Spark: what is it, and how does it use Bureau weather data – a real world application

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Spark Operational is a collaborative project between CSIRO and AFAC. Spark is an operational fire prediction tool that uses data that relates to fire behaviour, including fuels, topography, fire history and weather data to assist in the simulation of bushfire paths using scientifically tested fire behaviour models.

The weather Spark uses is spatially 6km gridded surface and 3D atmospheric weather to simulate bushfire paths, plumes and firebrands. A purpose build downloader has been created to download surface and atmospheric weather files from the BoM in a NetCDF format. The files are then used in plume and firebrand transport models to inform plume dynamics and potential firebrand paths and eventually spotfire prediction.

Spark has the ability to ensemble weather data and give probabilities of an area being impacted. This is an important aspect of Spark, as it assists with Emergency Warning messages and evacuation plans.

AWS observation weather can also be used for hindcasting a fire. This is useful for validating events during an incident and can also show local topographic influences on the weather. It is important to have the ability to downscale weather as Spark runs at a 30m resolution, and most weather grids are 1km and bigger.

There is also a manual option, with a CSV or XML file able to be uploaded. This file can be customised by a Spark user. All weather inputs that the fire behaviour models use can be manually adjusted. This can be helpful if forecast weather does not match with local observed conditions.

A challenge is that weather files are stored and released in different formats. This requires creation of different engine and models to interpret these files. There are many different file types, including XML, CSV, and NetCDF and FTP. Spot weather and Incident weather forecasts are also in a format not easily ingested by Spark. A reduction in the amount of time spent converting weather files would result in a more streamlined and quicker simulation process.