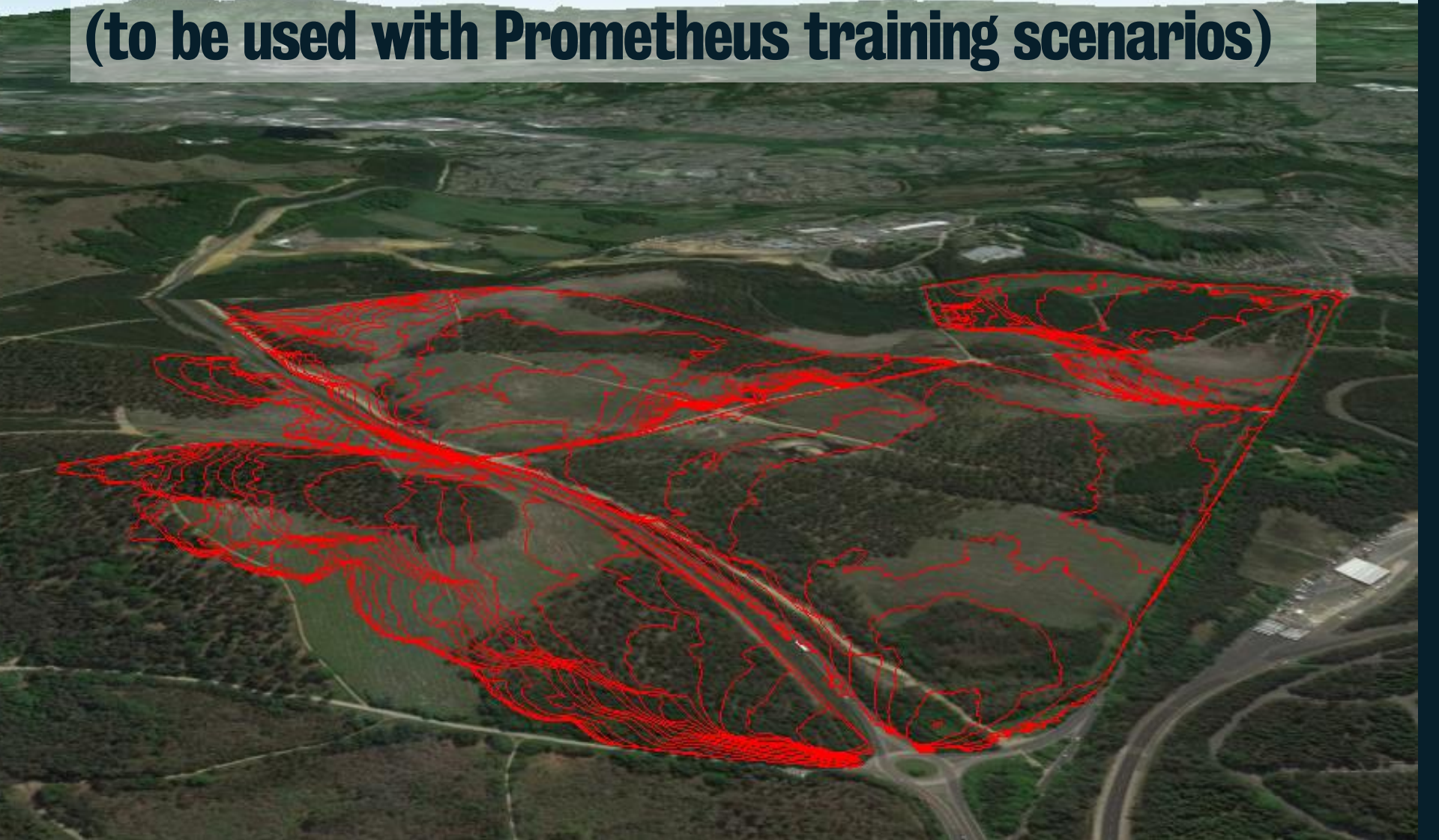


WILDFIRE PREDICTION SYSTEM (WPS) SIMULATIONS (to be used with Prometheus training scenarios)



SIMPLE MODEL 1: NO WIND OR SLOPE

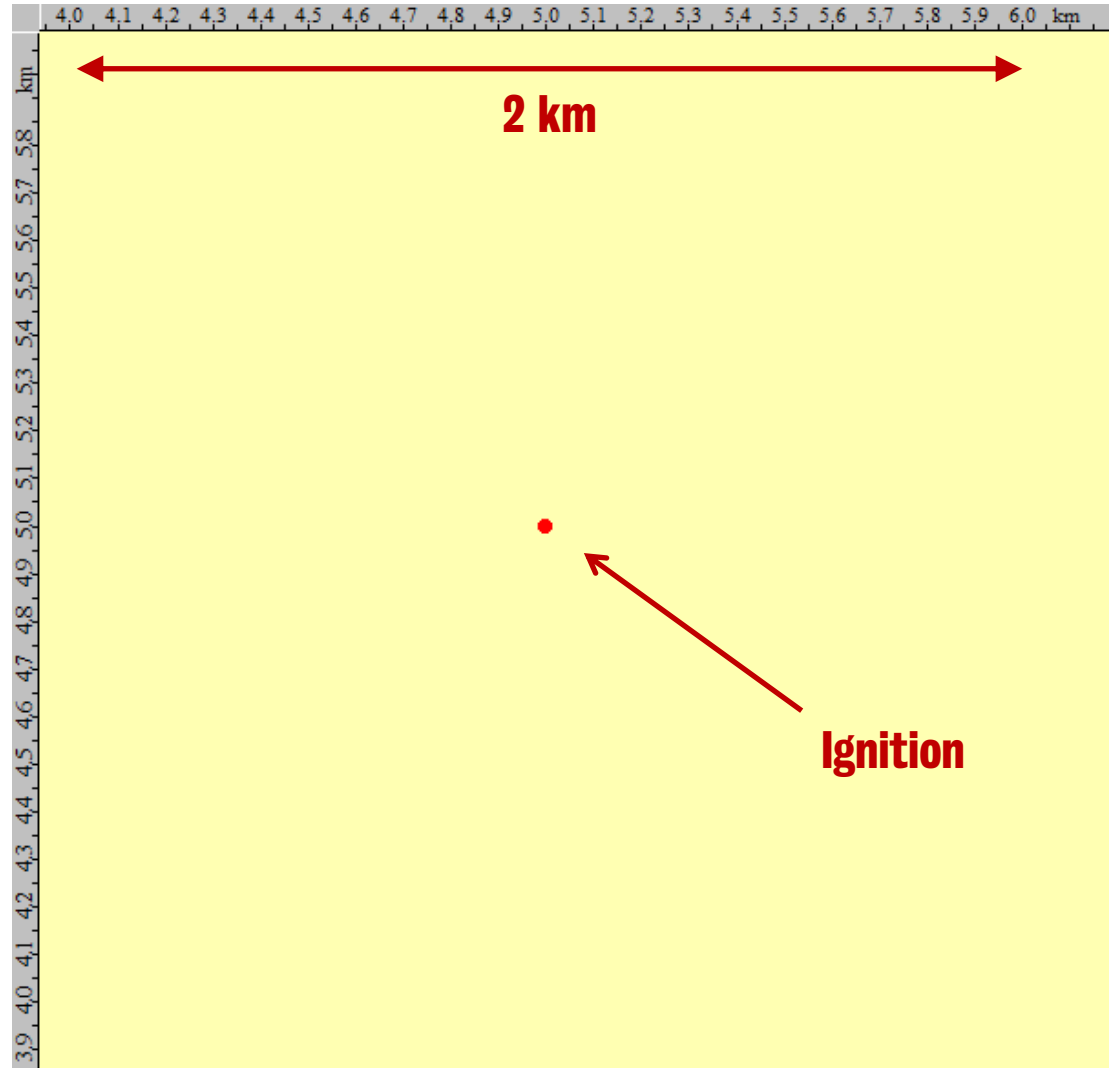
Open Simulation

1 – NoWindNoSlope.fgm

- No wind [0 m/s]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

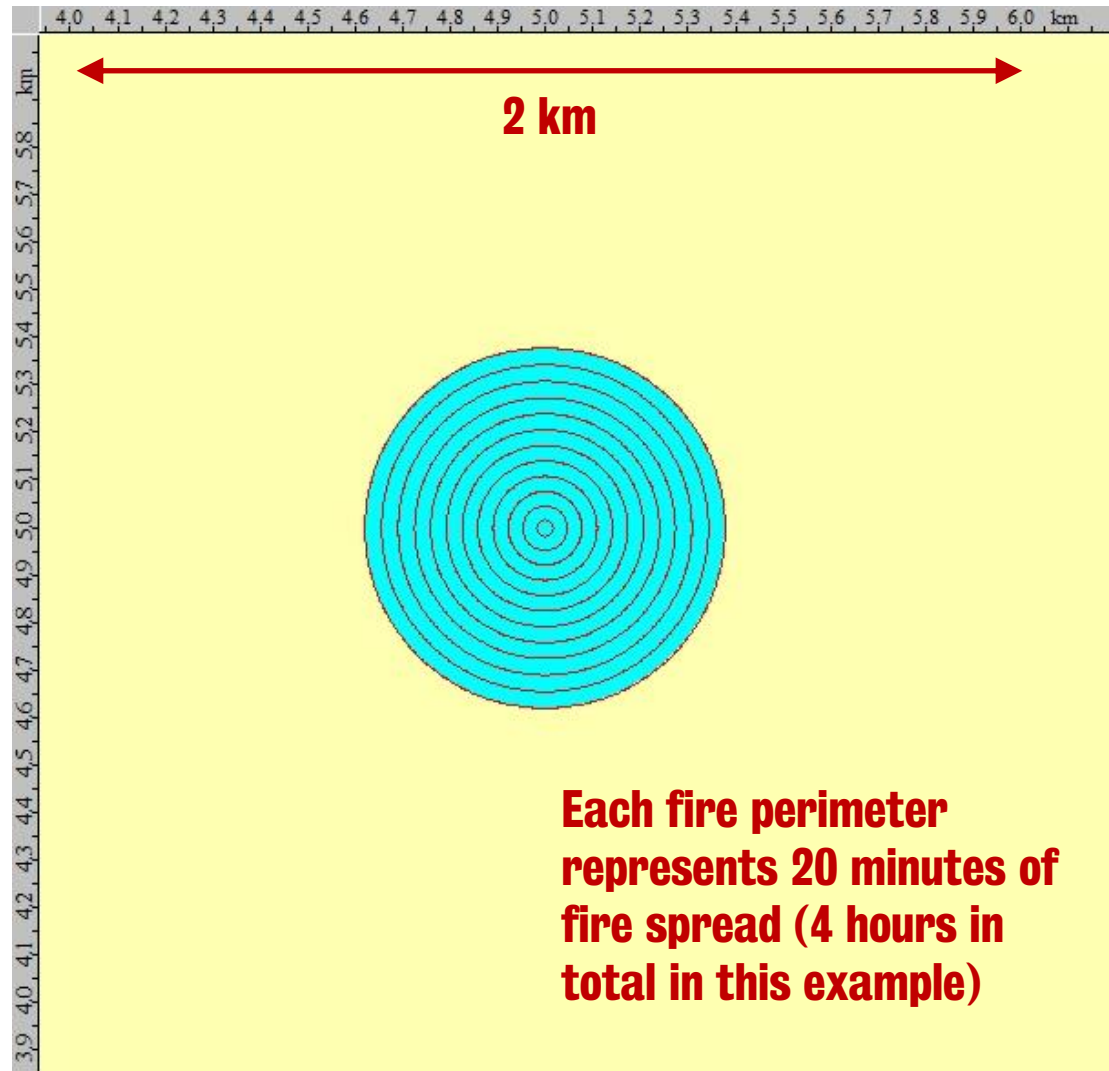


SIMPLE MODEL 1: NO WIND OR SLOPE

- No wind [0 m/s]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Fire behaviour:

- Uniform spread in all directions (400 m in 4 hours)
- Low intensity (no alignment)



