Quelques résultats de simulation de feux de prairie

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Large scale experimental fires (grassland, CSIRO, Australia)

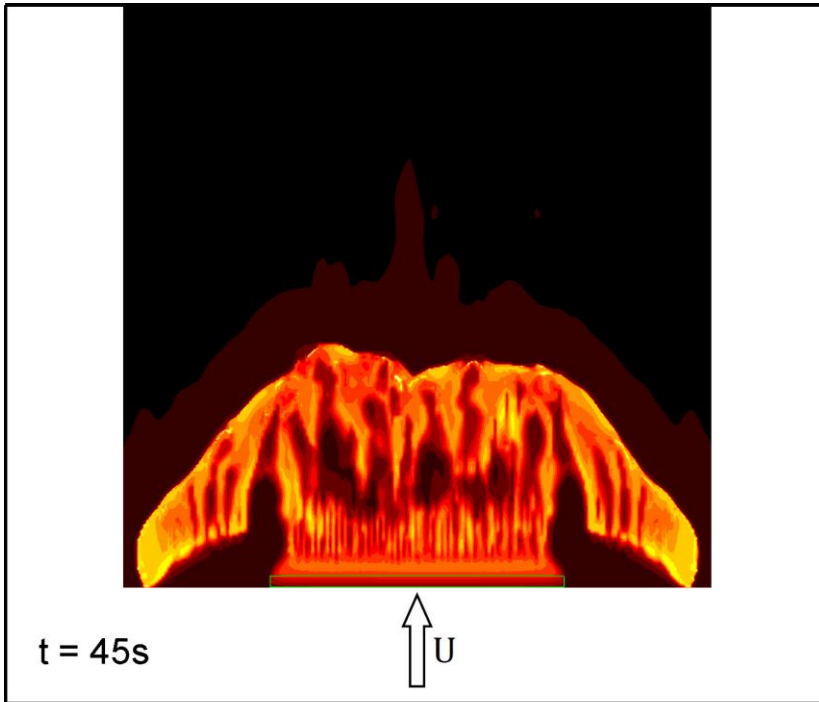**Plot: 100 m x 100 m (+ safety band), ignition line = 50 m**
Mesh ~ 5 millions cells ($\Delta x = \Delta y = 0.25$ m, $\Delta z = 0.035$ m)
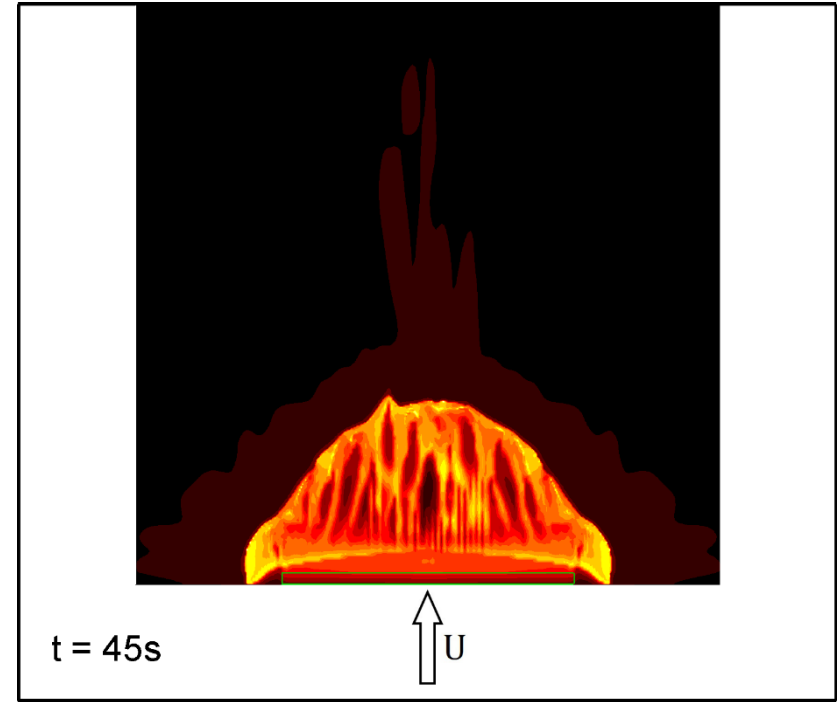

