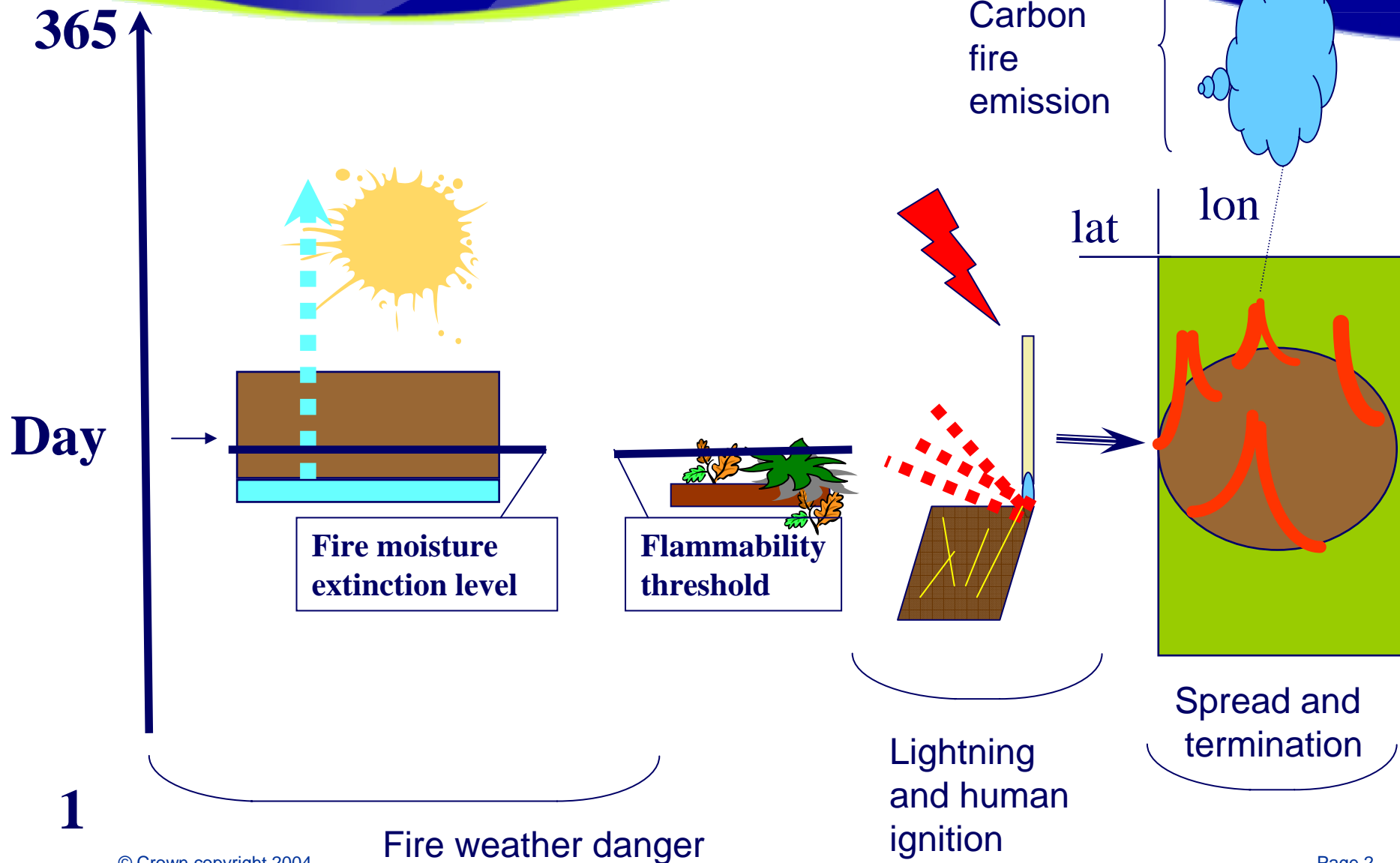


Experiments with SEVER-FIRE: Lessons for JULES fire modelling activities

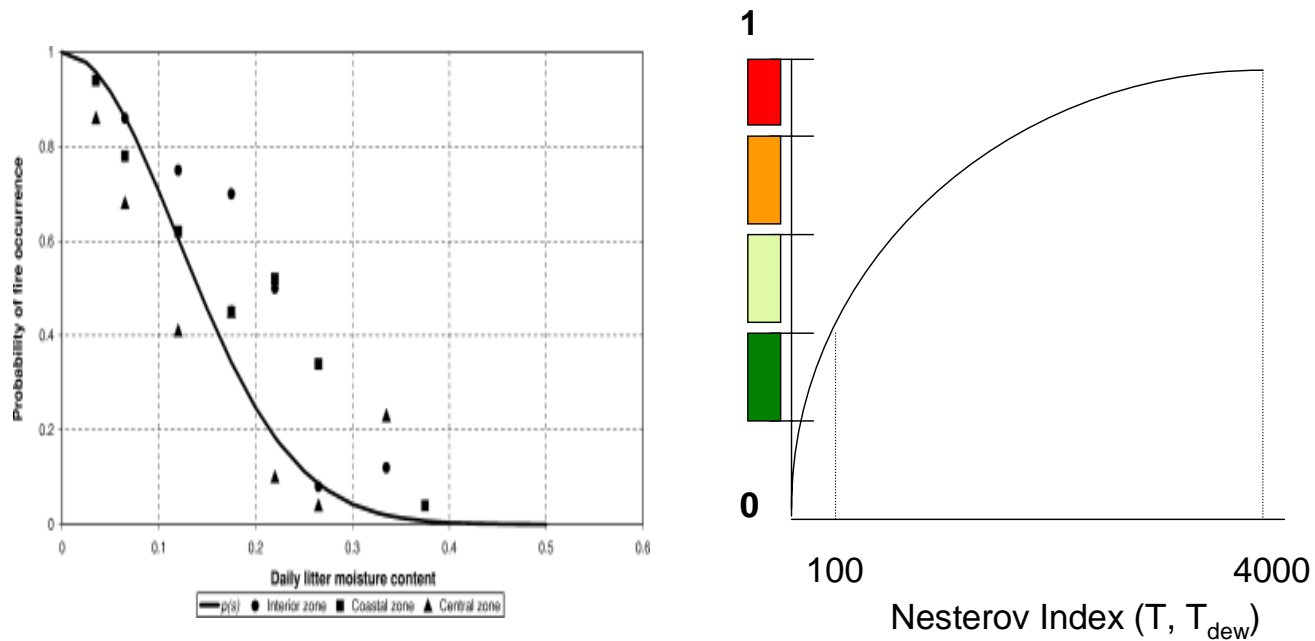
Sergey Venevsky, Alexey Rubtsov, Yannick Le Page,
Jose Pereira



