



**World Forum on  
Urban Forests**  
Mantova 2018

PS 4.4 Changing Environment

# ARE WILDFIRES KNOCKING ON BUILT-UP AREAS DOOR?

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# Wildfires in Mediterranean Region



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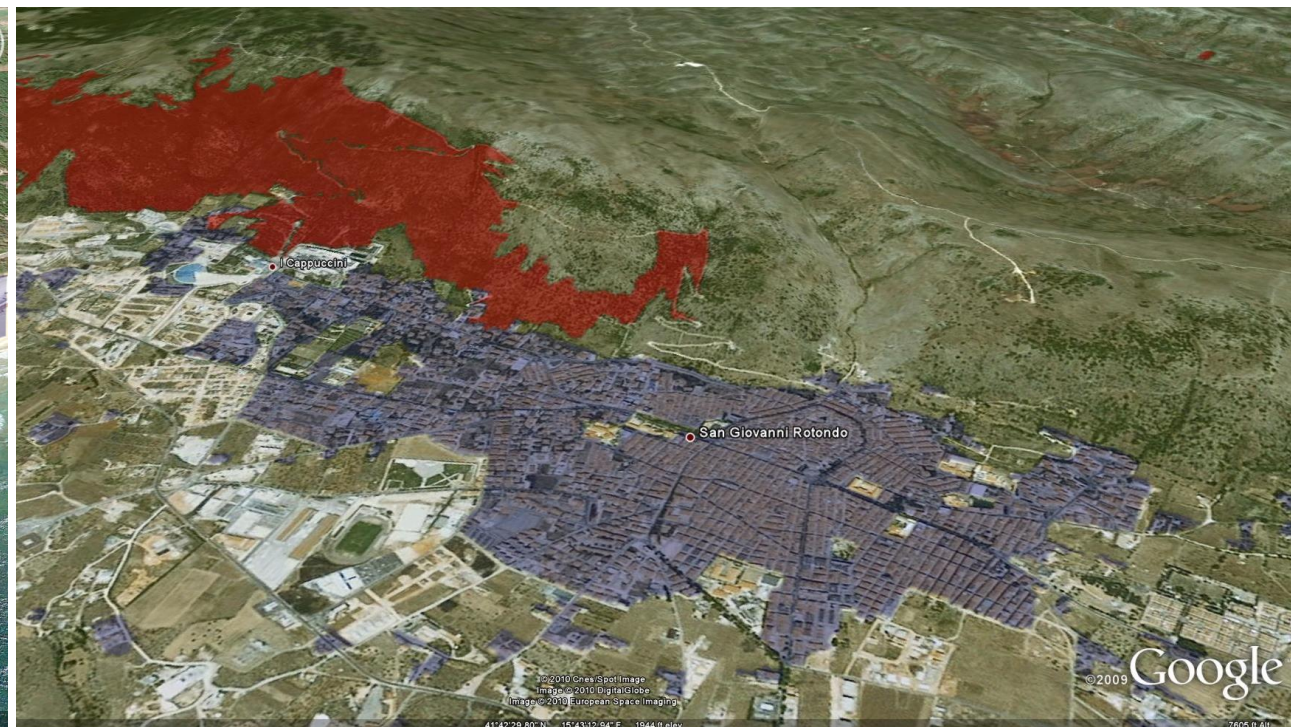
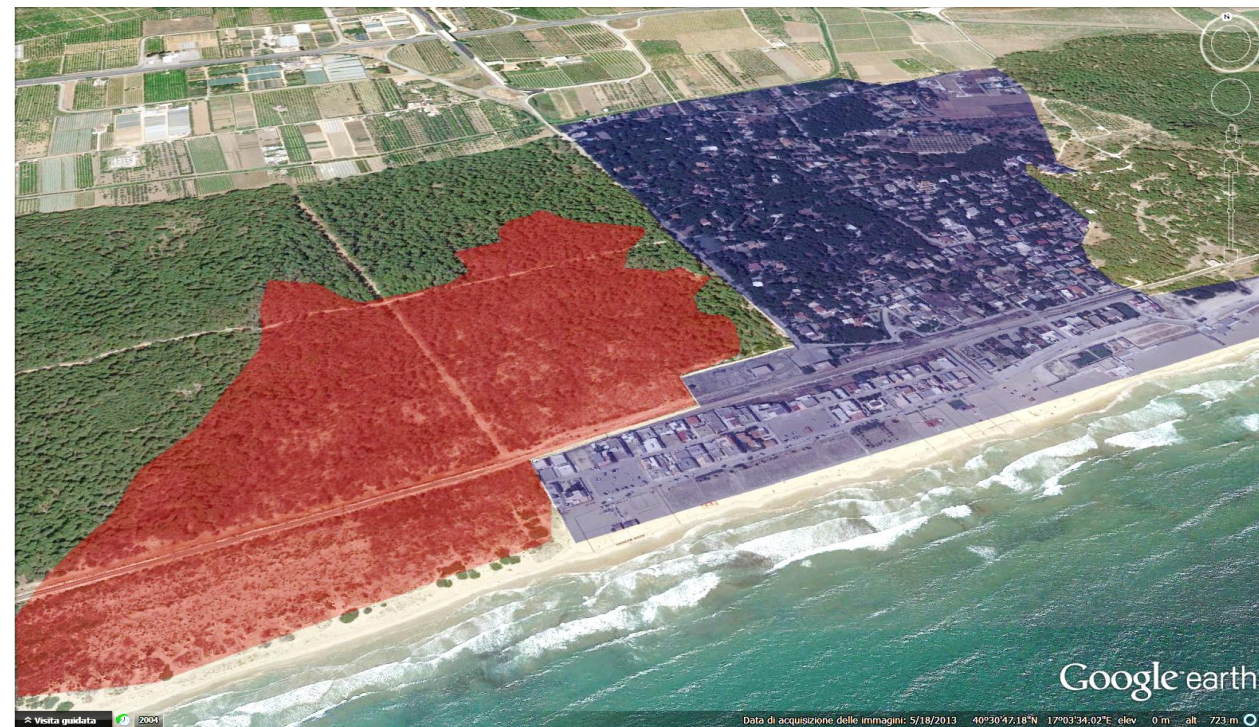
- **Human-induced** fires represent the **vast majority** of wildfires in Mediterranean Region
- The expansion of human settlements has led to the creation of landscapes where **man-made systems interact** with **undeveloped areas** (WUI)
- Wildfires can cause **tremendous damage to people** living in periurban areas



