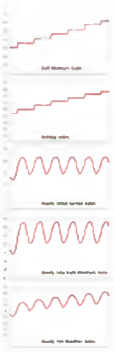
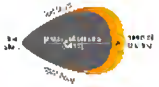
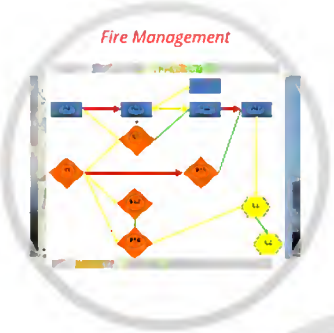
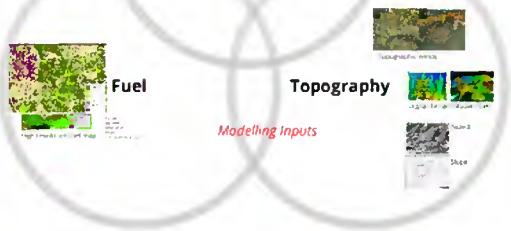
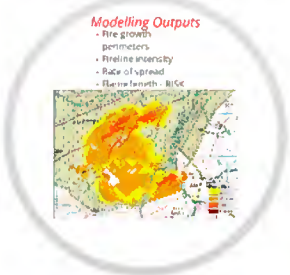


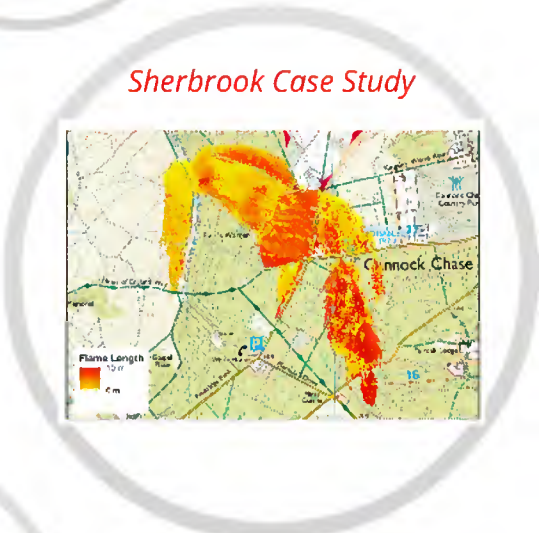

During Fire
Wind speed
Wind direction
Relative Humidity
Temperature
Precipitation
Soil drying
Aspect
Slope
Topographic winds
Wind speed
Wind direction
Meteorology


FIRE
point/line/area ignition


Fire Management


Fuel
Topography
Modelling Inputs

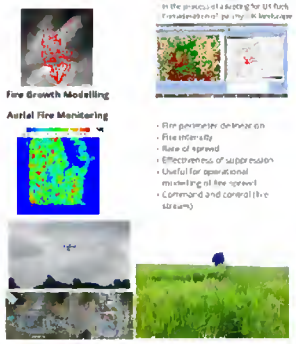

Modelling Outputs
Fire growth
perimeters
Fireline intensity
Rate of spread
Flame length - BUSE

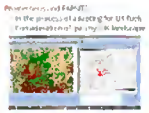

Sherbrook Case Study
Cannock Chase
Flame Length

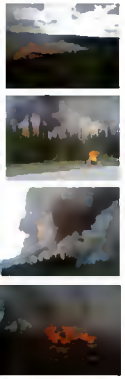

Fire Radiative Power
Plume Modelling
Spaceborne

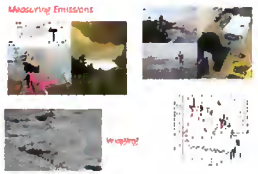

Airborne
Field

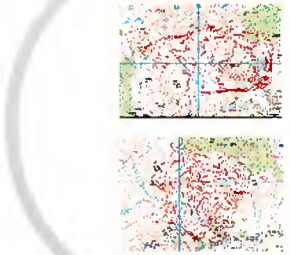

so how can we
ENHANCE understanding
of wildfire behaviour?

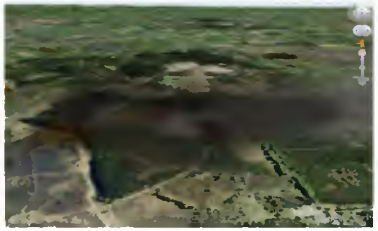

Fire Growth Modelling
Aerial Fire Monitoring






Measuring Emissions


Linhope Exercise



Wildfire 2013: 23 October 2013

KING'S College LONDON

Enhancing Understanding of Wildfire Behaviour and Suppression using Remote Sensing and Computer Simulation Modelling

Thomas Smith

Environmental Monitoring and Modelling Research Group,
Department of Geography, King's College London


