

Fire Research Report

Operational 10-day Forecasts of Fire Weather Indices

MetService

April 2007

The aim of this research was to operationally implement a 10-day forecast of fire weather indices. The forecasts were to be delivered by the MetConnect web application already in use by the fire managers. During the trial period (140 days) the forecasts were produced in a timely fashion and there were no missed forecasts. Based on this the software and systems for producing and delivering the forecasts have proved to be robust.

Operational 10-day Forecasts of Fire Weather Indices

**The provision of 10-day forecasts of Fire Weather Indices to
fire managers in an easily accessible and timely manner**

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Background

This project aimed to provide useful 10-day forecasts of fire weather indices to fire managers in an easily accessible and timely manner. MetService proposed to operationally implement the prototype 10-day forecasts of fire weather, developed under an earlier grant from the Contestable Research Fund. The forecasts were intended to provide fire and forest managers with advanced notice of potentially dangerous environmental conditions, and give additional information to help allocate fire fighting plant and management resources.

We expected the skill shown by the prototype project to be improved slightly due to a number of factors. Specifically the way wind information was used in the forecasting system, improvements in the weather prediction models run at NCEP, and with the passage of time there will be a larger dataset to train the system.

The forecasts were to be delivered by the MetConnect web application already in use by the fire managers.

Methodology

Work began on the project on 25 July 2006. The project was based on the prototype system, using multiple instances of the US National Centres for Environmental Prediction (NCEP) global ensemble numerical weather model.

The proposed change of not using the root of the wind speeds was incorporated into the code, and the PCA analysis for observation data was re-done. This resulted in a greater spread of values in the forecast winds.

A FWI forecast production system has been set up that meets MetService operational standards.

The system ingests NRFA observation files received daily at MetService, with missing data (up to a specified percentage of missing stations) re-created by iterating over the PCA process three times. Fire weather indices are calculated from these and the results archived for later use in the FWI system and future verification.

The system ingests data from the latest version of NCEP ensemble system, as proposed, making use of the existing operational feed of this dataset. An automated failover to the previous run in the event of missing input data has been implemented.

The system creates FWI forecasts from each ensemble member using the relationships previously calculated in the PCA and CCA analyses, along with a bias correction based on whatever data is available over the previous 14 days. Indices requiring a value from the previous day read this in from the observation archive files, use the forecast from the previous day, or use a default value. The individual forecasts are aggregated using one of a variety of methods (e.g. mean, median, percentile) to produce the final forecast.

The final FWI forecast data was then converted into text data for the 137 sites used in the prototype and put into newly produced tables based on the design of the tables already in use by the Fire Service in the MetConnect Web application.

Image files were also produced and displayed in charts which were also places on MetConnect. These charts can be animated in the same way the current 3 day charts can.

This was completed by 4 December 2006 and was ready for the trial period to ensure the software system for producing and delivering the forecasts was robust.

Trial Results

The trial commenced on 12 December 2006, and has been running for the 140 days since then. The NCEP ensemble system runs twice daily and produces a new set of 10-day FWI forecasts with each run. These forecasts are then made into tables and charts valid at midday for days 4 to 10, which are put on the MetConnect web application for easy use by fire and forest managers.

During the trial period the forecasts have been produced with each of the 280 model runs and displayed on MetConnect in a timely fashion. There were no missed forecasts.

Based on this the software and systems for producing and delivering the forecasts have proved to be robust.

Feedback on the extended FWI forecasts was asked for from users of MetConnect Fire via Mike Judd, and 1 response was received. The email response is included below:

Hi Robert,

Some feedback for you r.e the 10 day Fire Weather forecasts.

Cheers

Mike Judd
Team Leader Spatial Data
National Headquarters
New Zealand Fire Service

ph: 04 496 3659 fax: 04 496 3731

-----Original Message-----

From: Baker, Paul

Sent: Tuesday, 16 January 2007 11:52 a.m.

To: bboardman@doc.govt.nz; Judd, Mike
Subject: RE: 10 day forecasts

Thanks for your efforts Bob.

Good work.

Paul.

From: bboardman@doc.govt.nz [mailto:bboardman@doc.govt.nz]
Sent: Wed 10/01/2007 12:50 p.m.
To: Judd, Mike
Cc: Baker, Paul
Subject: 10 day forecasts

Hi Mike

Paul Baker asked people to give feedback on the usefulness of 10 day forecasts. I am not sure about long term accuracy but generally I have found the facility extremely useful to be able to get an insight of weather 10 days ahead. Also I think the 3 day rain map where you can move over a range of times and watch the progress is brilliant.

Cheers

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*Protect, enjoy, be involved: **Tiakina, hākinakinatia, whakauru***