Cheney & al Int. J. Wildland Fire 1998
Cheney & Gould Int. J. Wildland Fire 1995

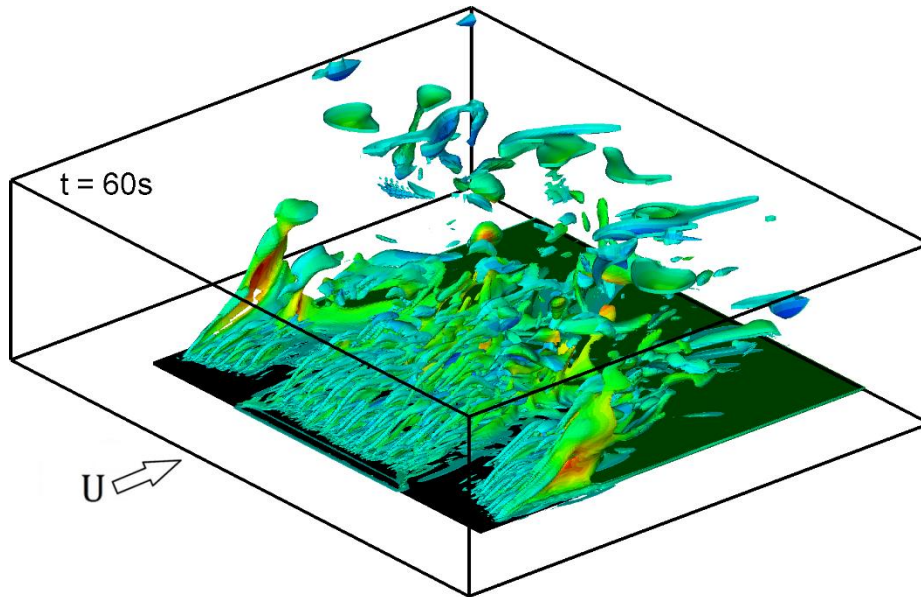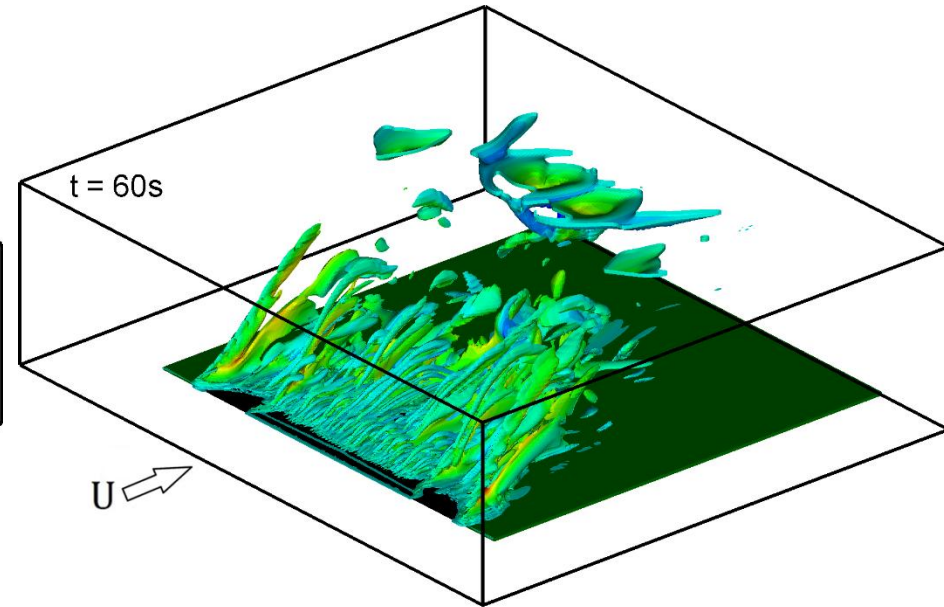# Influence of the ignition conditions
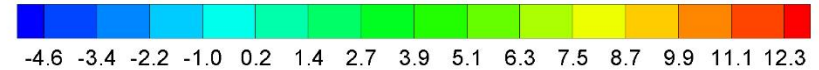

