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## 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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International Association of  
WILDLAND FIRE

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



irstea

# 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

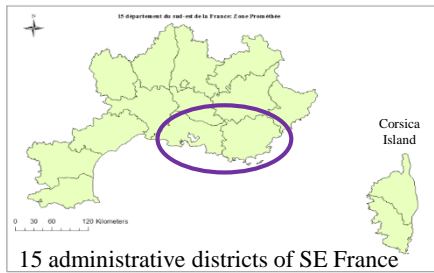
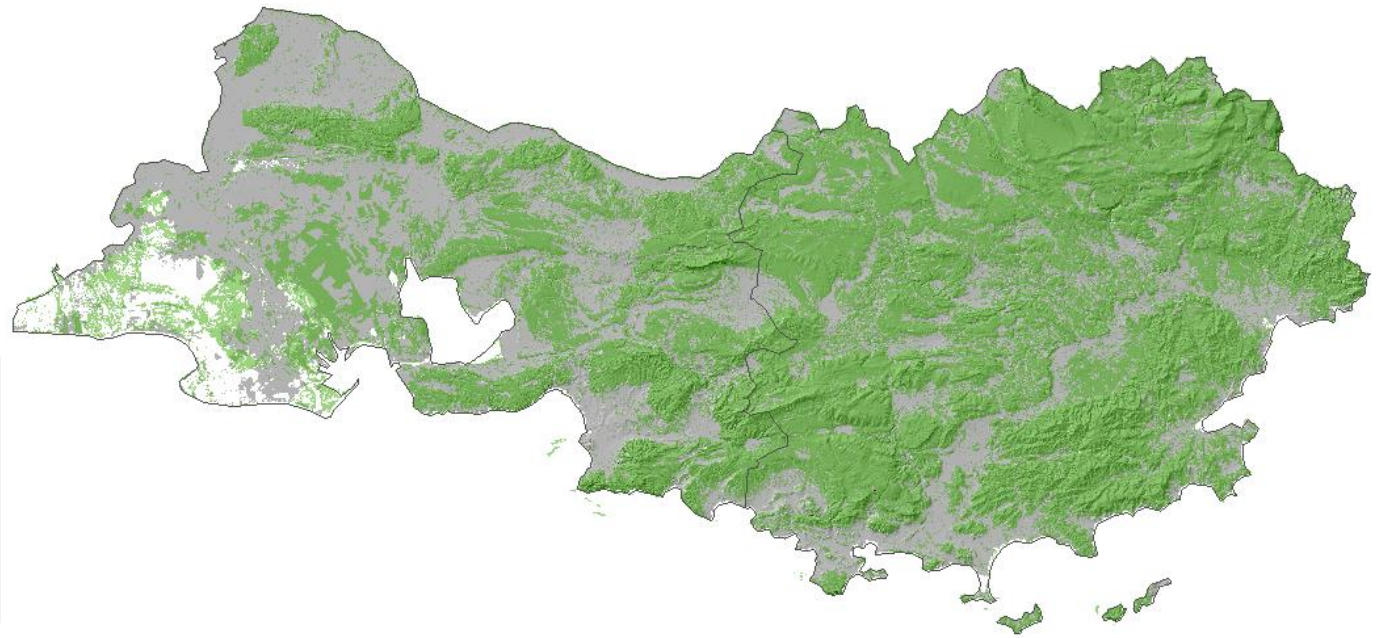
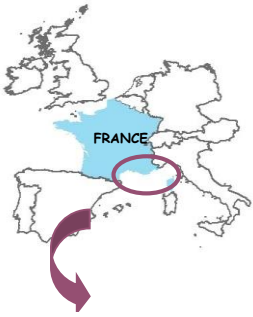
=> To identify the possible role of climate conditions and fuel continuity in shaping this longitudinal gradient



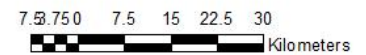
# METHODOLOGY

## ➤ Study Area

Increasing Precipitation and Forest Cover



Increasing Wildland-Urban Interfaces



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# METHODOLOGY

## ➤ Study Area



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# METHODOLOGY

## ➤ Study Area

... but landscape shaped by fires for millenia



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# 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**