SIMPLE MODEL 2: WIND

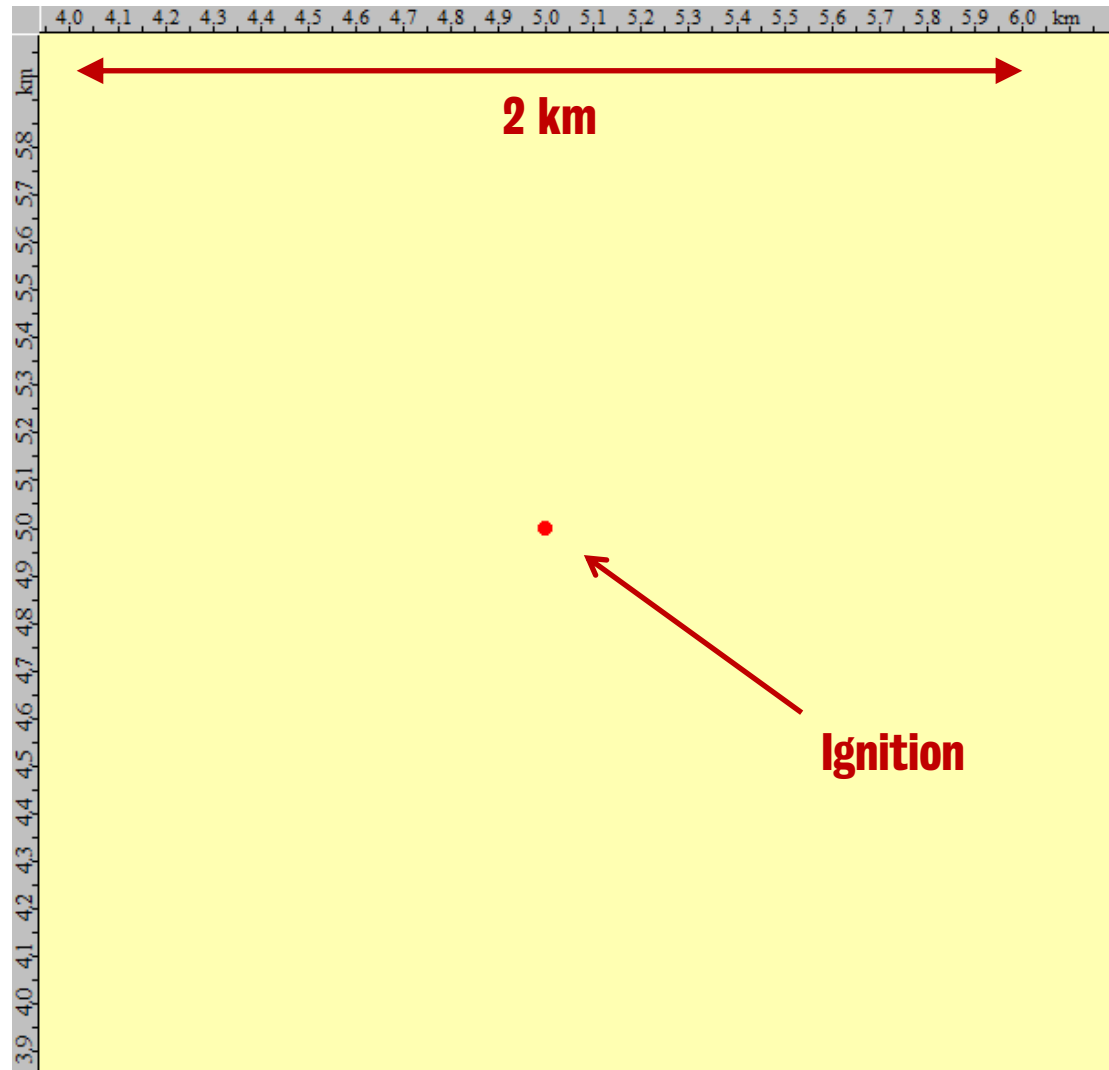
Open Simulation

2 – WindNoSlope.fgm

- 10 km/hr wind [2.8 m/s]
- Southerly wind [180°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

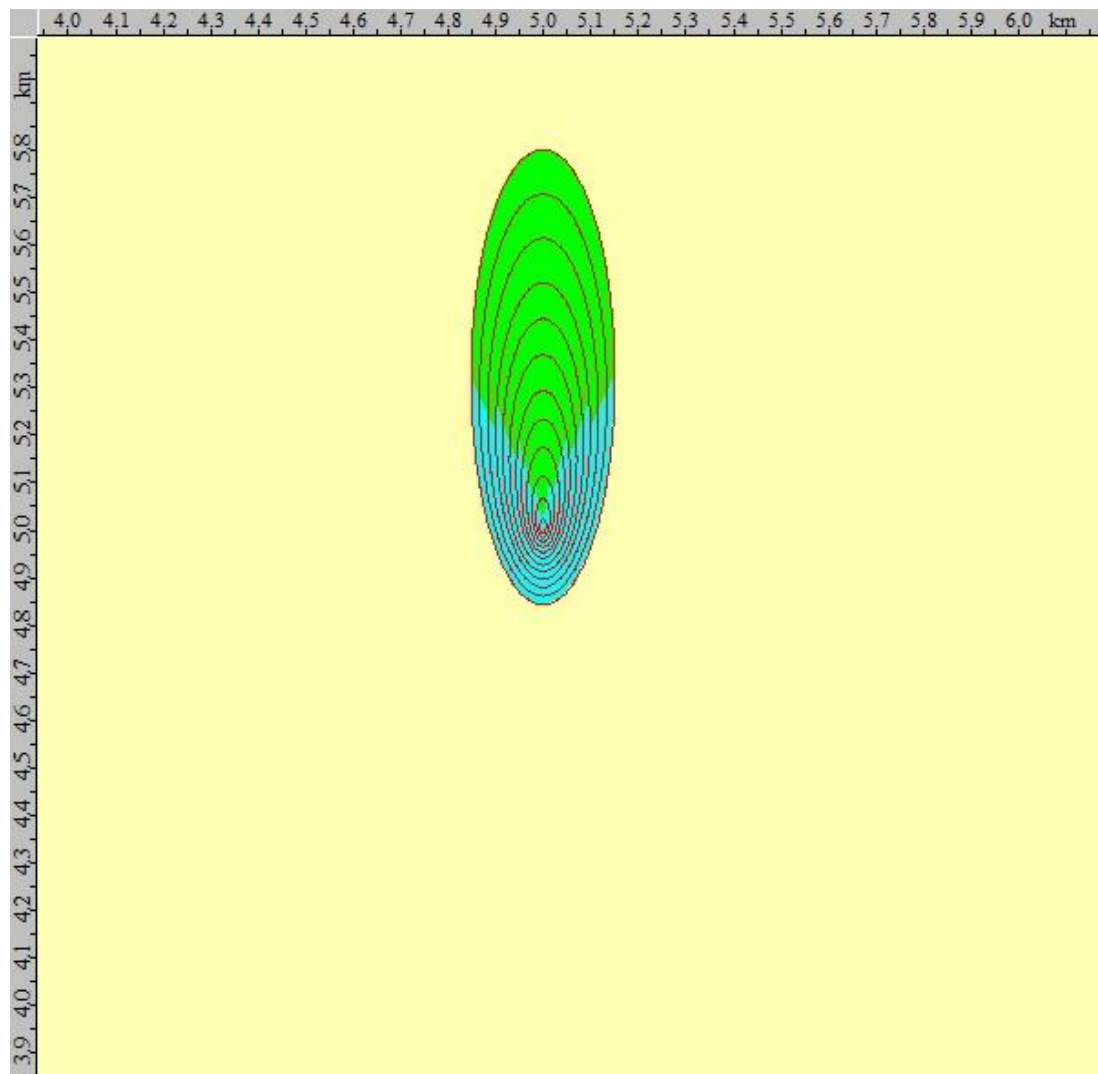


SIMPLE MODEL 2: WIND

- 10 km/hr wind [2.8 m/s]
- Southerly wind [180°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Fire behaviour:

- Spreading faster to the north (800 m in 4 hours)
- Low intensity in backing and flank fires (no alignment)
- Medium intensity in the head fire (alignments = 1)



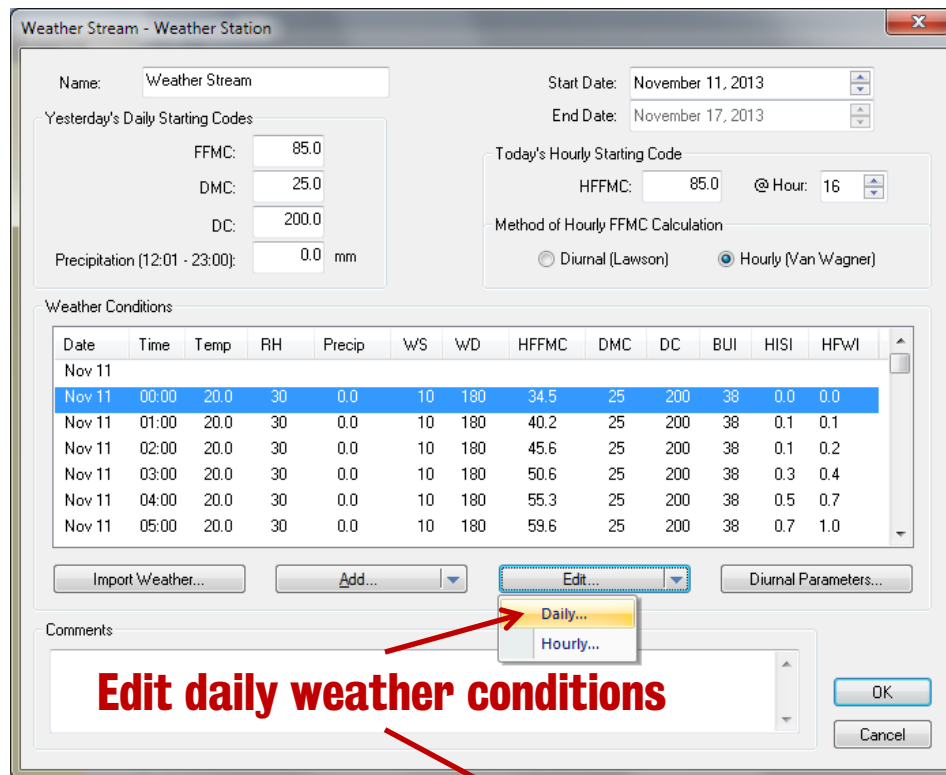
SIMPLE MODEL 2: WIND

Change the weather stream so that the wind speed is now 20 km/hr.

- 20 km/hr wind [5.6 m/s]
- Southerly wind [180°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?



Weather Stream - Weather Station

Name: Weather Stream

Start Date: November 11, 2013

End Date: November 17, 2013

Yesterday's Daily Starting Codes

FFMC: 85.0

DMC: 25.0

DC: 200.0

Precipitation (12:01 - 23:00): 0.0 mm

Today's Hourly Starting Code

HFFMC: 85.0 @ Hour: 16

Method of Hourly FFMC Calculation

Diurnal (Lawson) Hourly (Van Wagner)

Weather Conditions

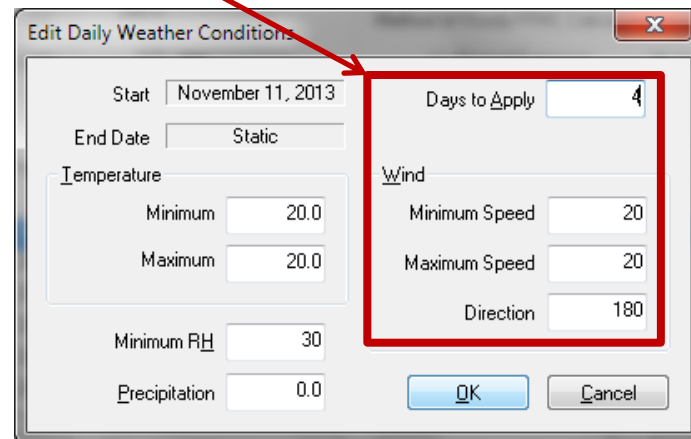
Date	Time	Temp	RH	Precip	WS	WD	HFFMC	DMC	DC	BUI	HISI	HPWI
Nov 11	00:00	20.0	30	0.0	10	180	34.5	25	200	38	0.0	0.0
Nov 11	01:00	20.0	30	0.0	10	180	40.2	25	200	38	0.1	0.1
Nov 11	02:00	20.0	30	0.0	10	180	45.6	25	200	38	0.1	0.2
Nov 11	03:00	20.0	30	0.0	10	180	50.6	25	200	38	0.3	0.4
Nov 11	04:00	20.0	30	0.0	10	180	55.3	25	200	38	0.5	0.7
Nov 11	05:00	20.0	30	0.0	10	180	59.6	25	200	38	0.7	1.0

Import Weather... Add... Edit... Diurnal Parameters...