Uniform ignition

Non uniform ignition

Influence of the ignition conditions
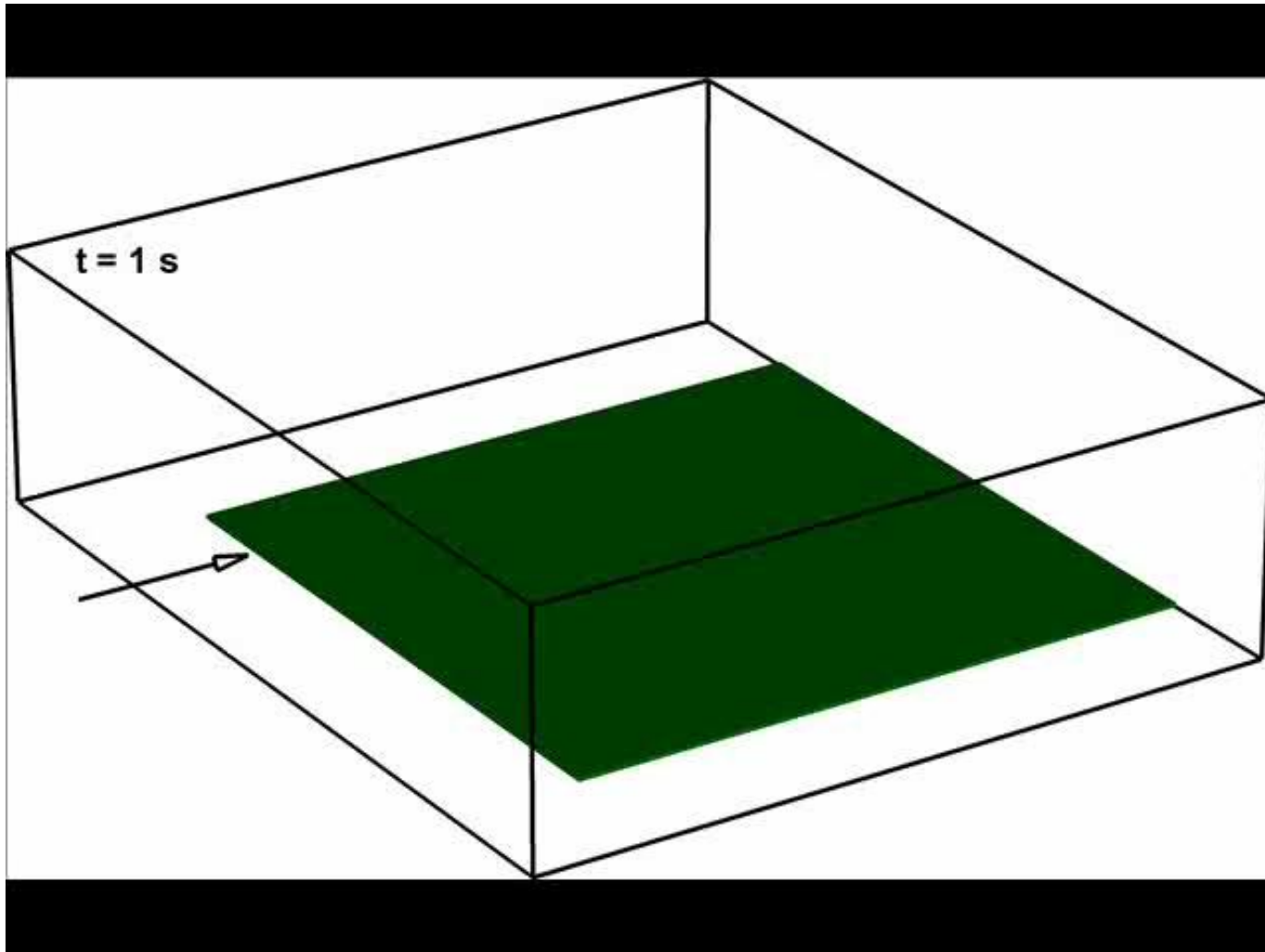