



## Does large fire activity vary within the French Mediterranean area?

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# Does large fire activity vary within the French Mediterranean area?

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6<sup>th</sup> International Conference on Fire Behavior and Fuels  
April 29<sup>th</sup>-May 3<sup>rd</sup>, 2019 – Marseille, France



# INTRODUCTION

- Large fires (LF) => huge socio-economic and environmental impacts, especially in WUI
- Need to better understand the spatial distribution of LF along a longitudinal transect in French Mediterranean area over 60 years of fire history

- Objectives:

= > To identify the locations associated with LF recurrence and to quantify the spatial extent of the region with reburns

=> To establish the fire return level along a longitudinal transect

=> To identify the possible role of climate conditions and fuel continuity in shaping this longitudinal gradient



Oleg Skripochka from the International Space Station ISS: (August 10, 2016 3:45pm TU to 5:45pm, ©)



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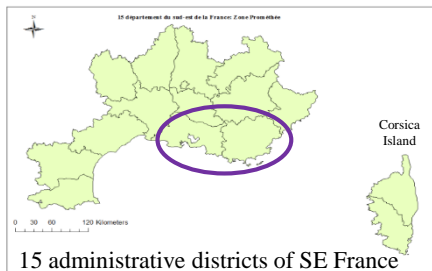
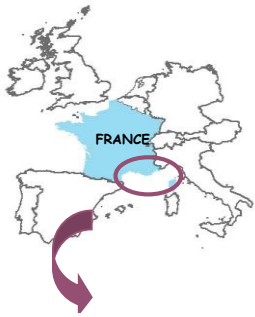
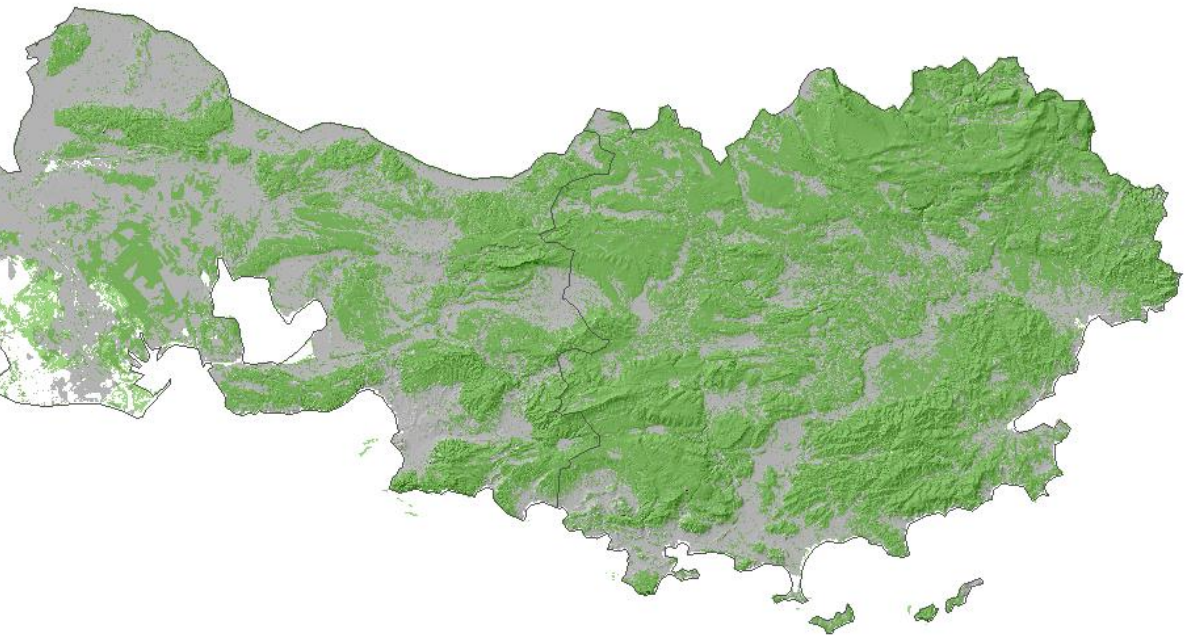
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# METHODOLOGY