Comments

Edit daily weather conditions

OK Cancel



Edit Daily Weather Conditions

Start: November 11, 2013

End Date: Static

Temperature

Minimum: 20.0

Maximum: 20.0

Minimum RH: 30

Precipitation: 0.0

Days to Apply: 4

Wind

Minimum Speed: 20

Maximum Speed: 20

Direction: 180

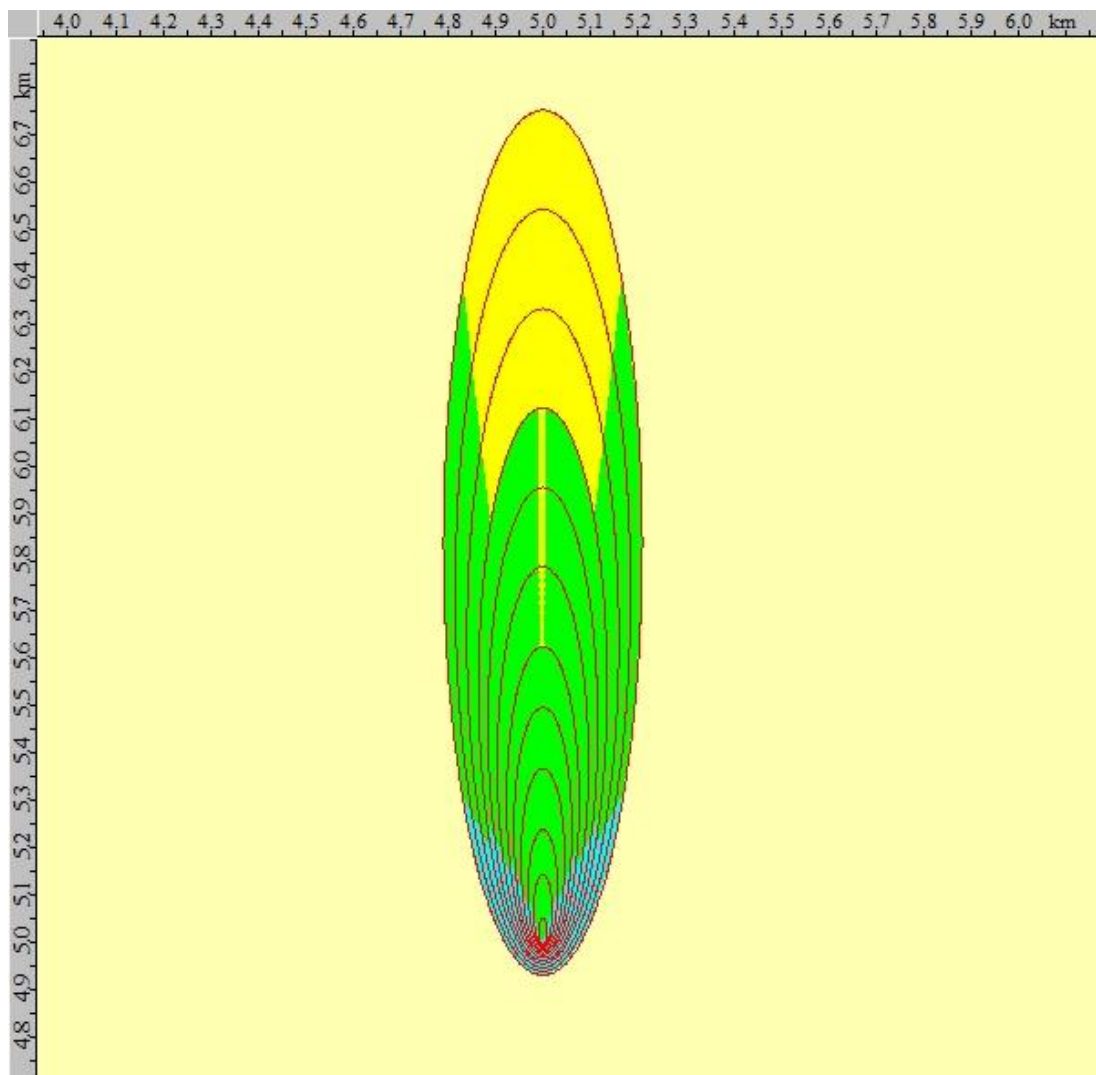
OK Cancel

SIMPLE MODEL 2: WIND

- 20 km/hr wind [5.6 m/s]
- Southerly wind [180°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Fire behaviour:

- Spreading even faster to the north (1.8 km in 4 hours)
- Low intensity in backing and flank fires (no alignment)
- Medium-to-high intensity in the head fire (alignments = 1)



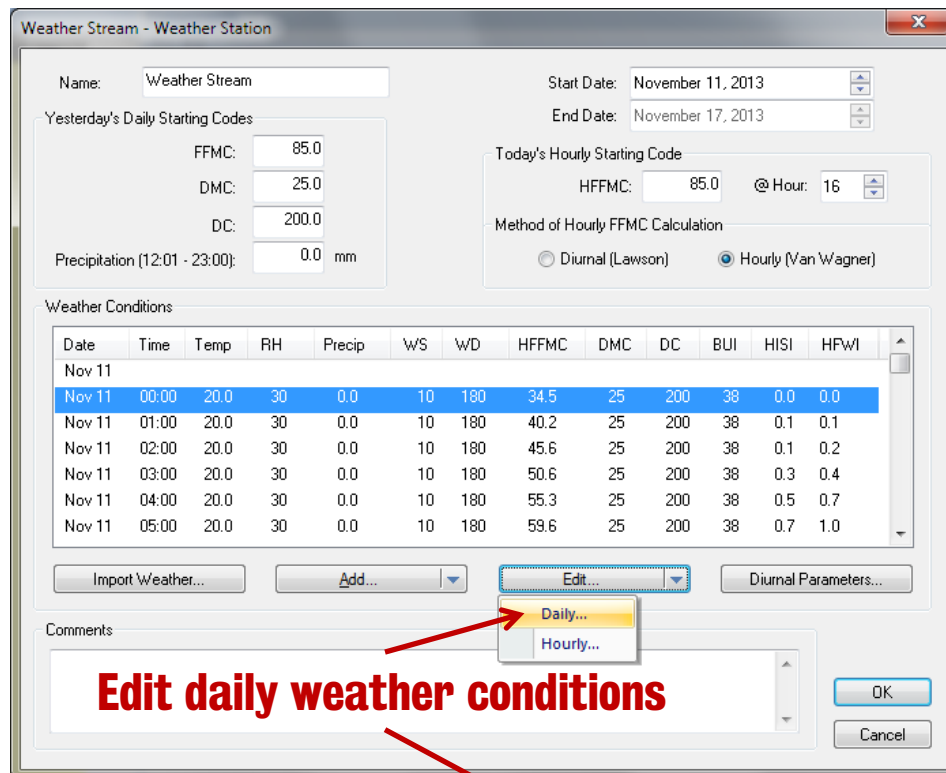
SIMPLE MODEL 2: WIND

Change the weather stream so that the wind speed is now 30 km/hr from the southeast (135°).

- 30 km/hr wind [8.3 m/s]
- Southeasterly wind [135°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?



Weather Stream - Weather Station

Name: Weather Stream Start Date: November 11, 2013 End Date: November 17, 2013

Yesterday's Daily Starting Codes

FFMC: 85.0
DMC: 25.0
DC: 200.0
Precipitation (12:01 - 23:00): 0.0 mm

Today's Hourly Starting Code

HFFMC: 85.0 @ Hour: 16

Method of Hourly FFMC Calculation

Diurnal (Lawson) Hourly (Van Wagner)

Weather Conditions

Date	Time	Temp	RH	Precip	WS	WD	HFFMC	DMC	DC	BUI	HISI	HPWI
Nov 11	00:00	20.0	30	0.0	10	180	34.5	25	200	38	0.0	0.0
Nov 11	01:00	20.0	30	0.0	10	180	40.2	25	200	38	0.1	0.1
Nov 11	02:00	20.0	30	0.0	10	180	45.6	25	200	38	0.1	0.2
Nov 11	03:00	20.0	30	0.0	10	180	50.6	25	200	38	0.3	0.4
Nov 11	04:00	20.0	30	0.0	10	180	55.3	25	200	38	0.5	0.7
Nov 11	05:00	20.0	30	0.0	10	180	59.6	25	200	38	0.7	1.0

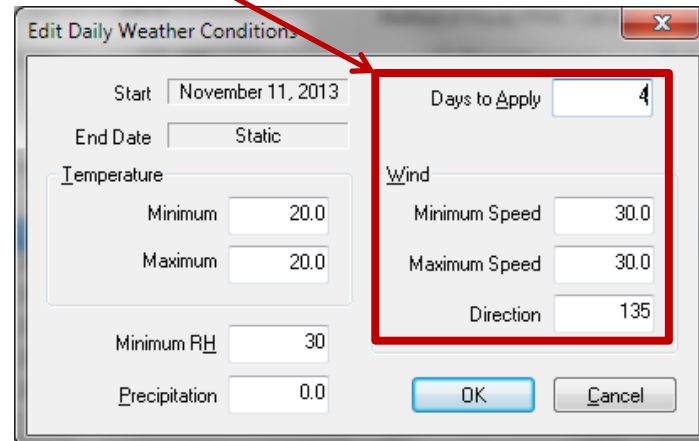
Import Weather... Add... Edit... Diurnal Parameters...

Comments

Daily... Hourly...