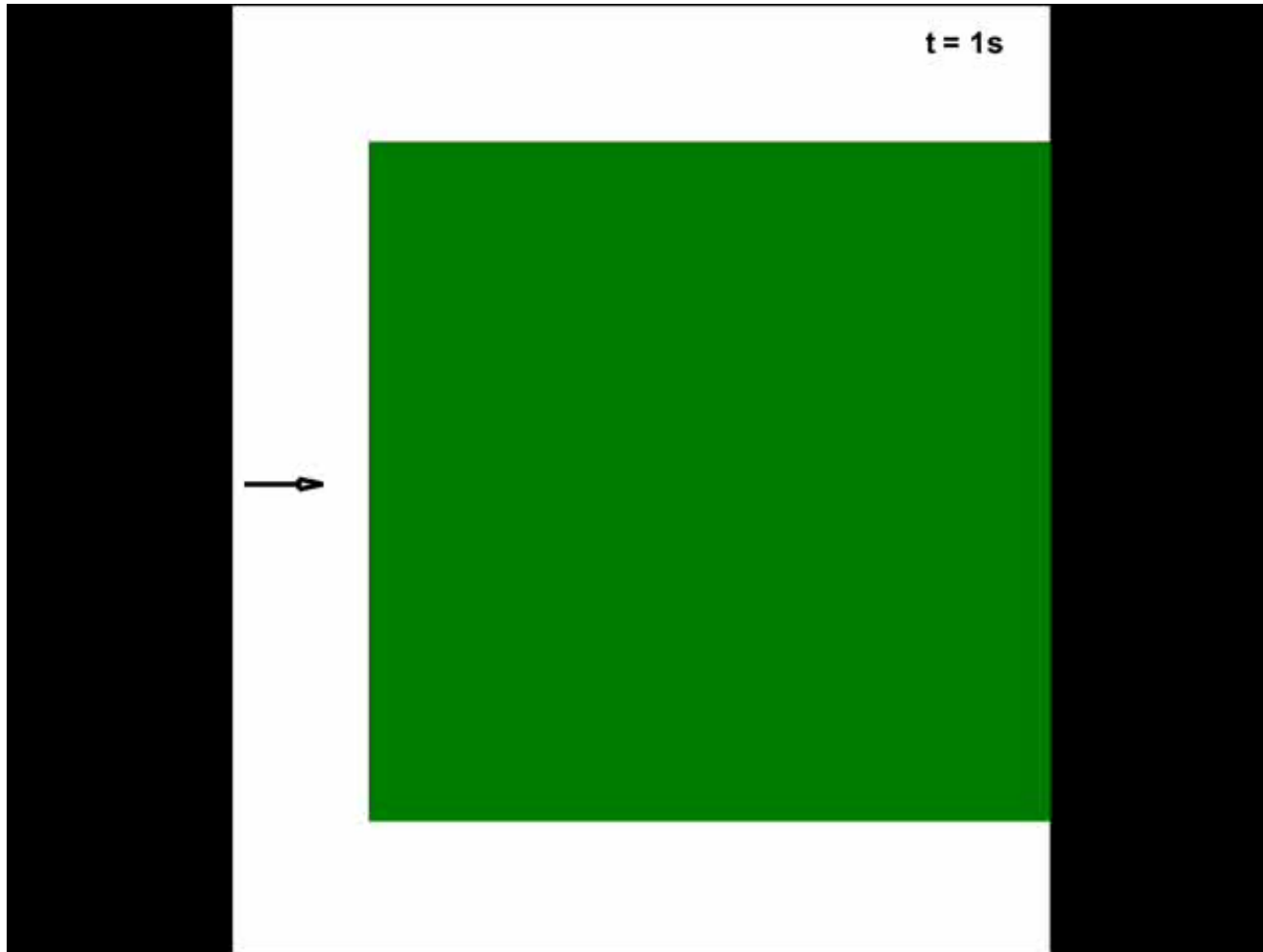# Q criterion colored by w-velocity component