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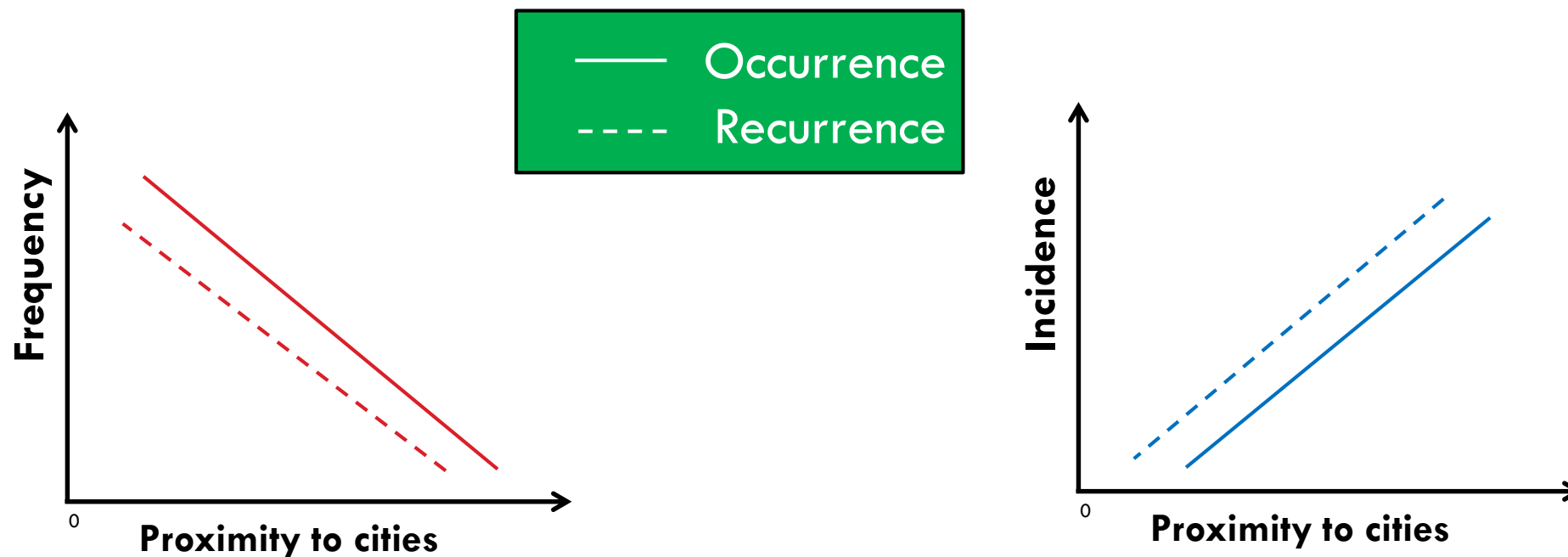
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- Understanding the **role of distance from built-up areas** in shaping coarse scale wildfire spatial patterns is becoming a major concern
- **Proximity to cities** became an **important factor** increasing wildfire probability

