Natural Resources Canada

Ressources naturelles Canada

Fire Weather Forecasting Products at Natural Resources Canada

Weather forecasting plays a critical role in fire management operations, but forecasting the weather over a range spanning from few hours to a few months is challenging and complex. Predicting how quickly a wildland fire grows in the next few hours or days requires the ability to forecast the weather accurately for a specific location in a timely fashion. In order to do this, meteorologists must have immediate access to recent weather observations and the latest technology.
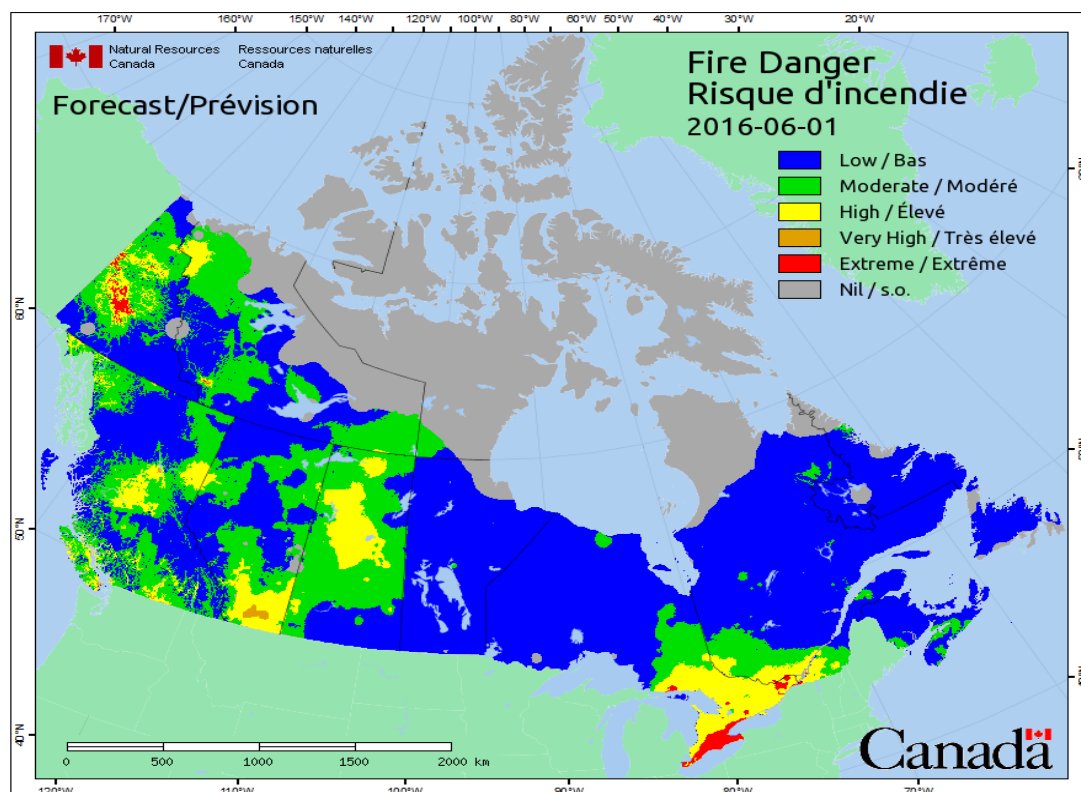

Figure 1: CWFIS Fire Weather Map (Natural Resources Canada)

It is also valuable to predict what weather conditions might be like a few days to weeks ahead to better predict whether there might be enough rain to help stop a forest fire, or whether further hot and dry conditions may cause a fire to threaten communities and challenge fire-fighting efforts. That is why it is critical to build computer models that predict fire danger conditions across Canada over a wide range of time frames, in as accurate a manner as possible. Efficient and accurate predictions are needed in order to mitigate risks to affected communities as well as to give firefighting agencies a better tool for putting out fires as soon as possible.

Insights

Canadian
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The Canadian Wildland Fire Information System (CWFIS) is one such tool and is central to Natural Resources Canada's efforts to provide support to fire management agencies (Figure 1). The CWFIS is a fire information system that monitors fire activity and fire danger conditions across Canada. Daily weather observations from over 2500 weather stations are collected and used to produce fire-weather and fire-behavior maps based on the Canadian Forest Fire Danger Rating System (CFFDRS).

Through cooperation with Environment and Climate Change Canada's Canadian Meteorological Centre (CMC), the CWFIS is now providing short, medium and long-range forecasts for fire conditions across Canada, which are used as inputs into the CFFDRS to produce fire weather forecasts ranging from the next few hours to an entire fire season. The CWFIS uses CMC's SCRIBE weather products to predict fire weather conditions for the next 48 hours; the North American Ensemble Forecast System (NAEFS) is used to produce fire weather forecasts for the next 14 days; and CMC's Canadian Seasonal to Inter-annual Prediction System (CANSIPS) forecasts are used to produce monthly forecasts for the next fire season.

Each of these weather forecasts (SCRIBE, NAEFS, CANSIPS) uses different techniques to predict weather. Short-term forecasts (SCRIBE) are, by their nature, quite reliable, while longer forecasts must use mathematical techniques to produce accurate forecasts. Kerry Anderson, a fire research officer with the Canadian Forest Service (CFS), works with these models and describes it much like driving a car. "It is easy to predict it will take 5 minutes to drive to the corner store, but predicting how long it takes to drive from Edmonton to Calgary, and then to Toronto is less precise. You know you will get there but not exactly when." In the same way, weather models may forecast rain, but the travel times of weather systems and hence the timing of such events is less precise for longer-term forecasts.

By using a series of weather forecasting models, the CWFIS is now predicting fire danger conditions through this range of time frames. "This is an important piece of knowledge for fire managers", says Anderson, "Knowing that hot, dry weather may continue or if a fire-stopping rainfall is coming may determine whether a contract for a helicopter should be extended or if fire-fighters need to be brought in from afar." Anderson concludes that, "While we can't yet predict precisely when and where it will rain weeks in advance, we can now assess with some confidence what parts of Canada may experience a bad fire season, so that we can be better prepared to respond."

Researcher: Dr. Kerry Anderson (kerry.anderson@canada.ca)
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