Edit daily weather conditions

OK Cancel



Edit Daily Weather Conditions

Start: November 11, 2013 End Date: Static

Temperature

Minimum: 20.0 Maximum: 20.0

Minimum RH: 30 Precipitation: 0.0

Days to Apply: 4

Wind

Minimum Speed: 30.0 Maximum Speed: 30.0 Direction: 135

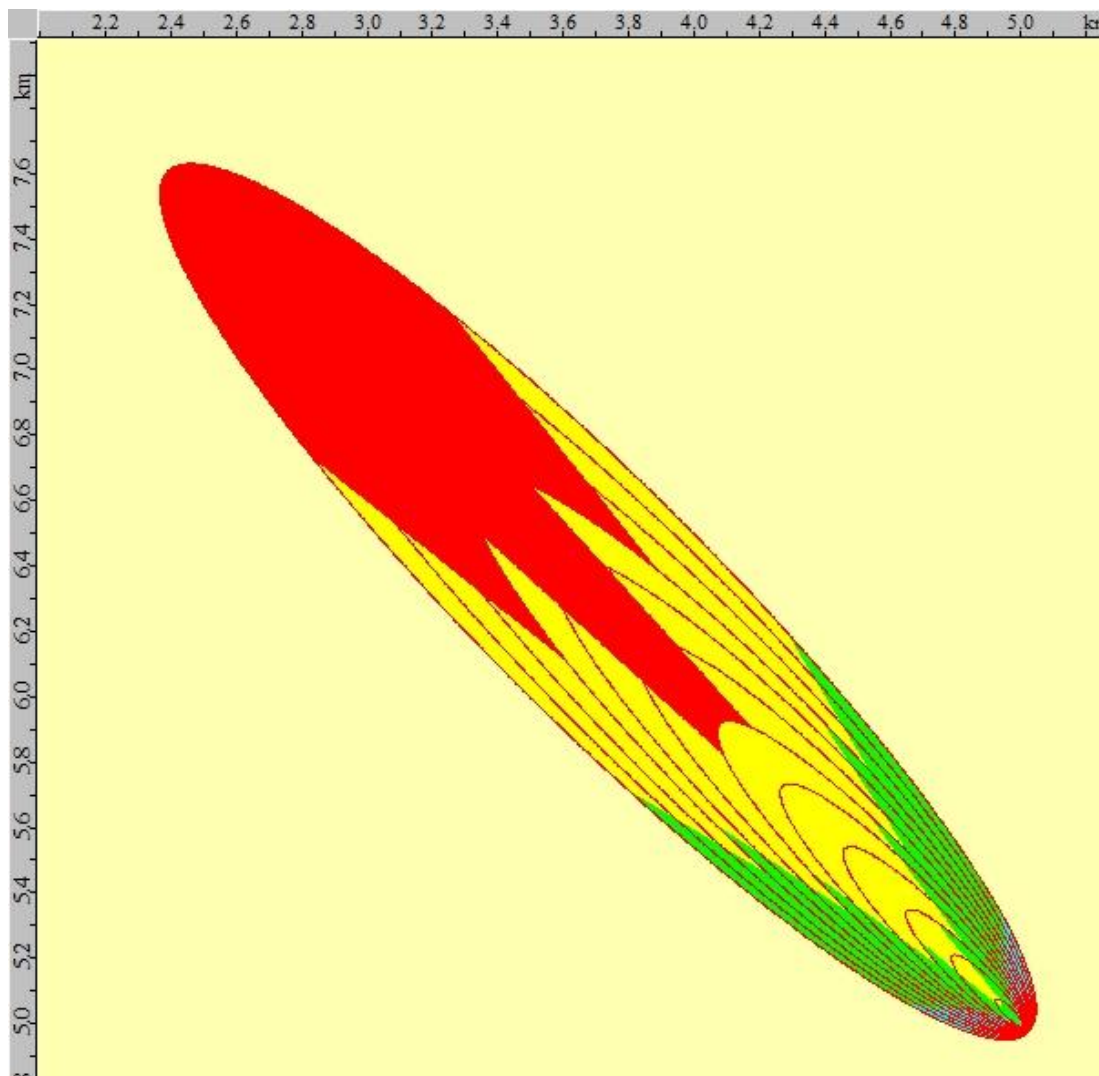
OK Cancel

SIMPLE MODEL 2: WIND

- 30 km/hr wind [8.3 m/s]
- Southeasterly wind [135°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Fire behaviour:

- Spreading even faster to the northwest (>3 km in 4 hours)
- Low-to-medium intensity in backing and flank fires (no alignment)
- High-to-very high intensity in the head fire (alignments = 1, high wind)



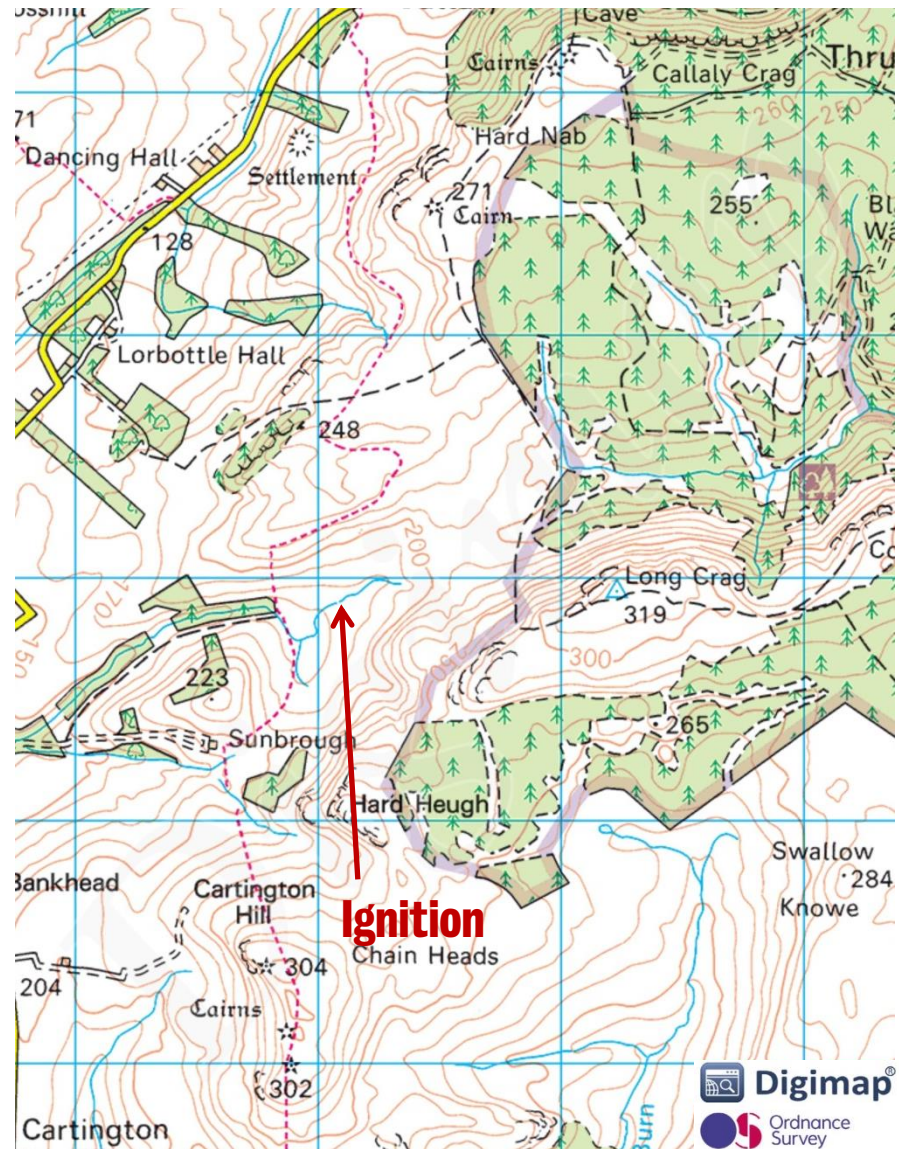
LANDSCAPE MODEL 1: SLOPE

Open Simulation 3 – SlopeNoWind.fgm

- No wind [0 m/s]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?



LANDSCAPE MODEL 1: SLOPE

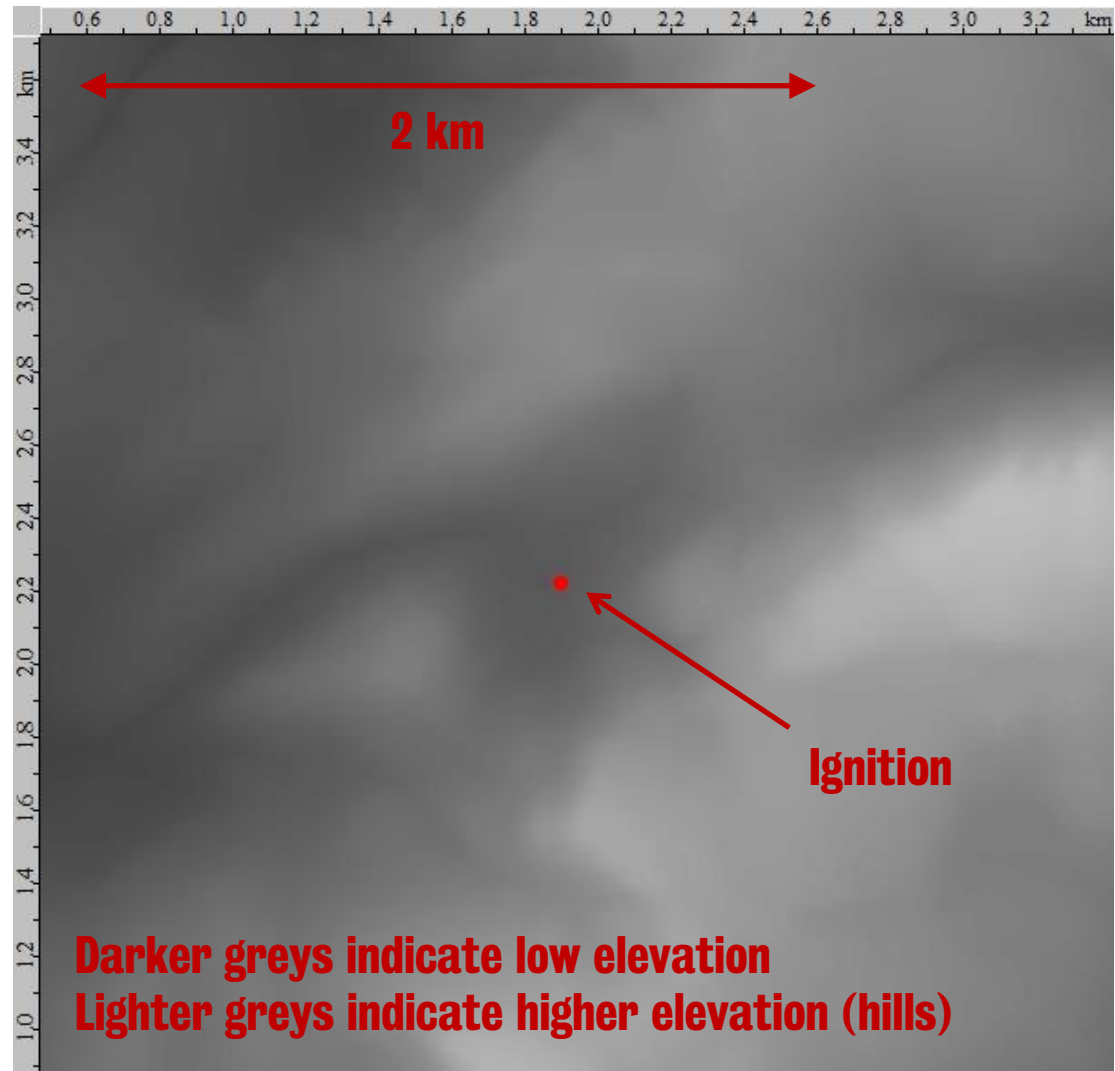
Open Simulation

3 – SlopeNoWind.fgm

- No wind [0 m/s]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

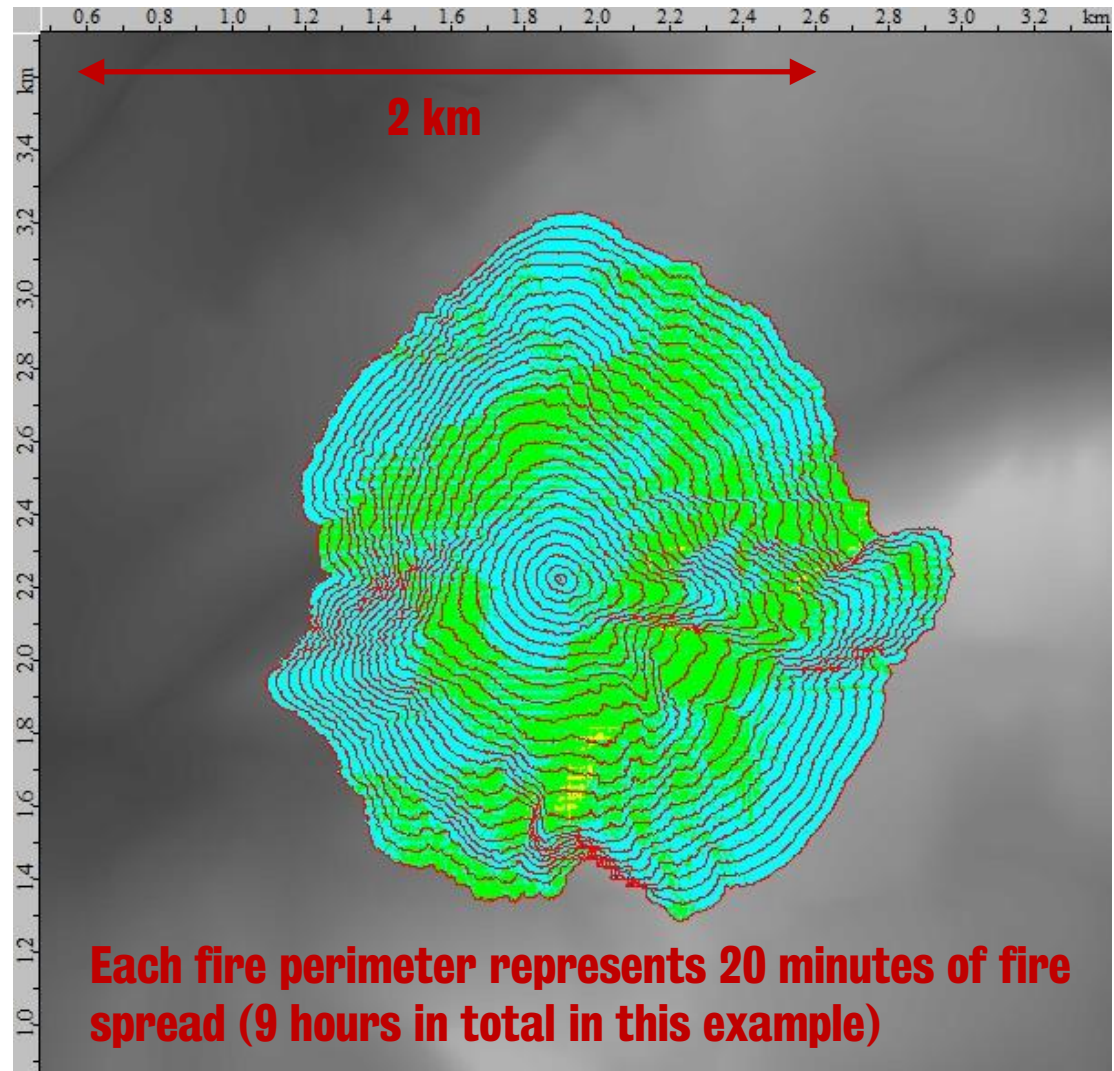


LANDSCAPE MODEL 1: SLOPE

- No wind [0 m/s]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Fire behaviour:

- Initially a uniform spread with low intensity in all directions (no alignment)
- When fire moves upslope it accelerates and becomes more intense (alignment = 1 or 2)
- Fire decelerates on downslopes



LANDSCAPE MODEL 2: SLOPE & WIND

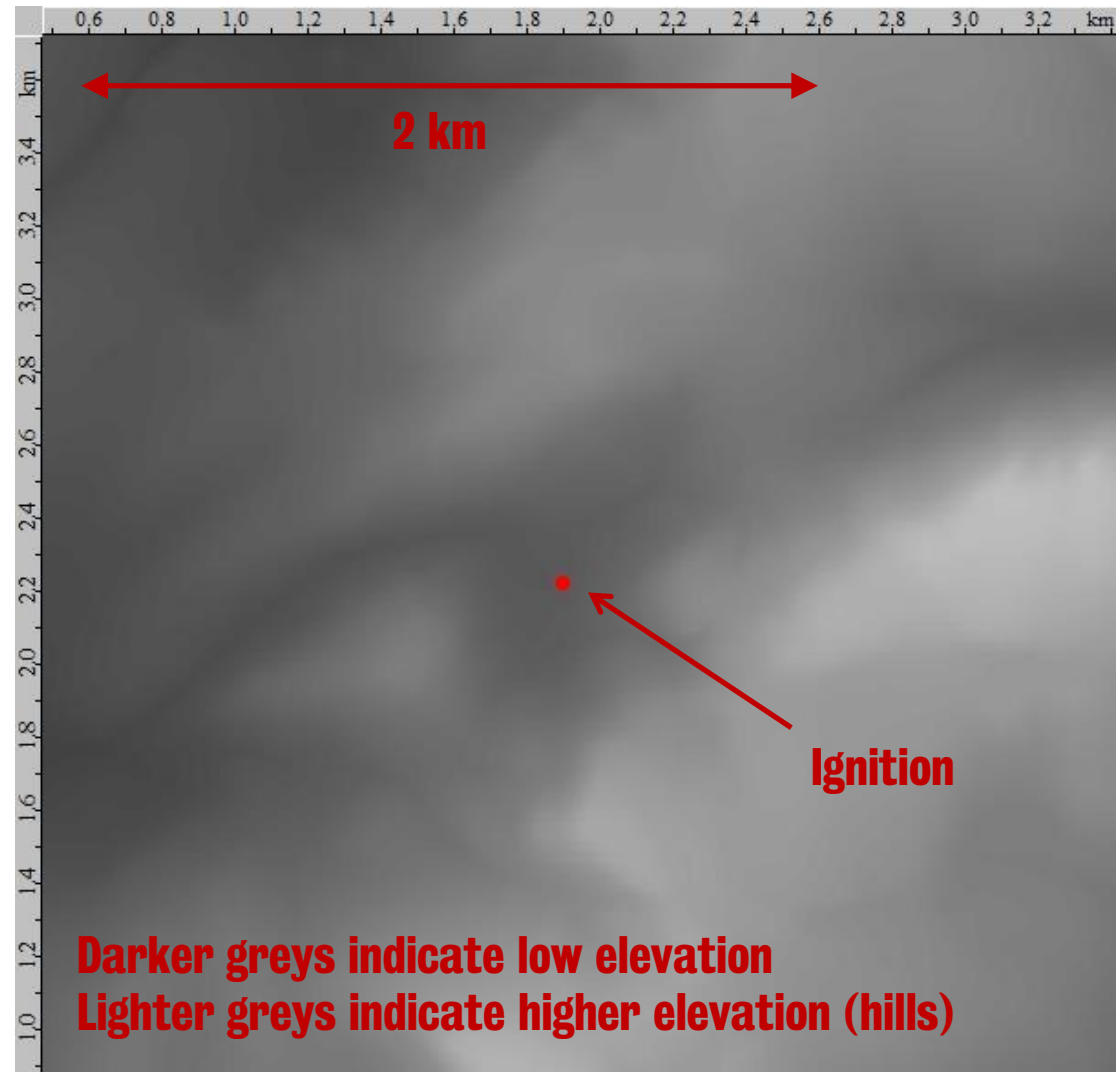
Open Simulation

4 – SlopeAndWind.fgm

- 10 km/hr wind [2.8 m/s]
- Westerly wind [270°]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

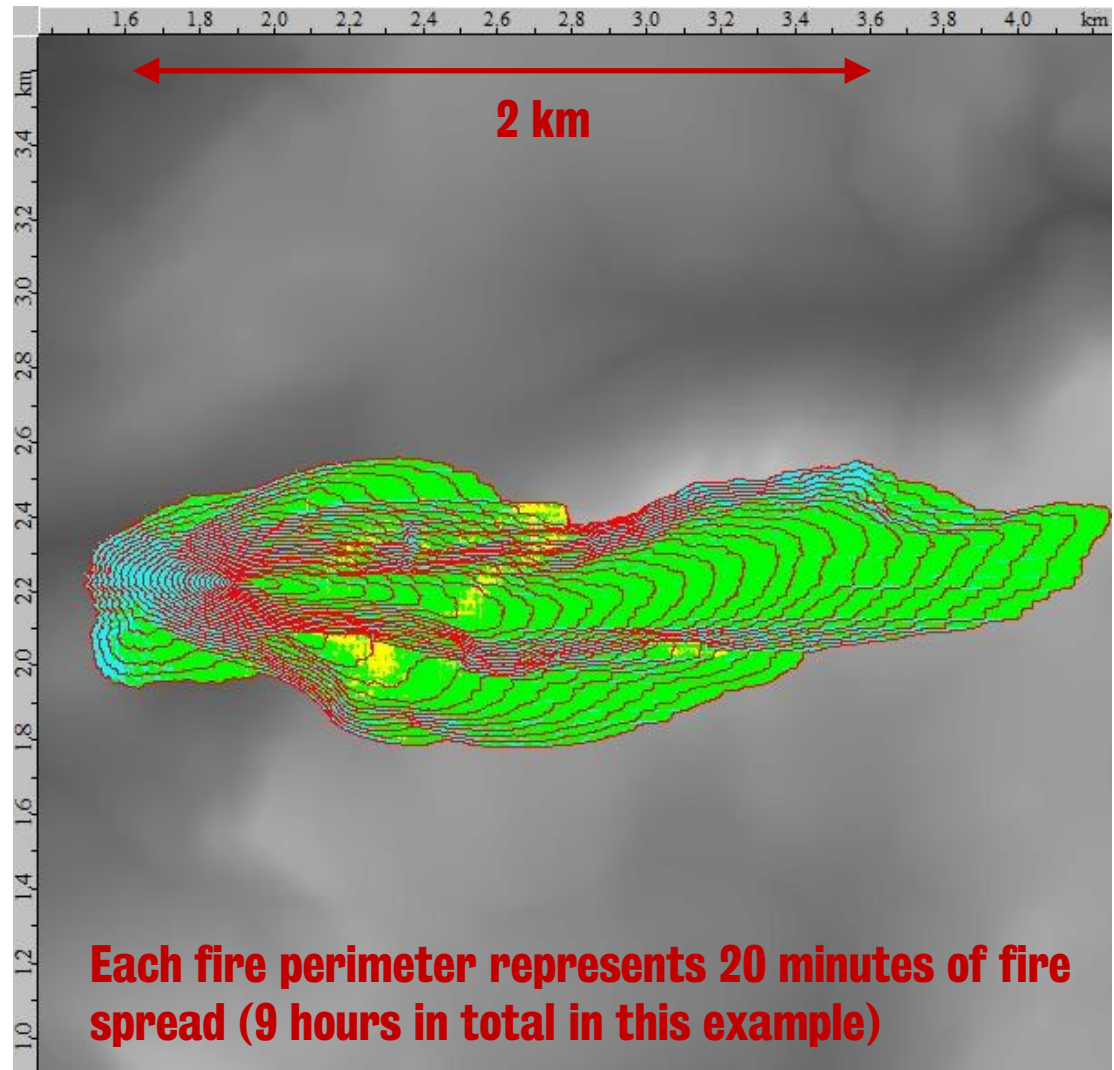


LANDSCAPE MODEL 2: SLOPE & WIND

- 10 km/hr wind [2.8 m/s]
- Westerly wind [270°]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Fire behaviour:

- Fire moves with the slope and wind eastwards
- Head fire burns with medium intensity, but this increases to high intensity on the steepest slopes (yellow patches).
- Fire burns with low intensity against the wind and slope (no alignment)



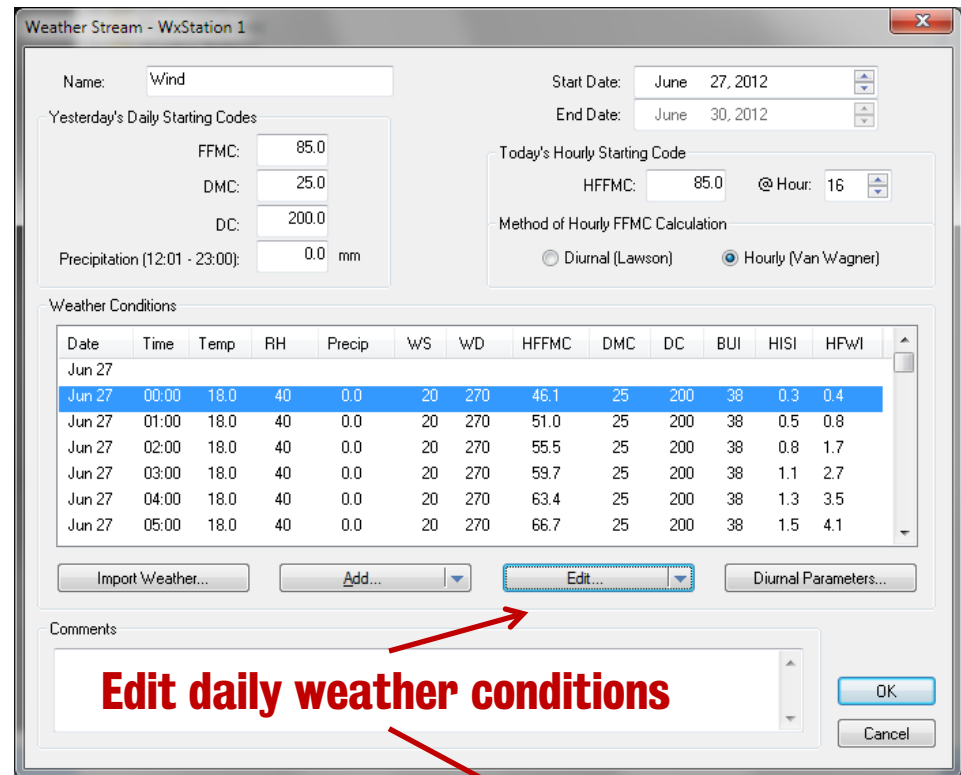
LANDSCAPE MODEL 2: SLOPE & WIND

Change the weather stream so that the wind direction is now from the northwest (315°).

