Spot-fire Project: research and utilisation

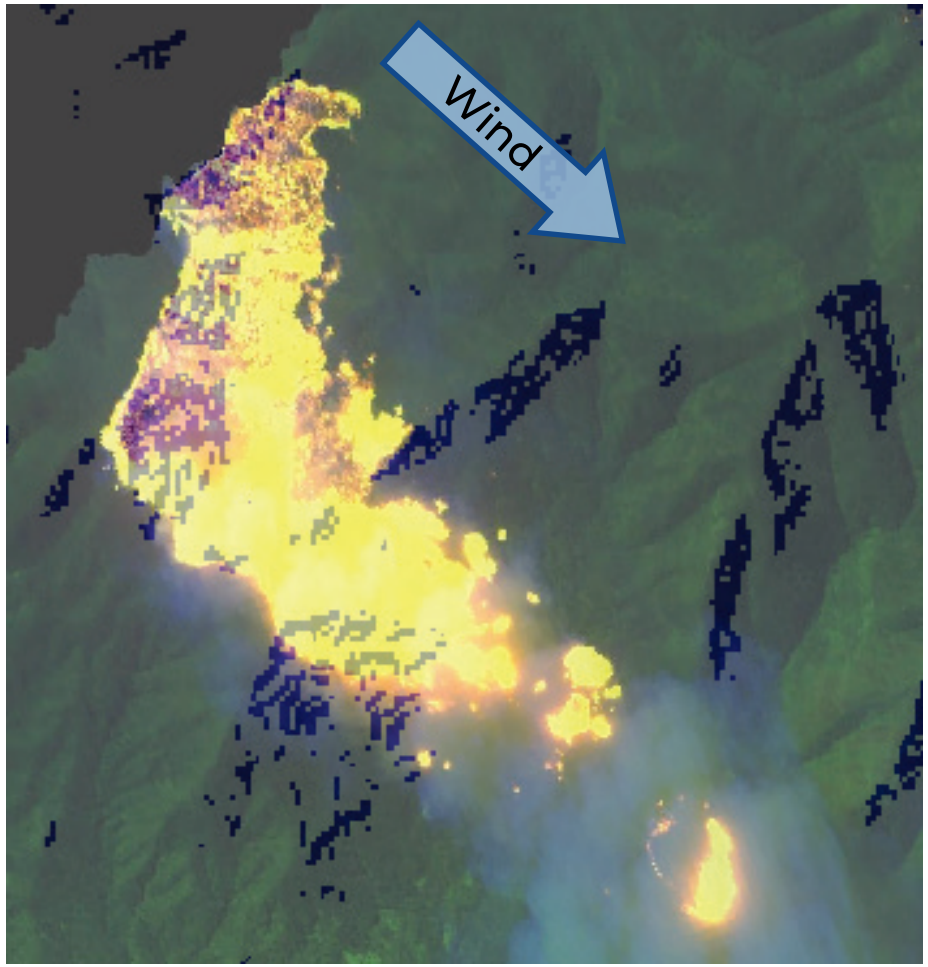
Research Advisory Forum / 2019

Jason J. Sharples [a,d], James E. Hilton [b,d], Andrew L. Sullivan [c,d]

[a] University of New South Wales
[b] CSIRO Data 61
[c] CSIRO Land and Water
[d] Bushfire and Natural Hazards CRC