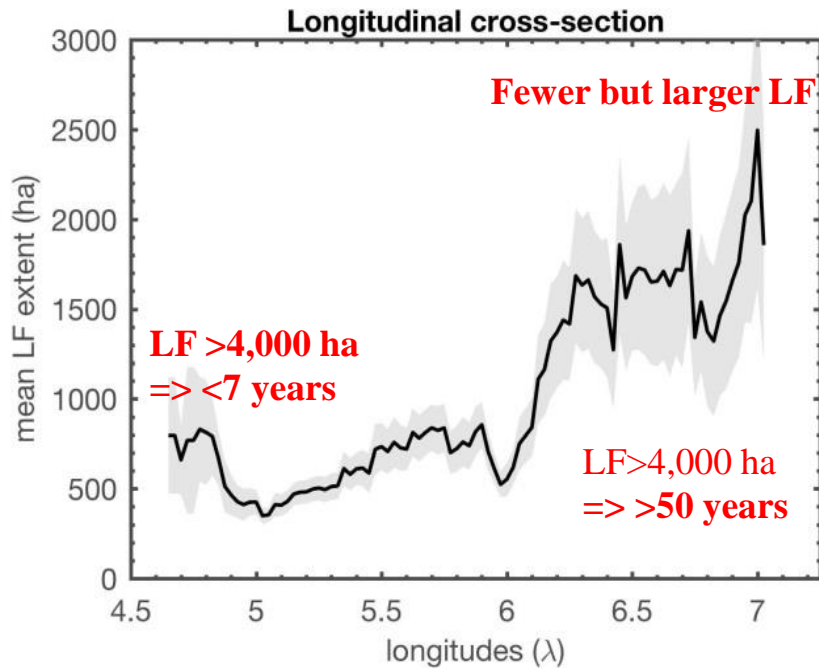
## ➤ Climate and Land Cover Data

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

# SOME RESULTS

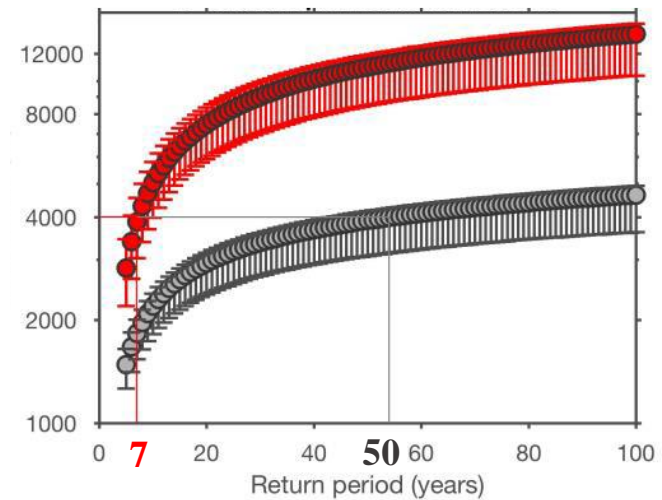
## ➤ Spatio-temporal trends of LF

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:

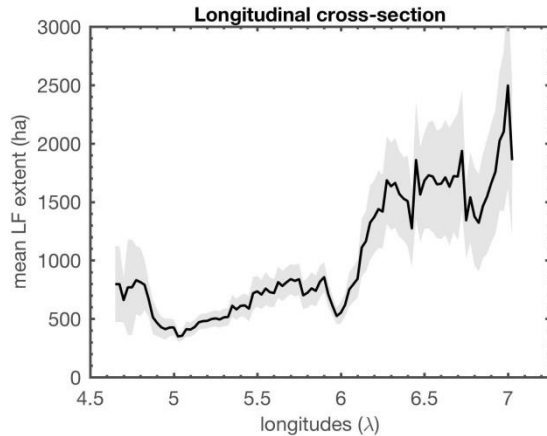
- Number and size
- Average time of occurrence