The background of the slide features a light blue color with several overlapping, wavy, white and light blue patterns that create a sense of movement and depth. The text is centered in a dark blue, sans-serif font.

Simulation of fire weather risk

Fire Weather Risk (FWR)

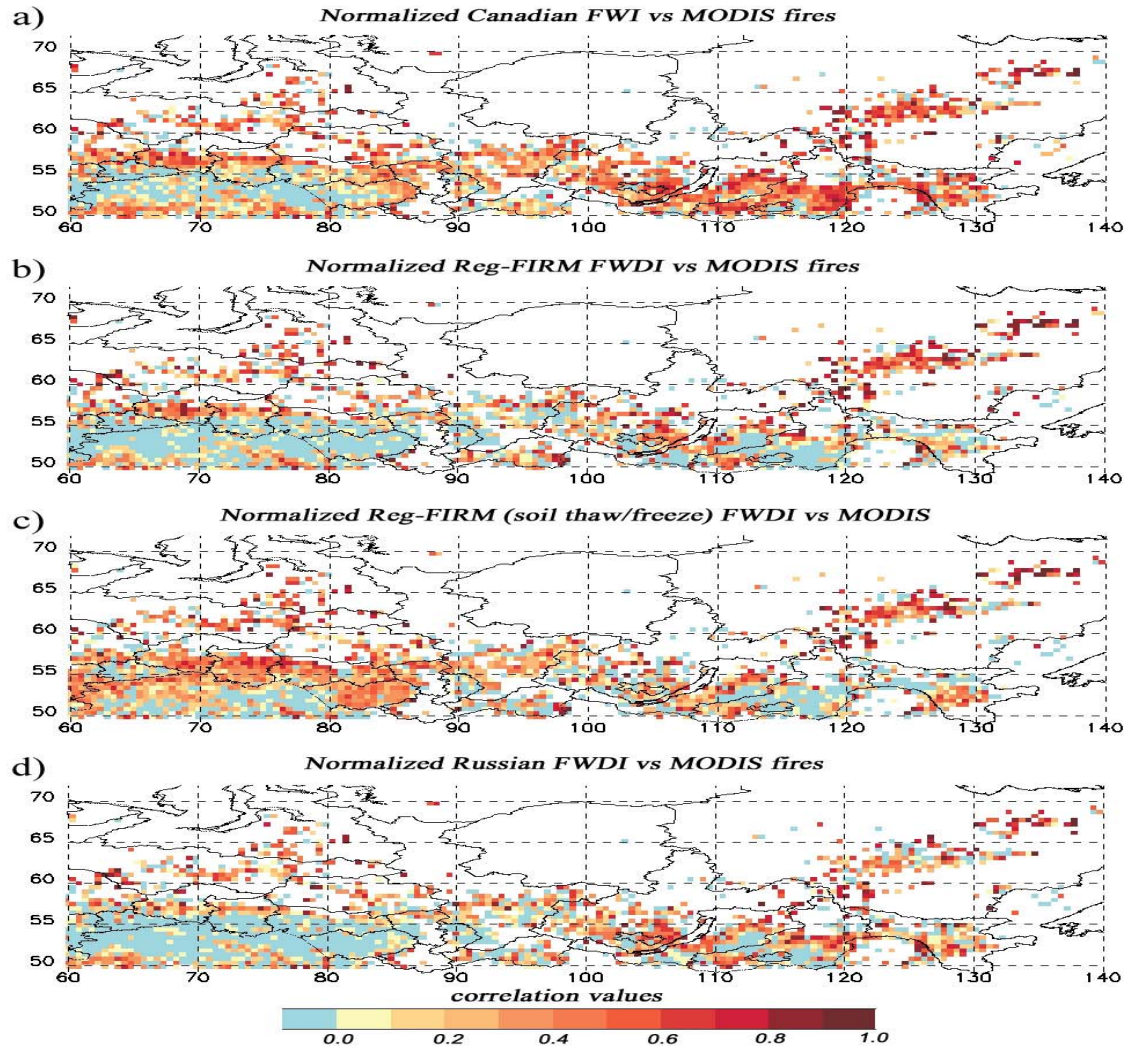


Moisture defined probability of fire * Temperature defined probability of fire

- Canadian FDWI ($T(^{\circ}\text{C})$, $R_h(\%)$, wind speed(km/h), rain (mm))
- Nesterov Index ($T_{\text{air}}(^{\circ}\text{C})$, $T_{\text{dew}}(^{\circ}\text{C})$, rain (mm))
- Reg-FIRM ($T_{\text{air}}(^{\circ}\text{C})$ max,min and soil moisture $S(\text{m}^3/\text{m}^3)$) T_{min} used for approximation of $T_{\text{dew}}(^{\circ}\text{C})$.