Utilisation

Development of tools for identifying regions prone to mass spotting

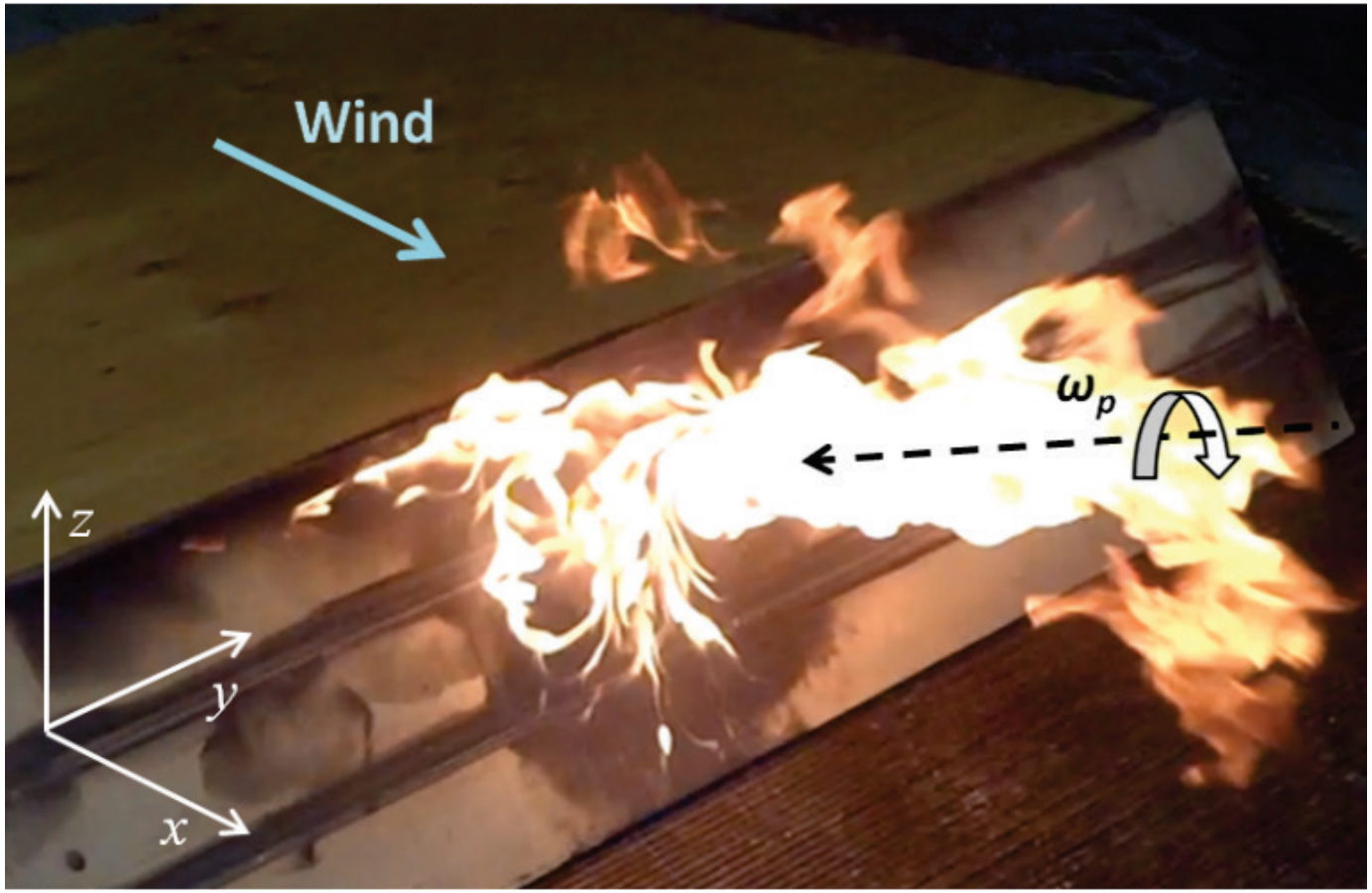


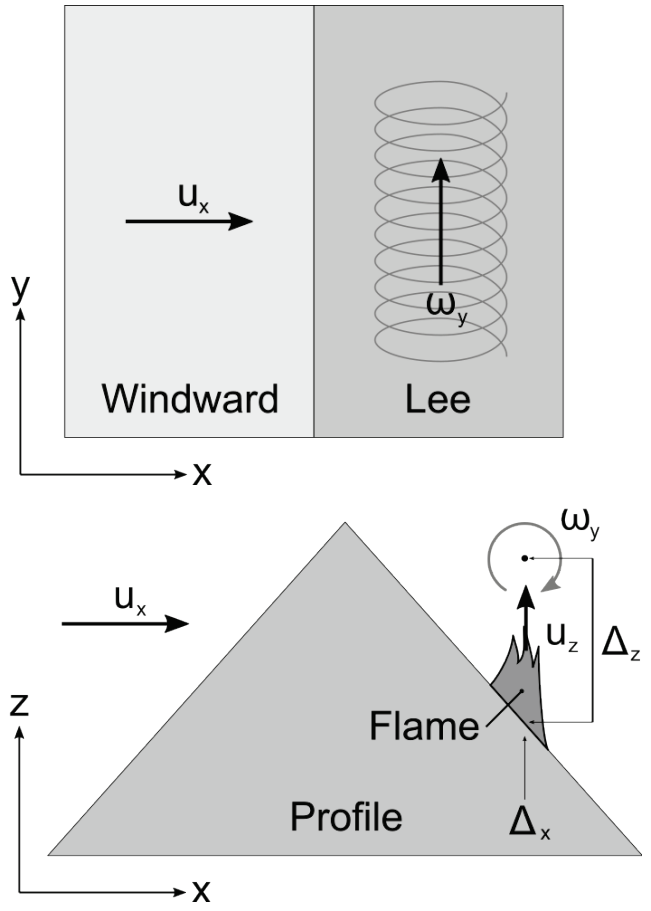
- Scaled to fit operational practice and embedded in current operational frameworks
- Automatically incorporates relevant spatial information, including forecast updates or scenario inputs
- Training packages including video material.

Project starts 2020…!