# Objective

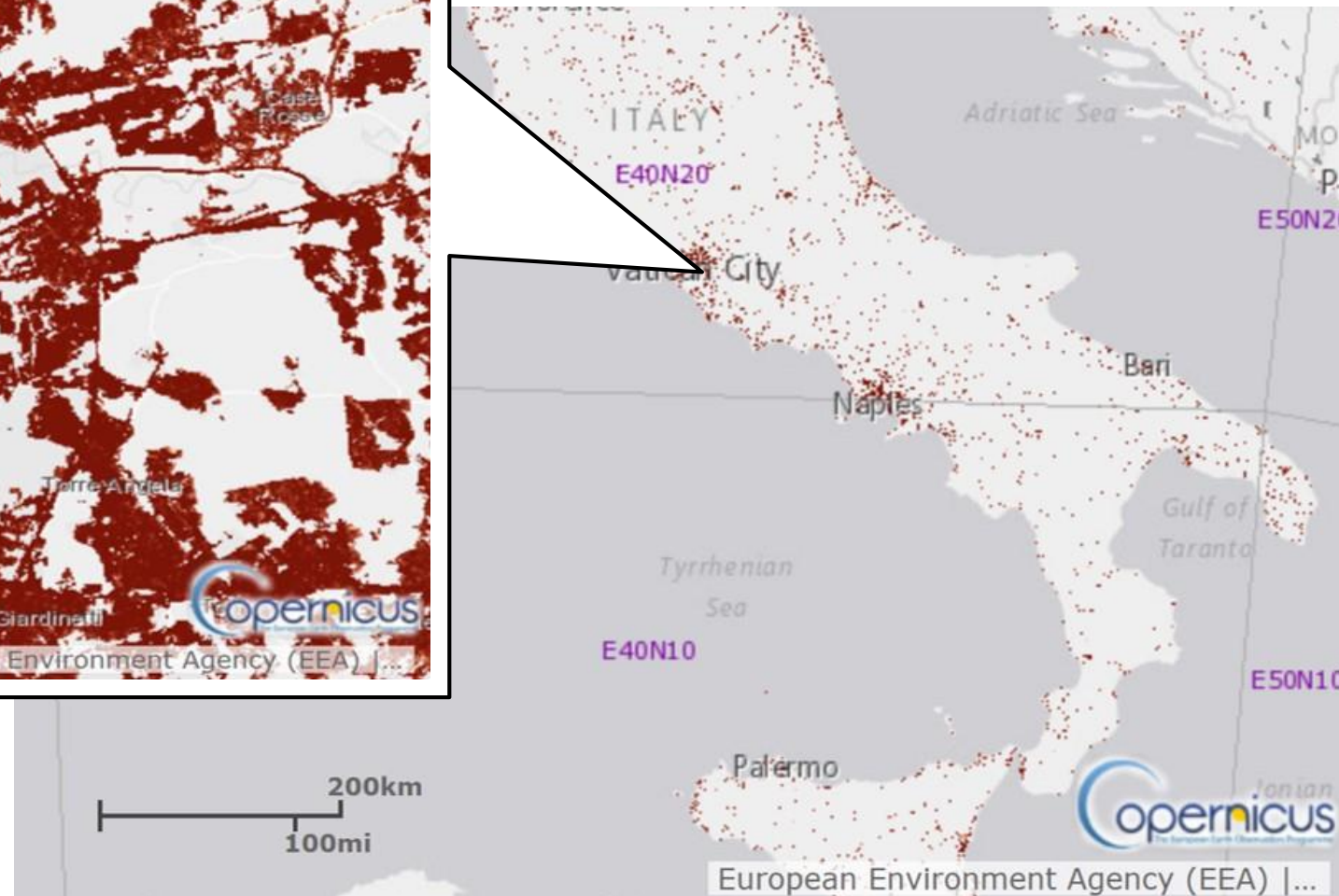
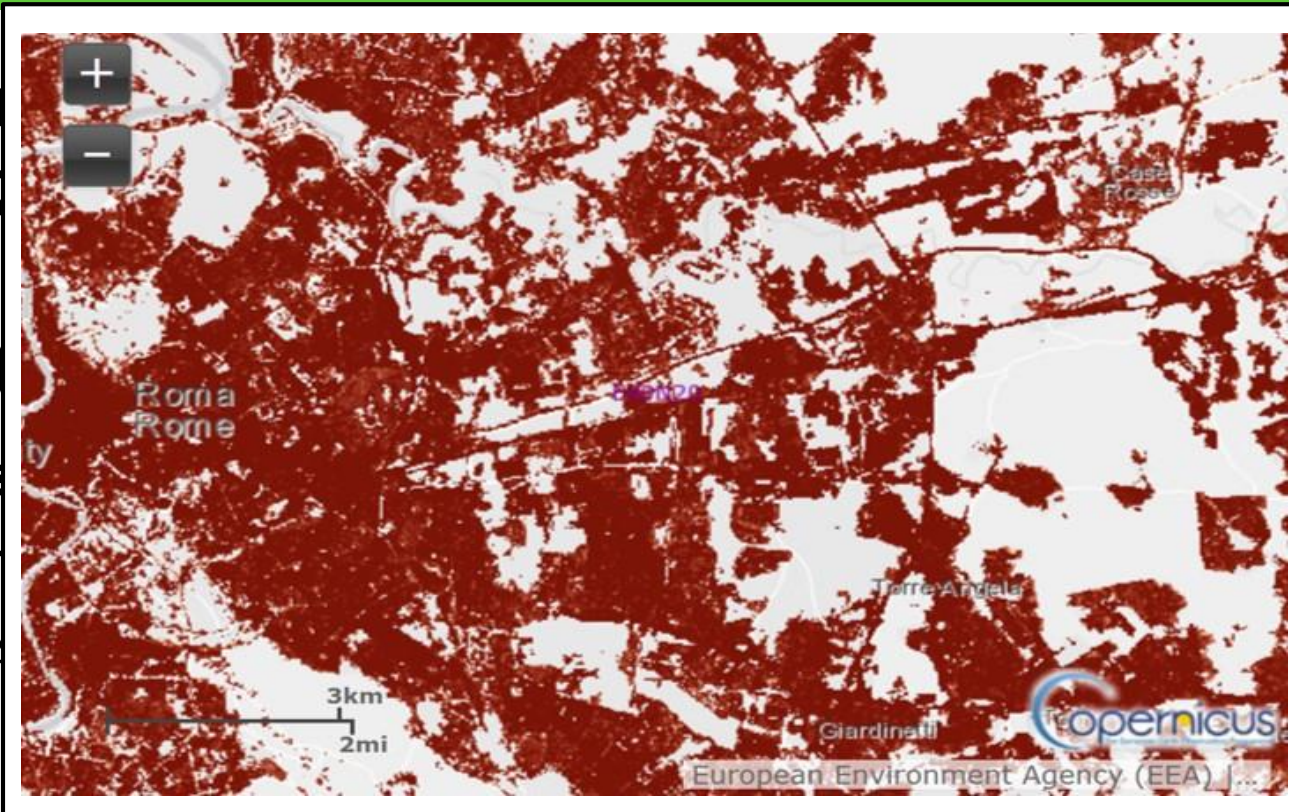
- we assessed **wildfire distribution in Italy** over a period of 8 years (**2007-2014**) to quantify fire **occurrence and recurrence** as a function of **proximity** from built-up area