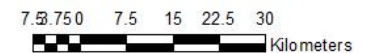
## ➤ Study Area

Increasing Precipitation and Forest Cover



15 administrative districts of SE France

Increasing Wildland-Urban Interfaces



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# METHODOLOGY

## ➤ Study Area



60 years of recorded fire history



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# METHODOLOGY

## ➤ Study Area

... but landscape shaped by fires for millenia





# METHODOLOGY

## ➤ Fire Data

- $LF \geq 100$  ha
- Long-term geo-referenced fire perimeter database (1958-2017) – ONF-DDTM  
=> **Spatio-temporal analysis of large fires (LF) : recurrence, time-since the last fire**
- Regional fire database Prométhée (1973-2017)  
=> **Spatio-temporal analysis of detailed large fire causes**

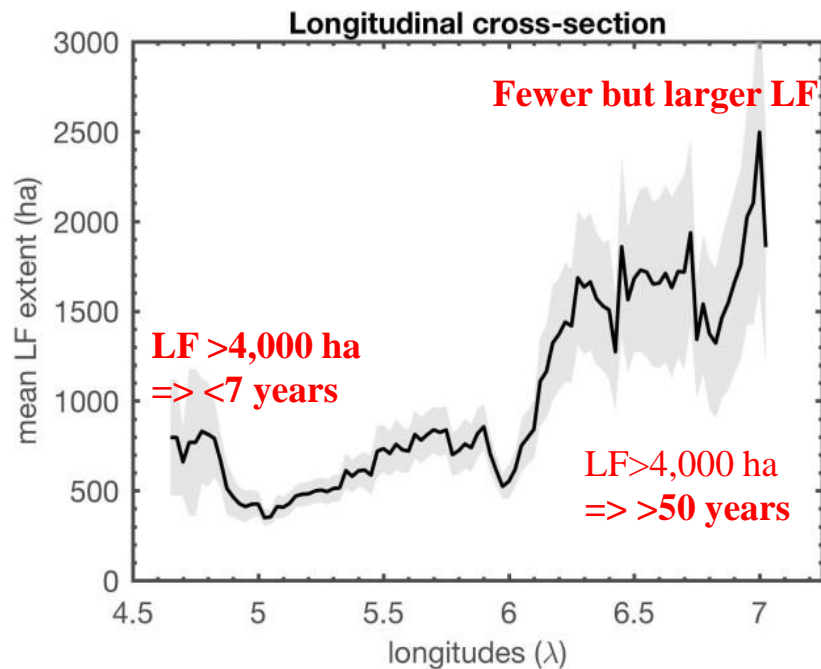
## ➤ Climate and Land Cover Data

- **Daily Fire Weather Index (FWI)** from SAFRAN dataset
- **Fuel cover** data from the “BD Forêt 2014” (IGN)

# SOME RESULTS

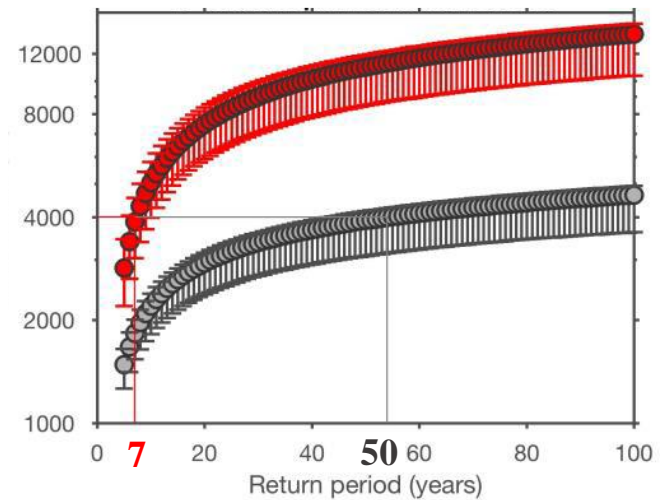
## ➤ Spatio-temporal trends of LF

LF = 28% of the total number of fires but 94% of burned area



but contrasting patterns between the East and the West in terms of:

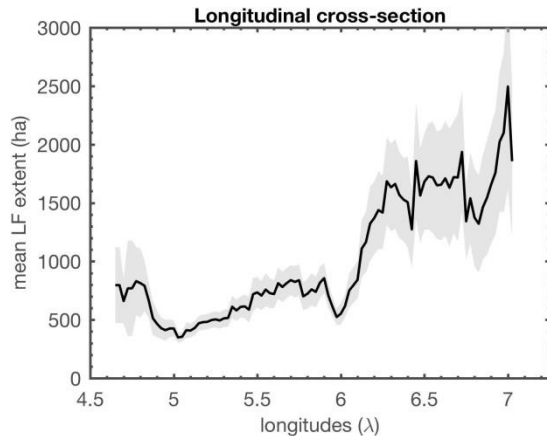
- Number and size
- Average time of occurrence





