UNIVERSITY OF EXETER

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Joining Forces to Better Manage the UK's Wildfires

Claire M. Belcher,

Andy Elliott, Ania Losiak

Kestrel Instruments

NERC SCIENCE OF THE ENVIRONMENT

HAIX

wildfire-lab.com

erc European Research Council Established by the European Commission

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Between 2010 and 2018 Fire and Rescue Services (FRS) in England:

Attended an average of 32,000 vegetation fires (wildfires) per year

Fires burned 37,000 hectares of land

Lasting 300,000 hours

Response costs = £55 million per yr

Ferndown Common, 2018

Forestry Commission Report analysis the time period 2010-2018

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- The UK has a relatively unique set of ecosystems

- Partially created by land management practices

- Sit amongst a rural-urban interface

This presents challenges both to FRS and researchers in their prediction of fire behaviour, assuring fire fighter safety and determining the impact of fire on ecosystems

This conference is called
'Manage the Fuel - Reduce the Risk'

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In order to understand the risk, manage the fuel and understand the fuels and their risk into the future we need to:

Characterise the fuels e.g. species, load, energy and moisture content under different conditions

– potential fire risk

Link these to the behaviour of the fires that they generate e.g. rate of fire spread, intensity of the fire and the flame lengths
– Fire danger = how dangerous are the fires to fight

Understand the impacts of this fire behavior on the ecosystem itself and how this might influence fuel into the future – continued fire risk, ecosystem services

These 3 points are critical to:

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1) Understanding the daily risk of vegetation fires occurring and where to stand up potential resources

2) Use resources effectively to action and manage any fires that result

3) Prescribe fire so that it has the planned effects on fuel and ecosystem health

So what steps do we need to take?

Frustrations

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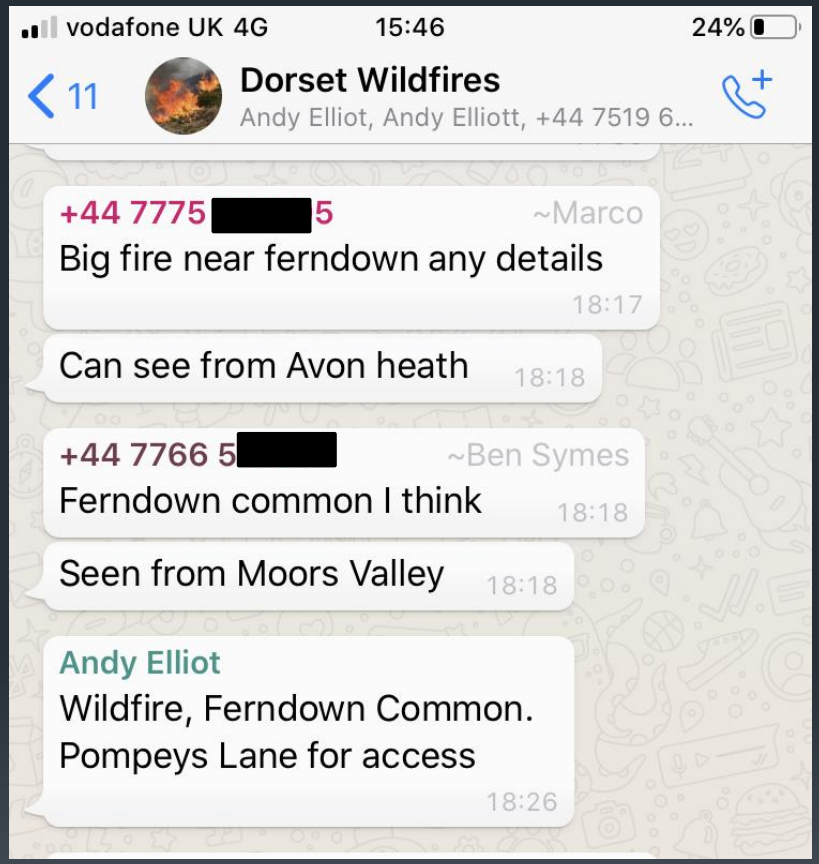
One of the most frustrating things as a researcher is our lack of ability to react rapidly to monitoring of wildfires