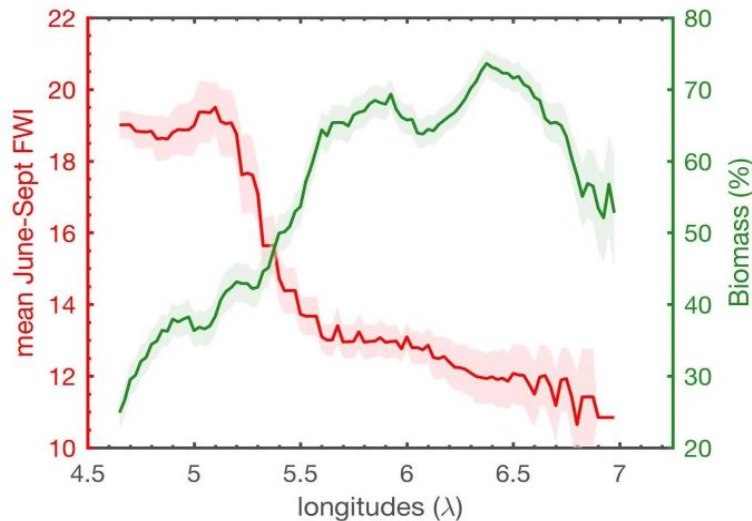
# SOME RESULTS

## ➤ Spatio-temporal trends of LF



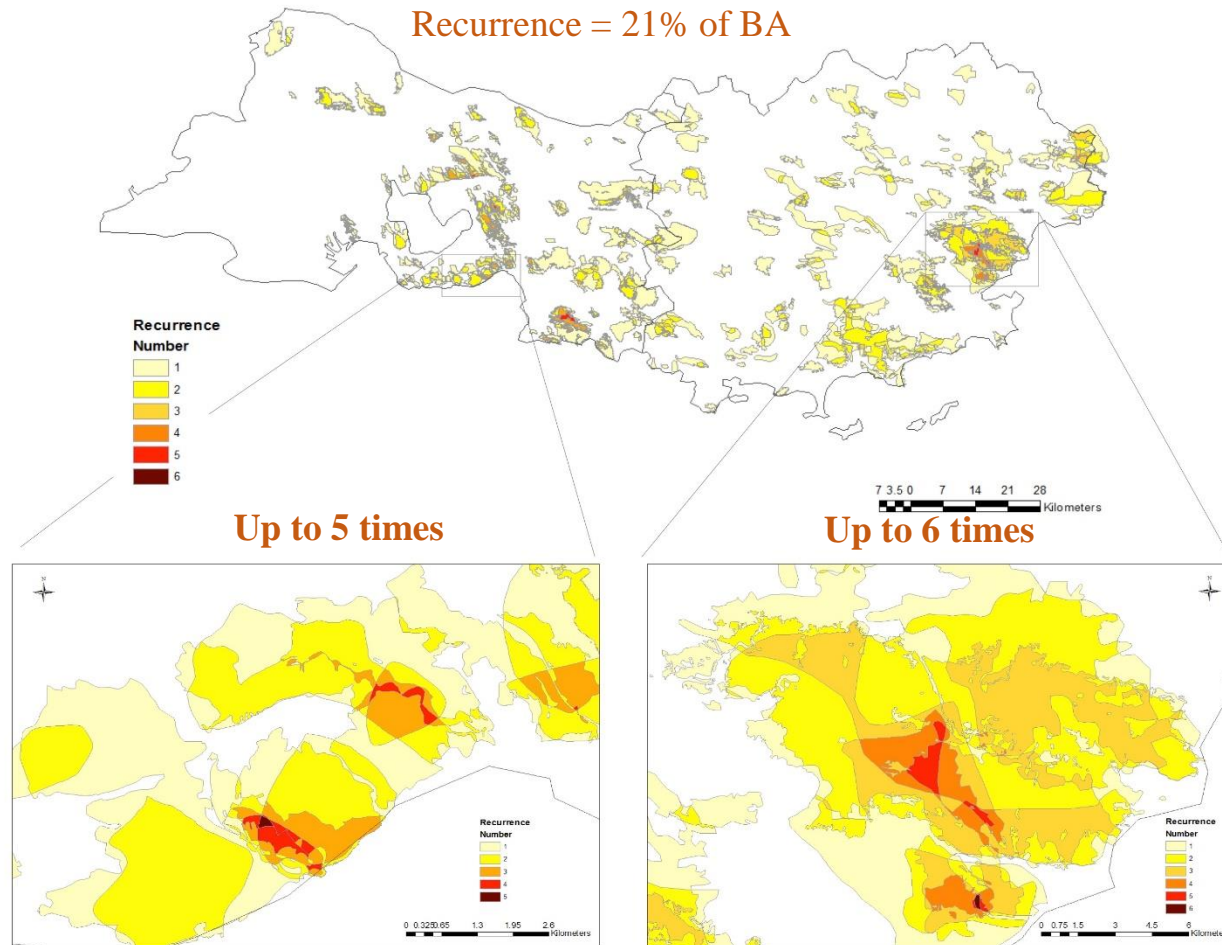
### Contrasting patterns between the East and the West

- 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

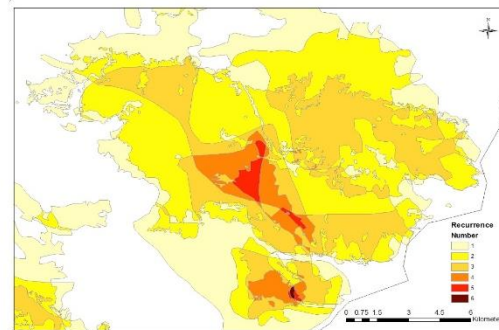
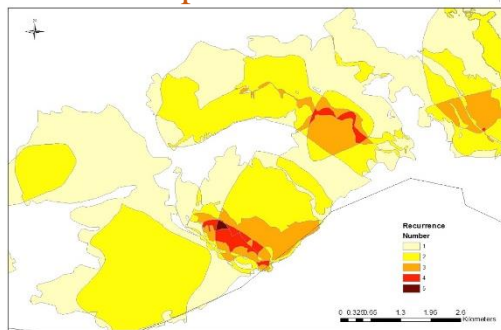


