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Amicus–A new tool for improved fire spread prediction

Amicus is a new software package designed to help make the prediction of fire behaviour more reliable. It combines existing state-of-the-art fire models for major fuel types found in Australia with an intuitive interface that enables quick predictions to be made with estimates of output reliability and graphical visualisations. A beta version for testing is available for download.

A bushfire behaviour knowledge base

Fast and accurate fire spread predictions are essential for implementing safe prescribed fires, planning effective suppression strategies and issuing timely and specific public warnings during wildfires. Those who undertake fire behaviour predictions generally use a broad range of information sources in order to complete their task—these might include formally published fire science, formal and informal observations (e.g. video, photos, situation reports, anecdotes, etc.), local knowledge, personal experience and expert judgement.

Amicus is a fire behaviour knowledge base system that will provide a platform to combine the various sources of fire knowledge into a tool that will facilitate more effective fire behaviour forecasting and analysis (Sullivan et al. 2013).

The current version of Amicus implements contemporary operational fire behaviour models recommended in recent reviews (Cruz *et al.* 2015a and 2015b) for use in Australia. The software has been fully tested and validated.

Amicus has a user-friendly interface that enables fuel, weather and location information to be easily entered. Model outputs can be easily visualised and exported for the preparation of fire spread and behaviour prediction reports (Fig. 1).

Download the software

Visit the Amicus web page to download the current version for testing:
http://research.csiro.au/amicus/download/

Follow the links to download the installation package for your operating system.

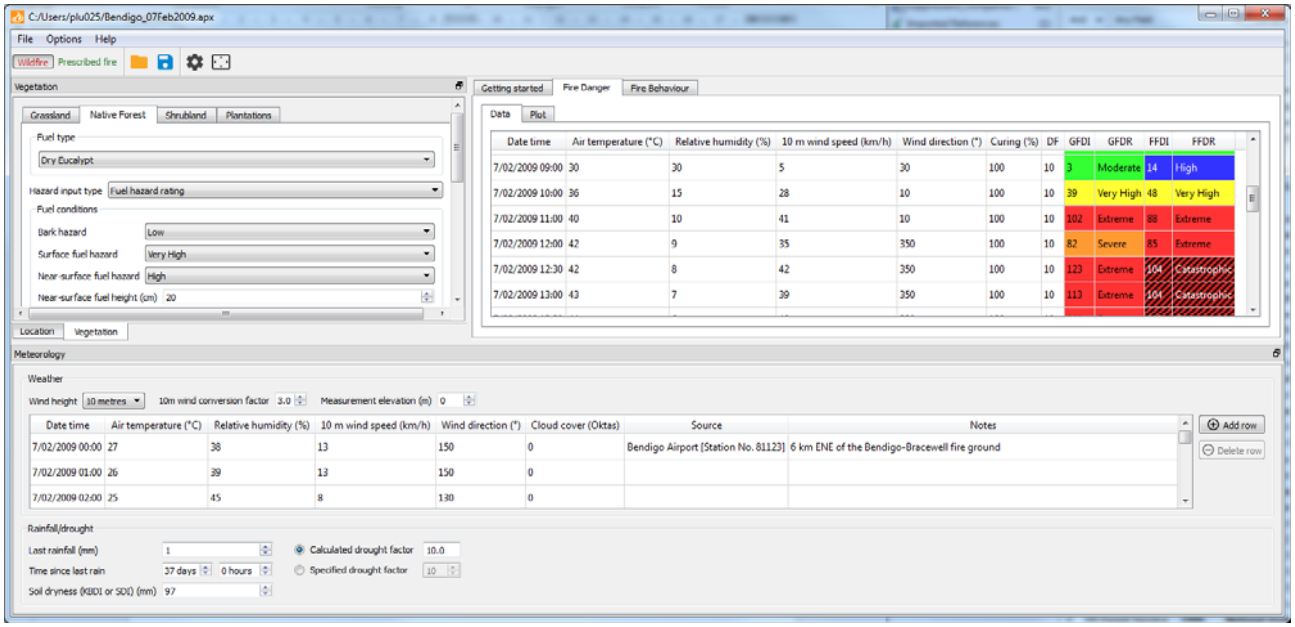

Figure 1. Screen shot of Amicus' default layout showing example fire danger rating predictions.