Modelling dynamic fire propagation

NEAR FIELD MODELLING OF VORTICITY-DRIVEN LATERAL SPREAD



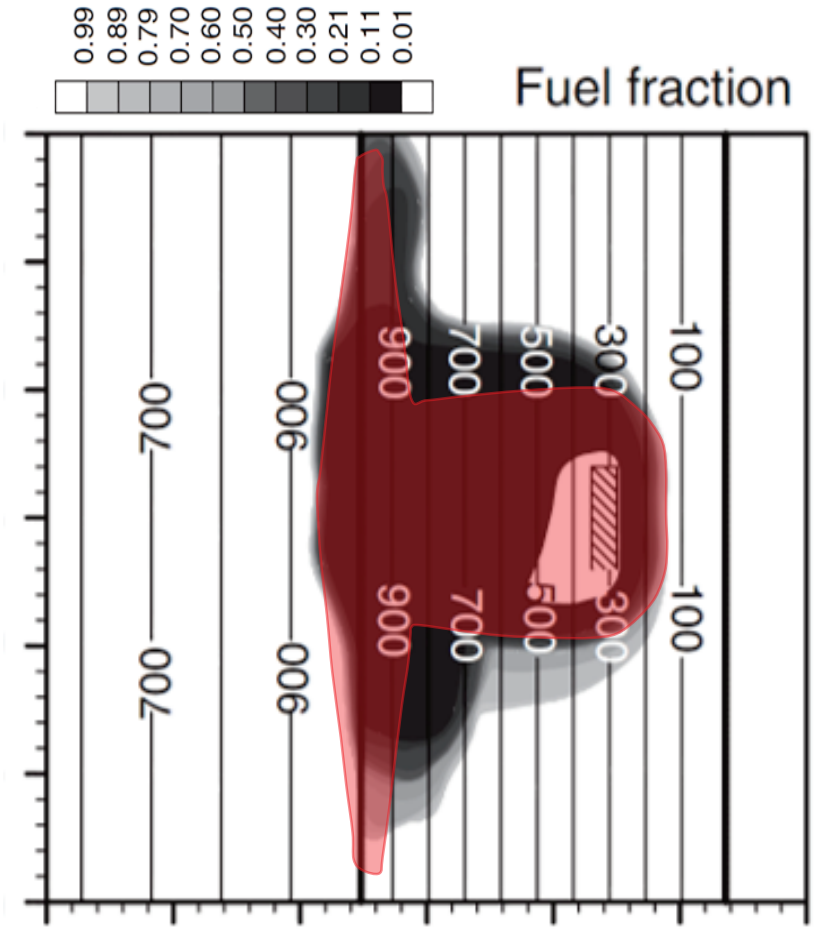


Modelling dynamic fire propagation

NEAR FIELD MODELLING OF VORTICITY-DRIVEN LATERAL SPREAD

Coupled fire -atmosphere model simulation

Approx. 10 hours to run on NCI supercomputer



Near field model simulation

Approx. 10 seconds to run on a laptop.

frontiers

Modelling vorticity-driven wildfire behaviour using near-field techniques

Jason J. Sharples [1,*] and James E. Hilton [2]

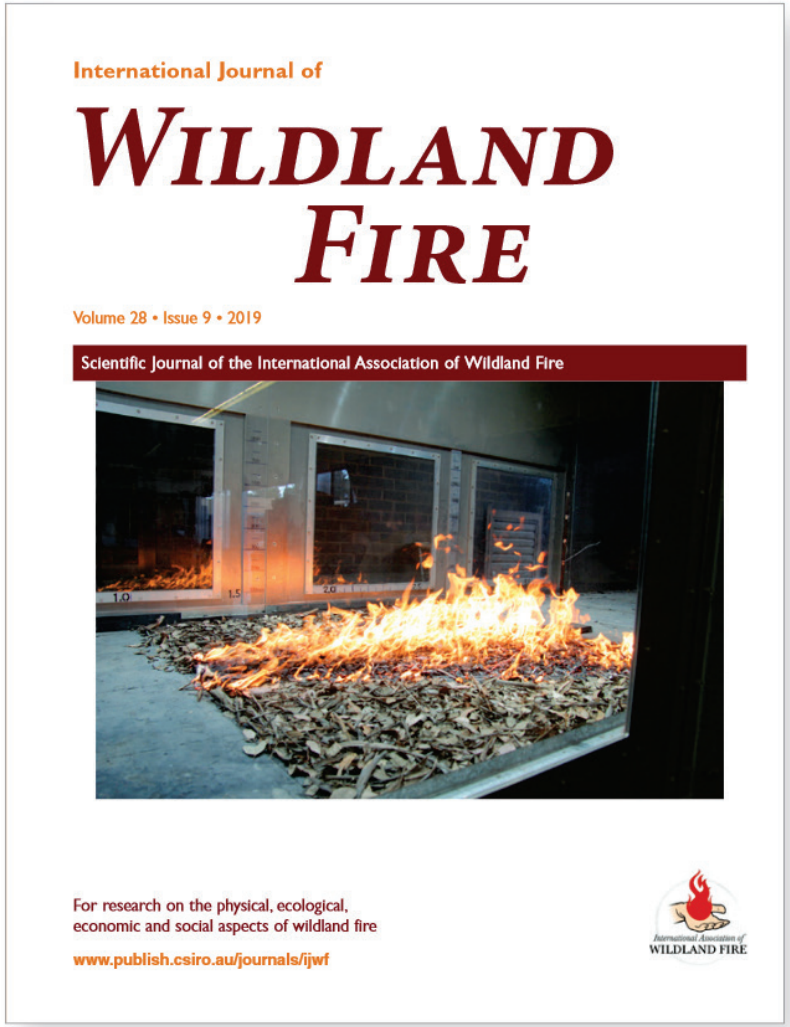
[1] *School of Science, UNSW Canberra, ACT 2600, Australia.*
[2] *CSIRO Data61, Clayton South, VIC 3169, Australia*

Frontiers in Mechanical Engineering.
Special Issue on Wildland Fire

Modelling dynamic fire propagation

V-FIRE PYROTRON EXPERIMENTS

- No increase in vertex speed under no-wind conditions
- Significant increase in the vertex speed in the presence of wind
- Results confirm that fireline interactions can influence the behaviour and spread of coalescing fire fronts
- Further research is required to understand the precise mechanisms driving this behaviour