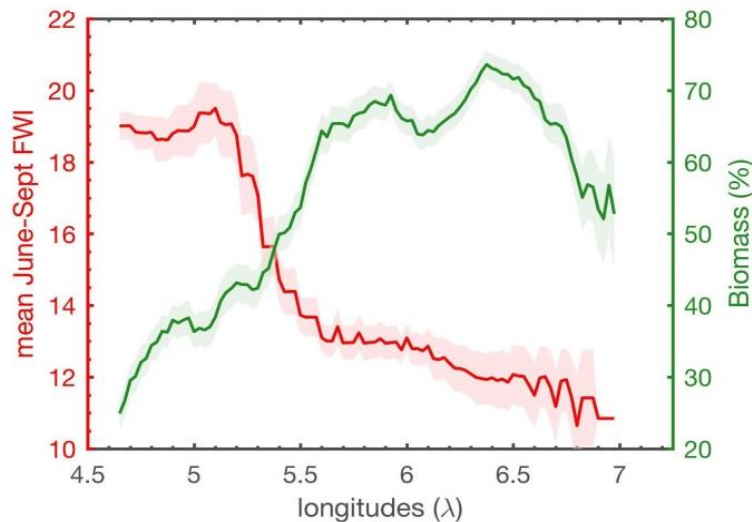
# SOME RESULTS

## ➤ Spatio-temporal trends of LF



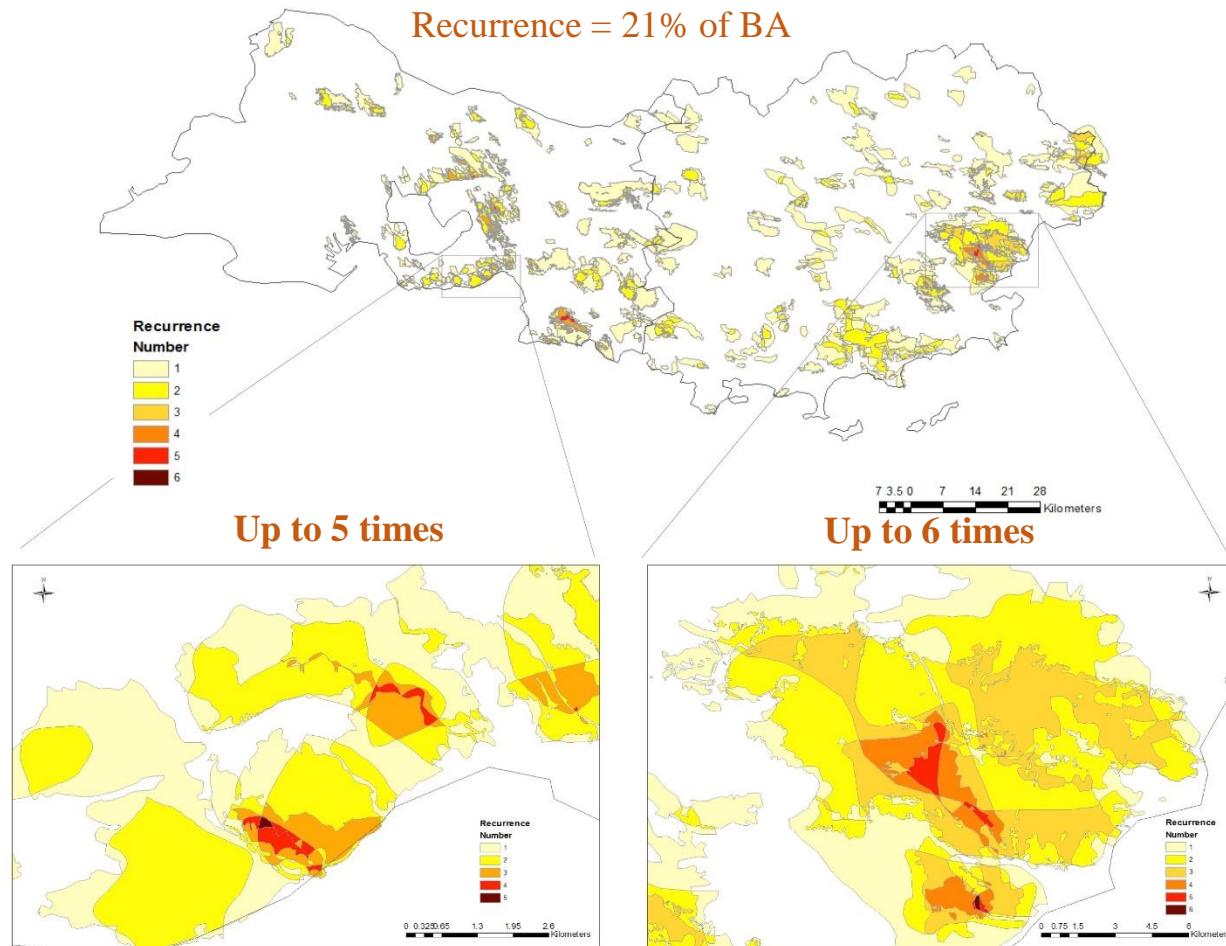
### Contrasting patterns between the East and the West