It is not always possible for us to reach the location of a wildfire or indeed be allowed access to a burning area for safety reasons

Ferndown Common, Dorset, 2018

Limits our ability to gather information from wildfires, such as observations of flame height, rate of spread and heat variations across the burned area



This is in contrast to fire and rescue services that have first-hand experience and access at the time of the fire

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Information exposure

During the fire

After the fire

Monitoring damage and regrowth

Fire and Rescue Services

Researchers

Ferndown Common, Dorset, 2018

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Information exposure

During the fire

After the fire

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Problem:

End up with disjointed information making it harder to improve fire management and firefighter safety whilst, also protecting communities and natural landscapes

Joining Forces

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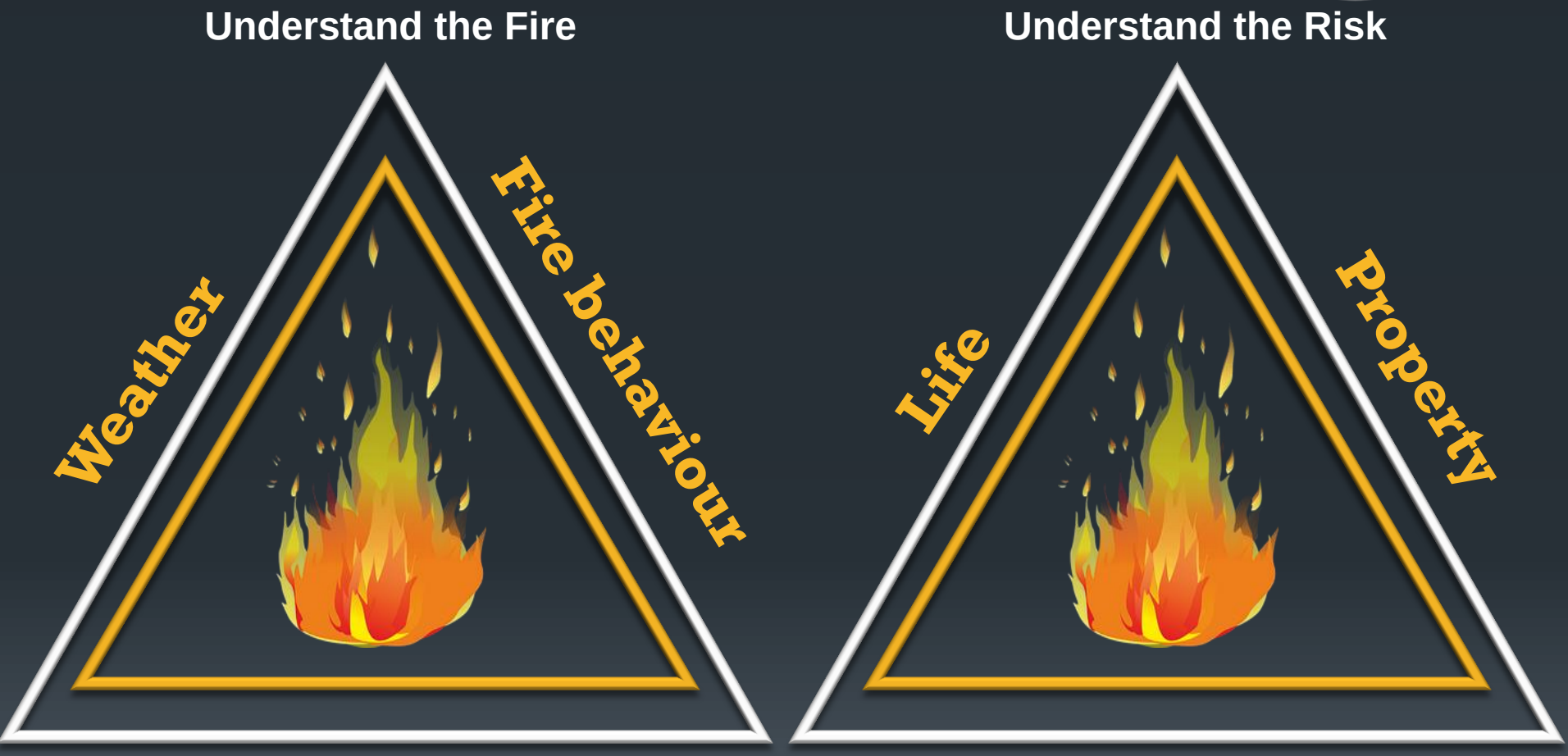

Fuel **Environment**

Solution: Wildfires can be better understood if scientists, researchers and Fire & Rescue Services work together – Are you interested to collaborate?