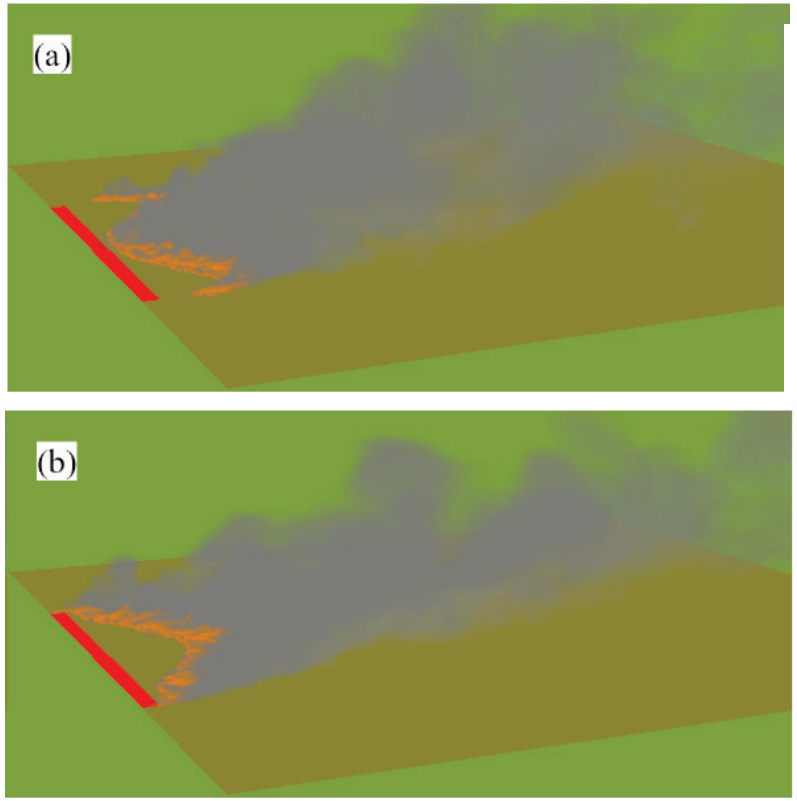
CSIRO PUBLISHING
International Journal of Wildland Fire **2019**, *28*, 704–719
https://doi.org/10.1071/WF18217

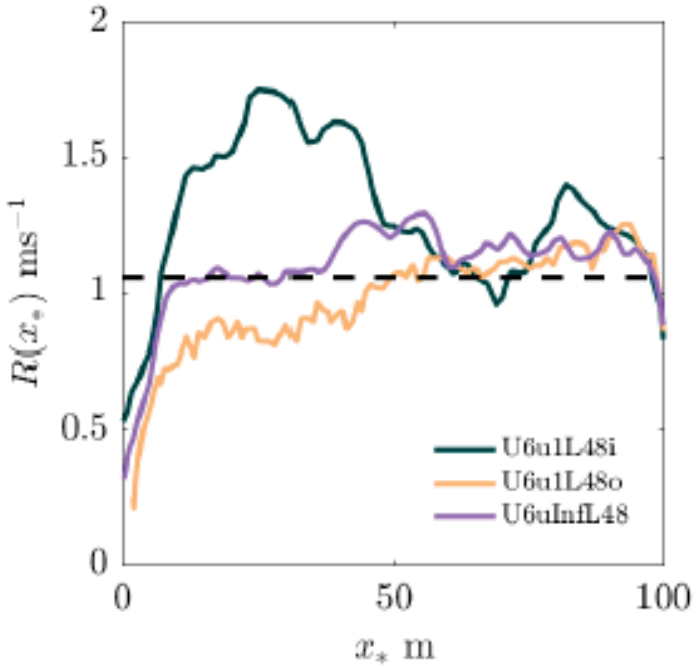
Investigation of the effects of interactions of intersecting oblique fire lines with and without wind in a combustion wind tunnel

Andrew L. Sullivan [A,D], *William Swedosh* [B], *Richard J. Hurley* [A], *Jason J. Sharples* [C] and *James E. Hilton* [B]

