermal emissions of bushfires. The 10 minute imaging cadence of Himawari provides a unique dataset for validating FBMs against the behaviour of the most intense fires. However, the translation from the model outputs of common FBMs to the observed space-based temperature measurements is challenging.

We report on a project to survey recent intense Victorian bushfires and to derive constraints on the fire behaviour from the Himawari IR imaging. We use aircraft linescans as a basis for a simple geometric model of the fire perimeter and then in turn to compare the predicted Fire Radiative Power of such a model to the observed Himawari brightness temperatures. We demonstrate that the common assumption of a constant rate of spread is inconsistent with the observed IR lightcurves. We also demonstrate the possibility of using this approach to constrain FBMs in different fuels and weather conditions. Our results indicate that, despite their limitations, space-based IR data can provide insights in the development of bushfires and can inform better understanding of fire behaviour and better emergency response.

Keywords: *Bushfire: Natural hazard: Remote sensing*