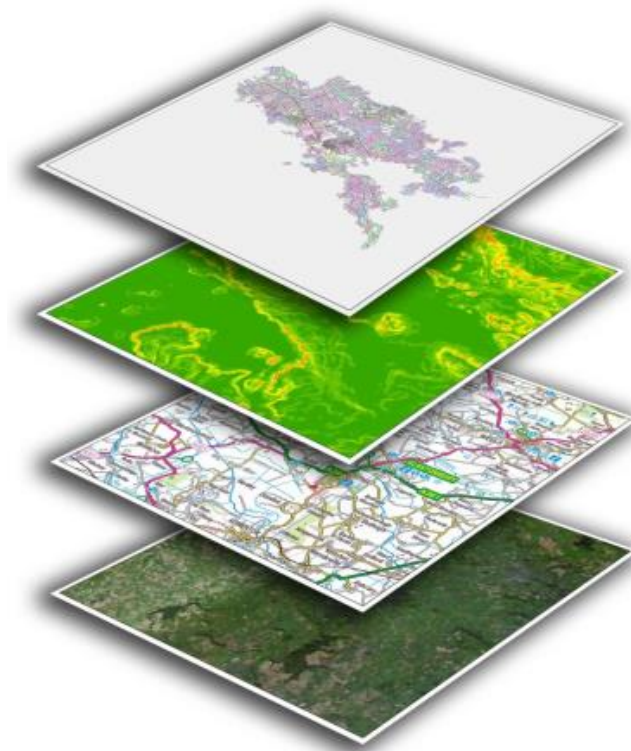
# Geospatial datasets

- 33,500 (2000) Italia (CFS)
- Forest the m data CLC
- Imperviousness Degree HRL (IMD HRL 