t = 60s

U

Uniform ignition

Non uniform ignition

-4.6 -3.4 -2.2 -1.0 0.2 1.4 2.7 3.9 5.1 6.3 7.5 8.7 9.9 11.1 12.3

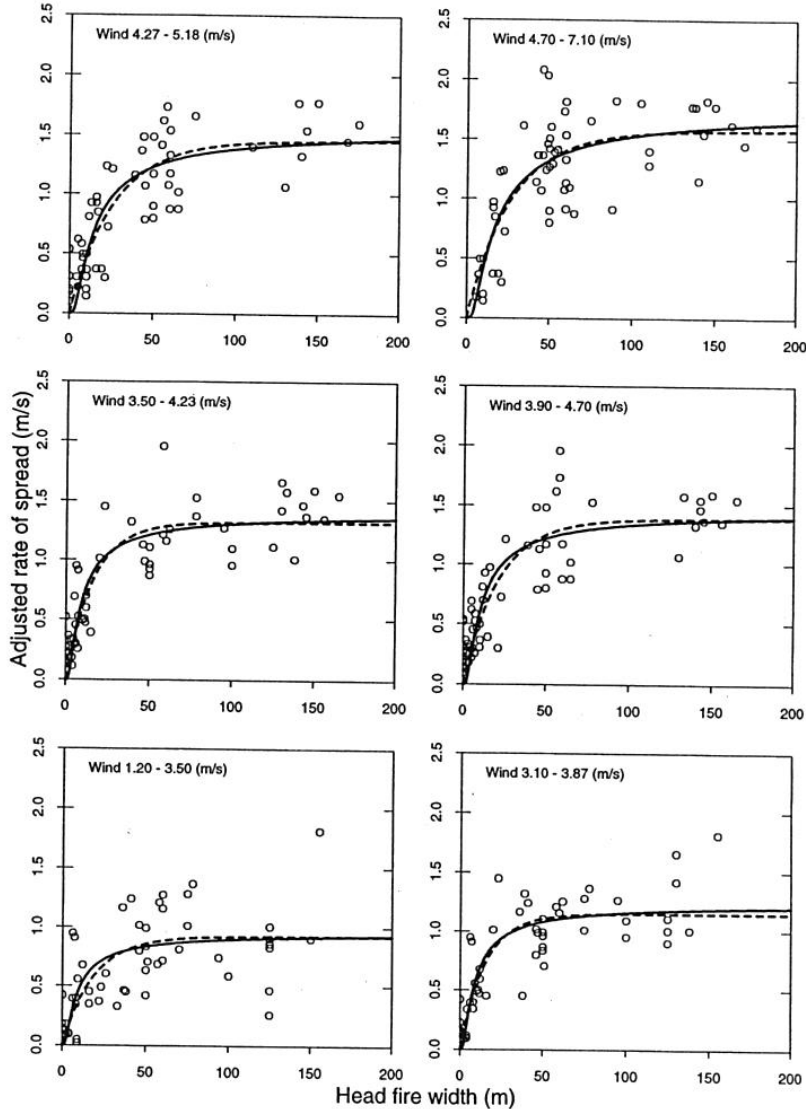# Fire in grassland: 3D simulation (FIRESTAR) (U_{10} = 5 m/s)

t = 1 s

Fire in grassland: 3D simulation (FIRESTAR) (U_{10} = 5 m/s)