Data: MODIS active fire data 8-days for years 2002-2005

Resulting correlations



$R^2=0.44$

$R^2=0.38$

$R^2=0.42$

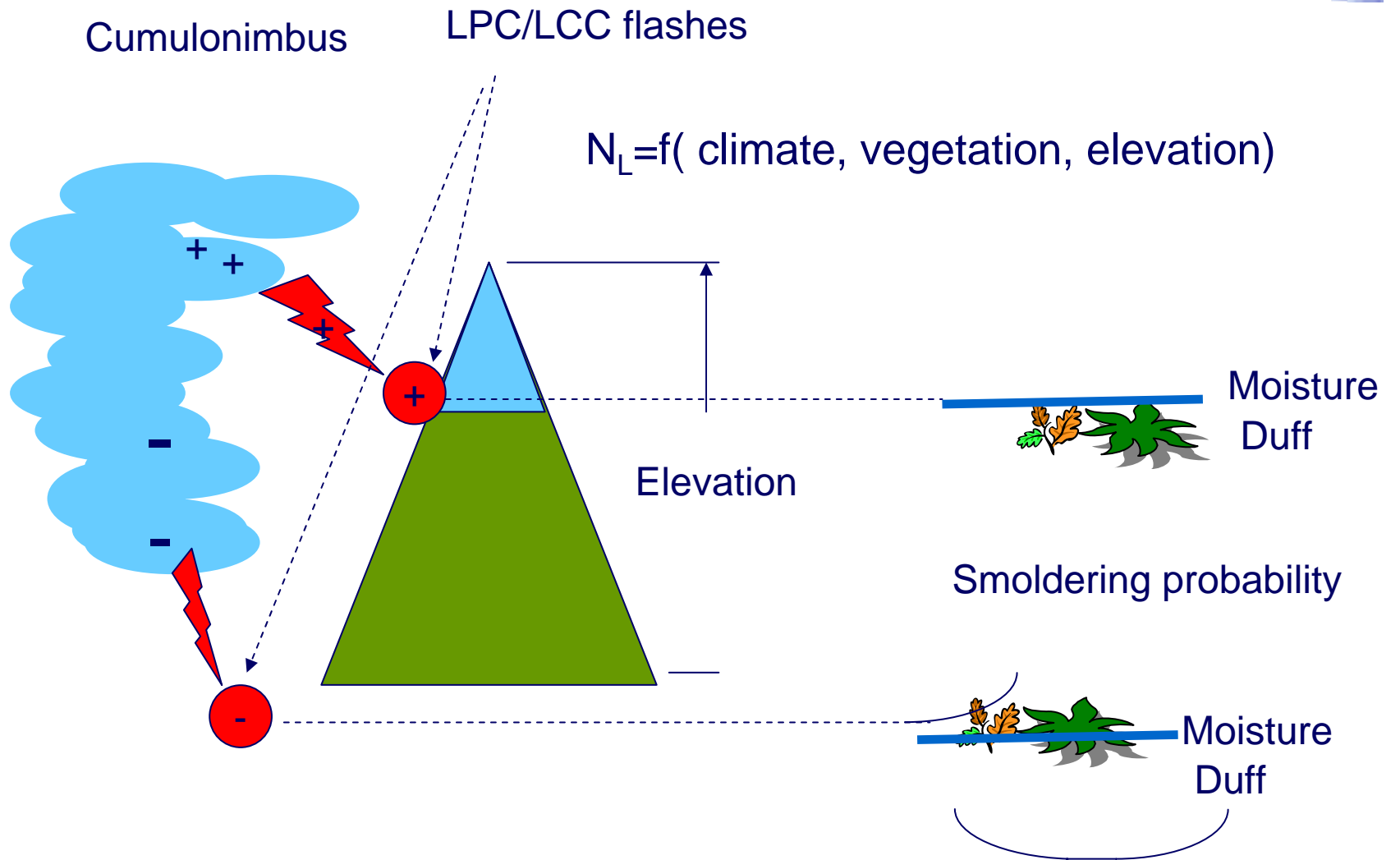
$R^2=0.37$

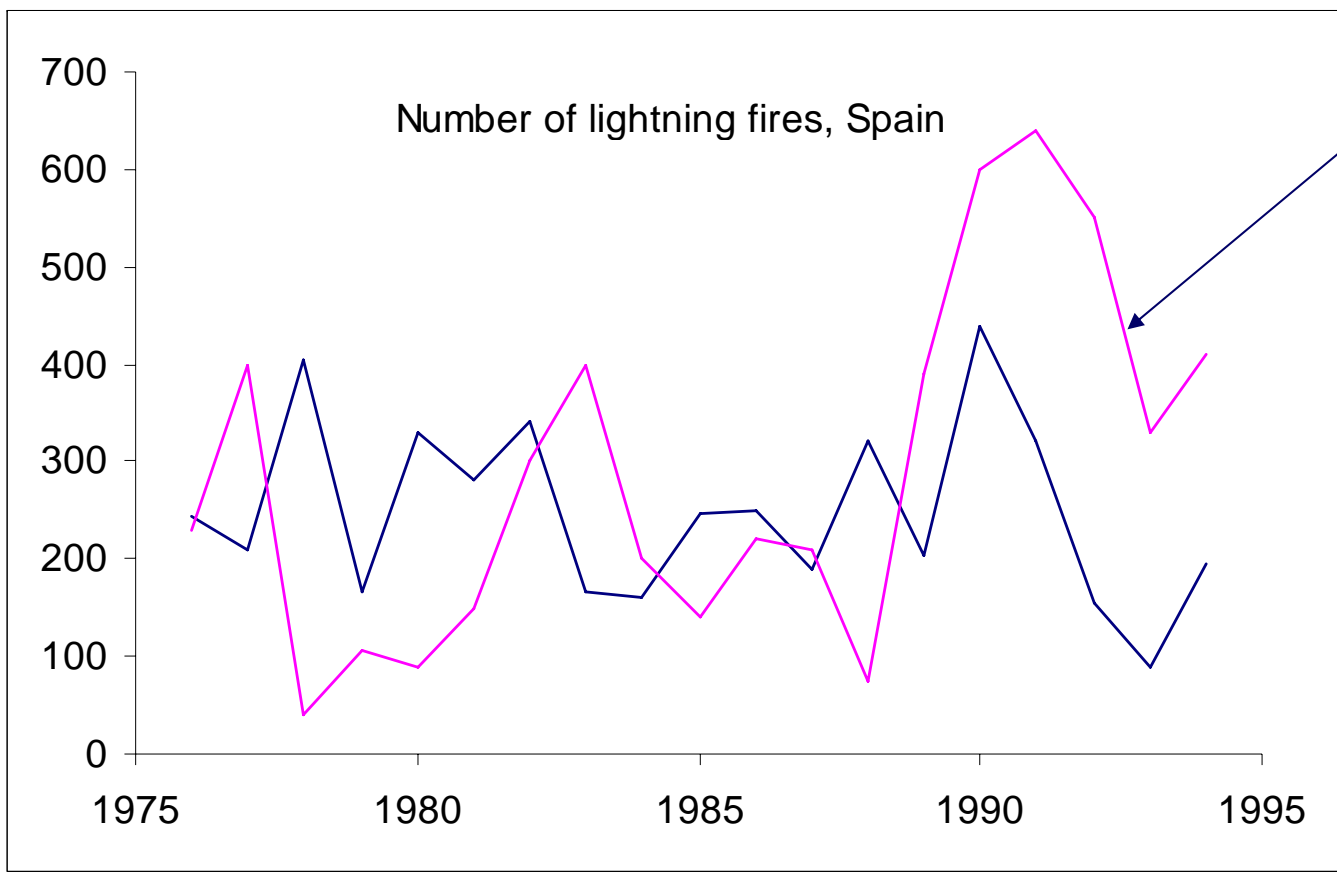
Messages for JULES fire activities:

1. Fire weather indexes have similar quality for description of fires