2012), 20-m raster dataset to identify built-up areas



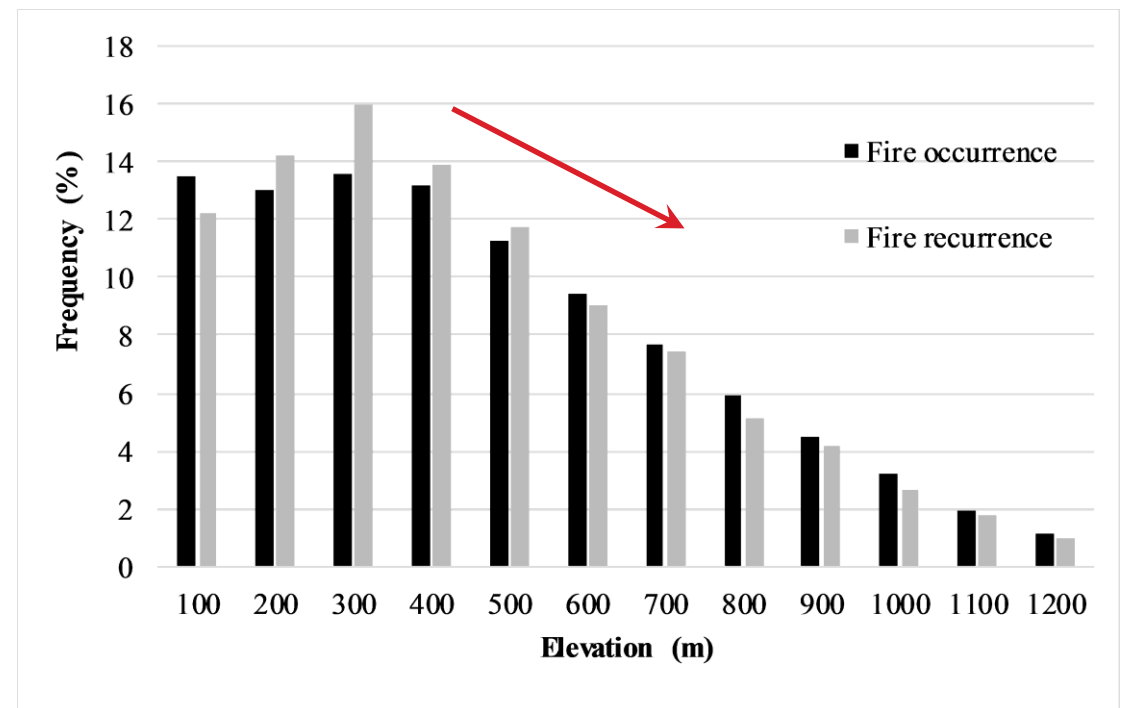
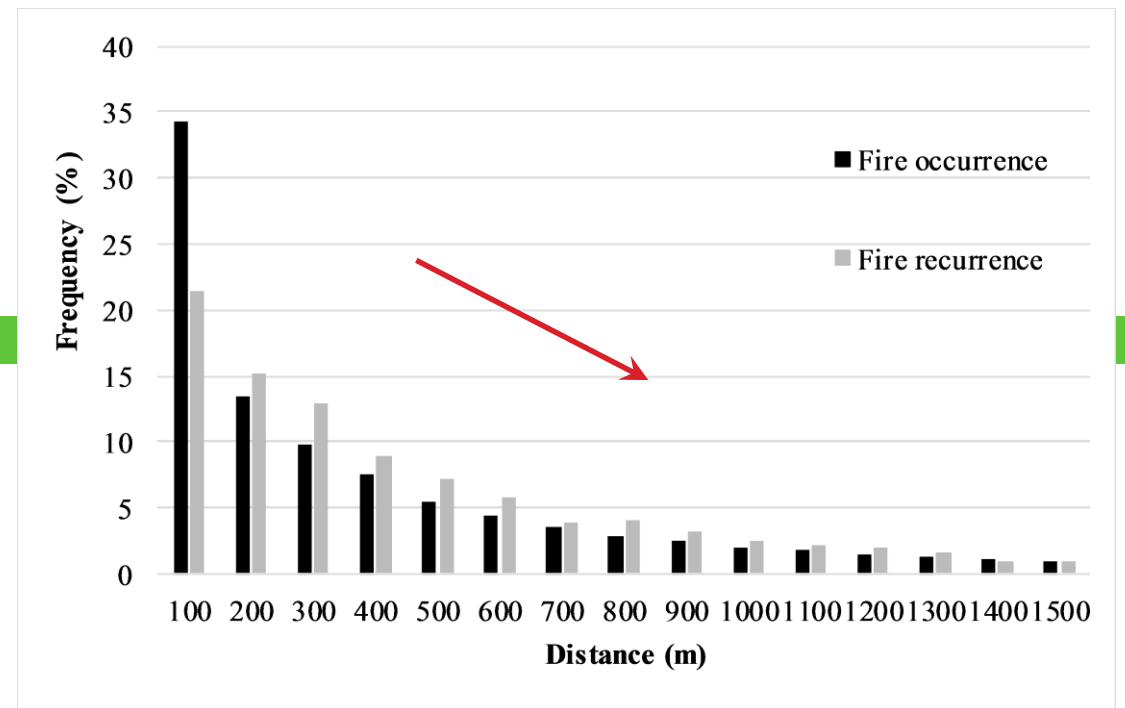
# Data processing