KCL Wildfire Research

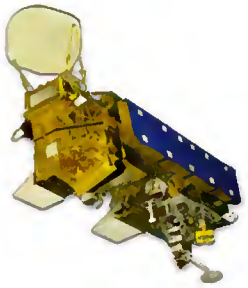
Field

KCL Wildfire Research

Airborne

KCL Wildfire Research

Field

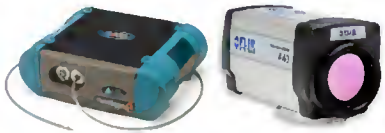


Spaceborne

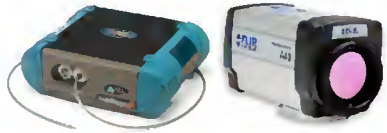
Airborne

KCL Wildfire Research

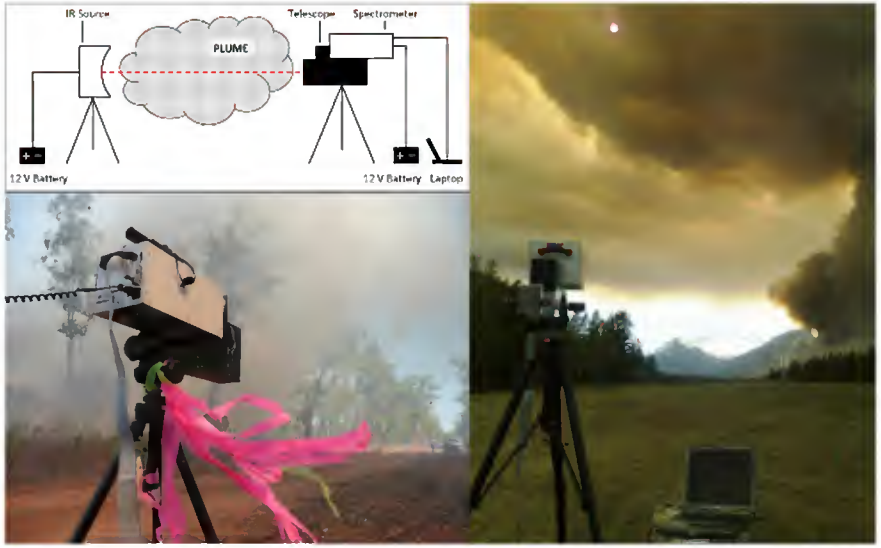
Field



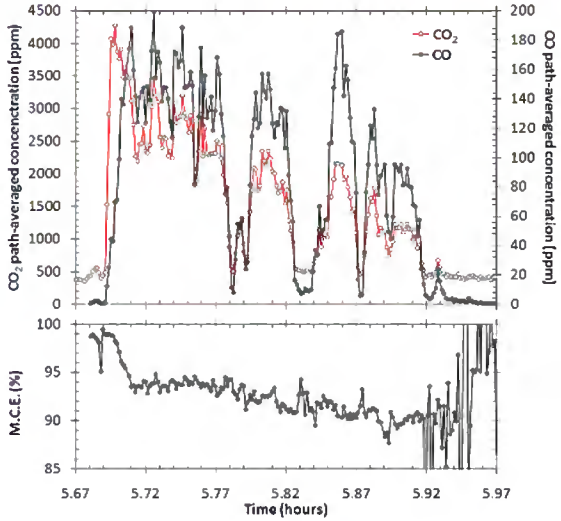
Field



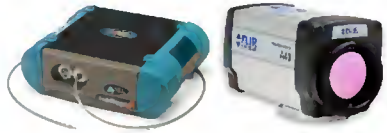
Measuring Emissions



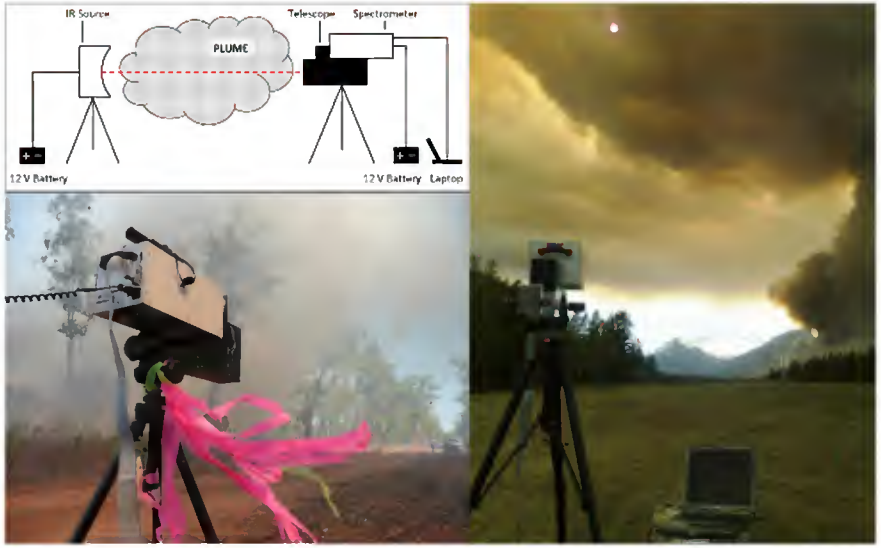
Imaging



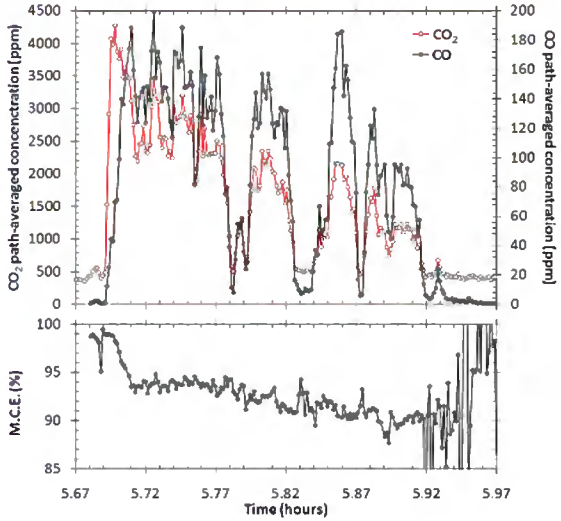
Field

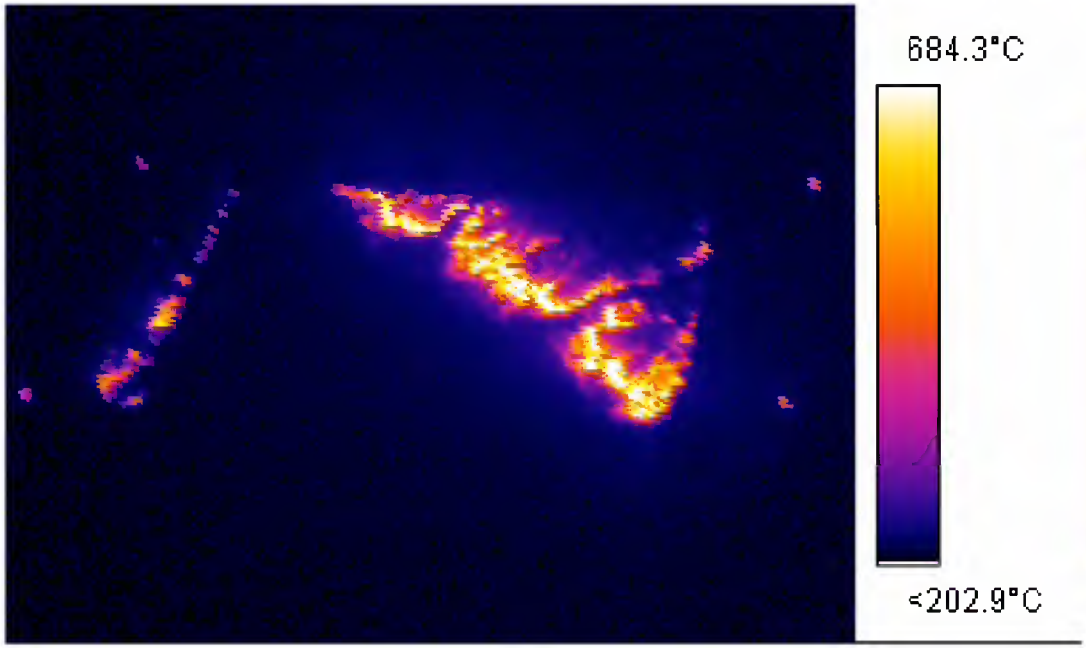


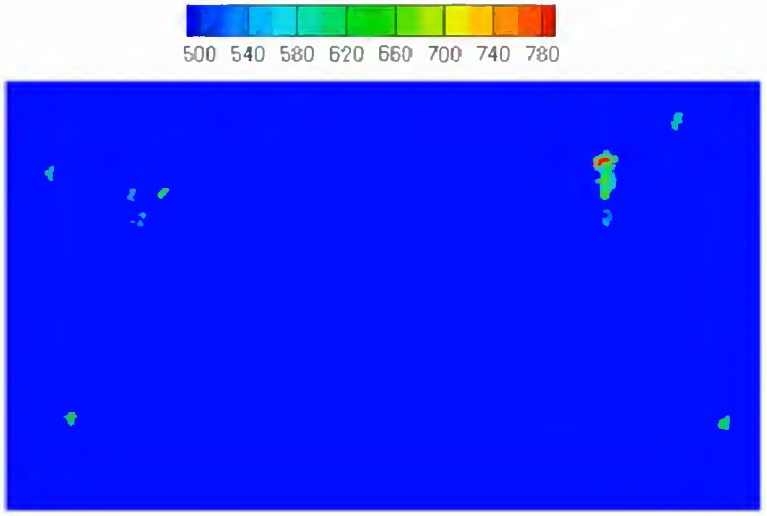
Measuring Emissions



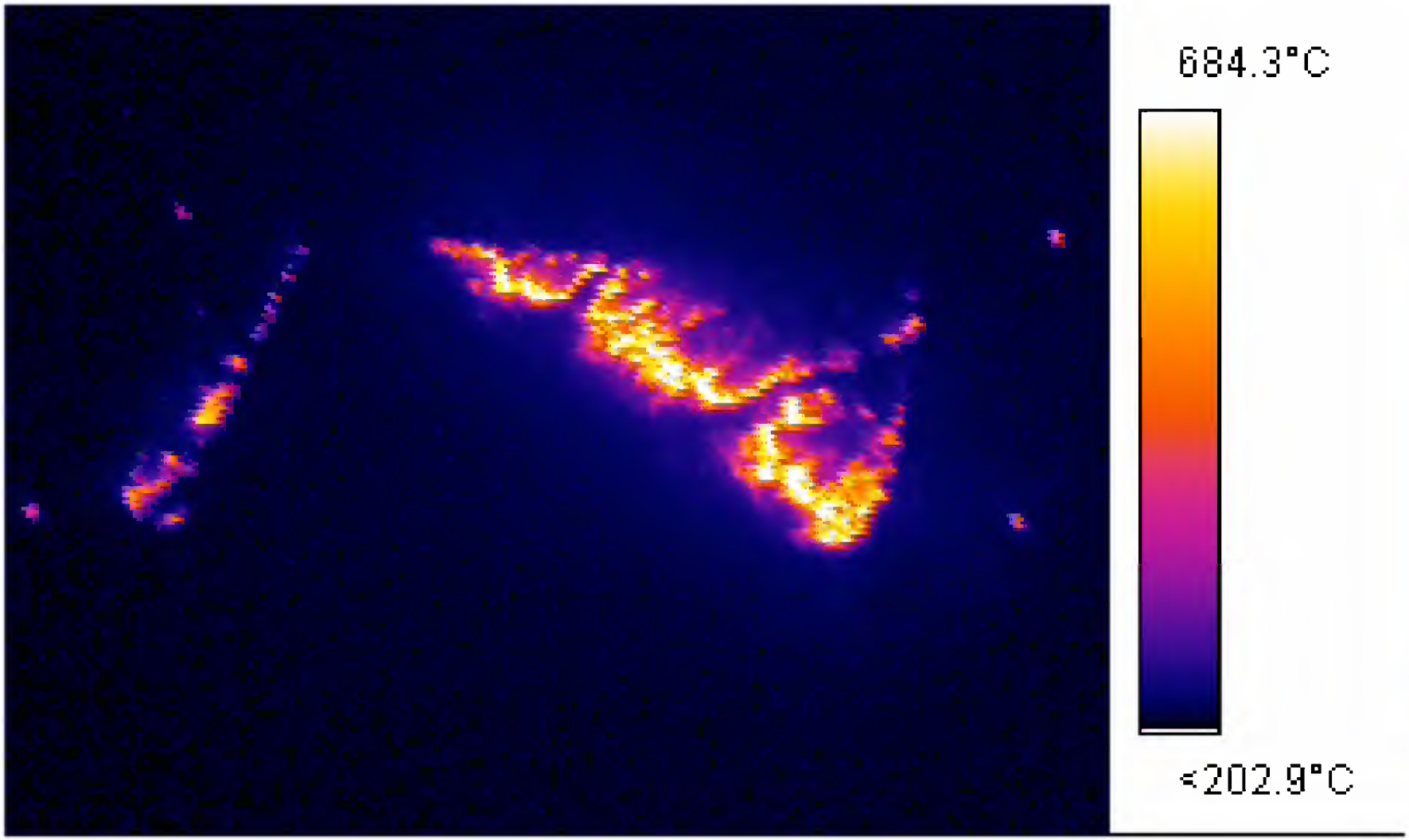
Imaging