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- We are looking for partners from the FRS that attend wildfires and/or land managers that undertake management fires or prescribed burning

- We want you to join us to test prototype monitoring equipment that is simple and safe to deploy that will help us all to gain basic information about fire behaviour in UK vegetation types and the conditions experienced by firefighters

- Based on the prototype runs we will improve and re-send you improved equipment that together we can use to understand fire behaviour and its effects on firefighters and ecosystems

If you sign up what kit will you receive and why?

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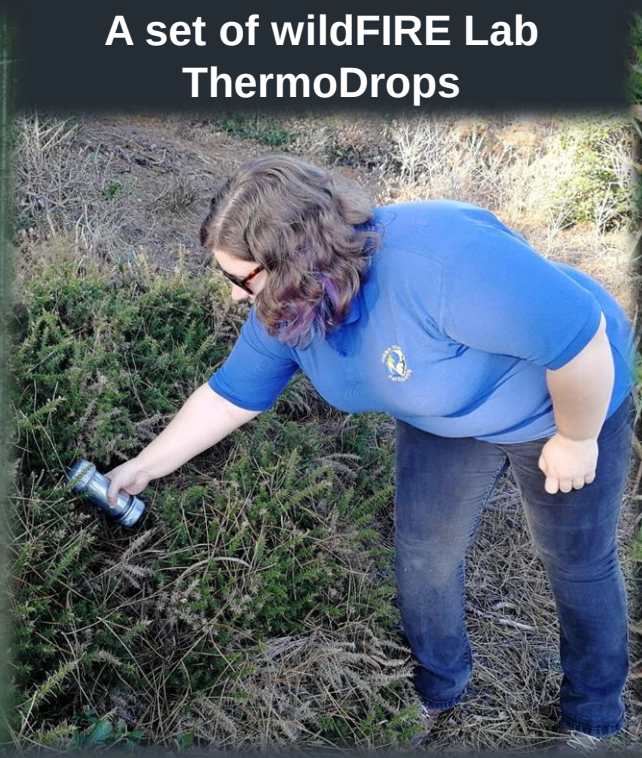
Monitoring Fire Conditions and Behaviour - Simple monitoring equipment

A set of wildFIRE Lab ThermoDrops



USB downloadable data logger – that tracks temperature variations through time

ThermoDrops record the rise and fall in temperature as the firefront passes

If you sign up what kit will you receive and why?

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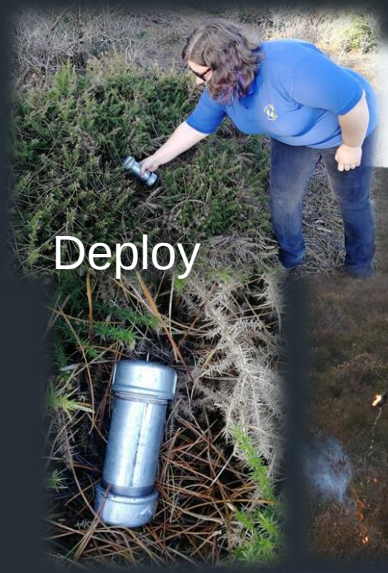
The ThermoDrops can be deployed rapidly into wildfires or in advance of management/prescribed burns



What data will we be able to collect?