- We created **the distance raster from the built-up areas** (i.e. pixels with imperviousness  $> 0\%$ )
- for each forest polygon affected by fire, we estimated: the total area of the polygon, burnt area and **incidence** as the **ratio between burnt area and the total area** of the polygon
- We estimated the **frequency and incidence of occurring and recurring fires** according to distance and elevation class (100-m ramp) from built-up areas.



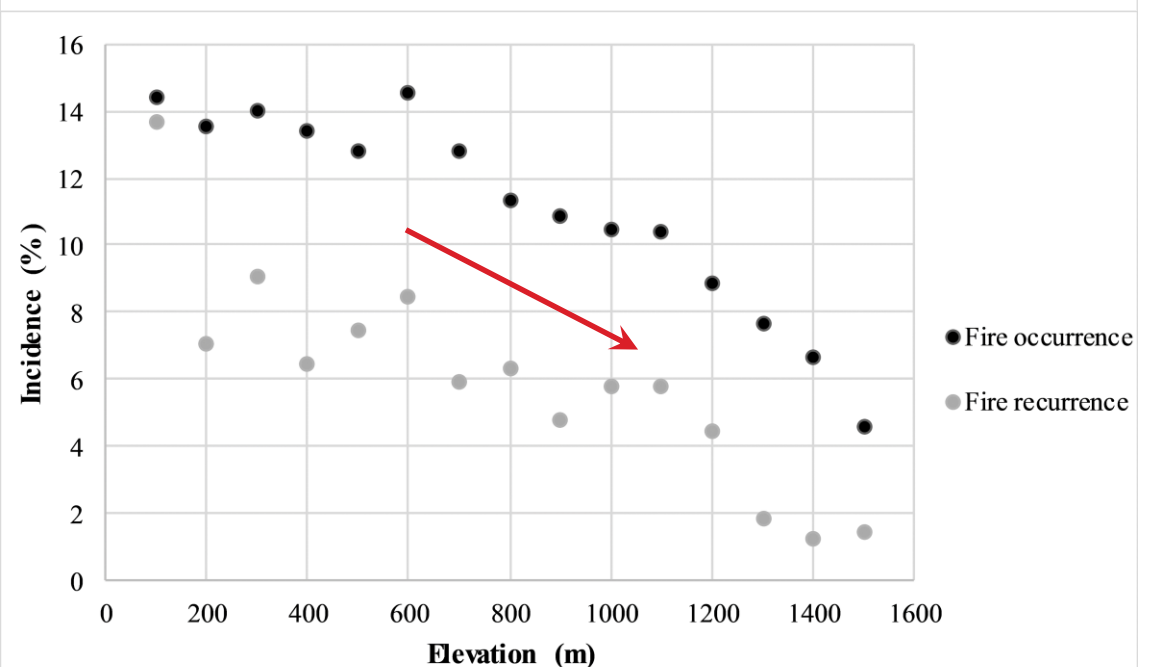
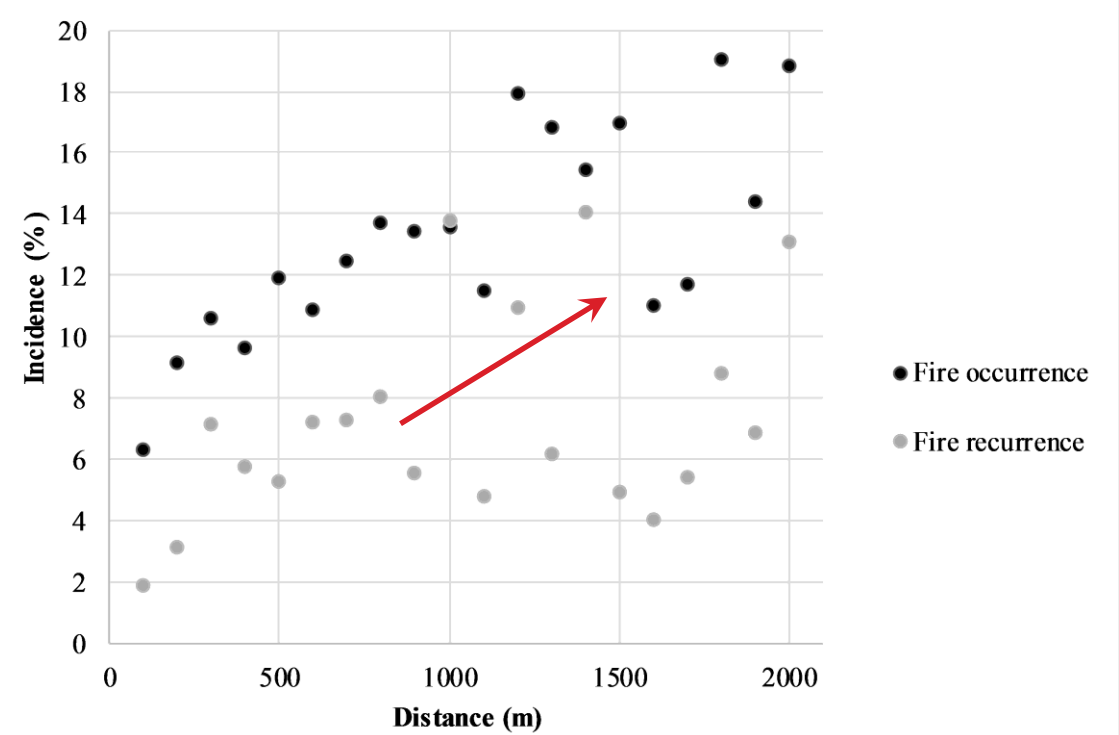
# Results (1): frequency

- The **frequency** of fire events **decreases** as the **distance** from built-up areas **increases**
- More than **70%** of the fire events occur **within 500 m** from built-up areas, while more than **70%** of the recurring fires are **within 600 m** from built-up areas.
- fire frequency is extremely high up to 400 m, with values ranging between 11% and 16%; fire frequency decreases as elevation increases.