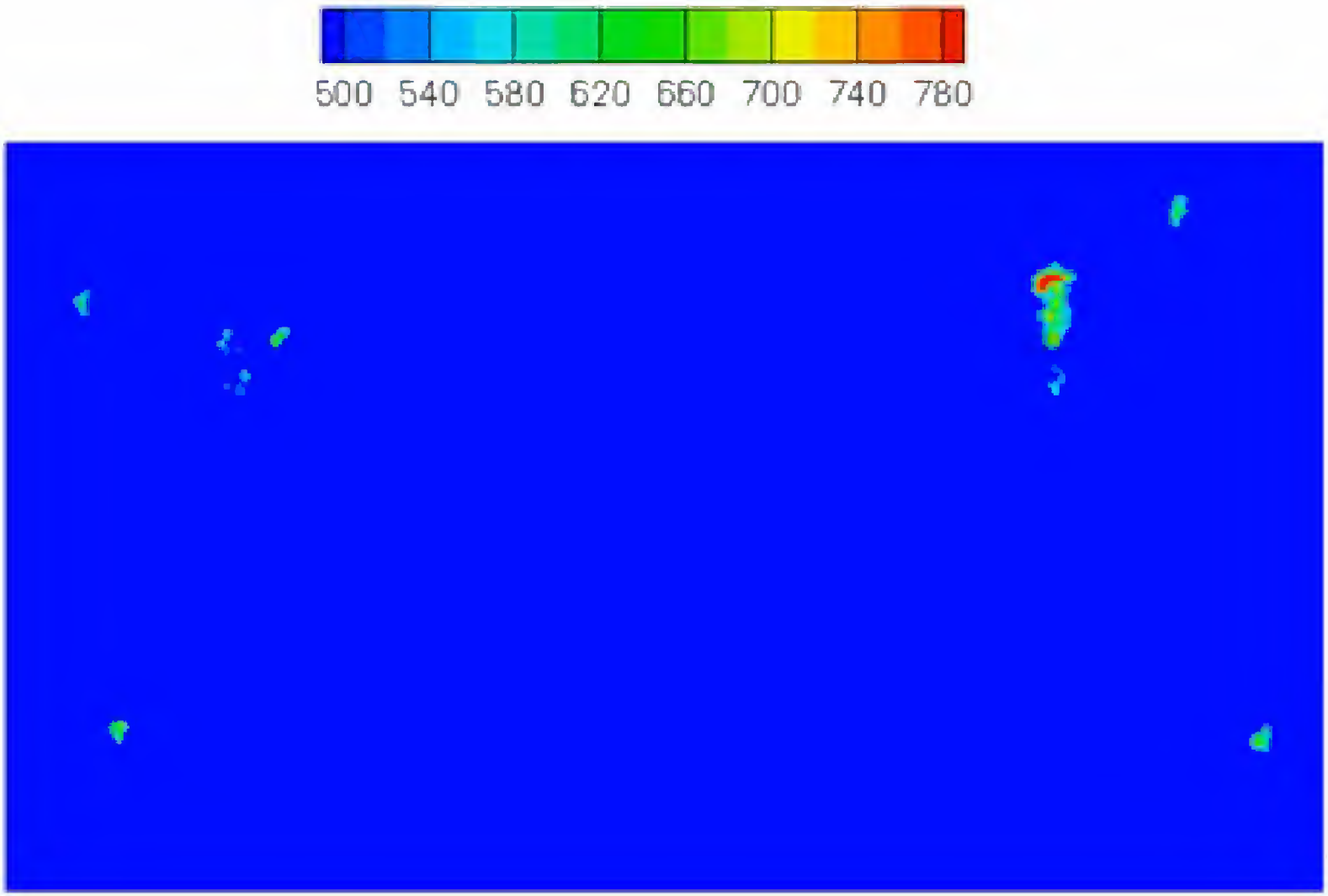




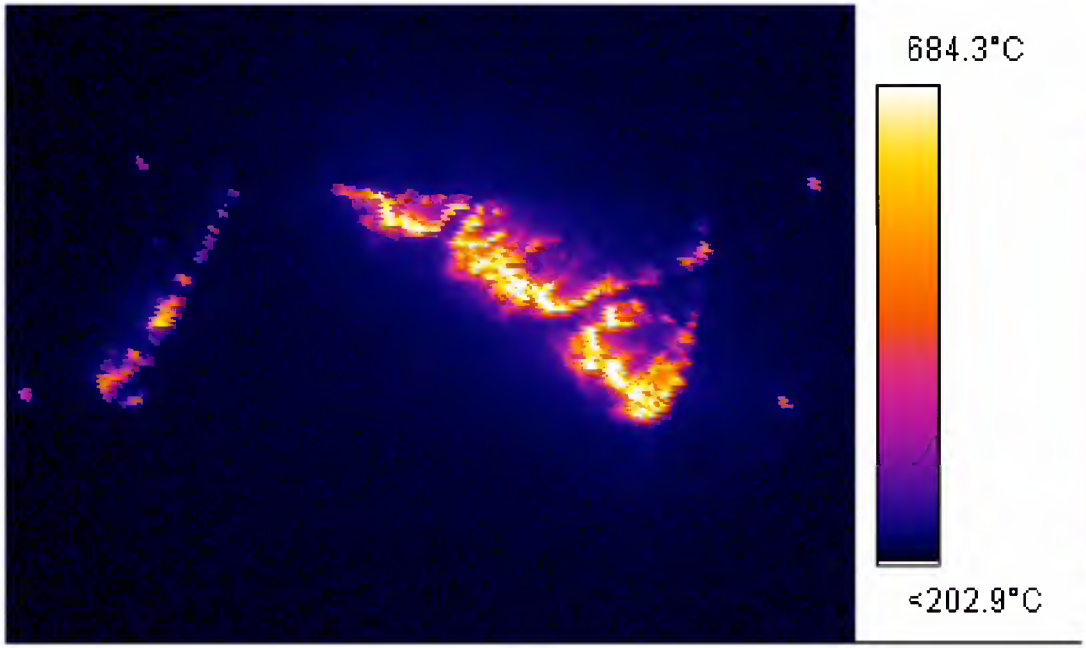
Airborne

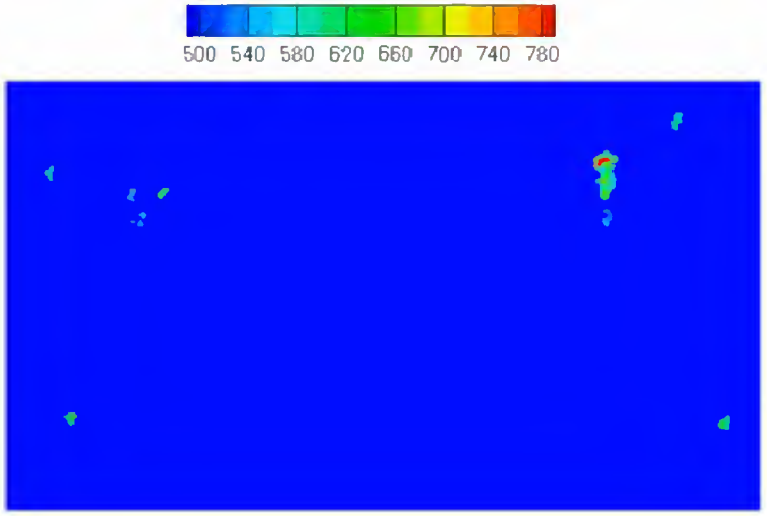

684.3°C
<202.9°C

8°C

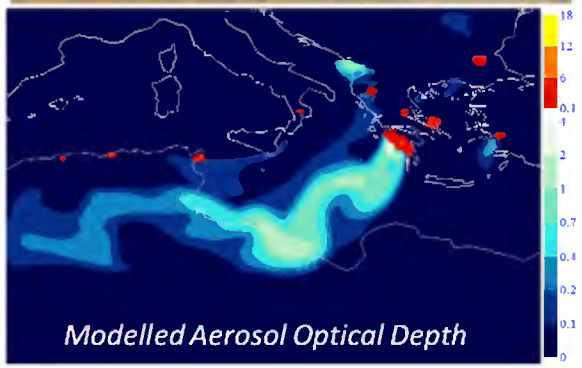


.9°C

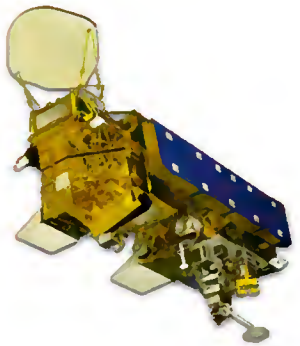




Airborne

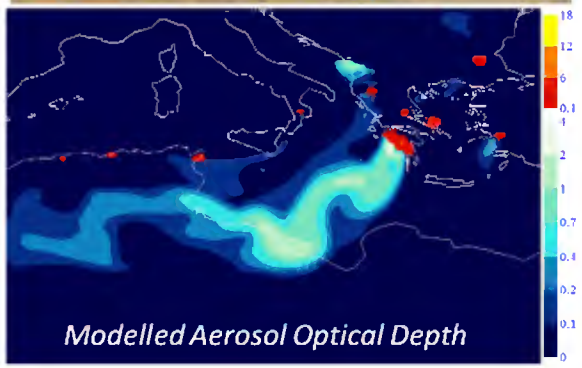


Fire Radiative Power Plume Modelling

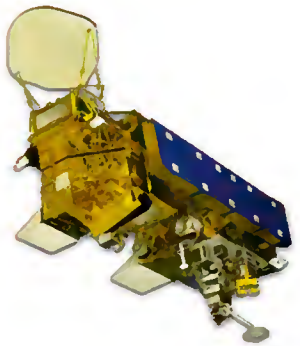


Spaceborne

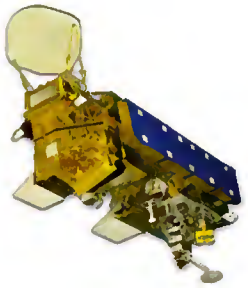
Fire Radiative Po



Fire Radiative Power Plume Modelling



Spaceborne

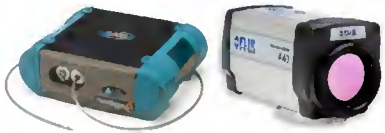


Spaceborne

Airborne

KCL Wildfire Research

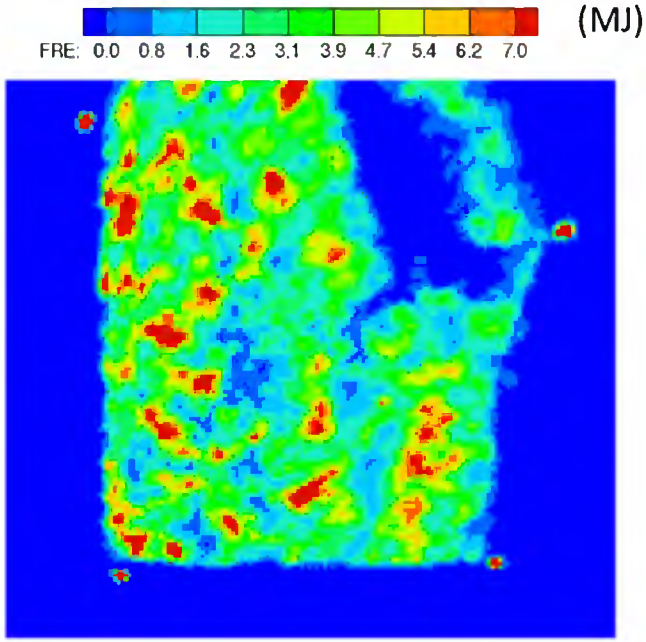
Field



...so how can we ENHANCE understanding of wildfire behaviour?