Modelling dynamic fire propagation

LINKAGES WITH OTHER BNHCRC PROJECTS

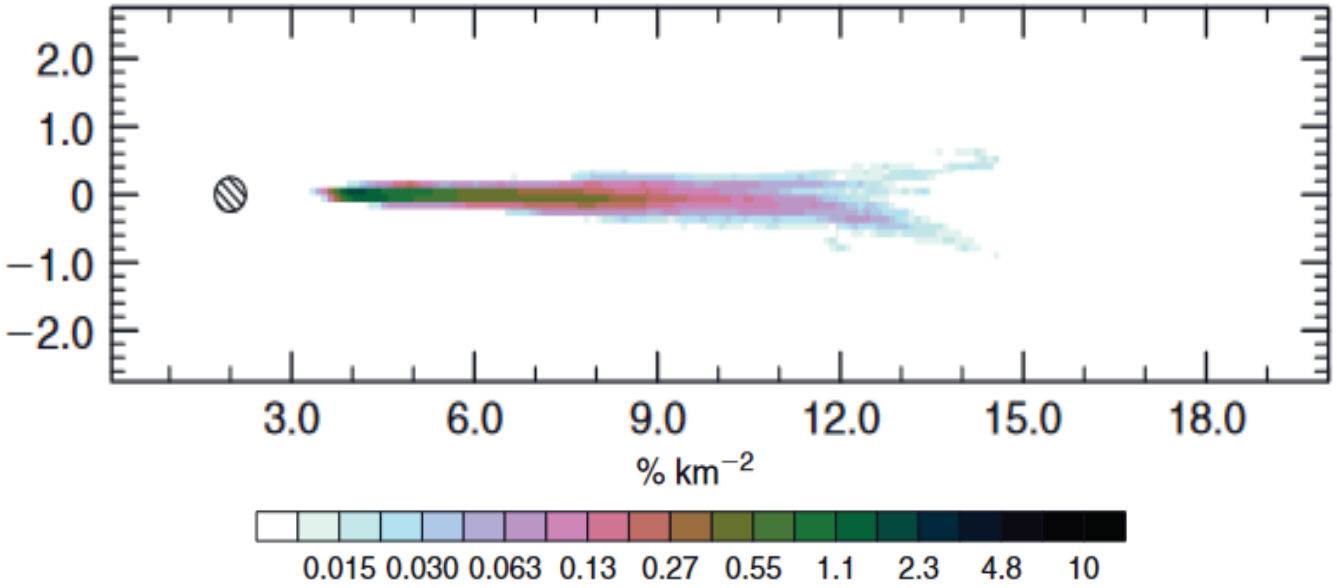




Sutherland, D., Sharples, J.J., Moinuddin, K.A.M. (2019) The effect of ignition protocol on grassfire development. *International Journal of Wildland Fire.* In press.

