ACCESS-Fire: Coupled Fire-Atmosphere Modelling

Harvey Ye, Mika Peace and Jeff Kepert, Bureau of Meteorology

The coupled fire-atmosphere model ACCESS-Fire has proven to be a valuable tool in the study of extreme fire behaviour when dynamic interactions between the fire and its surrounding atmosphere occur. The model has been successfully used in eight case studies to provide insights into some key processes that contribute to extreme fire behaviour. These include pyroCb development, entrainment from low level jets, sea breeze convergence, fire generated vortices, fire coalescence, and plume updraft structure.

This presentation highlights some significant progress that has been made in the development of ACCESS-Fire to take its capability and functionality to the next level. One of the most notable enhancements is the implementation of the Australian Fire Danger Rating System (AFDRS). AFDRS' very detailed and very high-resolution information about the fuel type and fuel state, together with fire behaviour models (FBMs), has resulted in more accurate and realistic fire simulations. Another major effort has been to upgrade ACCESS-Fire to run with a recent version of the atmospheric model (UM13.0) and rewriting the fire code to make it suitable for inclusion in the Joint UK Land Environment Simulator (JULES) trunk. This will make ACCESS-Fire available to anyone who can run the Unified Model (UM). These upgrades also make ACCESS-Fire consistent with the Bureau's next generation of operational models.

The upgraded ACCESS-Fire is being used in two new case studies in a Natural Hazard Research Australia (NHRA) project. The project will develop a streamlined high-resolution model case study framework, so that effective and timely learnings can be identified and shared after a high impact weather event.

Future fire regimes in Australia and internationally are expected to include more frequent extreme fire events over an expanded range to that of historical fire adapted landscapes. Accurate and timely fire predictions will be increasingly needed. ACCESS-Fire will be continuously developed and updated to meet this community expectation.