Fire Growth Modelling

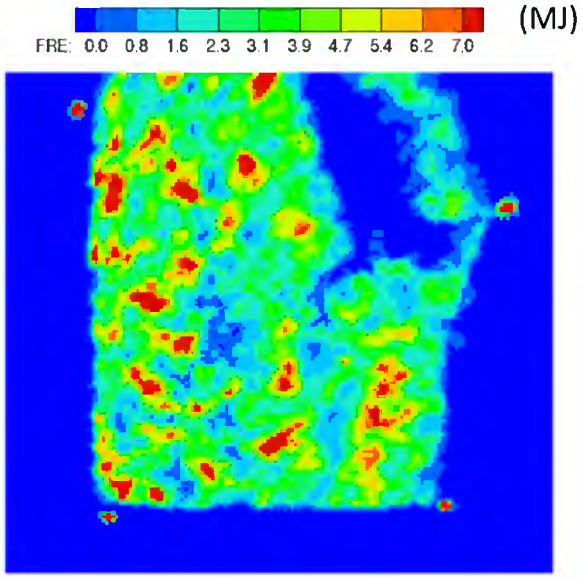
Aerial Fire Monitoring



NERC Knowledge Exchange Grant
Partners: Steve Gibson & NFRS
Support from:
SWFRS, CFRS
EWWF
NERC UAV Cluster

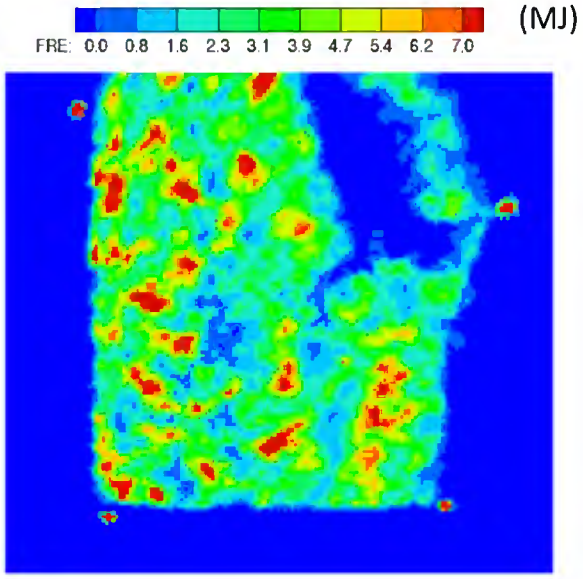
Original meeting in York: 27 April 2011
Grant awarded: 17 August 2011
Work began: February 2012
Scope: until Summer 2014

Aerial Fire Monitoring



- Fire perimeter delineation
- Fire intensity
- Rate of spread
- Effectiveness of suppression
- Useful for operational modelling of fire spread
- Command and control (live stream)

Aerial Fire Monitoring



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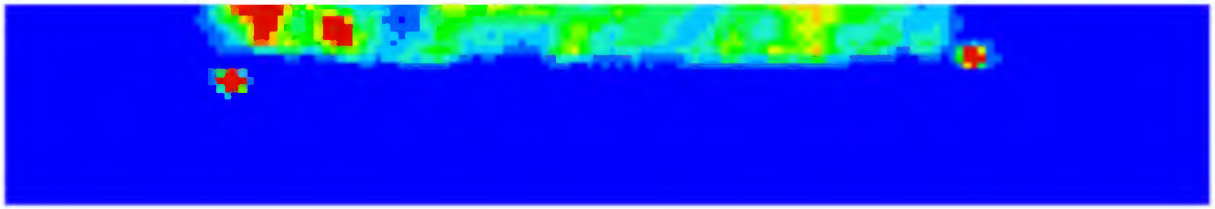
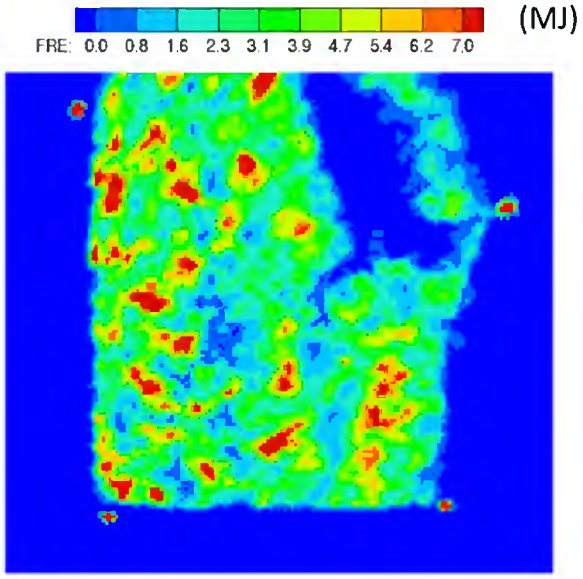


Aerial Fire Monitoring



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- Fire intensity
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- Useful for operational modelling of fire spread
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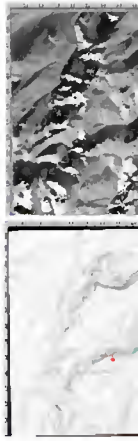
Species
Age class
Dead wood
Breaks
Continuum to canope

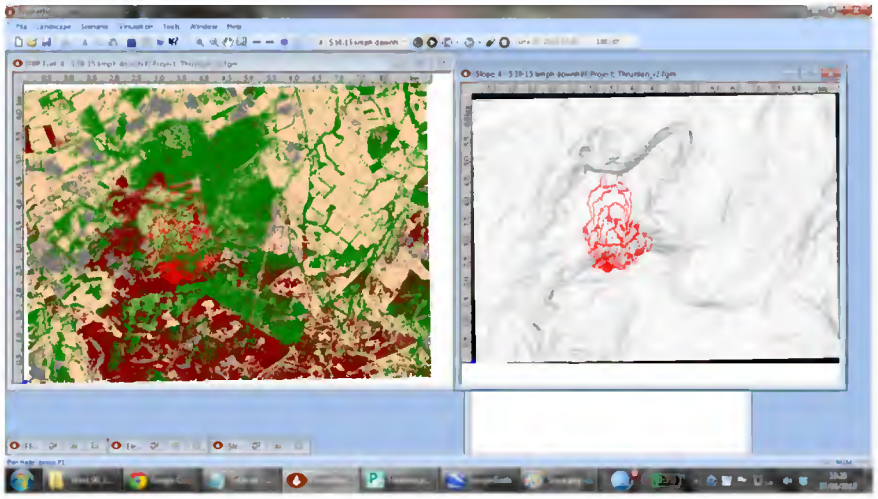
Modelling Inputs



Fire Growth Modelling

Prometheus and FARSITE:

- In the process of adapting for UK fuels
- Consideration of 'patchy' UK landscape