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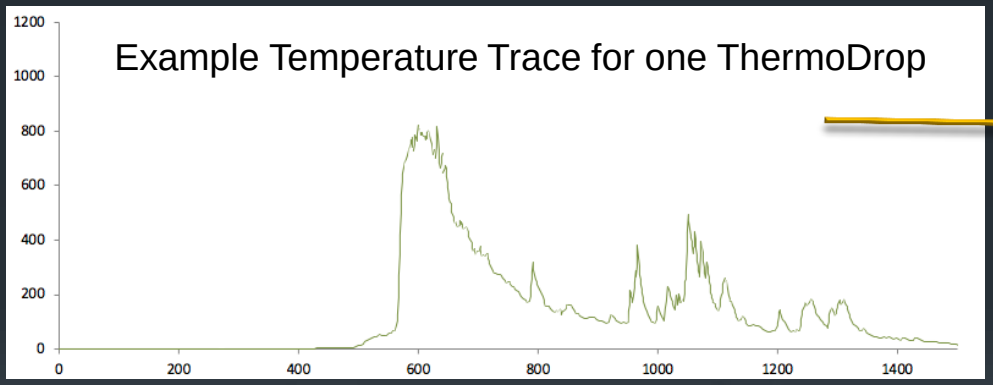
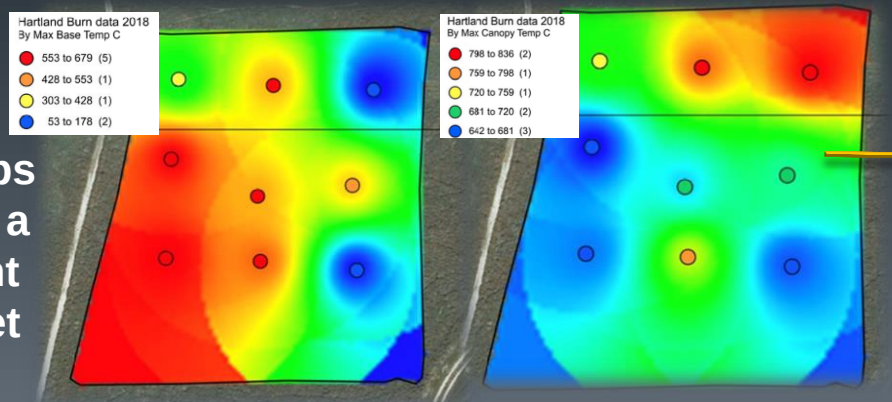


By combining data from different fires across the country we can compare:

Rate of spread in different fuel types and moisture conditions

Energy release from a range of different fuels and conditions

Heat maps made from ThermoDrops deployed in a management fire in Dorset



Assess damage-regrowth and success of prescriptions

If you sign up what kit will you receive and why?

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Monitoring the Conditions experienced by FRS

Kestrel 5500FW Fire Weather Pro – for measuring the Fire Weather

Monitor firefighter heat stress while fighting fires

Kestrel Drop personal monitor

What will the data collected enable us to improve?

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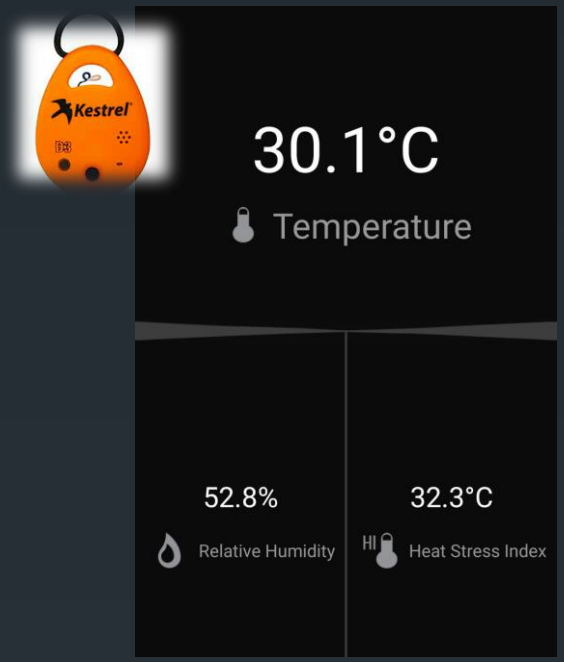

Drops link to a free smart phone app that downloads the information

OSHA Heat Index Guidelines

HEAT INDEX	RISK LEVEL	PROTECTIVE MEASURES
Less than 91°F	Lower(Caution)	Basic heat safety and planning
91 to 103 °F	Moderate	Drink ~4 cups of water/hour Take breaks as needed
103 to 155 °F	High	Drink water every 15-20 minutes Take frequent breaks Schedule heavy work tasks when the heat index is lower
Greater than 115 °F	Very hight to extreme	Drink water frequently Reschedule non-essential heavy work if possible Alert workers to heat index for the day and identify precations in place including who to call for medical help