2. They work better for vegetation types, they were tuned for
3. Thaw/freeze processes are important for fire dynamics in boreal zone

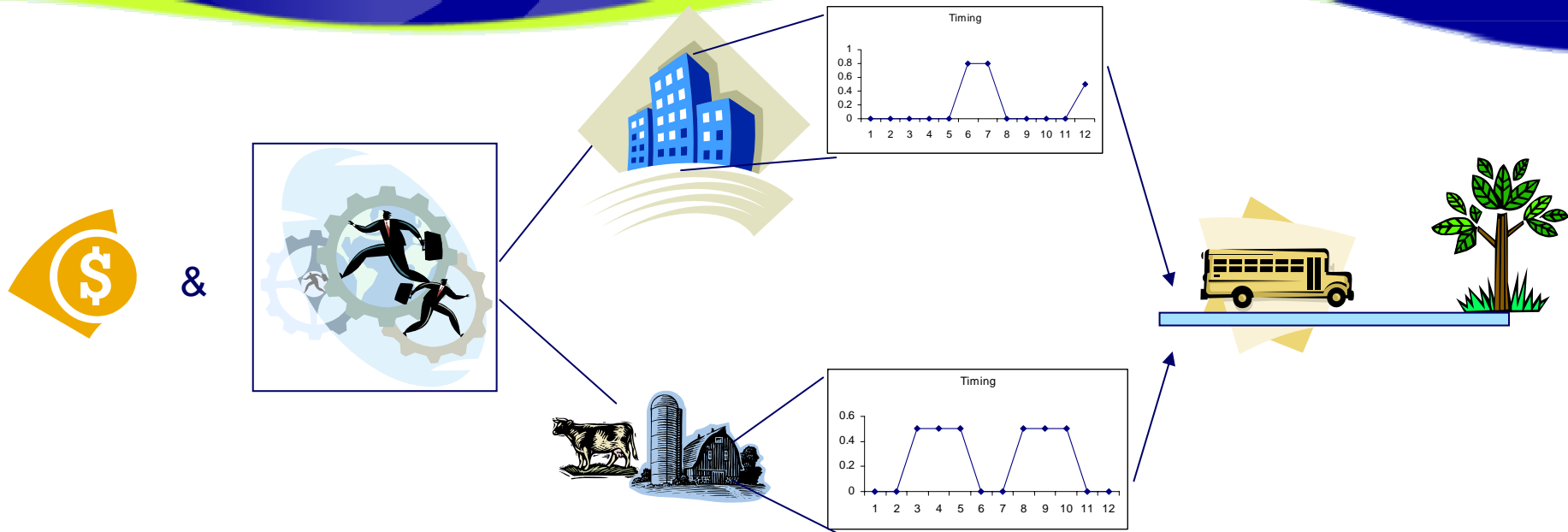
The background of the slide features a light blue color with several overlapping, wavy, horizontal bands of varying shades of blue and white, creating a fluid, wave-like pattern.