Meteorology

Topograp

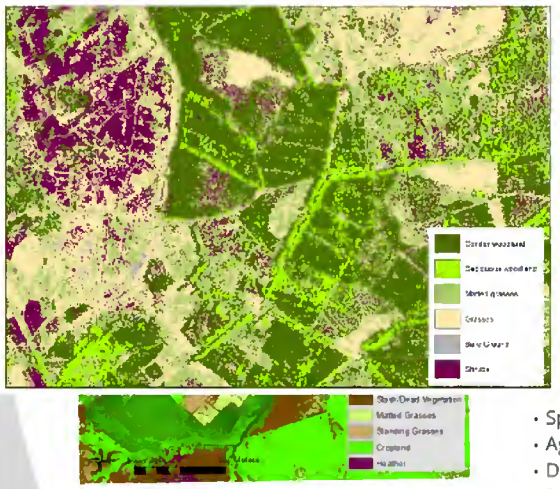
nap

Fuel

- Species
- Age class
- Dead wood
- Breaks
- Continuum to canopy

Topography

Modelling Inputs



High resolution fuel map

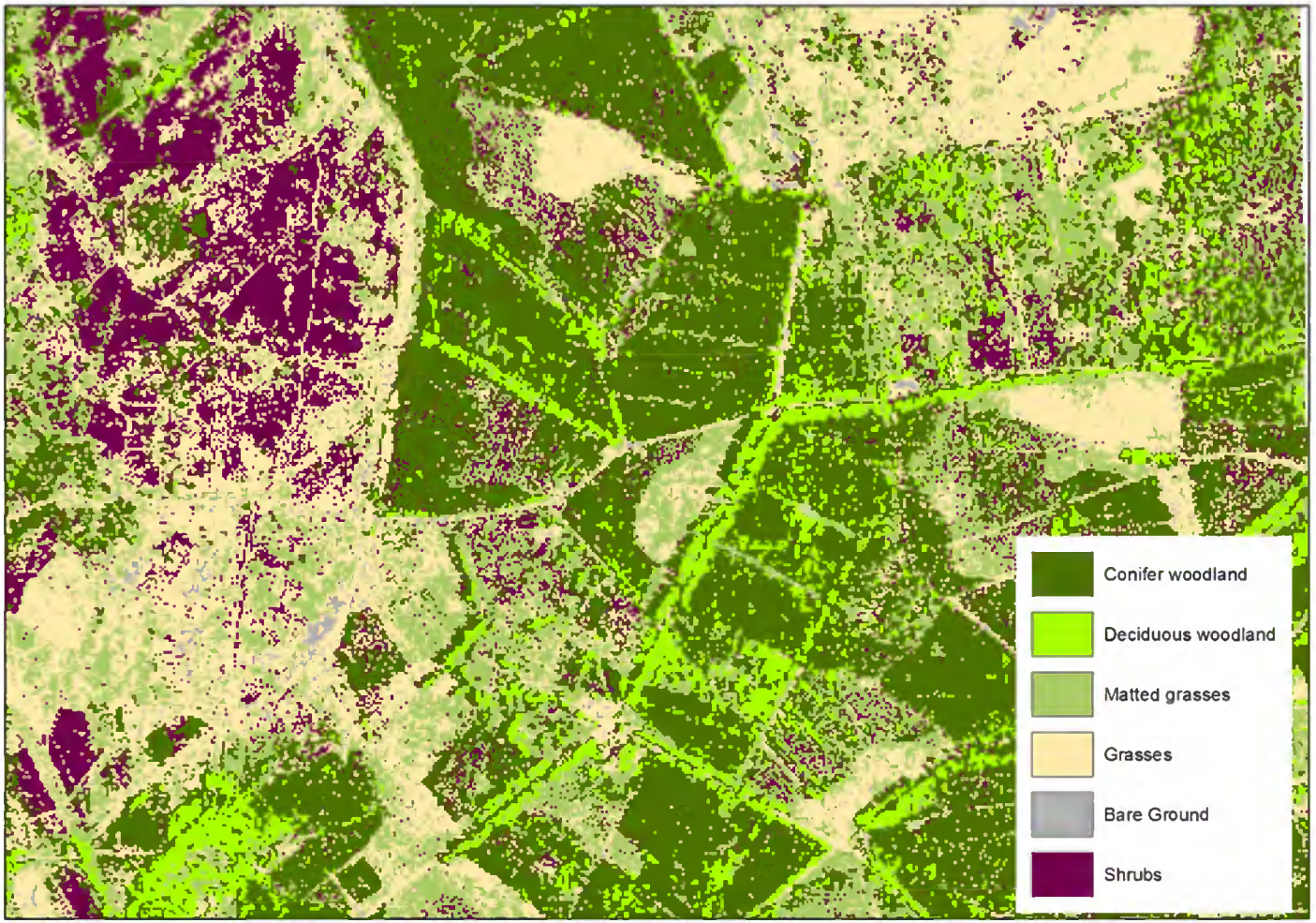
Fuel

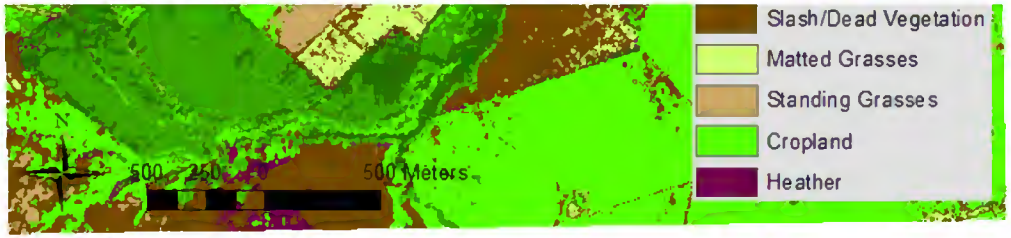
- Species
- Age class
- Dead wood
- Breaks
- Continuum to canope

Topo

Modelling Inputs

Fuel





High resolution fuel map

- Species
- Age class
- Dead wood
- Breaks
- Continuum to canope

During Fire:

- Wind speed
- Wind direction
- Relative Humidity
- Temperature
- Precipitation

Soil/Veg moisture:

- Rainfall
- Relative Humidity
- Temperature

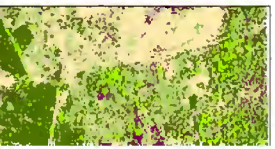
Solar drying:

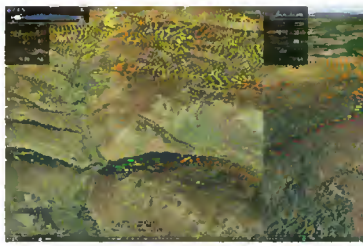
- Aspect
- Slope

Topographic winds:

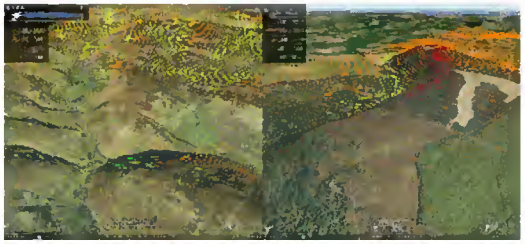
- Wind speed
- Wind direction

Meteorology



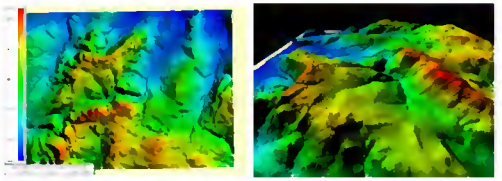


Topographic Winds



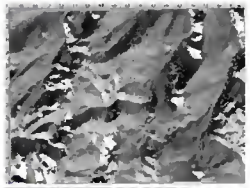
Topographic Winds

Topography

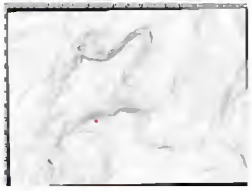


Digital Terrain Model - 5 m

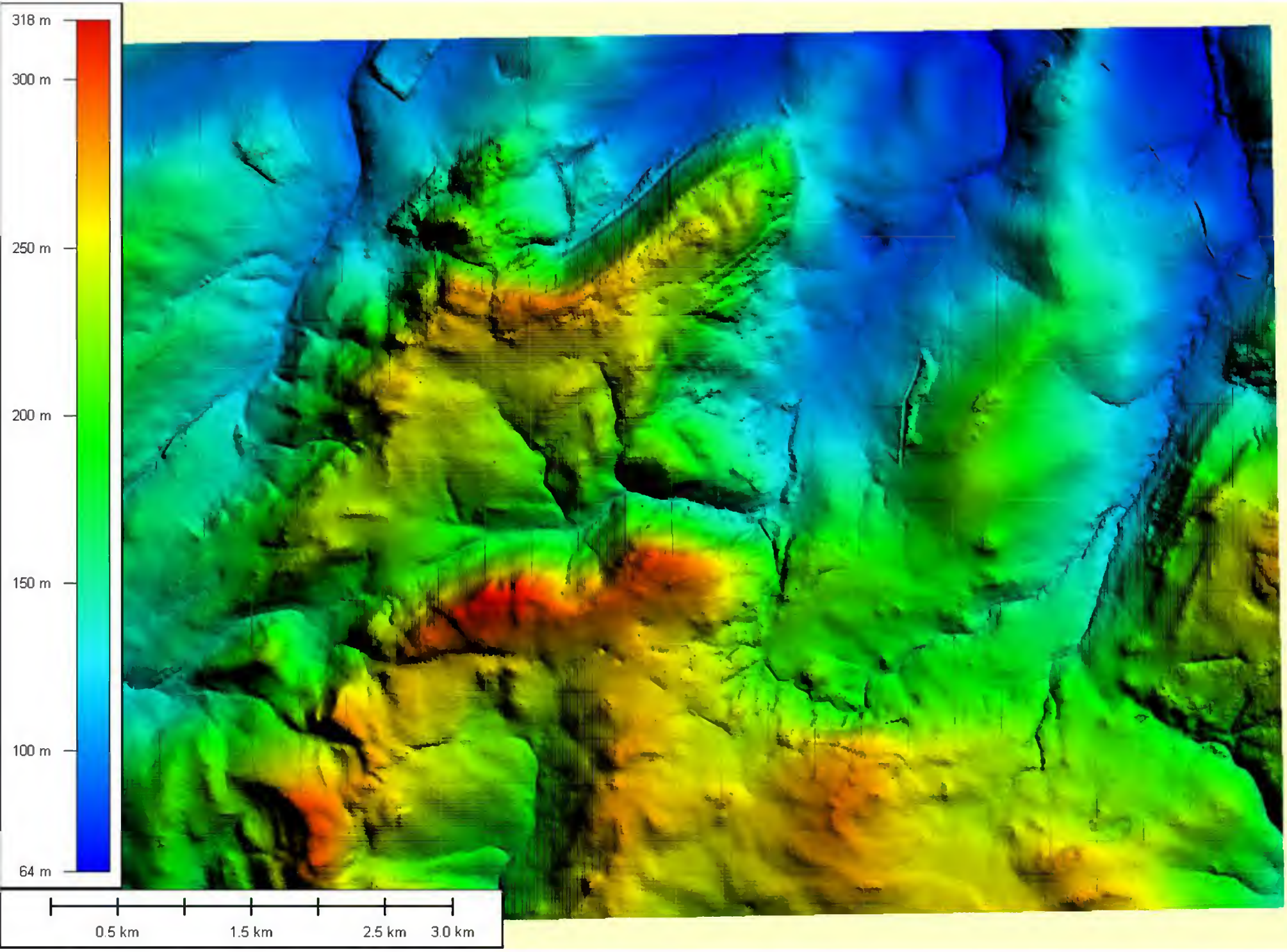
Modelling Inputs

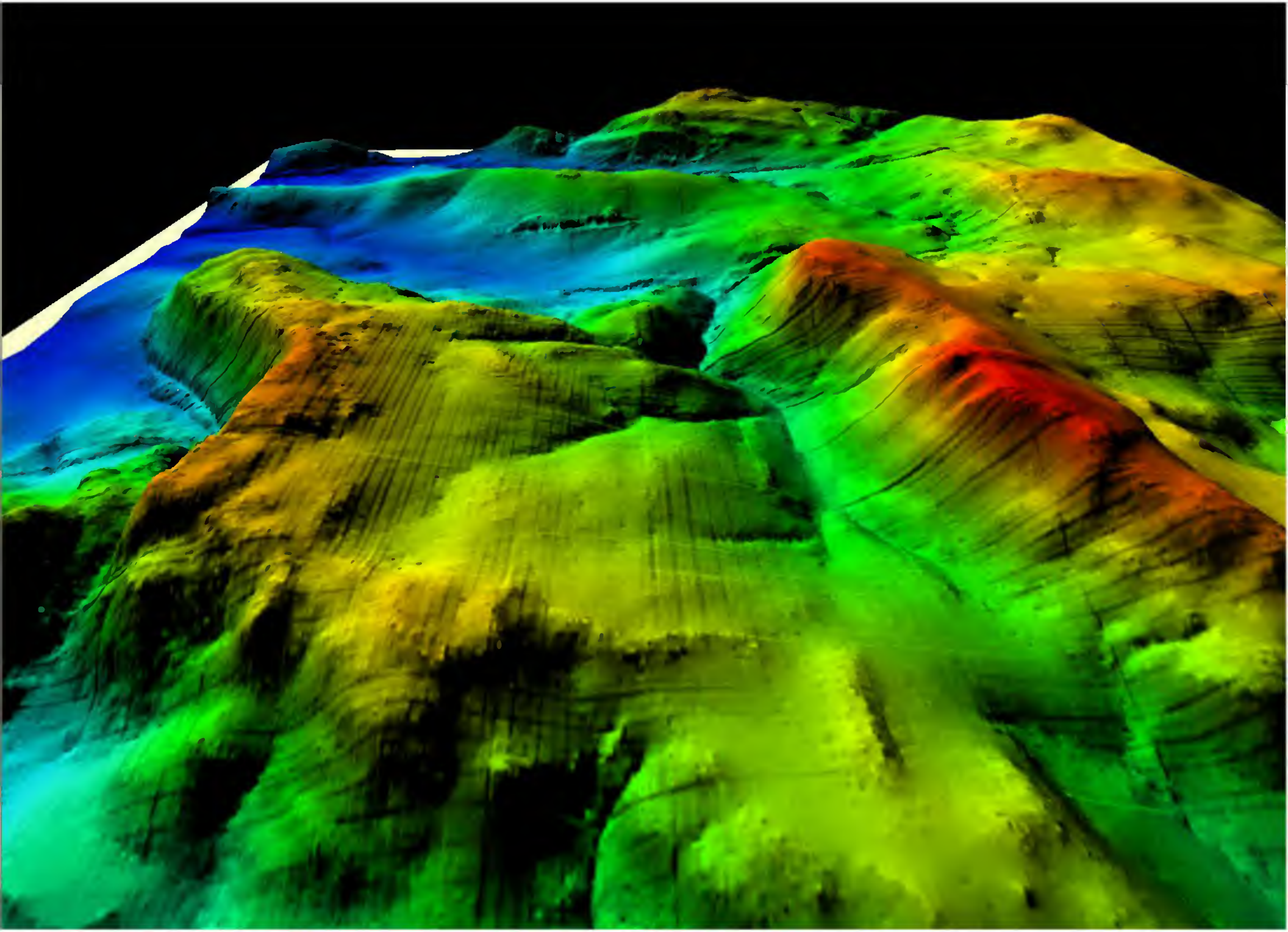


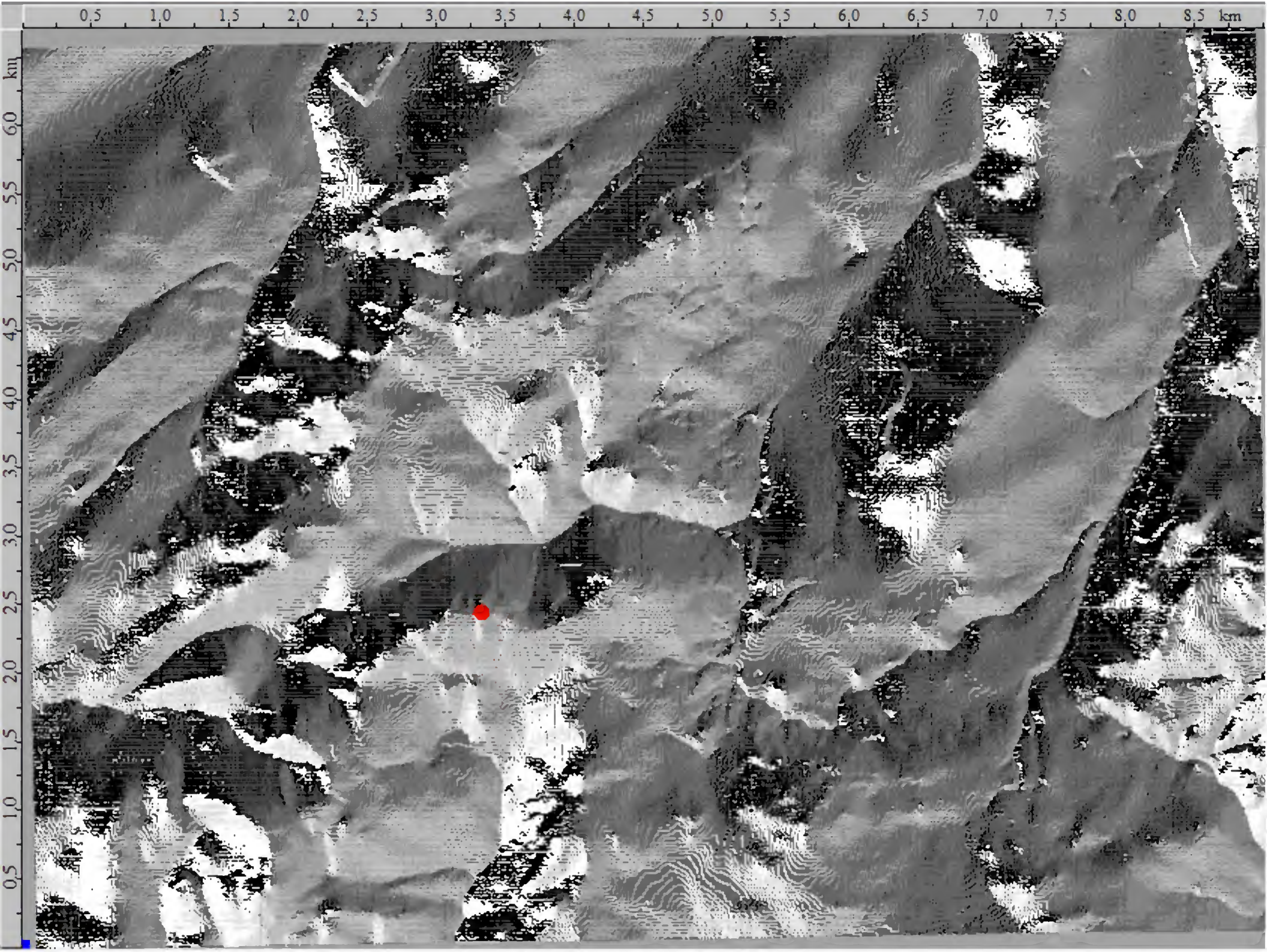
Aspect



Slope


318 m
300 m
250 m
200 m
150 m
100 m
64 m
0.5 km
1.5 km
2.5 km
3.0 km




0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
km
km
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5


0.5
1.0
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6.5
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8.0
8.5
km
km
6,0
5,5
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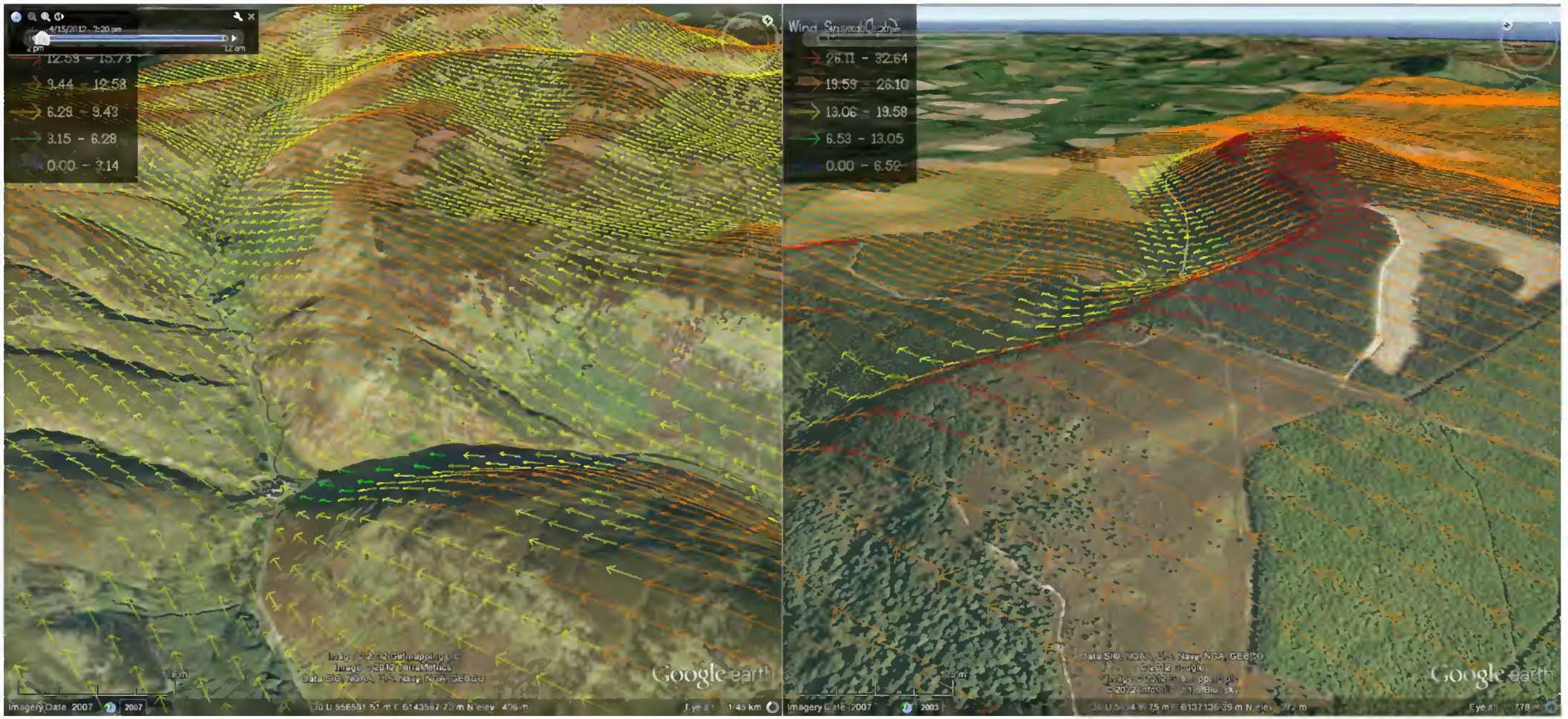
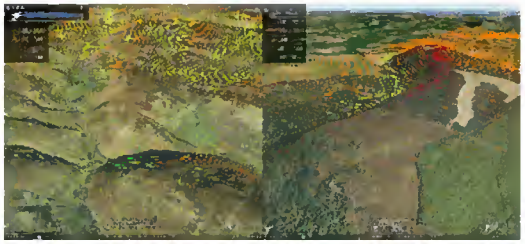
3,0
2,5
2,0
1,5
1,0
0,5