Modelling the spotting process

WIND-TERRAIN EFFECTS ON SPOTTING DISTRIBUTION

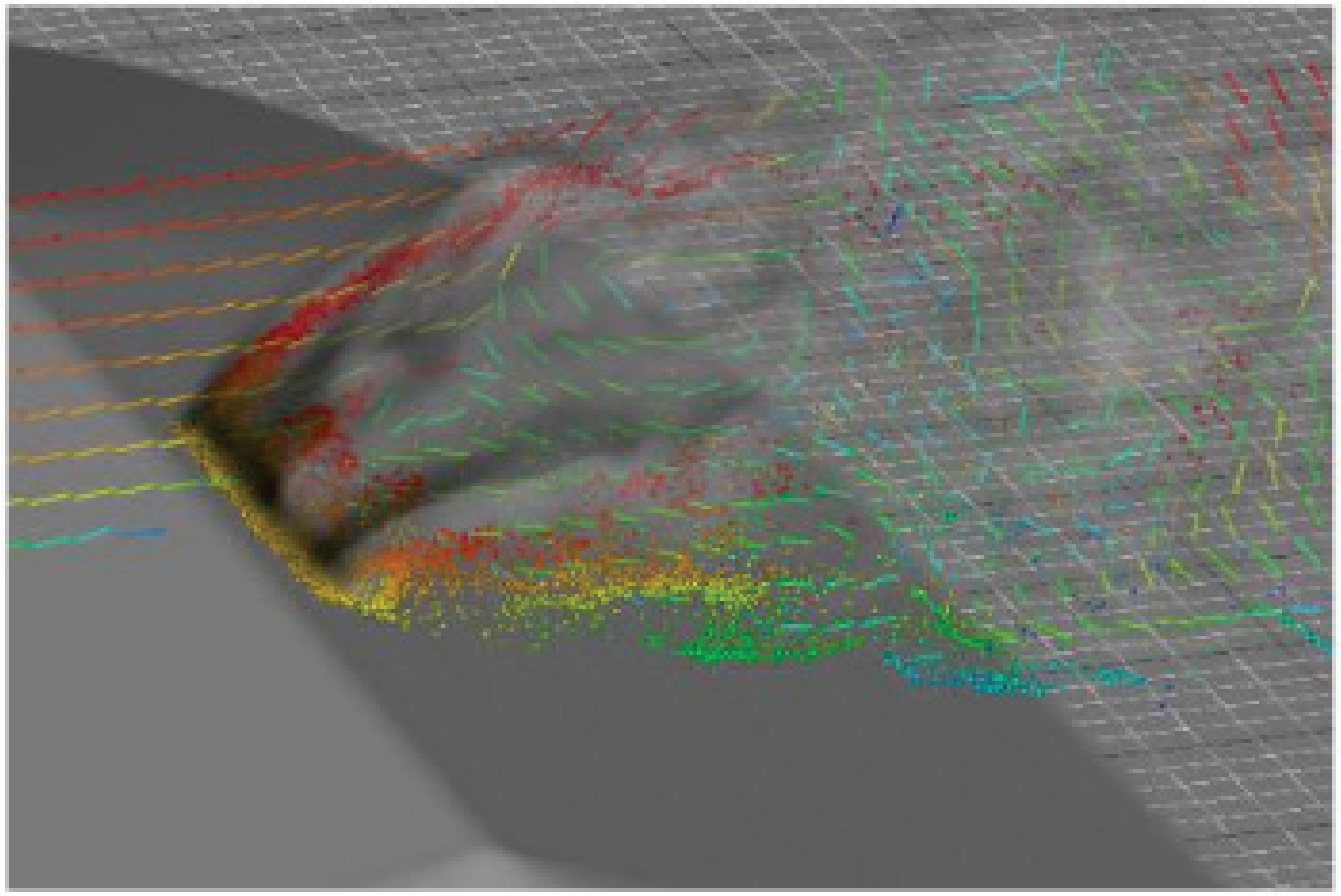


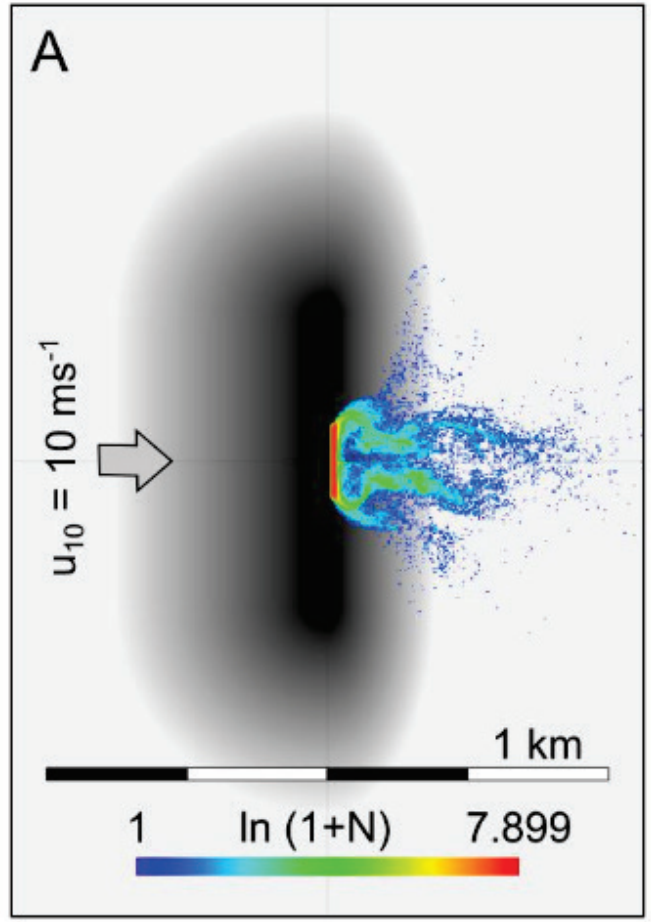
No terrain!

Thurston et al. (2017) The contribution of turbulent plume dynamics to long-range spotting. *International Journal of Wildland Fire*, 26(4): 317-330.