- Not consistent with the **strong decrease in mean fire weather conditions in the East**
- Consistent with **larger fuel cover in the East** => strong role of fuel continuity in fire spread
- Consistent with **lower WUI in the East** => enhancing fire spread



# SOME RESULTS

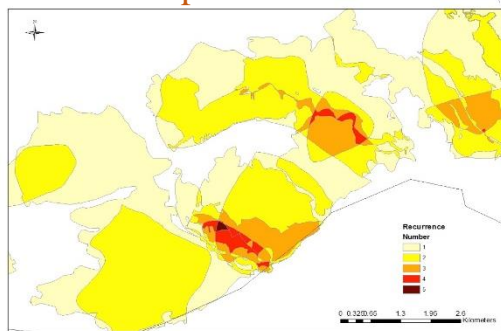
## ➤ Spatial variation of fire recurrence



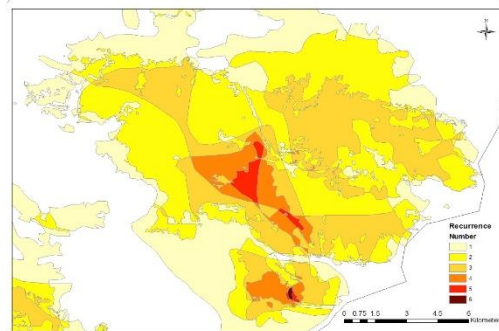
# SOME RESULTS

## ➤ Spatial variation of fire recurrence

Up to 5 times