Experimental fires (Annaburoo, Australia 1986)

$$R = R_{\infty} \, e^{-a/W}$$
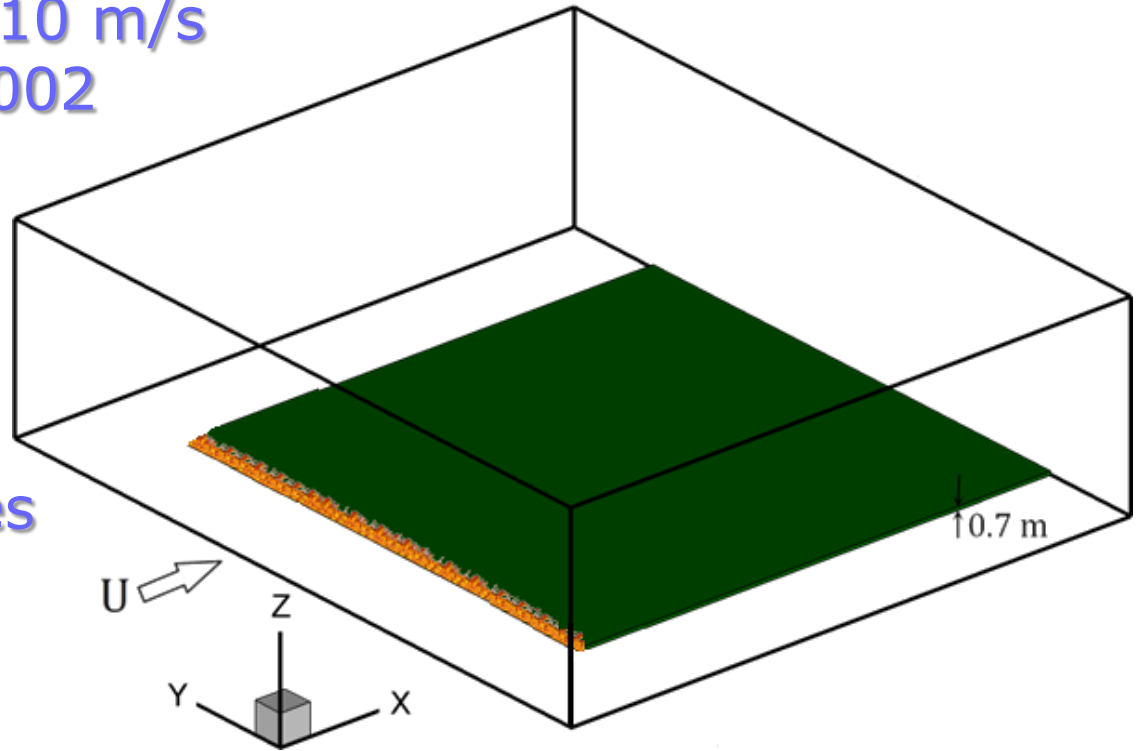
$$R = R_{\infty} \left(1 - e^{-bW} \right)$$