- 20 km/hr wind [5.6 m/s]
- Northwesterly wind [315°]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?



Weather Stream - WxStation 1

Name: Wind Start Date: June 27, 2012 End Date: June 30, 2012

Yesterday's Daily Starting Codes

FFMC:	85.0
DMC:	25.0
DC:	200.0
Precipitation (12:01 - 23:00):	0.0 mm

Today's Hourly Starting Code

FFMC: 85.0 @ Hour: 16

Method of Hourly FFMC Calculation

Diurnal (Lawson) Hourly (Van Wagner)

Weather Conditions

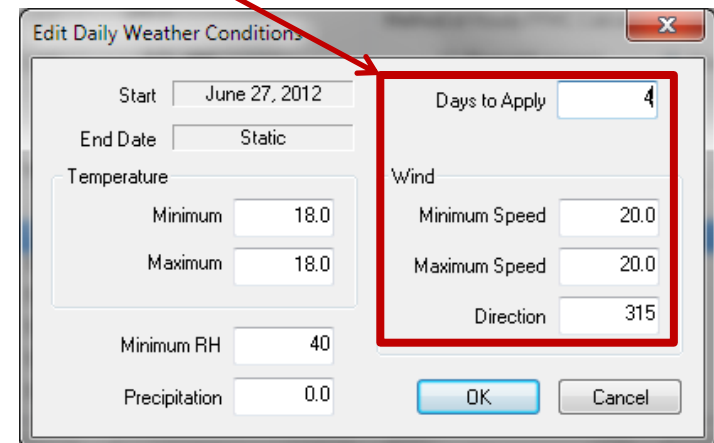
Date	Time	Temp	RH	Precip	WS	WD	FFMC	DMC	DC	BUI	HISI	HPWI
Jun 27	00:00	18.0	40	0.0	20	270	46.1	25	200	38	0.3	0.4
Jun 27	01:00	18.0	40	0.0	20	270	51.0	25	200	38	0.5	0.8
Jun 27	02:00	18.0	40	0.0	20	270	55.5	25	200	38	0.8	1.7
Jun 27	03:00	18.0	40	0.0	20	270	59.7	25	200	38	1.1	2.7
Jun 27	04:00	18.0	40	0.0	20	270	63.4	25	200	38	1.3	3.5
Jun 27	05:00	18.0	40	0.0	20	270	66.7	25	200	38	1.5	4.1

Import Weather... Add... Edit... Diurnal Parameters...

Comments

Edit daily weather conditions

OK Cancel



Edit Daily Weather Conditions

Start: June 27, 2012 End Date: Static

Temperature

Minimum: 18.0 Maximum: 18.0

Minimum RH: 40 Precipitation: 0.0

Days to Apply: 4

Wind

Minimum Speed: 20.0 Maximum Speed: 20.0 Direction: 315

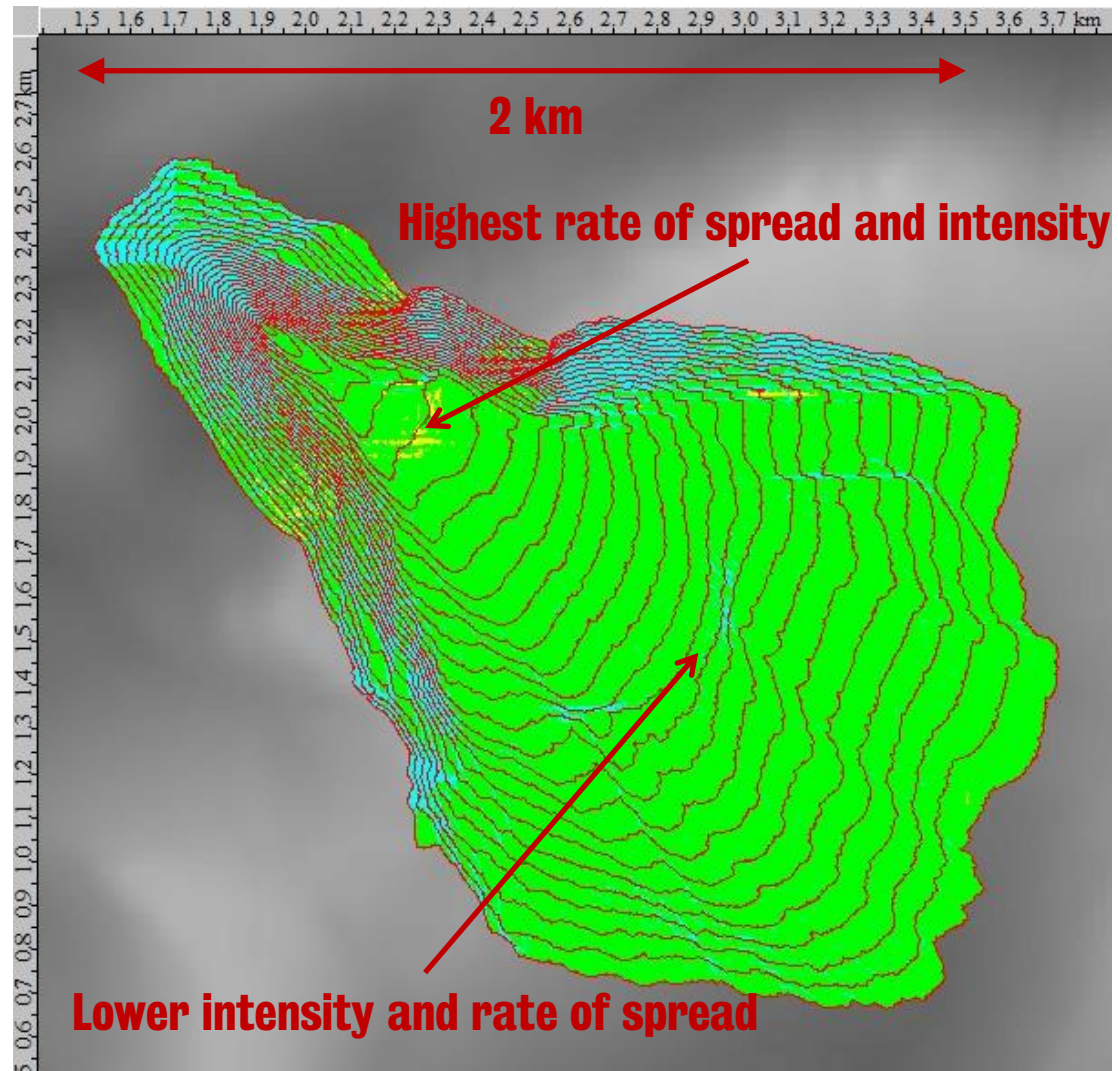
OK Cancel

LANDSCAPE MODEL 2: SLOPE & WIND

- 20 km/hr wind [5.6 m/s]
- Northwesterly wind [315°]
- Flat terrain moving into hilly terrain
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Fire behaviour:

- Fire moves with the slope and wind southeastwards
- Head fire burns with medium intensity, but this increases to high intensity on the steepest slopes (yellow patches).
- Head fire decreases intensity when going down slope, even with the wind (alignment = 1 or 2, rather than 2 or 3)



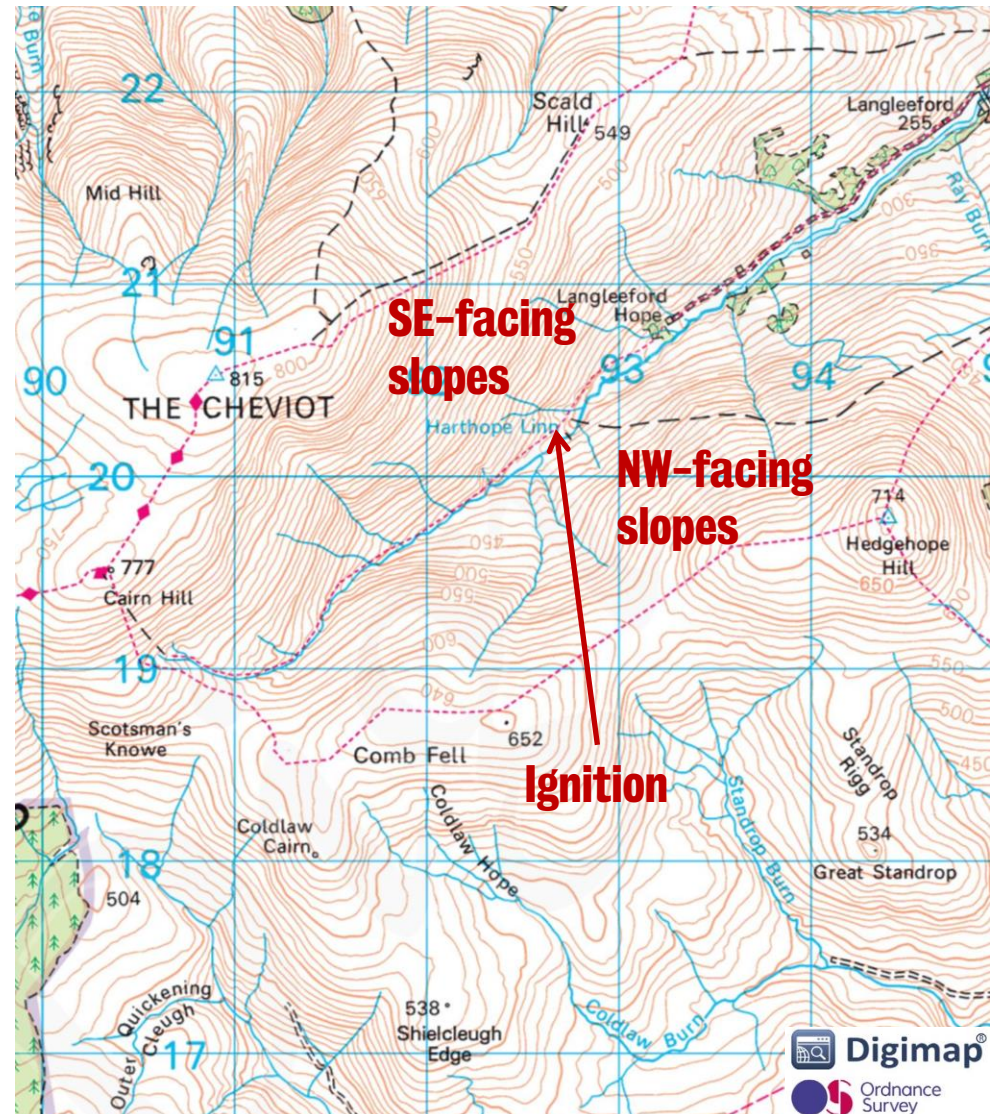
LANDSCAPE MODEL 3: ASPECT

Open Simulation 5 – AspectSlope.fgm

- No wind [0 m/s]
- Valley bottom with SE and NW facing slopes either side
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?



