

Spark - What is it, and how does it use Bureau weather data.

A real-world application

DATE

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PRESENTER

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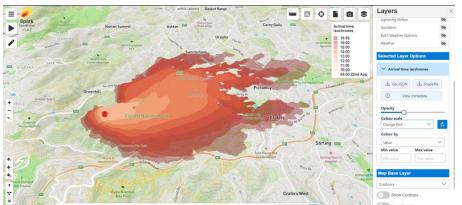












Output data

Lock Map View

- Collaborative project between CSIRO and AFAC
- Fire simulation tool
- Uses fuel load, fuel age, topography, road network, weather data
- Data sensitivities
- Adapted AFDRS fire behaviour models
- Sub models simulate plume and firebrand generation

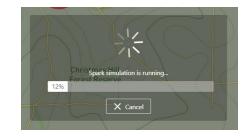


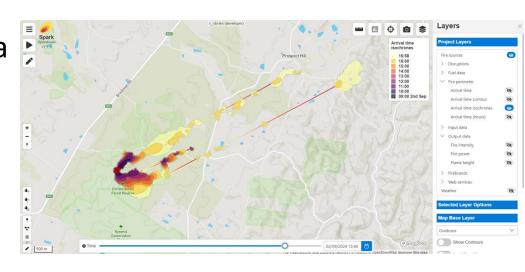




What is Spark

- Different to weather model (ACCESS Fire)
- Time to run
- Computer/server types
- Differences in spatial data resolutions (Spark can be 30m, ACCESS C 1.5 km, GFE 6km)
- Need high resolution for simulations





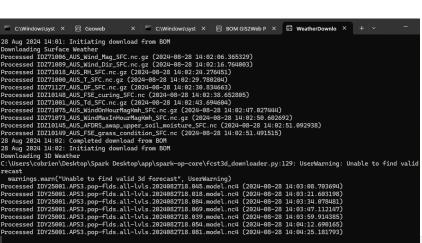




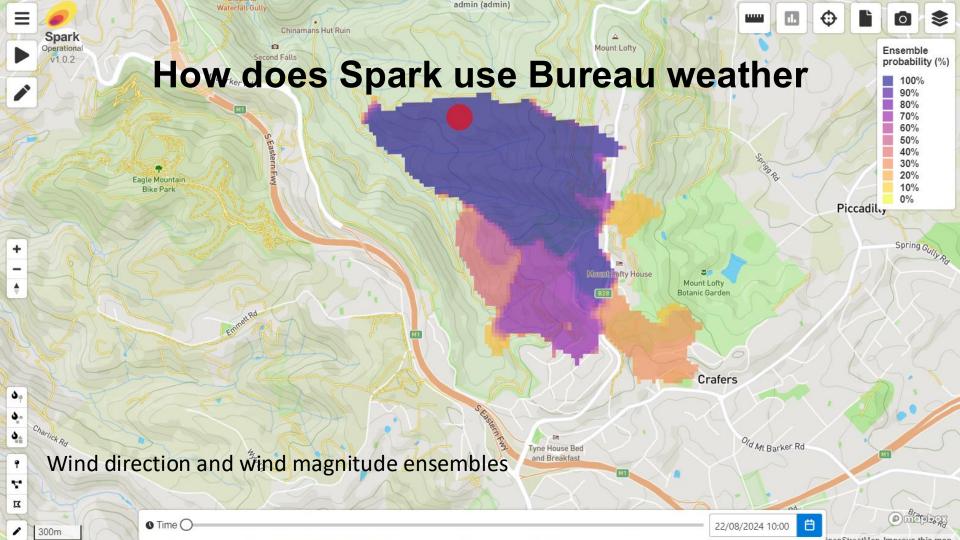


How does Spark use Bureau weather

- Gridded surface weather ADFD via FTP
- 3D weather parameters
- CSIRO developed 'weather downloader'