Cheney & Gould Int. J. Wildland Fire 1995

Test Case : Grassland Fires

Wind speed = 2 -6 - 10 m/s
Packing ratio: α = 0.002
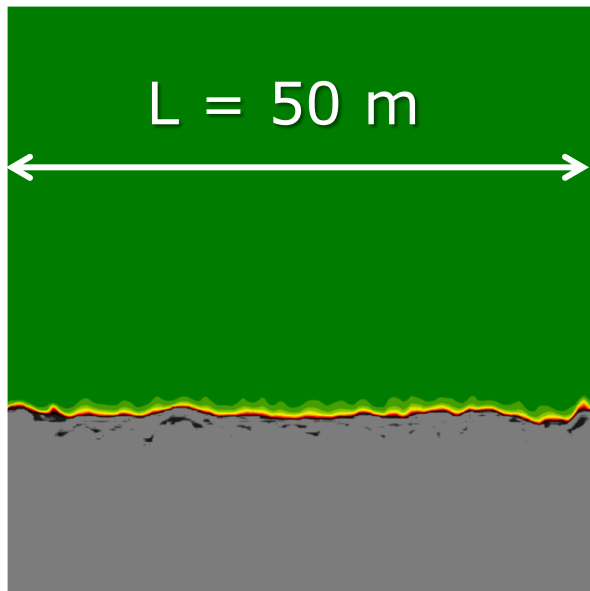Fuel bed: δ = 0.7 m

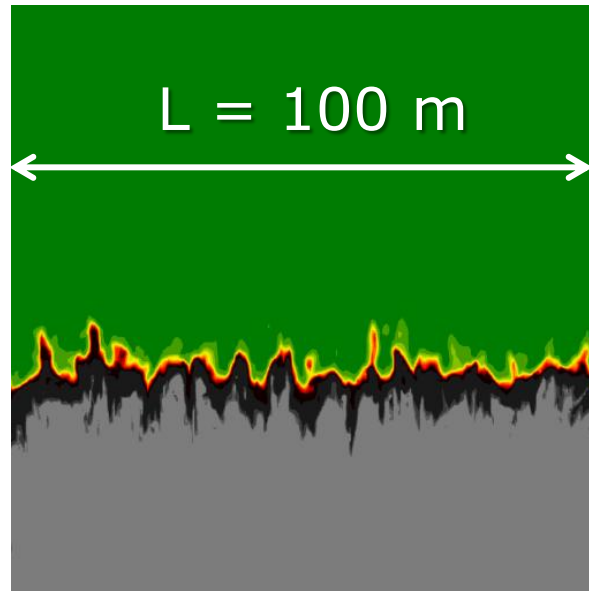With periodic line fires

Fuel density: ρ_P = 500 kg/m^3
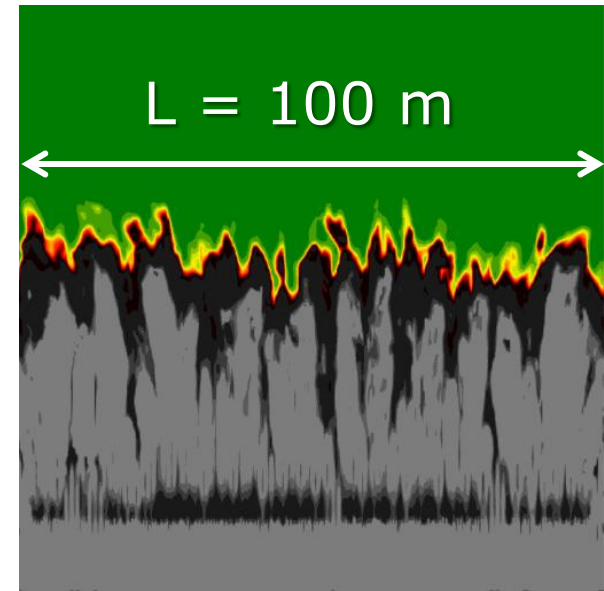Surface/Volume ratio: σ = 4000 m^{-1}
Moisture content: M = 5 %