Up to 6 times



Recurrence = 21% of BA

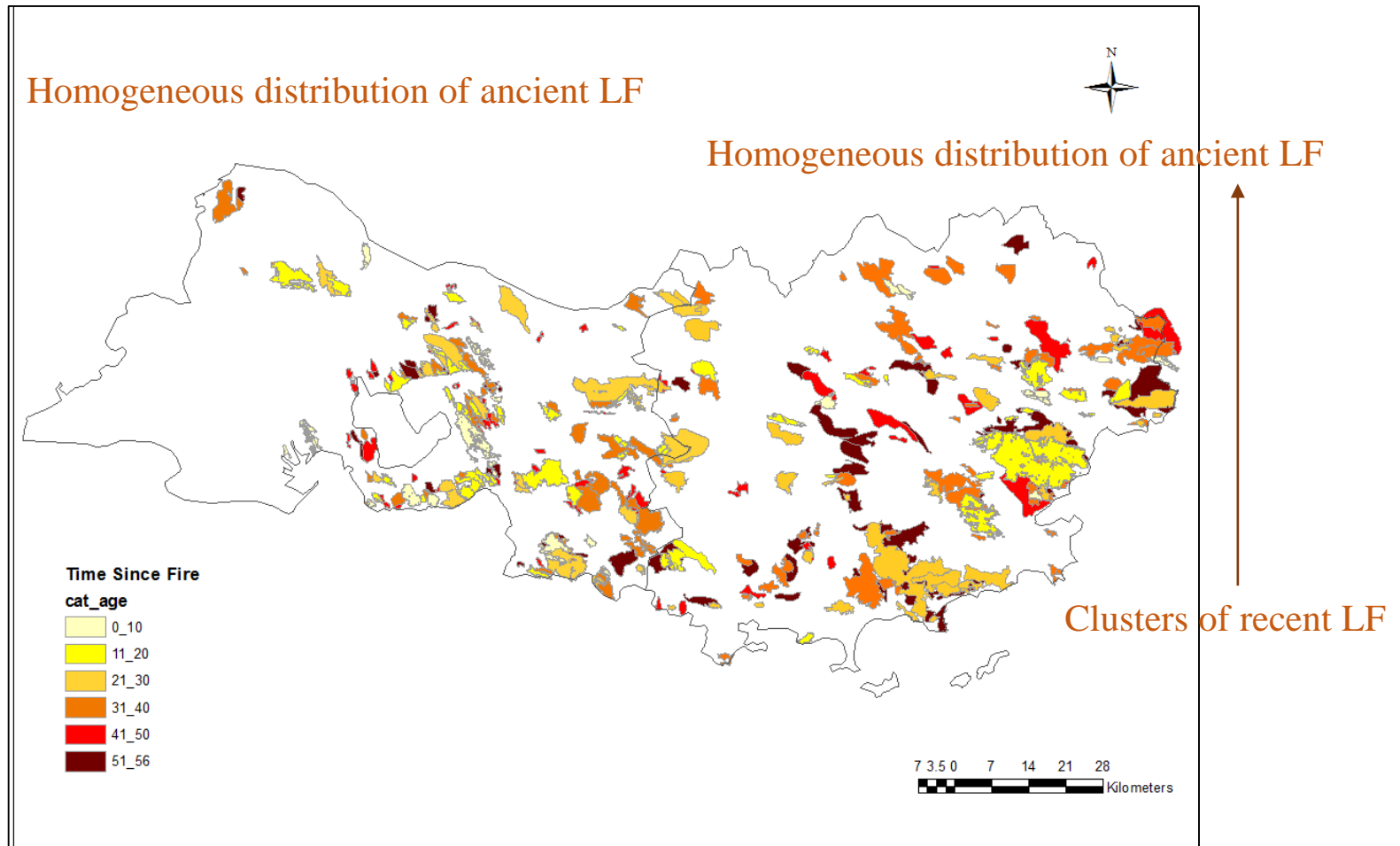
=> potential impact on forest resilience





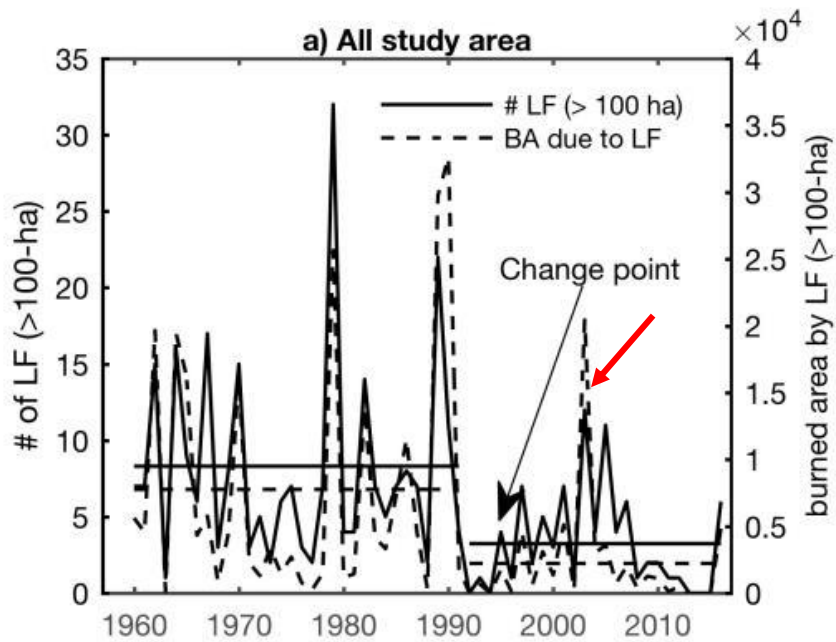
# SOME RESULTS

## ➤ Spatial variation of time-since-LF



# SOME RESULTS

## ➤ temporal variation of LF trend



Sharp decrease in both LF frequency and burned area in the early 1990s

=> Reinforced **fire suppression and prevention** => weakening of the functional climate-fire relationship