LANDSCAPE MODEL 3: ASPECT

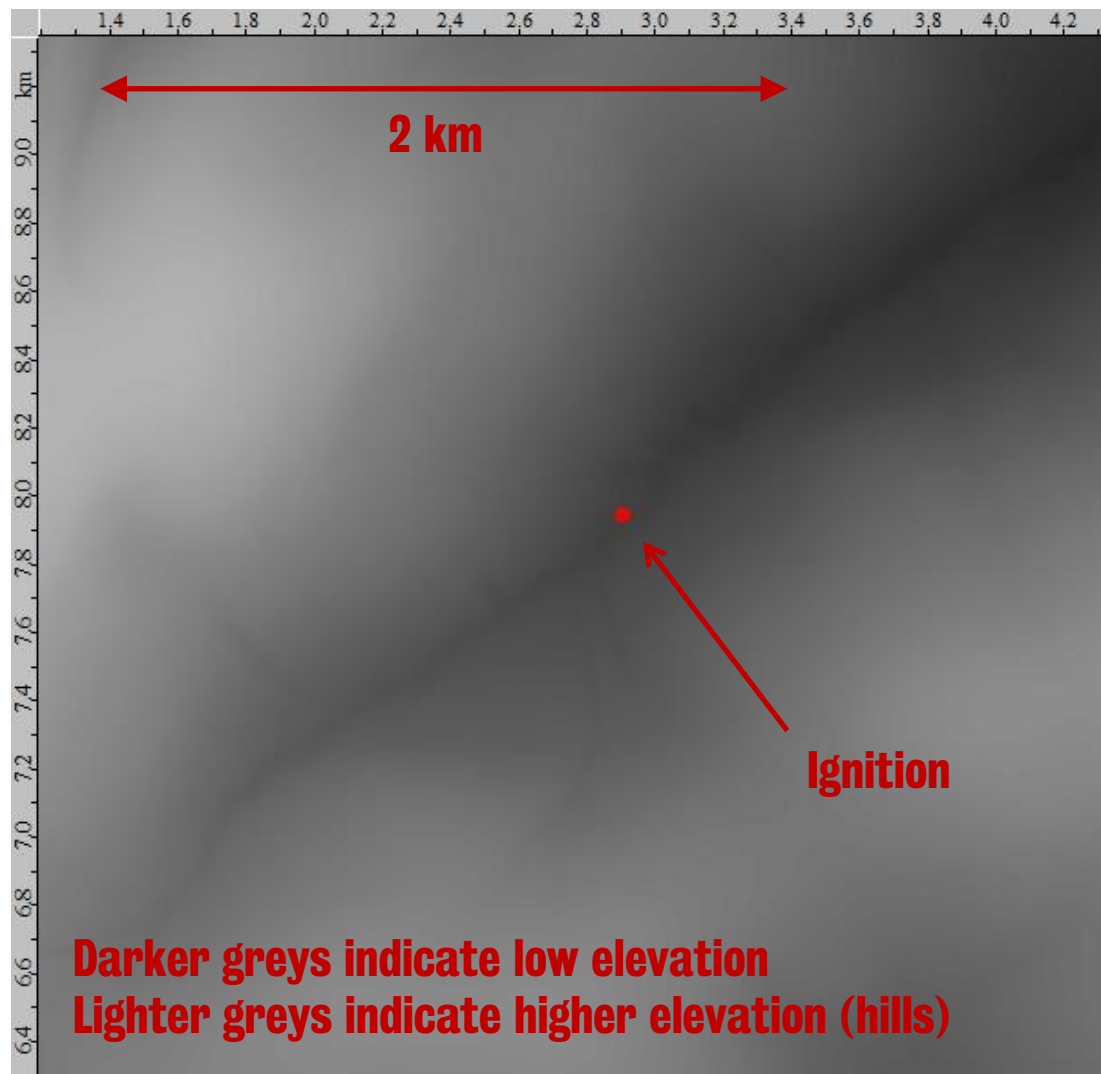
Open Simulation

5 – AspectSlope.fgm

- No wind [0 m/s]
- Valley bottom with SE and NW facing slopes either side
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

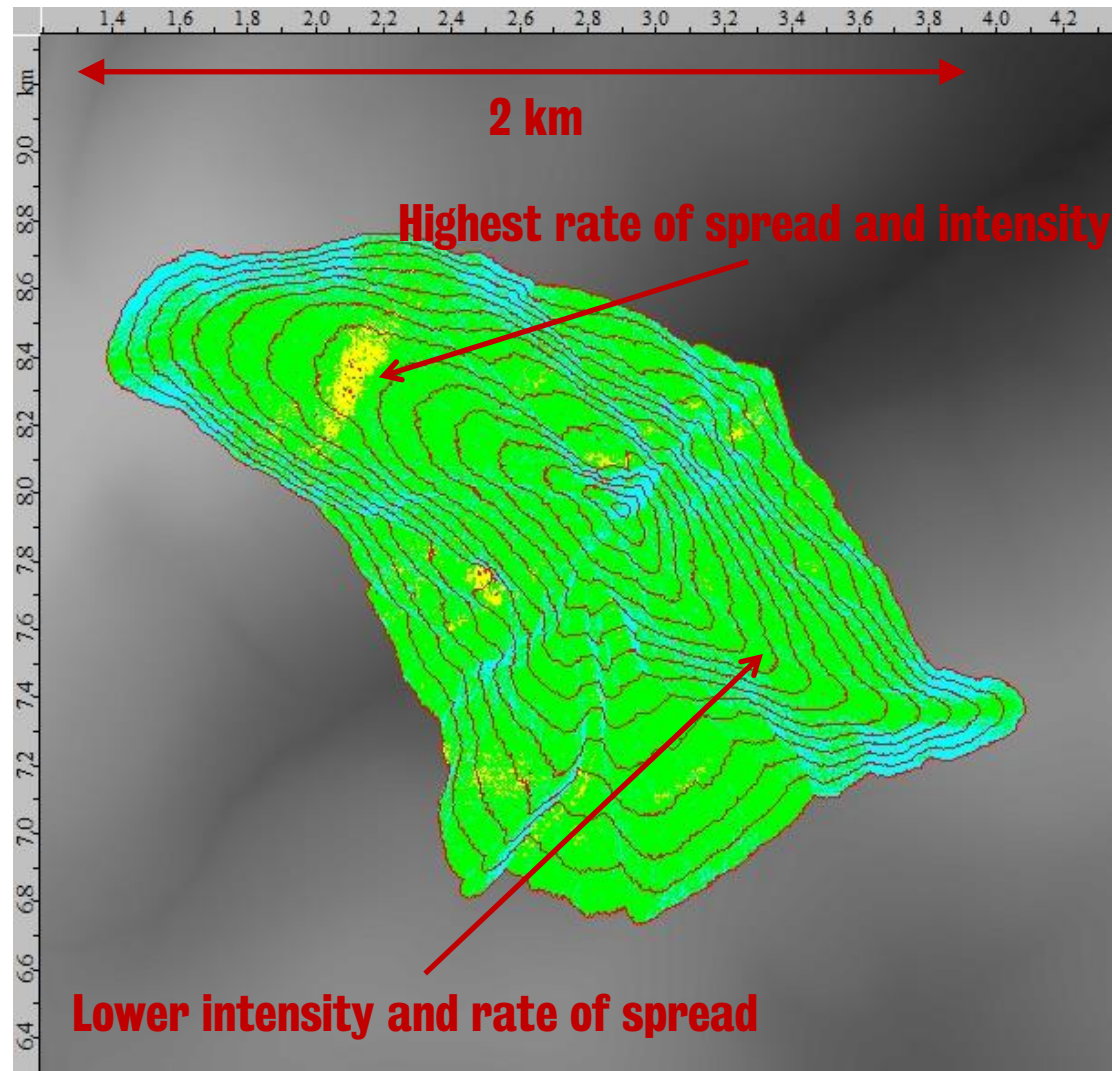


LANDSCAPE MODEL 3: ASPECT

- No wind [0 m/s]
- Valley bottom with SE and NW facing slopes either side
- 30% relative humidity
- Uniform fuel (dry heather)
- Single POINT ignition

Fire behaviour:

- Fire moves with the slope
- Two head fires moving up both slopes. Head fire along SE-facing slope moves quicker and with more intensity due to aspect and greater slope (alignment = 2). Head fire along NW-facing slopes moves slower (alignment = 1).
- Lower intensity fire moves up and down the valley.



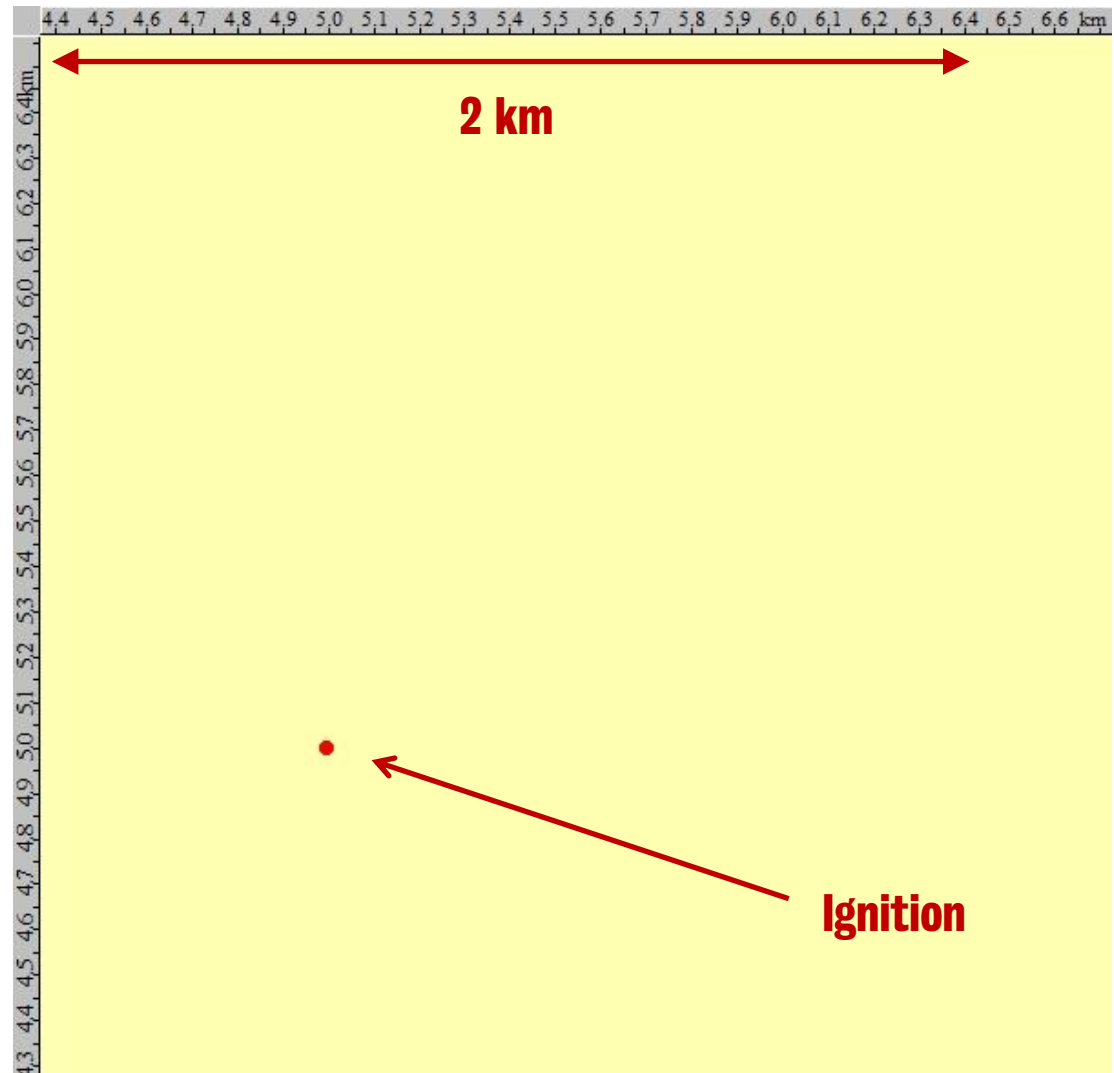
SIMPLE MODEL 3: WIND SHIFT

Open Simulation 6 – WindShift.fgm

- 20 km/hr wind [5.6 m/s]
- Southerly wind [180°] changing to Westerly wind [270°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

Run the simulation:

- What fire behaviour should we expect?
- Where will the fire spread?
- What are the fire alignments?