	BoM_I	BoM_Demo								Advanced			
	Basic	Source	s Layers	Initialisation	Advection	Rate of Sp	pread	Update	Processing	Sub Mod	els		
	Input L	ayers	Input Vectors	Gridded Lay	vers Outpu	t Layers Va	ariables						
	Gridded	Layers											
	Name			Source				Proje	ction	Ту	pe	Scale	Offset
BoM_Demo	Winds	OnHourMa	gKmh_SFC	./data/adfd/IDZ7	1075_AUS_Wind	iOnHourMagKm	nh_SFC.nc	EPS	5:4326	v	vind_magnitude	1.5	0
irebrands Plumes	orands Plumes Wind_Dir_SFC			/data/adfd/IDZ71089_AUS_Wind_Dir_SFC.nc				EPSG:4326		v	vind_direction	1	0
lame	T_SFC RH_SFC			_/data/adfd/lDZ71000_AUS_T_SFC.nc _/data/adfd/lDZ71018_AUS_RH_SFC.nc				EPSG:4326 EPSG:4326		t	emperature	2.5	0
z										n	elative_humidity	0.2	0
	grass	curing		_/data/adfd/IDZ1	0148_AUS_FSE_0	curing_SFC.nc		EPS	5:4326	c	uring	5	0
ode													
1 // Vertical position (eq. 3.9) 2 REAL du = Nu/N; 3 REAL du = Nu/N; 4 REAL Usc = Nu/N; 5 return du/Usc; 7	DF_SF ⊙ Add		o Gridded Layer	./data/adfd/IDZ7	71127_AUS_DF_S	FC.nc		EPS	G:4326	d	rought_factor	2	0
1 // Vertical position (eq. 3.9) 2 REAL du = Nu/M; 3 REAL du = Nu/M; 4 REAL Usc = Nypot(Us+du, dw); 5 c return du/Usc; 7 6			o Gridded Layer		1127_AUS_DF_S	FC.nc		EPSO	G:4326	d	rought_factor	2	0
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1 // Vertical position (eq. 3.9) 2 REAL du = Nu/N; 3 REAL du = Nu/N; 4 REAL du = Nu/N; 5 return du/Usc; 7 7 0 Add element to Plume models			o Gridded Layer		71127_AUS_DF_S	FC.nc		EPS	5:4326	d	rought_factor	2	o
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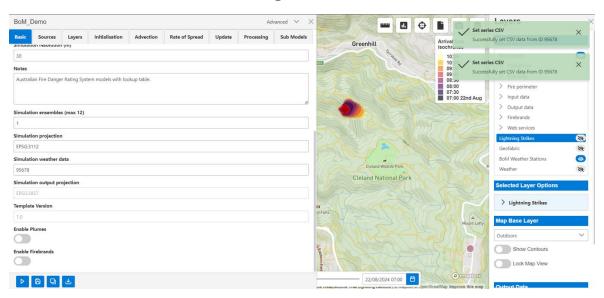




AWS observations

Spark can use AWS point observations to do hindcasting simulations

- if runs beyond observations, will fill with gridded forecast









Weather manipulation

BoM_Demo									
Basic Sources Layer	Initialisation Advection Rate of Spread	Update Processing S	Sub Models						
Input Layers Input Vecto	rs Gridded Layers Output Layers Variables								
Gridded Layers									
Name	Source	Projection	Туре	Scale	Offset				
WindOnHourMagKmh_SFC	OnHourMagKmh_SFC ./data/adfd/IDZ71075_AUS_WindOnHourMagKmh_SFC.nc		wind_magnitude	1.5	0				
Wind_Dir_SFC	./data/adfd/IDZ71089_AUS_Wind_Dir_SFC.nc	EPSG:4326	wind_direction	1	0				
T_SFC	./data/adfd/IDZ71000_AUS_T_SFC.nc	EPSG:4326	temperature	2.5	0				
RH_SFC	FC		relative_humidity	0.2	0				
grass_curing	./data/adfd/IDZ10148_AUS_FSE_curing_SFC.nc		curing	5	0				
DF_SFC	./data/adfd/IDZ71127_AUS_DF_SFC.nc		drought_factor	2	0				
Add element to Gridded Lav	ers								

If forecast weather isn't matching on ground observations or AWS observations, weather inputs can be manipulated.

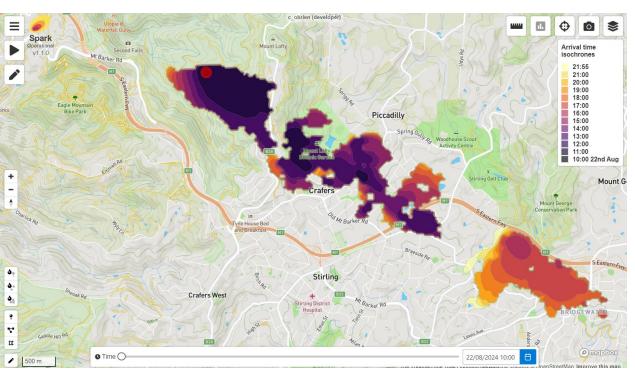
Scale and offset Editing of csv and xml files







Current challenges



- Ease of access of Bureau weather – CSIRO built downloader
- NetCDF format
- Historical and realtime datasets different
- ADFD grids are overwritten 5 times a day
- Gridded weather 6km grid –
 lack of local effects
- IWF ingestion currently only receive as a PDF – electronic aren't distributed

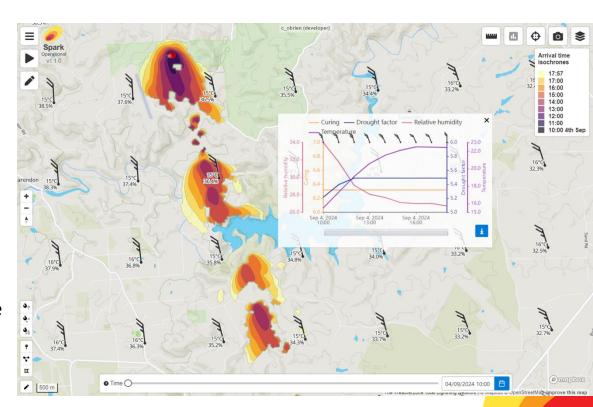






Future Opportunities

- World leading in fire simulation
- Test with winds at 300 or 100m resolution using high resolution ACCESS
- Test with ACCESS Fire with spotting combine ACCESS Fire with Spark spotting simulation model
- Jeff Kepert's parametric Ember Transport scheme
- Compare with satellite data for real time verification
- Potential for forecast demo collaboration project
- Real time collaboration using satellite data, mobile radar data which enables real time verification of fire perimeters





Thank you