Simulation of ignitions



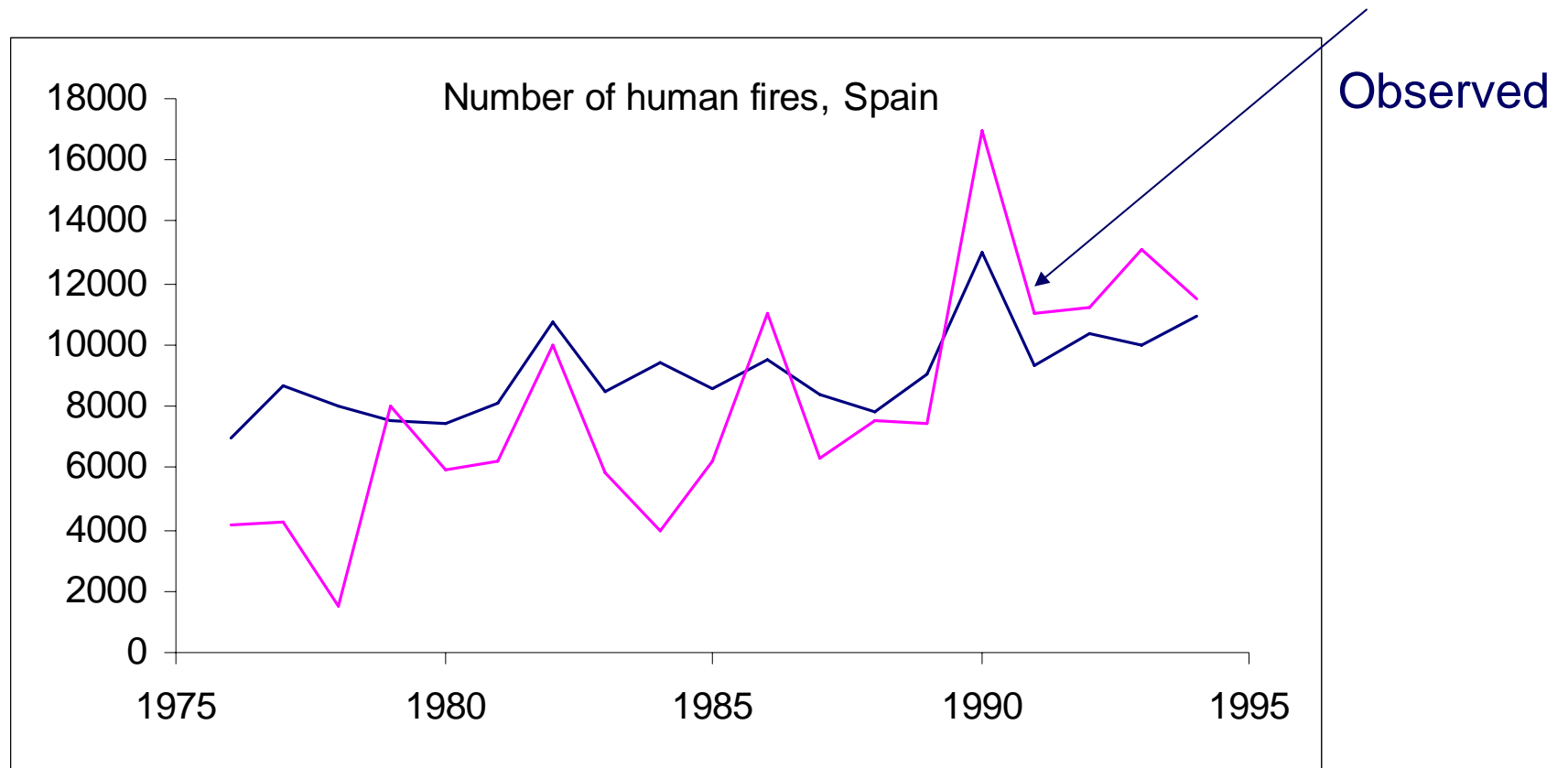


Observed

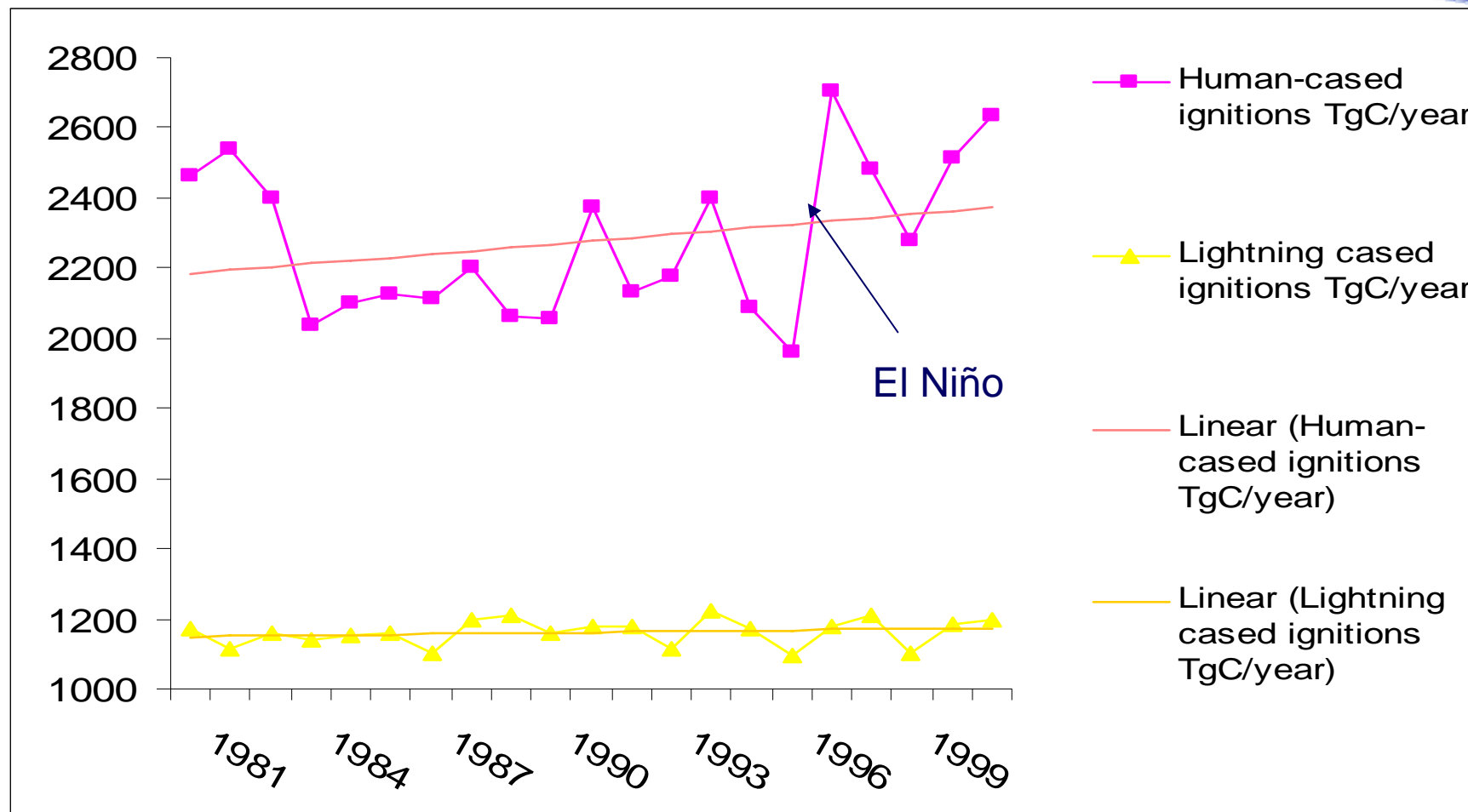


Wealth status *
 Population density *
 Urban/ rural *
 Timing *
 accessibility

$$N_h = f(\text{human population, land use})$$