# Results (2): incidence

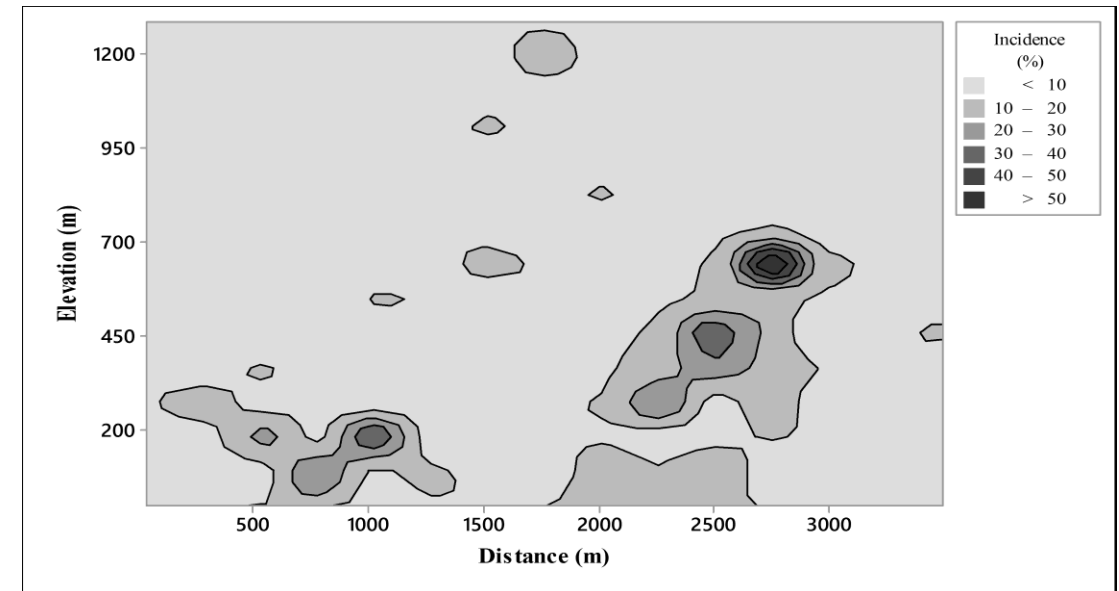
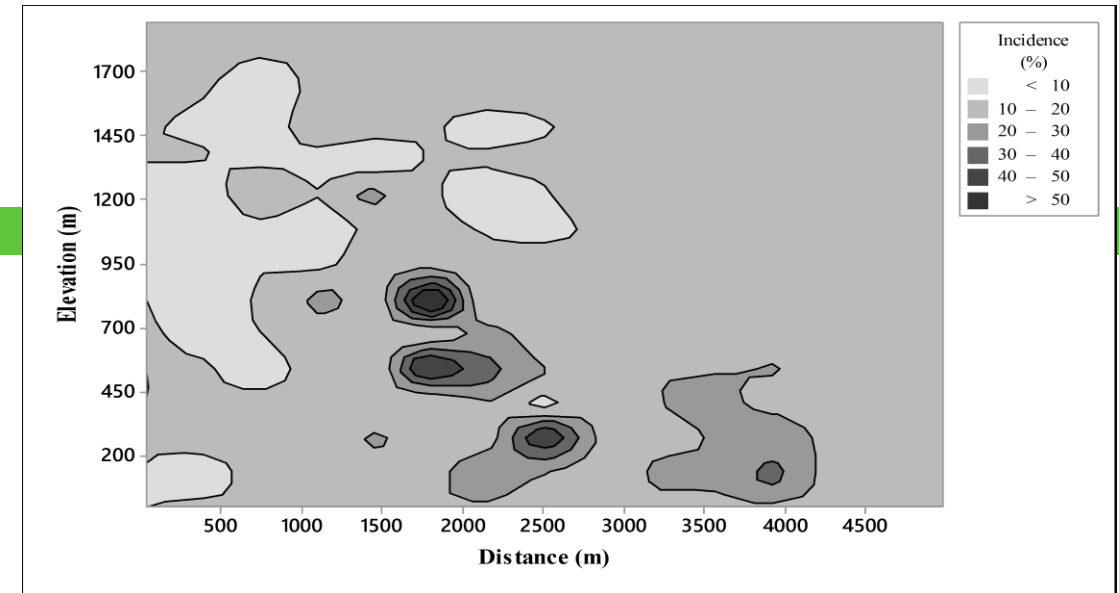
- Fire **incidence** shows a more **dispersed pattern** at increasing distances from built-up areas
- Fire **incidence decreases** at increasing elevation





# Results (3): contour plot

- the most critical **combination of elevation and distance** from built-up areas in terms of fire incidence of single or recurrent fires;
- these **hotspots of fire incidence are located in hilly and low mountain rural areas** (1800 to 2700 m from built up areas, at an elevation from 600 to 800 m)



# Discussion



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- **Positive relationship** between the **distance from built-up areas and fire incidence**; by contrast, there is a **negative relation** between the **distance** from built-up areas and fire **frequency** and recurrence distances from built-up areas
- **200-m buffer** play a key role in the **management** of prevention activities
- a considerable amount of fire events has **never** reached an **incidence higher than 10% in flat areas (<200 m)** and **higher than 30% in hilly and mountainous areas**
- areas **closer** to man-made settlements are thus **more likely to burn**, but the **lowest values of burnt area** per event

# Conclusion

- investigate forest fires on a large-scale, covering the entire territory of Italy from an **“horizontal”** (distance from built-up areas) and a **“vertical”** (elevation) **points of view**
- assess and understand **how patterns of fire occurrence and recurrence are distributed** across large territories helps decision makers to **improve the effectiveness of fire prevention, detection and firefighting resource allocation**
- The spatial analysis here presented reveals two faces of the same coin: a **disproportionately high fire occurrence in WUIs** along with **high fire incidence hotspots in relatively remote rural areas**