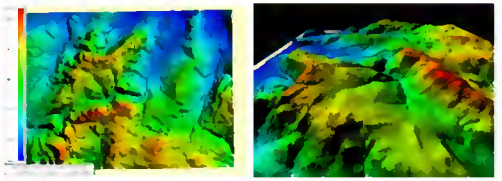


Topographic Winds



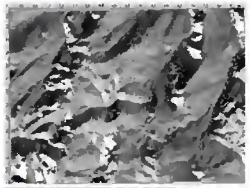
Topographic Winds

Topography

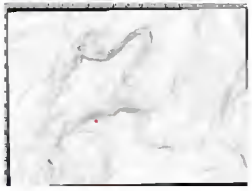


Digital Terrain Model - 5 m

Modelling Inputs



Aspect



Slope

Meteorology

Topograp

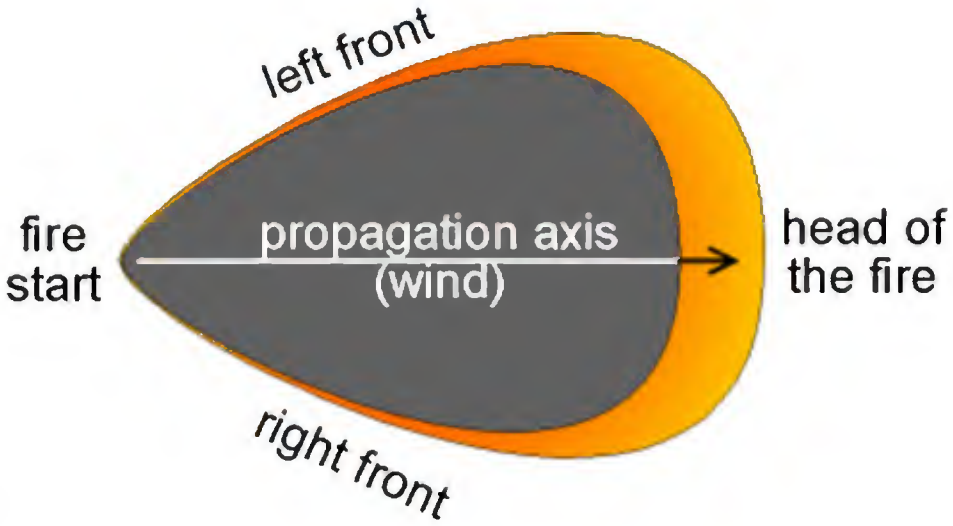
nap

Fuel

- Species
- Age class
- Dead wood
- Breaks
- Continuum to canopy

Topography

Modelling Inputs

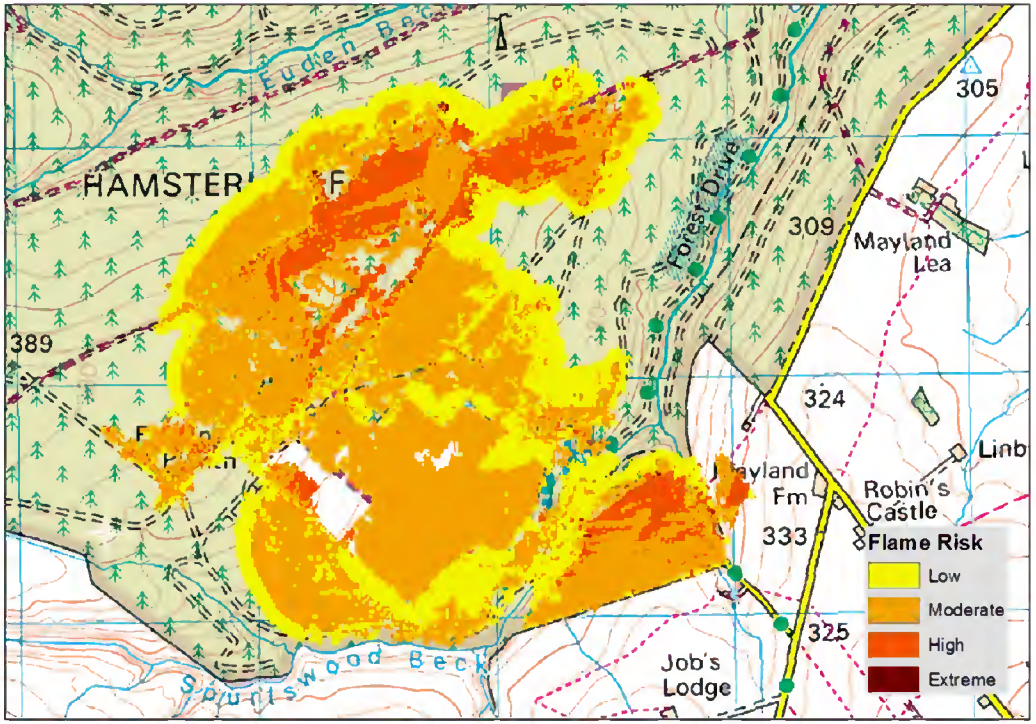


FIRE

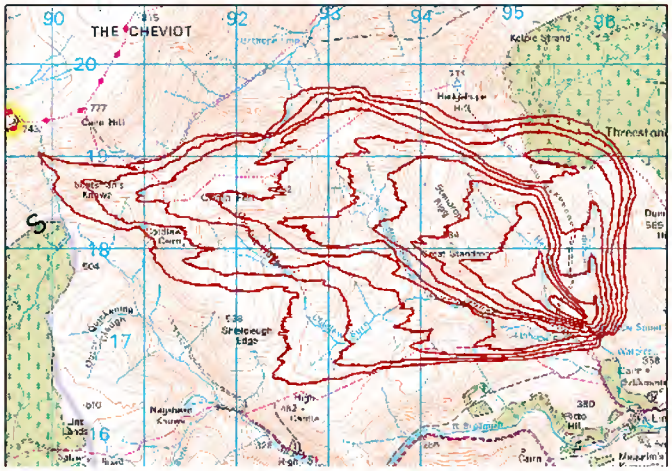