Simulated global carbon fire emission during 1981-2002 (human and lightning cases)



Total averaged for 1971-2002 annual fire emissions 3581 TgC (3530 TgC for 1997-2001, van der Werf et.al, 2004)

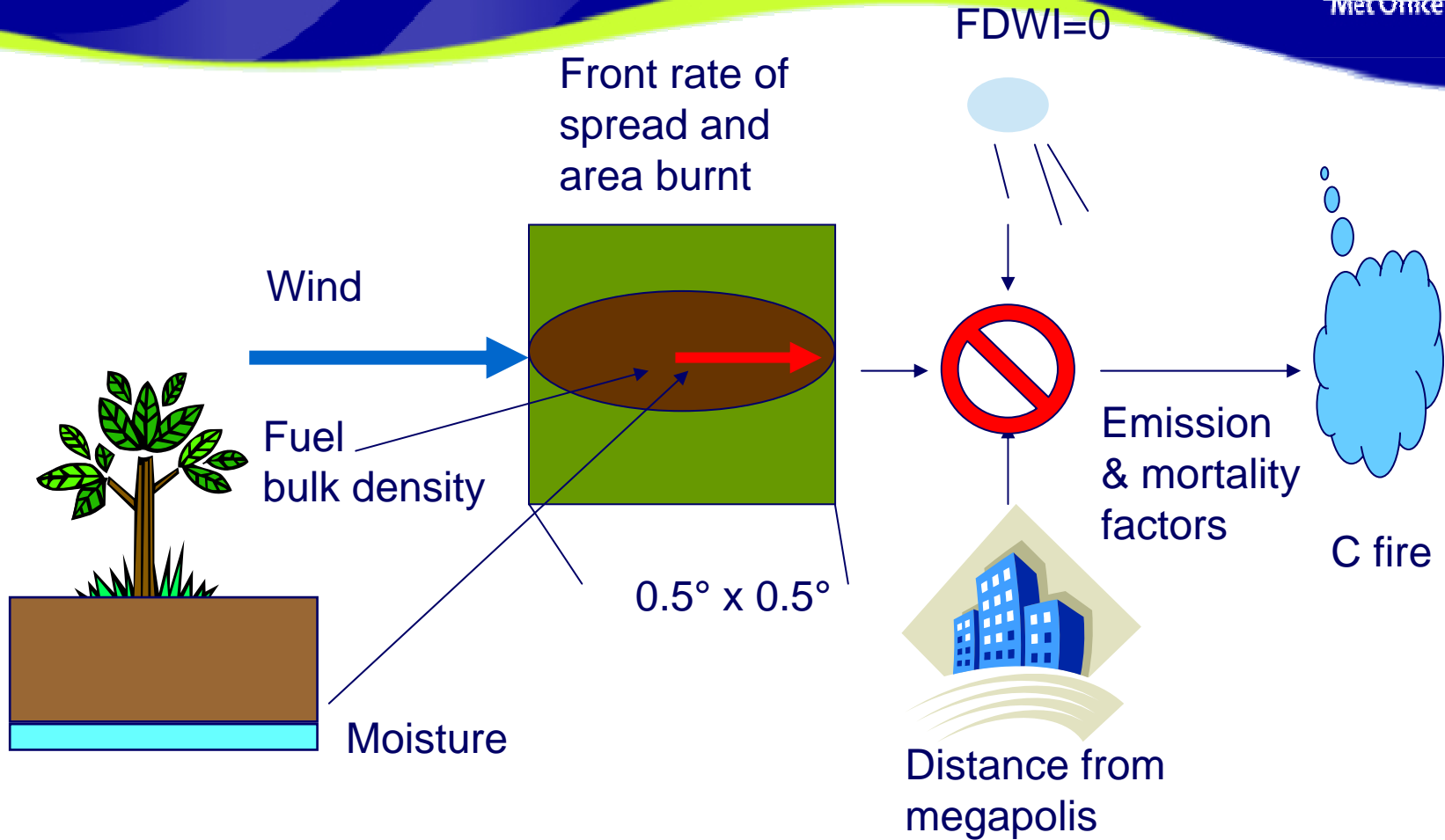
Messages for JULES fire activities:

1. Lightning ignitions can be simulated using environmental data, which are already in JULES
2. Human ignitions can be simulated using additional socio-economic data
3. Human ignitions are very important for description of recent fire emissions

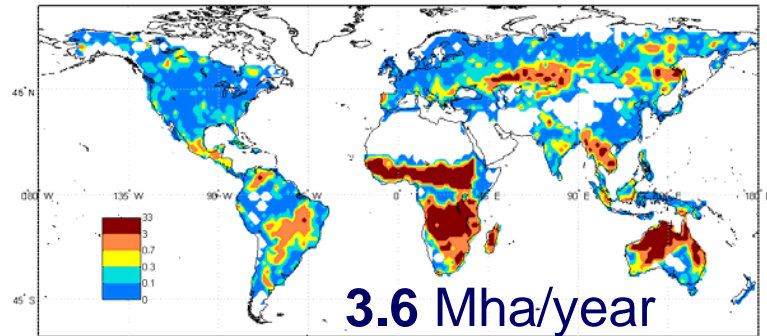
The background of the slide features a light blue color with several overlapping, wavy, horizontal bands of a slightly darker shade of blue, creating a fluid, water-like texture.

Simulation of fire spread and emissions

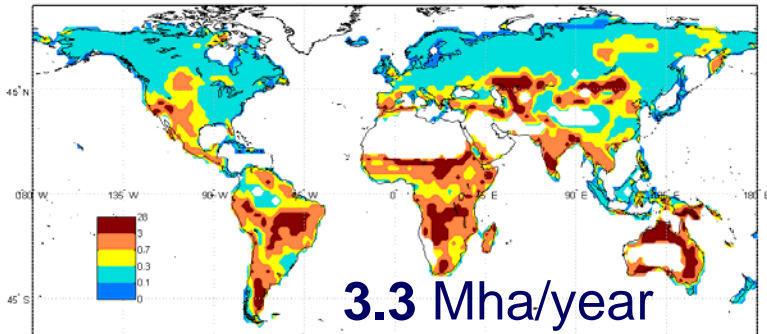
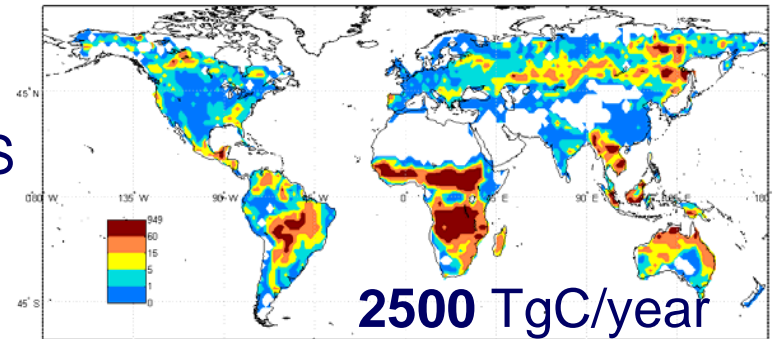
Fire spread and emissions: conceptual scheme



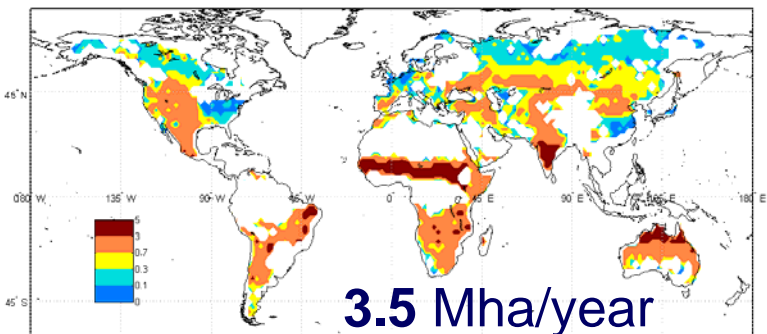
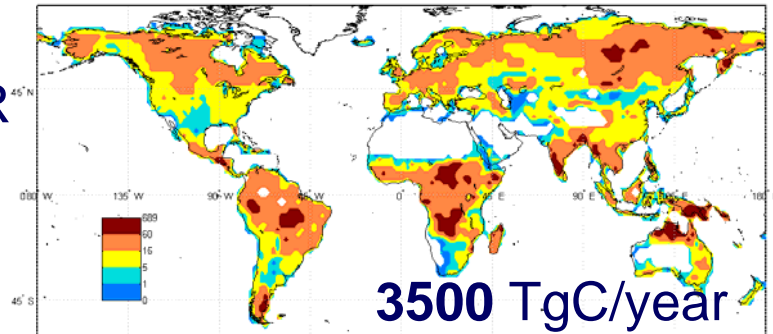
Area burnt = f (climate, vegetation, human population)
 Emissions = g (area burnt, vegetation)