Modelling the spotting process

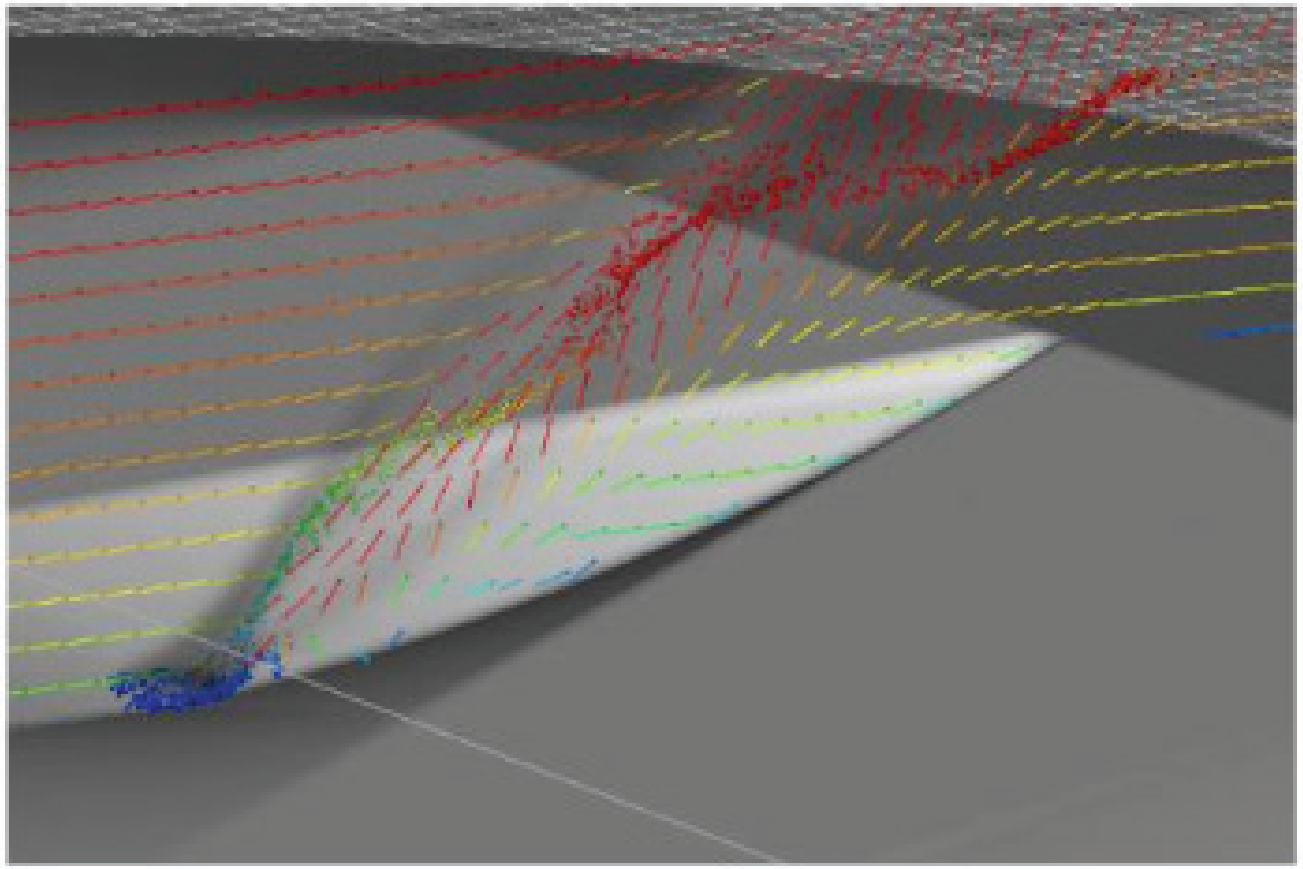
WIND-TERRAIN EFFECTS ON SPOTTING DISTRIBUTION

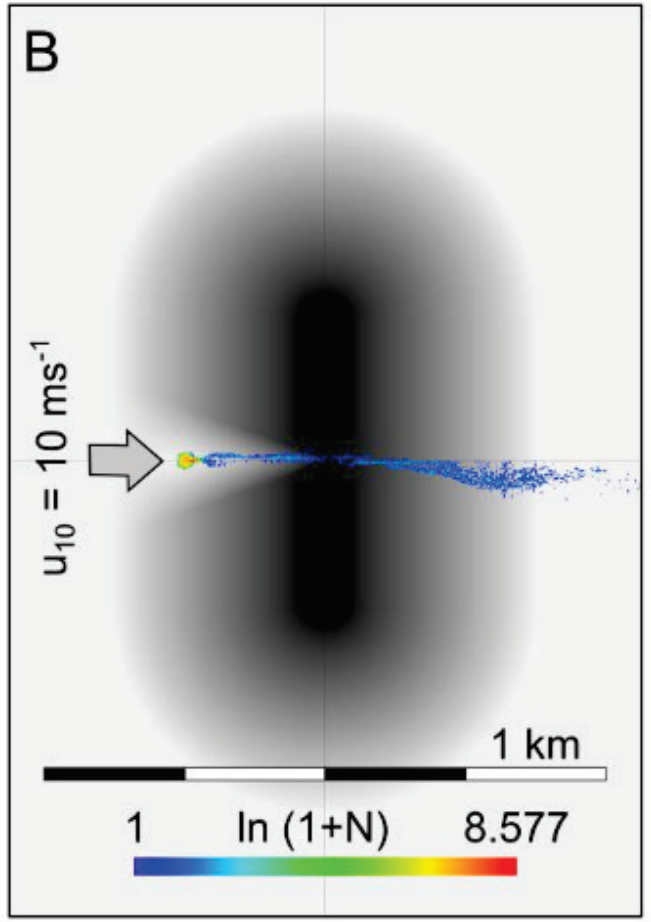




Modelling the spotting process

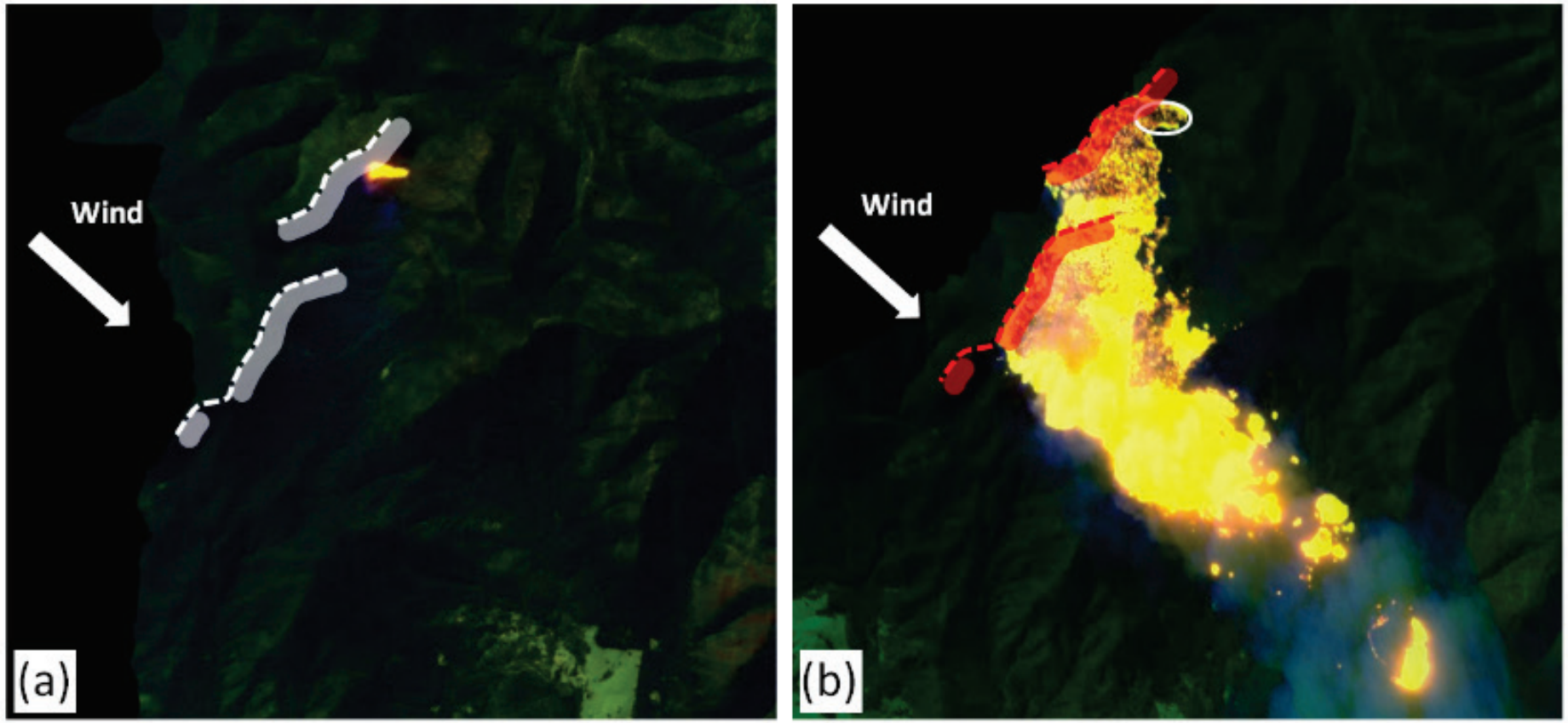
WIND-TERRAIN EFFECTS ON SPOTTING DISTRIBUTION





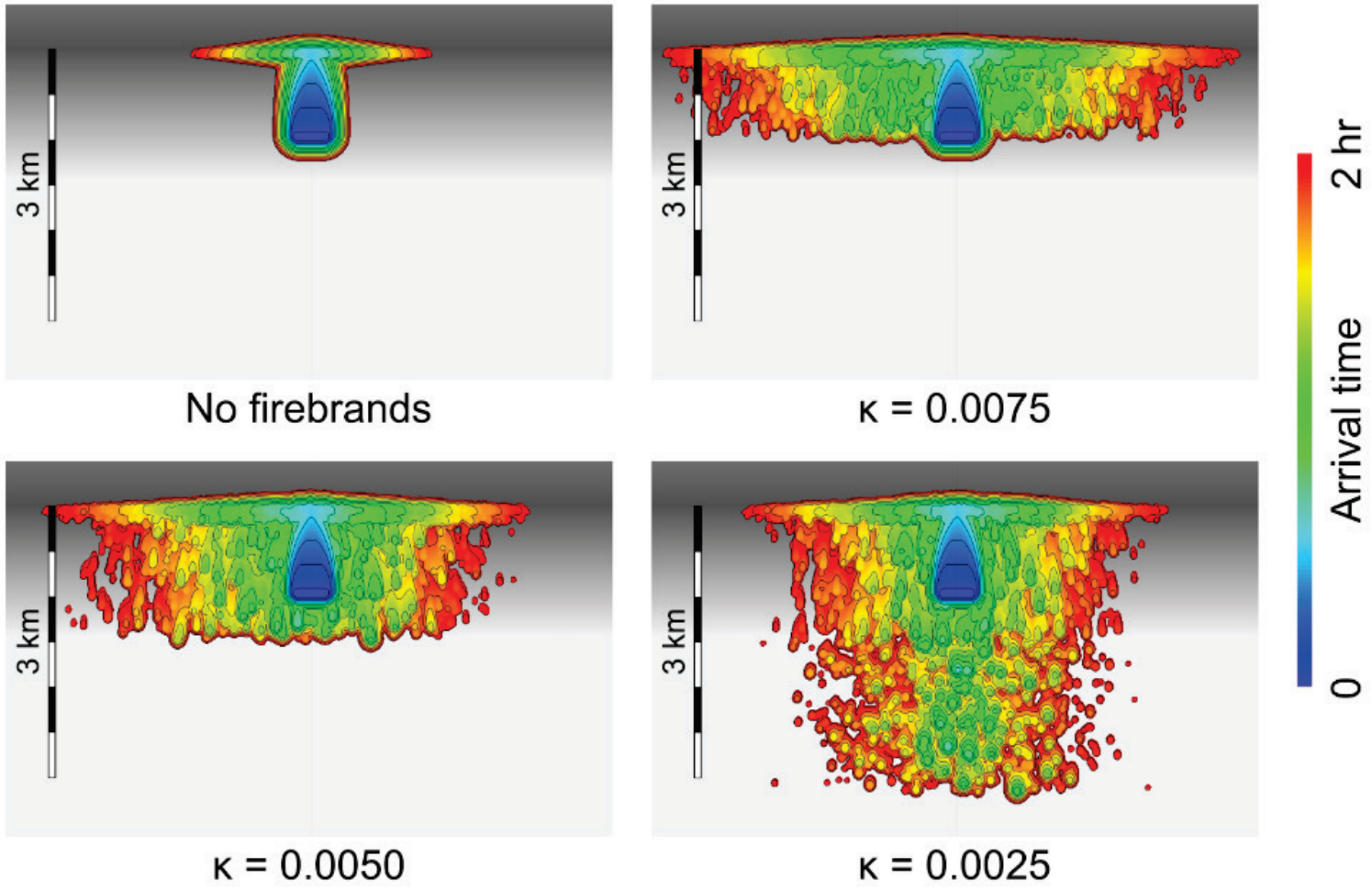
Modelling the spotting process

COMBINING SPOTTING WITH VLS

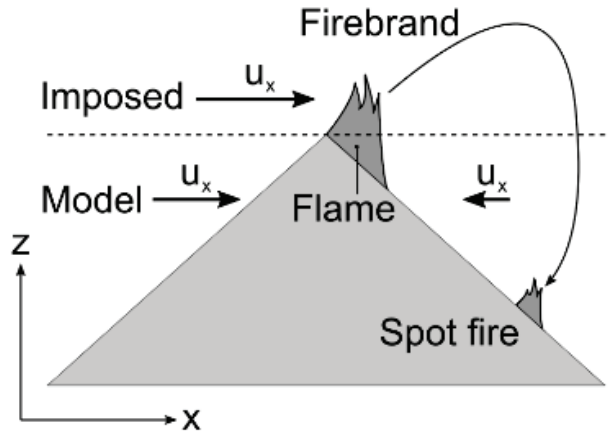


Modelling the spotting process

COMBINING SPOTTING WITH VLS



Things to ponder…



- How do we deal with non-ballisitic embers?
- What sort of approach should we use to model them?
- How to incorporate these models within the 2D framework..?
- How do we link with other work; for example, work on downslope winds..?