This guidance is available online at www.osha.gov/SLTC/heatillness/heat_index

We will be using these data to build a calibration for Heat Stress Index recommendations for fire fighters

So with collaboration with FRS we can provide useful data towards optimizing conditions for FRS during fire containment

Recommended Modifications to Athletic Participation Based on the Heat Index

APPARENT TEMPERATURE	HEAT STRESS RISK WITH PHYSICAL ACTIVITY AND/OR PROLONGED EXPOSURE
90°-104°	Heat cramps or heat exhaustion possible ***Modify practice; take water breaks every 15 to 20 minutes.***
105°-124°	Heat cramps or heat exhaustion likely. Heatstroke possible ***Modify practice. NO HELMET OR SHOULDER PADS, t-shirt and shorts only; frequent (every 15 minutes) water and rest breaks.***
>125°	Heat stroke highly likely ***Recommend NO PRACTICE!***

Note: This Heat Index chart is designed to provide general guidelines for assessing the potential severity of heat stress . Individual reactions to heat will vary. It should be remembered that heat illness can occur at lower temperatures than indicated on the chart. In addition, studies indicate that susceptibility to heat disorders tends to increase with age.

Are you interested to join forces?

Would you and your crews be willing to:

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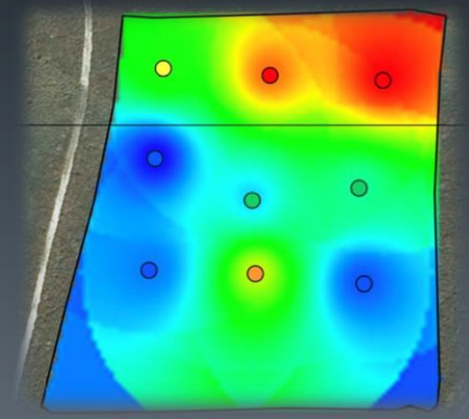
Deploy ThermoDrops into training fires, prescribed fires, wildfires?

Monitor general conditions and the conditions you and your crews are experiencing?

Work with us to interpret and understand the data and the implications?



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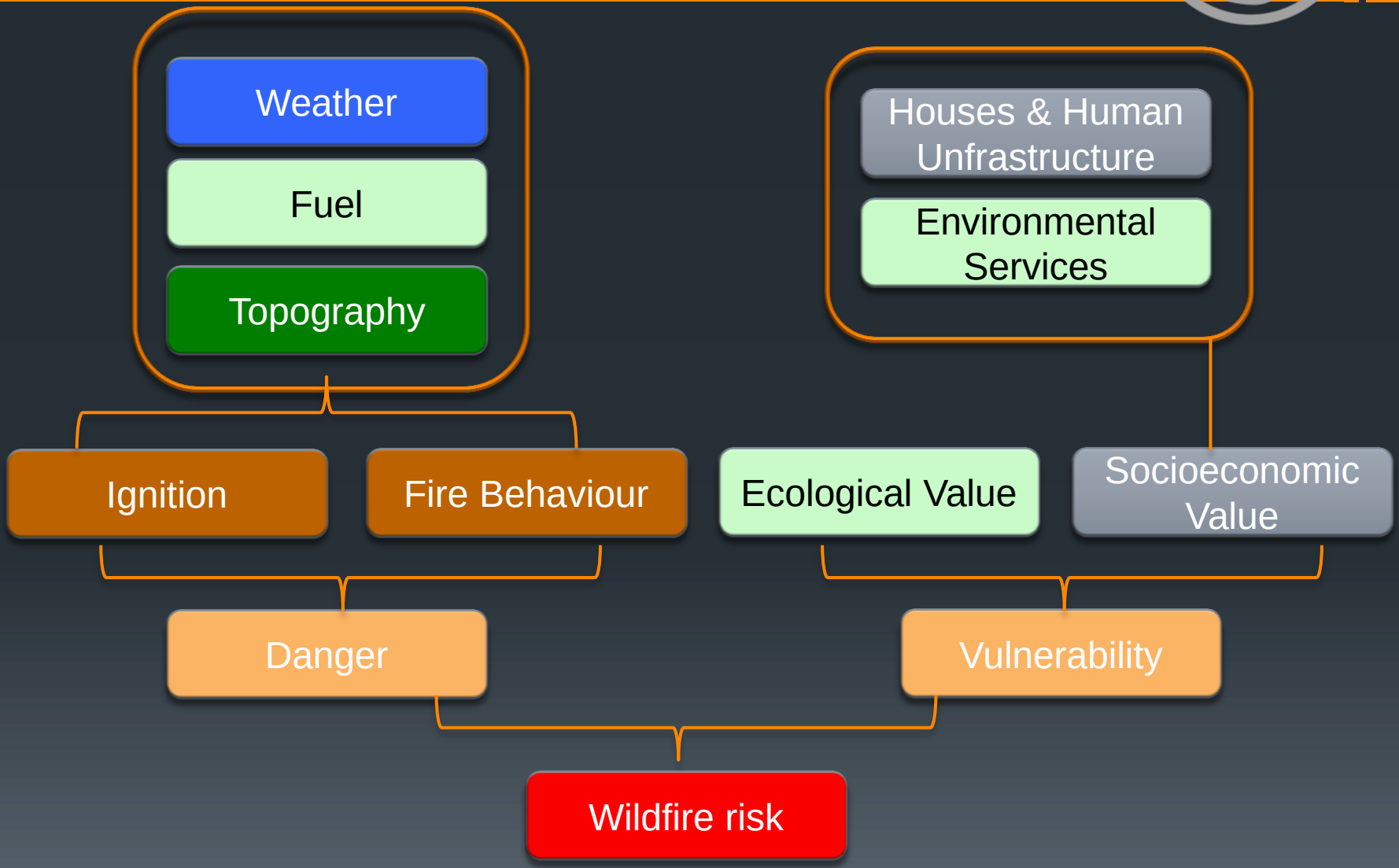