Preliminary LES Results in Periodic line fire Top view
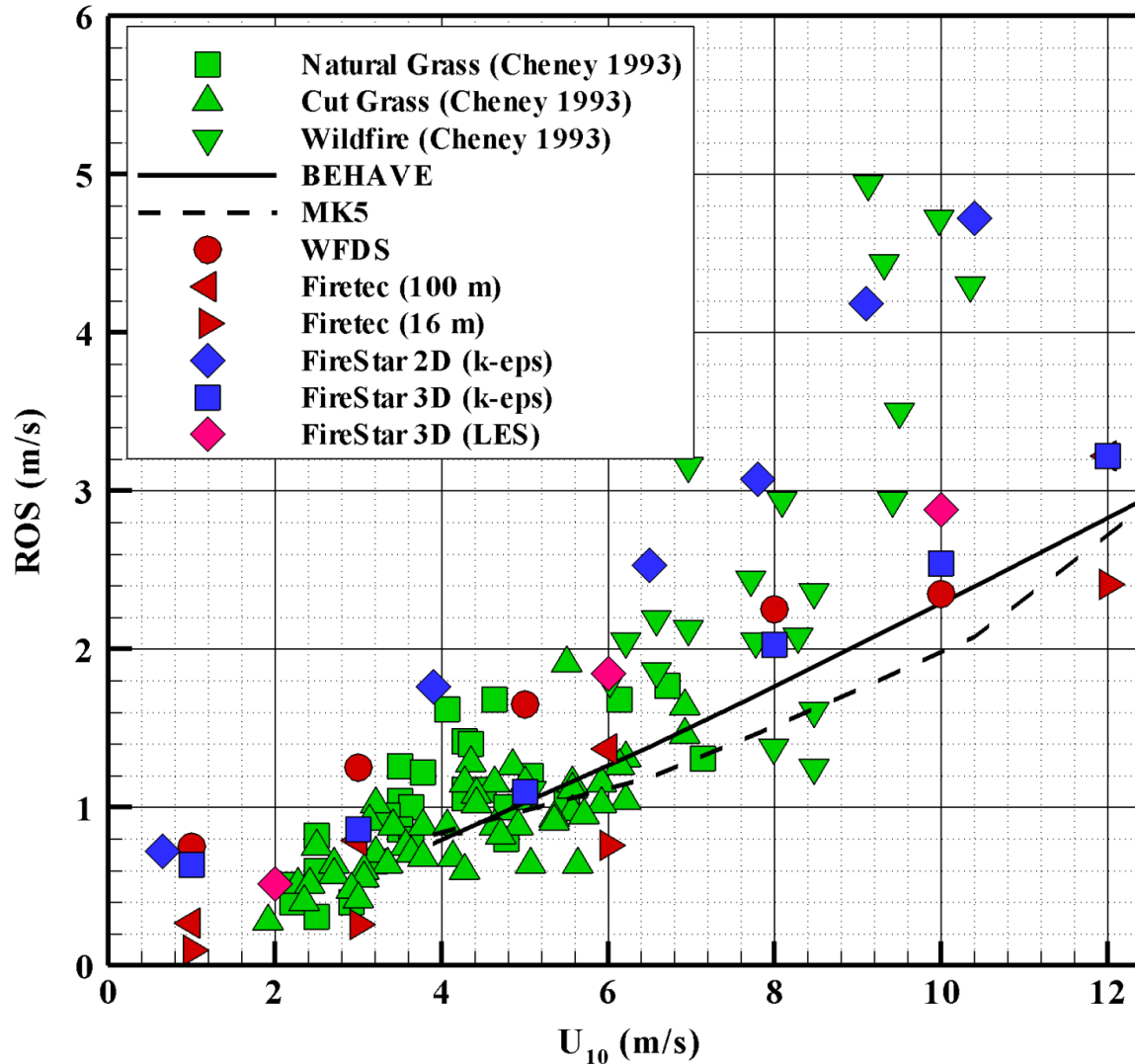

L = 50 m

L = 100 m

L = 100 m

U = 2 m/s

U = 6 m/s

U = 10 m/s

T=30s

$$I = \eta \, M_{fuel} \times \Delta H \times R$$

Grassland Fires: ROS vs wind speed

Merci pour votre attention.