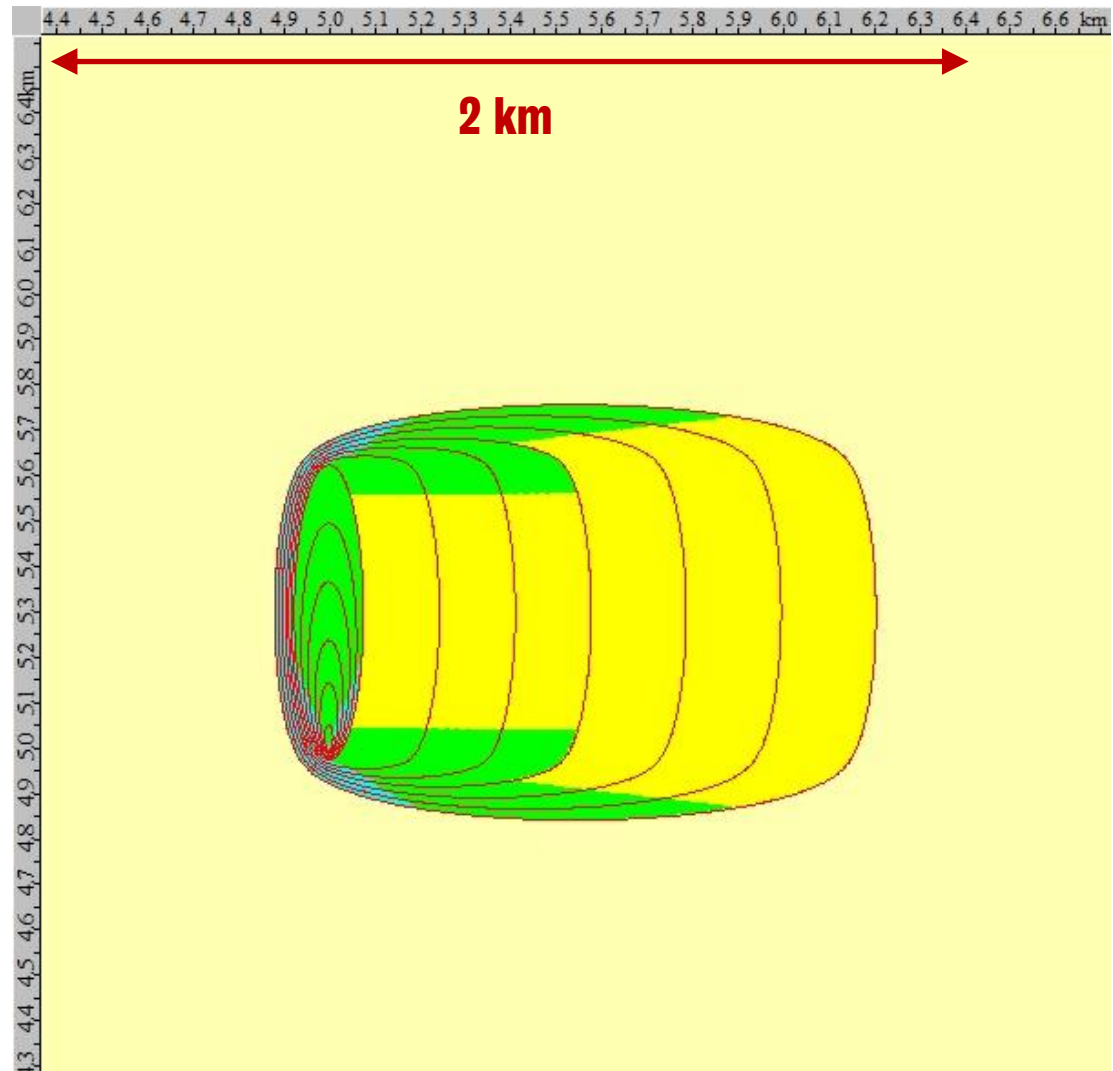


SIMPLE MODEL 3: WIND SHIFT

- 20 km/hr wind [5.6 m/s]
- Southerly wind [180°] changing to Westerly wind [270°]
- No slope [0°]
- 30% relative humidity
- Uniform fuel (dry grass)
- Single POINT ignition

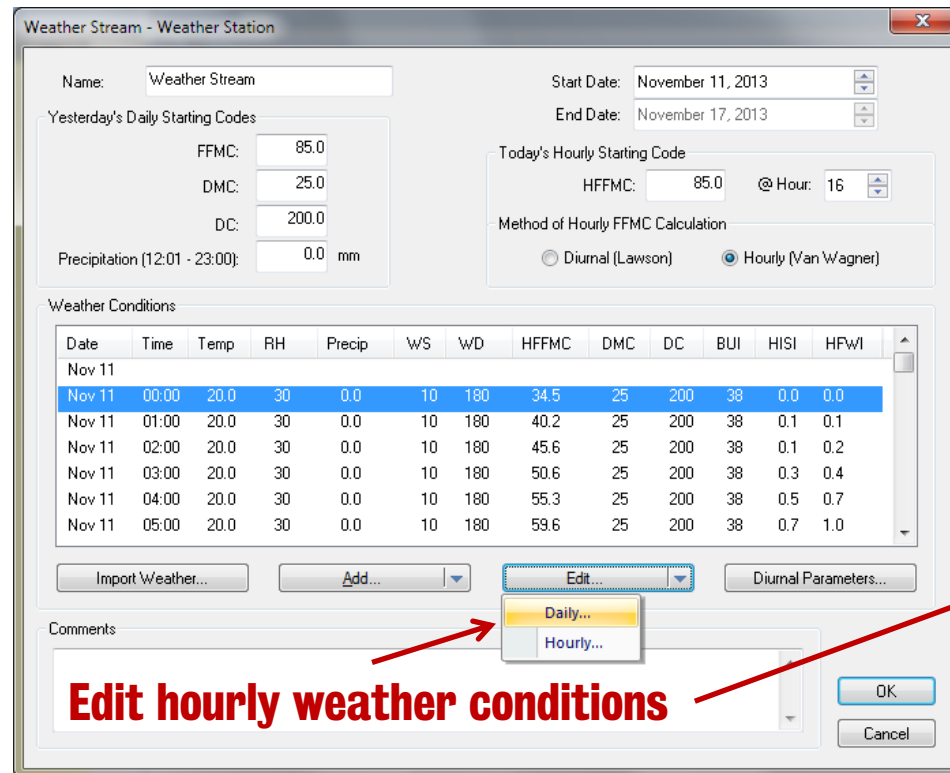
Fire behaviour:

- Spreading to the north (600 m in 2 hours)
- Low intensity in backing and flank fires (no alignment)
- When wind changes direction, the slow-moving low-intensity east flank fire becomes a large quick-moving (1 km in 2 hours) high-intensity head fire.



SIMPLE MODEL 3: WIND SHIFT

Change the wind speed and wind direction in the weather stream by clicking on “edit” and then “hourly”. Here you can adjust the time of the wind shift and the direction that it shifts to, as well as the wind speed. Try doing the same for some of the landscape models used previously.



Weather Stream - Weather Station

Name: Weather Stream

Start Date: November 11, 2013

End Date: November 17, 2013

Yesterday's Daily Starting Codes

FFMC: 85.0

DMC: 25.0

DC: 200.0

Precipitation (12:01 - 23:00): 0.0 mm

Today's Hourly Starting Code

HFFMC: 85.0 @ Hour: 16

Method of Hourly FFMC Calculation

Diurnal (Lawson) Hourly (Van Wagner)

Weather Conditions

Date	Time	Temp	RH	Precip	WS	WD	HFFMC	DMC	DC	BUI	HIS1	HFWI
Nov 11	00:00	20.0	30	0.0	10	180	34.5	25	200	38	0.0	0.0
Nov 11	01:00	20.0	30	0.0	10	180	40.2	25	200	38	0.1	0.1
Nov 11	02:00	20.0	30	0.0	10	180	45.6	25	200	38	0.1	0.2
Nov 11	03:00	20.0	30	0.0	10	180	50.6	25	200	38	0.3	0.4
Nov 11	04:00	20.0	30	0.0	10	180	55.3	25	200	38	0.5	0.7
Nov 11	05:00	20.0	30	0.0	10	180	59.6	25	200	38	0.7	1.0

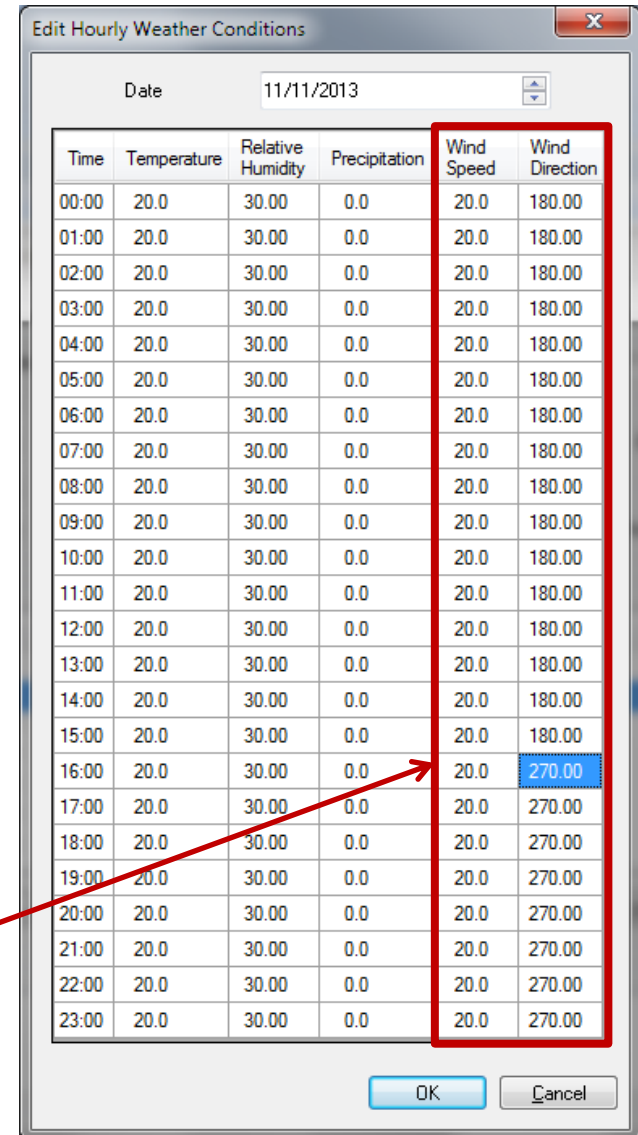
Import Weather... Add... Edit... Diurnal Parameters...

Comments

Daily... Hourly...

Edit hourly weather conditions

OK Cancel



Edit Hourly Weather Conditions

Date: 11/11/2013

Time	Temperature	Relative Humidity	Precipitation	Wind Speed	Wind Direction
00:00	20.0	30.00	0.0	20.0	180.00
01:00	20.0	30.00	0.0	20.0	180.00
02:00	20.0	30.00	0.0	20.0	180.00
03:00	20.0	30.00	0.0	20.0	180.00
04:00	20.0	30.00	0.0	20.0	180.00
05:00	20.0	30.00	0.0	20.0	180.00
06:00	20.0	30.00	0.0	20.0	180.00
07:00	20.0	30.00	0.0	20.0	180.00
08:00	20.0	30.00	0.0	20.0	180.00
09:00	20.0	30.00	0.0	20.0	180.00
10:00	20.0	30.00	0.0	20.0	180.00
11:00	20.0	30.00	0.0	20.0	180.00
12:00	20.0	30.00	0.0	20.0	180.00
13:00	20.0	30.00	0.0	20.0	180.00
14:00	20.0	30.00	0.0	20.0	180.00
15:00	20.0	30.00	0.0	20.0	180.00
16:00	20.0	30.00	0.0	20.0	270.00
17:00	20.0	30.00	0.0	20.0	270.00
18:00	20.0	30.00	0.0	20.0	270.00
19:00	20.0	30.00	0.0	20.0	270.00
20:00	20.0	30.00	0.0	20.0	270.00
21:00	20.0	30.00	0.0	20.0	270.00
22:00	20.0	30.00	0.0	20.0	270.00
23:00	20.0	30.00	0.0	20.0	270.00

OK Cancel

thomas.smith@kcl.ac.uk
@DrTELS

@KCLGEOGRAPHY
facebook.com/KCLGeography

NERC

SCIENCE OF THE ENVIRONMENT



National Centre for Earth Observation

NATURAL ENVIRONMENT RESEARCH COUNCIL



Field Spectroscopy Facility

NATURAL ENVIRONMENT RESEARCH COUNCIL



Operational tools for improving efficiency in wildfire risk reduction in EU landscapes



This project is co-funded by the European Union

KING'S
College
LONDON
Geography