point/line/area ignition

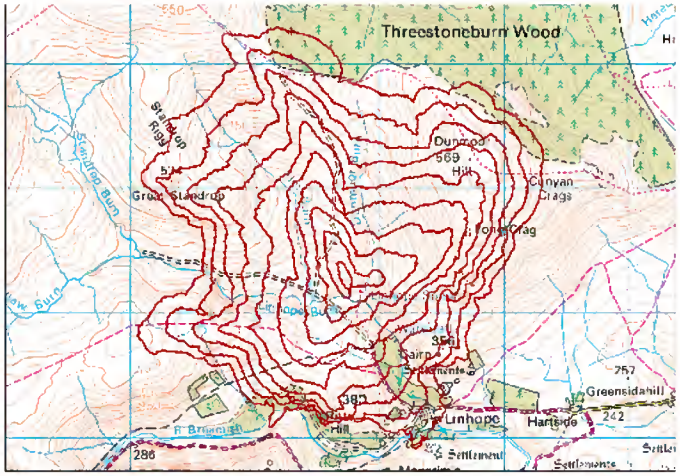
Modelling Outputs

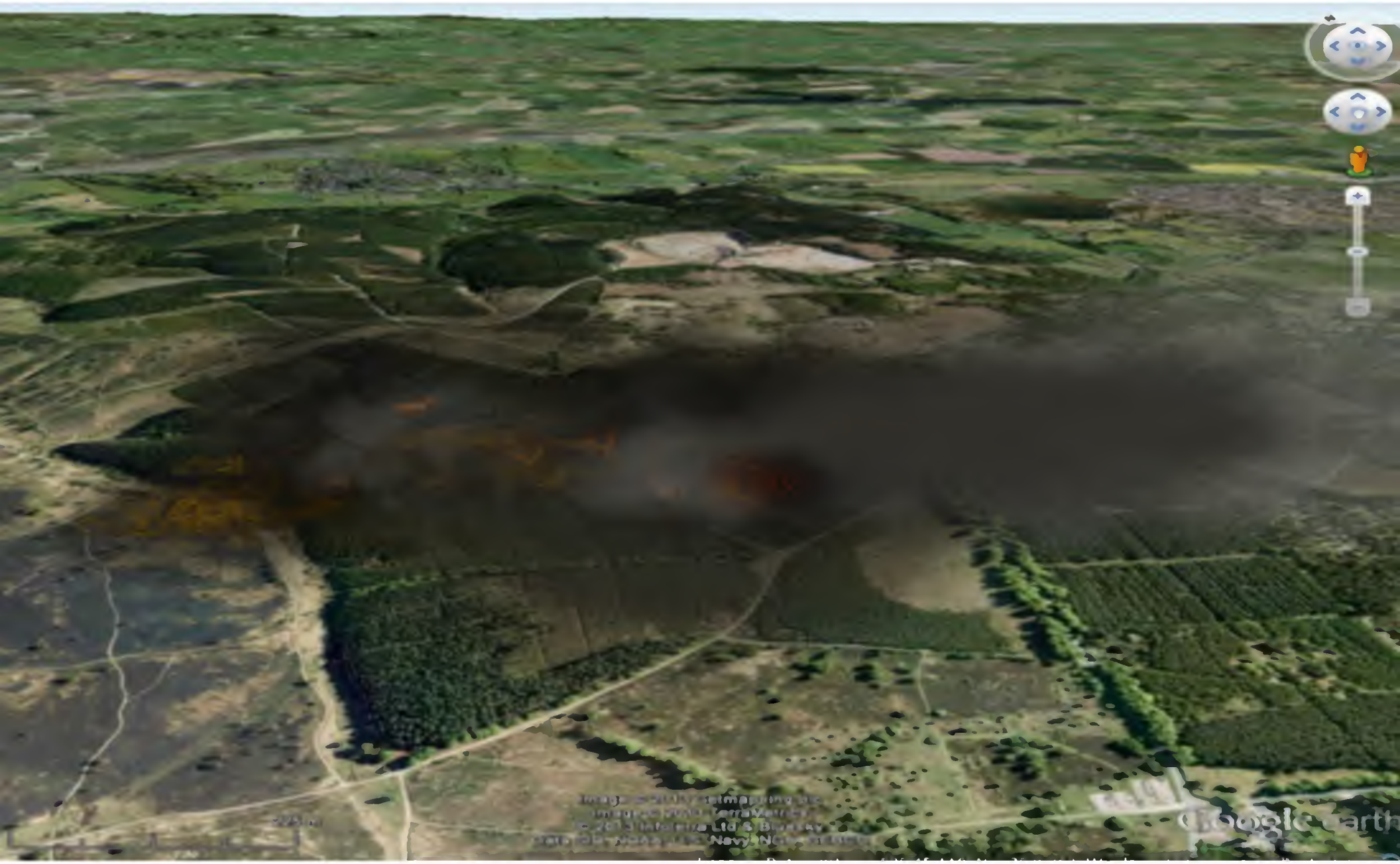
- Fire growth perimeters
- Fireline intensity
- Rate of spread
- Flame length - RISK



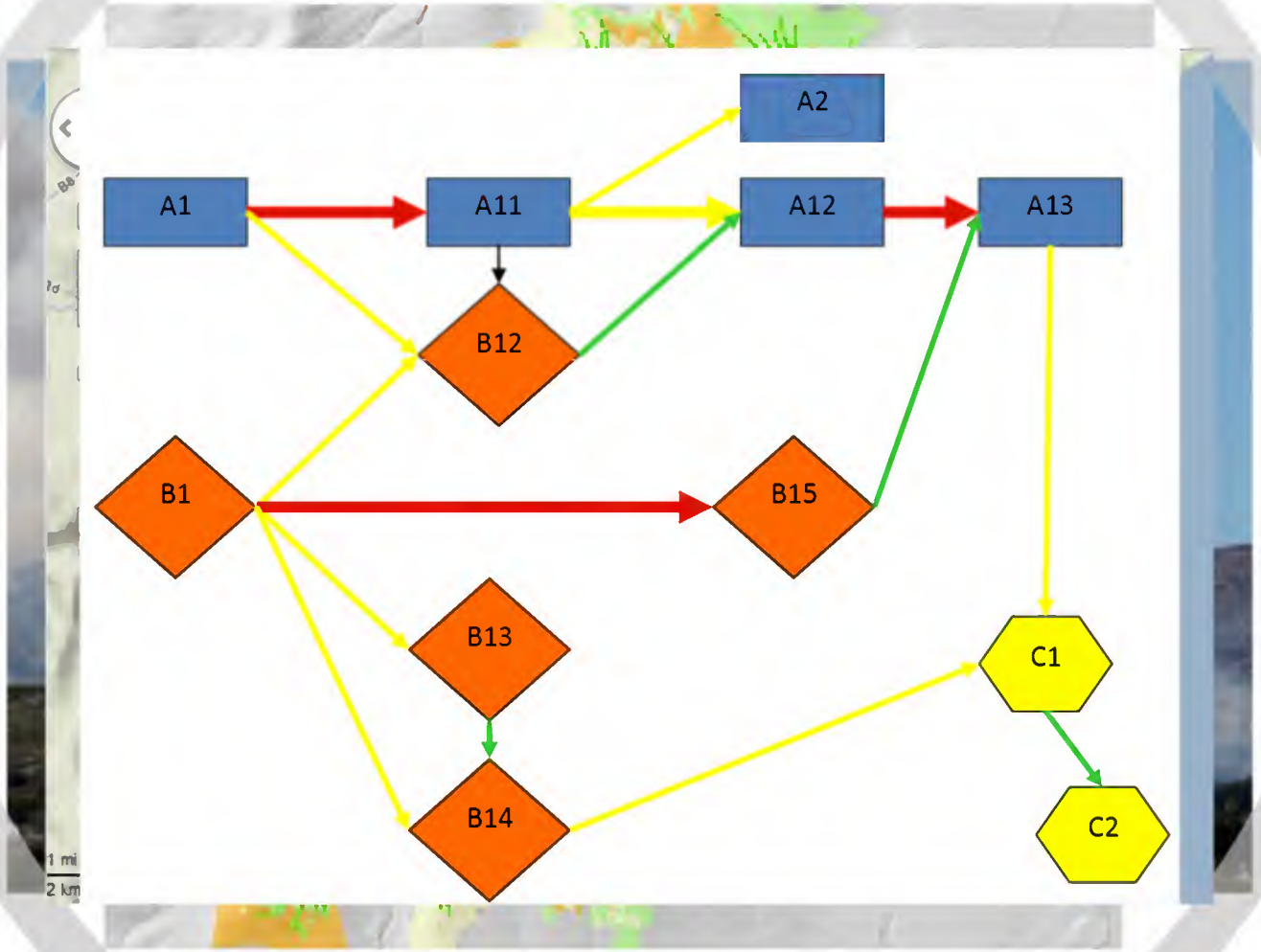
Linhope Exercise

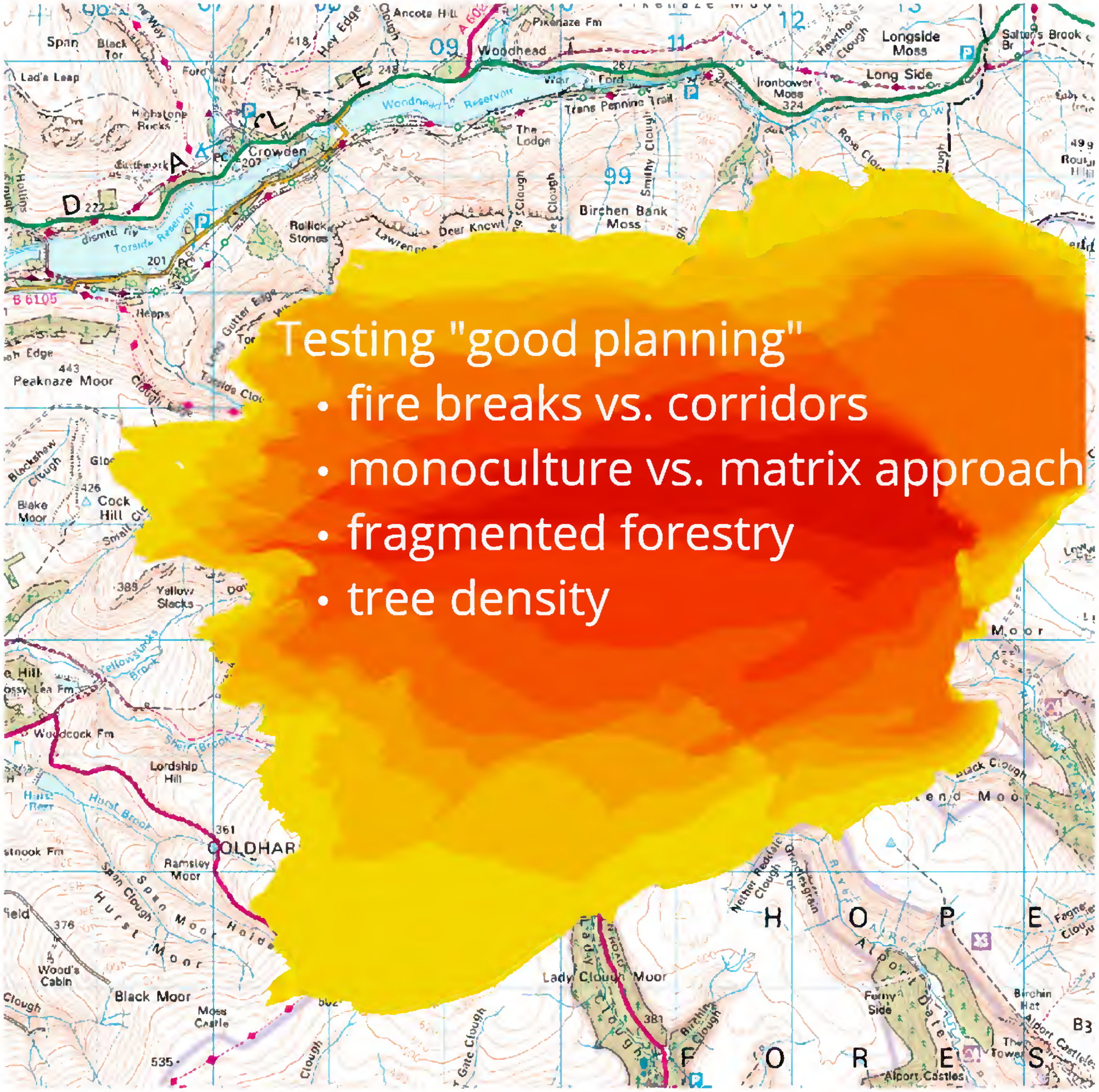






Fire Management





Testing "good planning"

- fire breaks vs. corridors
- monoculture vs. matrix approach
- fragmented forestry
- tree density

Questions?

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