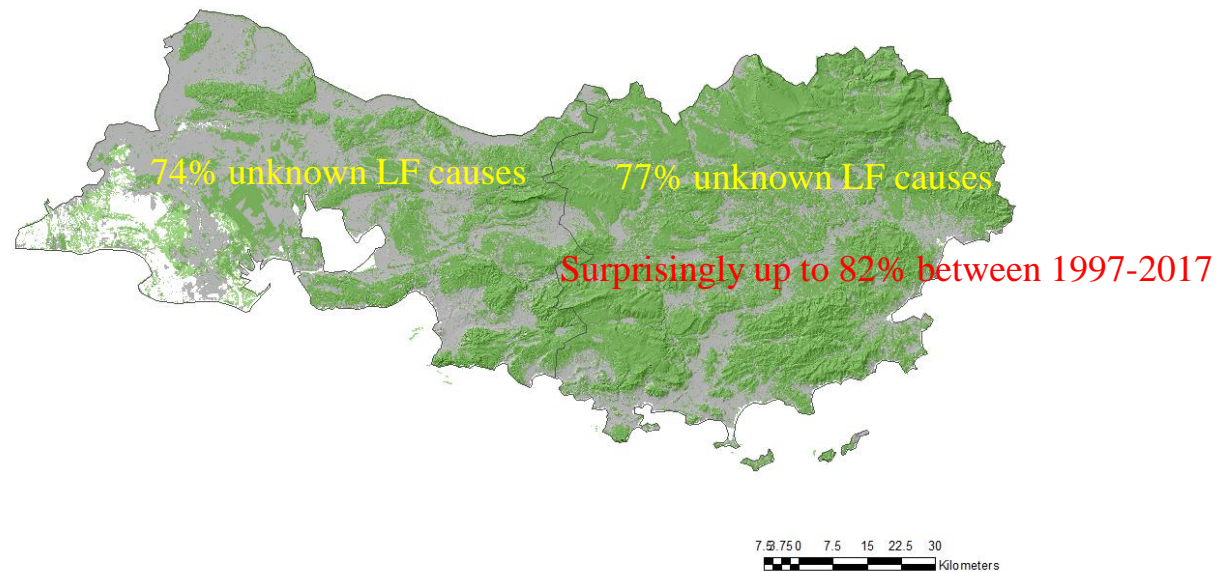


=> Possible outbreaks due to **extreme weather conditions** (e.g. 2003)

# SOME RESULTS

## ➤ Spatio-temporal variation of LF causes (BD Prométhée)

Bad knowledge of the fire causes (regardless of the size)

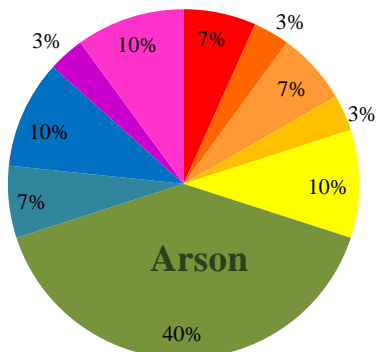


1997: Creation of teams for fire cause investigation



# SOME RESULTS

## ➤ Spatio-temporal variation of LF causes (BD Prométhée)



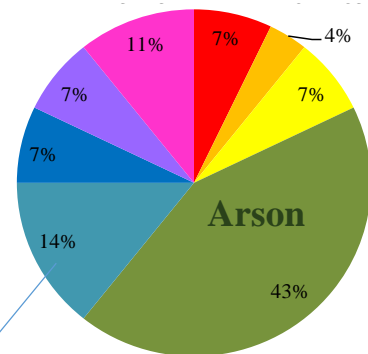
Negligence during  
Agricultural works

Negligence \_  
Glowing objects

Accident \_ Vehicles

**Before 1997**

**After 1997**



Negligence during  
Forestry Works

**Before 1997**



**Targeting fire ignitions will differ spatially**



# CONCLUSIONS

- Analysis of LF trends based on long-term geo-referenced fire time series (1958-2017)
- 21% of the total area burned by LF occurred on a surface that already burned in the past
- LF were less frequent but larger in the eastern part of the study area with shorter time of occurrence between LF => according to the land cover longitudinal trend but in contrast to FWI
- Abrupt decline in LF in the early 1990s => Change in fire management policy  
=> Except if extreme weather conditions
- Bad knowledge of LF causes and arson = most frequent cause in the study area



**Thank you for your attention**



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