Features

Amicus calculates fire danger and key fire behaviour characteristics (e.g. rate of spread, flame height, fireline intensity, maximum spotting distance) for major Australian vegetation types (grasslands, forests, shrublands and plantations, including pine) in wildfire and prescribed fire situations.

Users can enter location-specific topographic data and forecast or historical weather streams. Fuel information specific to the selected fuel type can be entered and a quick preview of fire behaviour predictions assessed. Fuel scenarios can be created to carry out fire behaviour predictions from a weather stream. These predictions are presented in graphical (Fig. 2) and tabular form.

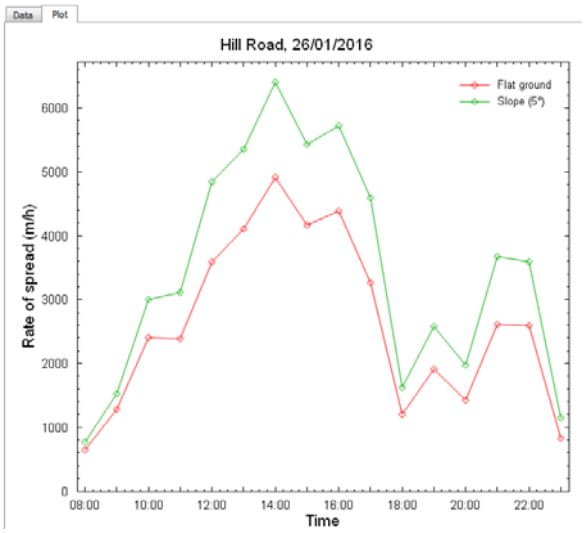

Figure 2. Screen shot of the fire behaviour graph showing diurnal variation in rate of spread for flat and sloped ground.

Importantly, highlighted cells in the output table alerts users when models are being used outside of their intended domains and their reliability may be reduced (Fig 3). Rate of spread predictions can be given in units that can be readily transcribed onto a map.

Provide feedback

We are seeking feedback on the operation and use of Amicus. To send feedback or register to be notified of updates, send an email to: amicus@csiro.au

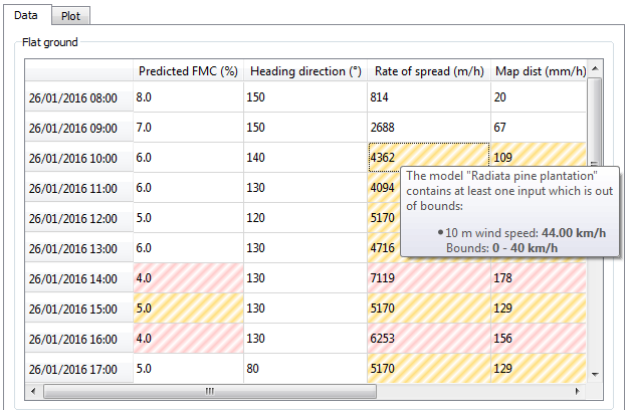

Figure 3. Screen shot of the fire behaviour output table showing colour coded warnings.

Future development

Amicus is subject to continuing testing and development in response to user feedback. As new features are added, updated beta versions will be released for further testing.

Additional features in development include:

- Ensemble model runs to assess the impact of input uncertainty
- Visualised output analysis that allows users to understand temporal trends and compare the effects of different drivers of fire spread
- Direct downloading of Bureau of Meteorology weather forecasts for specific site coordinates
- Estimates of flank rate of spread

Future versions of Amicus will enable users to upload details of their predictions and observations of fire behaviour to better inform future predictions.

References

Cruz MG, Gould JS, Alexander ME, Sullivan AL, McCaw WL, Matthews S (2015a) *A Guide to Rate of Fire Spread Models for Australian Vegetation*. AFAC Publishing, Melbourne. 125 pp.

Cruz MG, Gould JS, Alexander ME, Sullivan AL, McCaw WL, Matthews S (2015b) Empirical-based models for predicting head-fire rate of spread in Australian fuel types. *Australian Forestry* 78, 118-158.

Sullivan AL, Gould JS, Cruz MG, Rucinski C, Prakash M (2013) Amicus: A national fire behaviour knowledge base for enhanced information management and better decision making. In: Piantadosi J, Anderssen RS & Boland J (Eds.), MODSIM2013, 20th International Congress on Modelling and Simulation, pp. 2068-2074.

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