Towards a UK Fire Danger Rating System

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PLEASE CONTACT ME (CLAIRE BELCHER)
AT
C.BELCHER@EXETER.AC.UK
www.wildfire-lab.com

FIRE ECOLOGY ACROSS BOUNDARIES: CONNECTING SCIENCE AND MANAGEMENT

October 20-23, 2020

Florence, Italy

The Association for Fire Ecology and Pau Costa Foundation are partnering with Regione Toscana and University of Florence to host a conference in Europe for diverse stakeholders involved in wildfire management. Save the date and join us in Florence for workshops, plenary and concurrent presentations, and field trips.

For more information visit fireacrossboundaries.org

Association for Fire Ecology

PAU COSTA FOUNDATION

UNIVERSITÀ DEGLI STUDI FIRENZE
DAGRI
DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

REGIONE TOSCANA

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If you sign up what kit will you receive and why?

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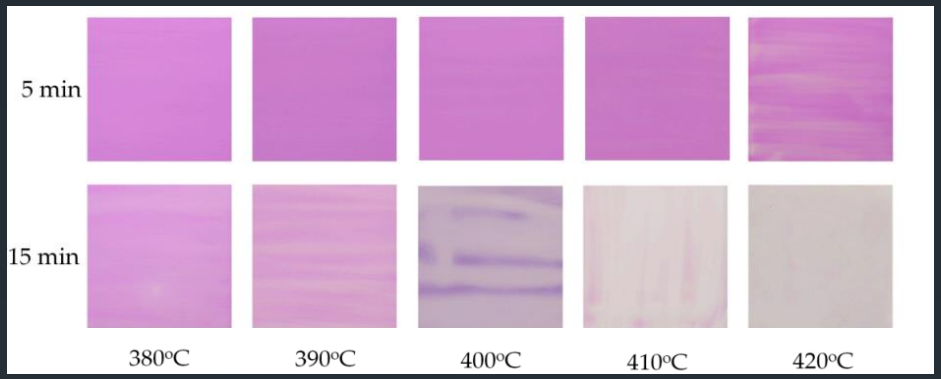
Monitoring Fire Conditions and Behaviour - Simple monitoring equipment

Making some thermochromatic paints



Possible rapid deploy ground stakes to monitor temperature and duration in heather canopy for example