MODIS



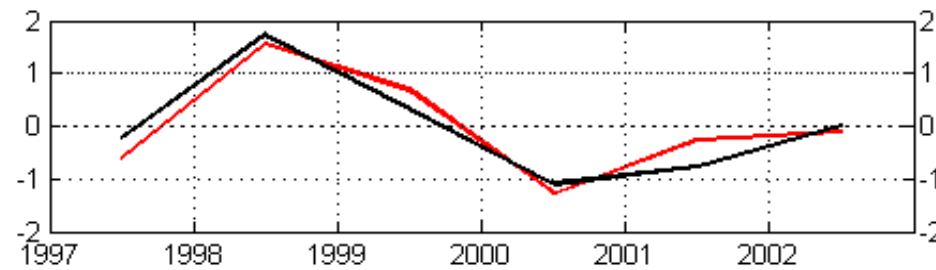
SEVER



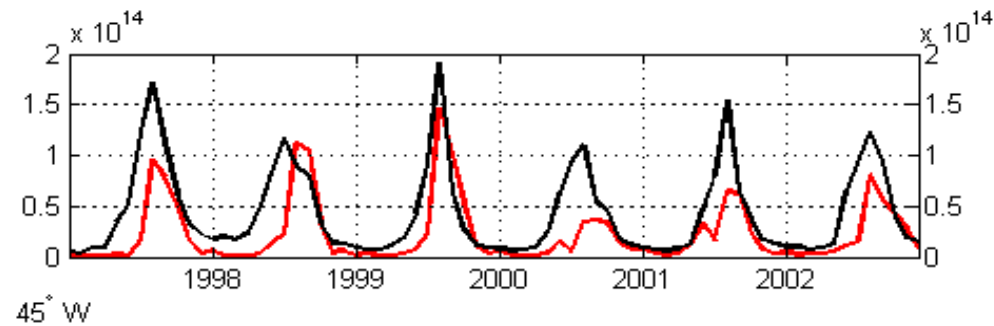
MC1

South America

Burned area anomaly

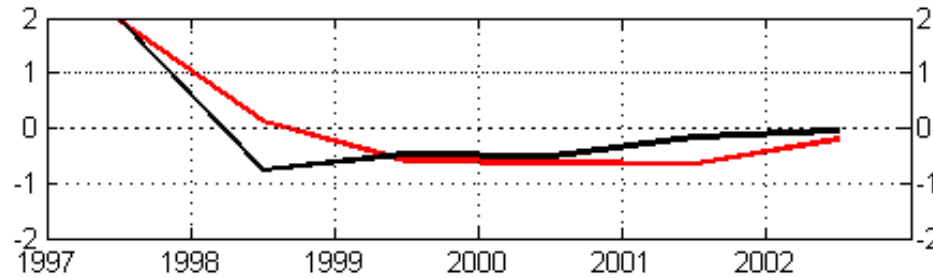


Monthly

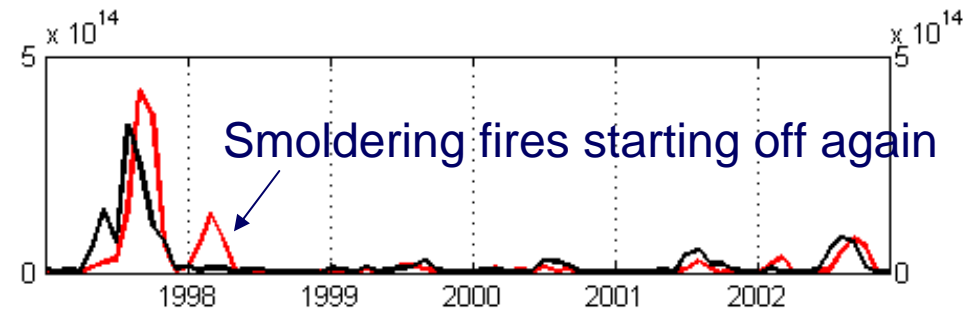


South America

Burned area anomaly



Monthly



Messages for JULES fire activities:

1. Areas burnt and emissions can be estimated realistically if number and location of fires are known
2. Smoldering peat fires in tropics should be described and included in a model

THANK YOU !

Messages for future JULES fire activities:

- Fire weather indexes have similar quality for description of fires
- They work better for vegetation types, they were tuned for
- Thaw/freeze processes are important for fire dynamics in boreal zone
- Lightning ignitions can be simulated using environmental data, which are already in JULES
- Human ignitions can be simulated using additional socio-economic data
- Human ignitions are very important for description of recent fire emissions
- Areas burnt and emissions can be estimated realistically if number and location of fires are known
- Smoldering peat fires in tropics should be described and included in a model