# SOME RESULTS

## ➤ Spatial variation of fire recurrence

Up to 5 times

Up to 6 times



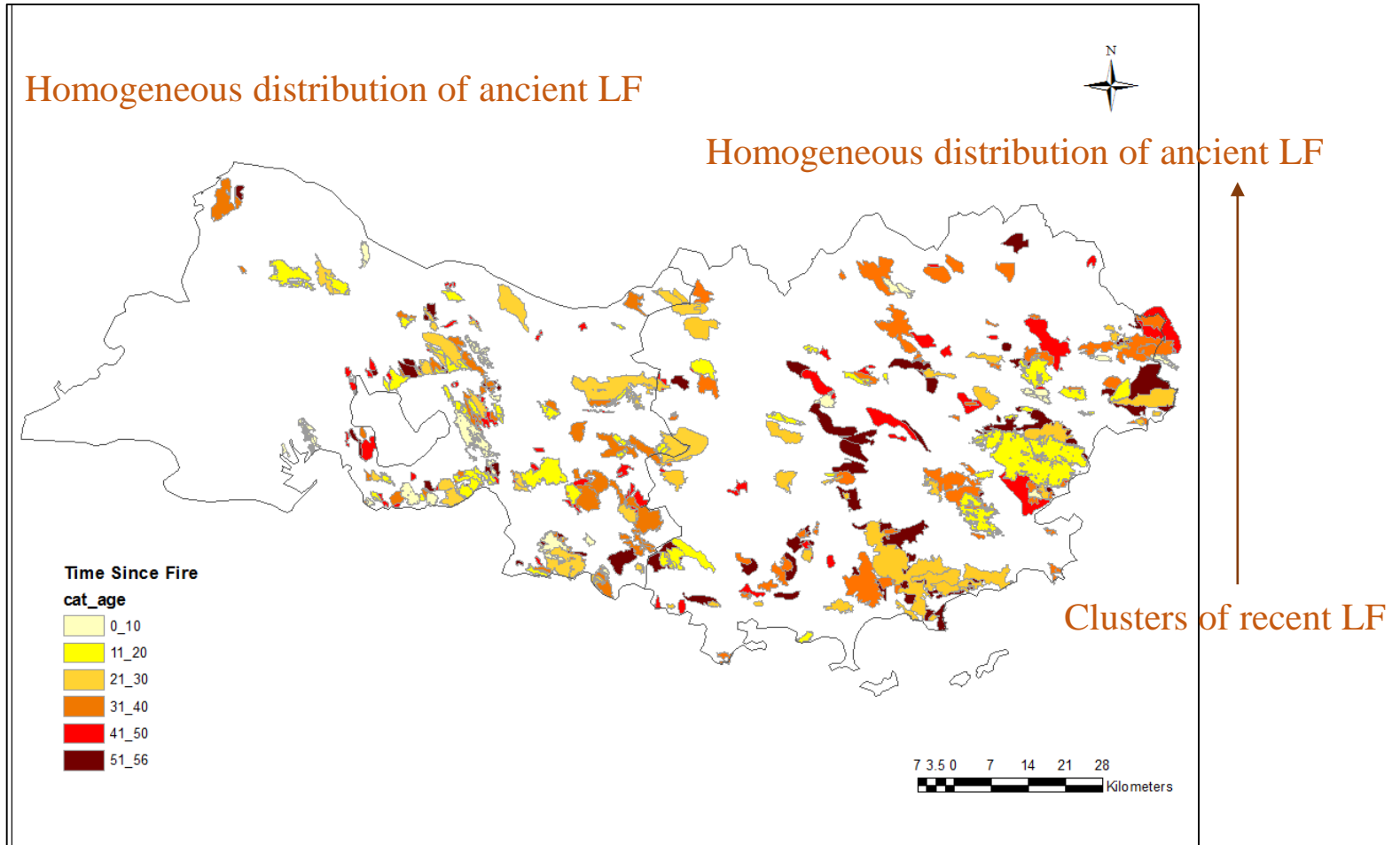
Recurrence = 21% of BA

=> potential impact on forest resilience



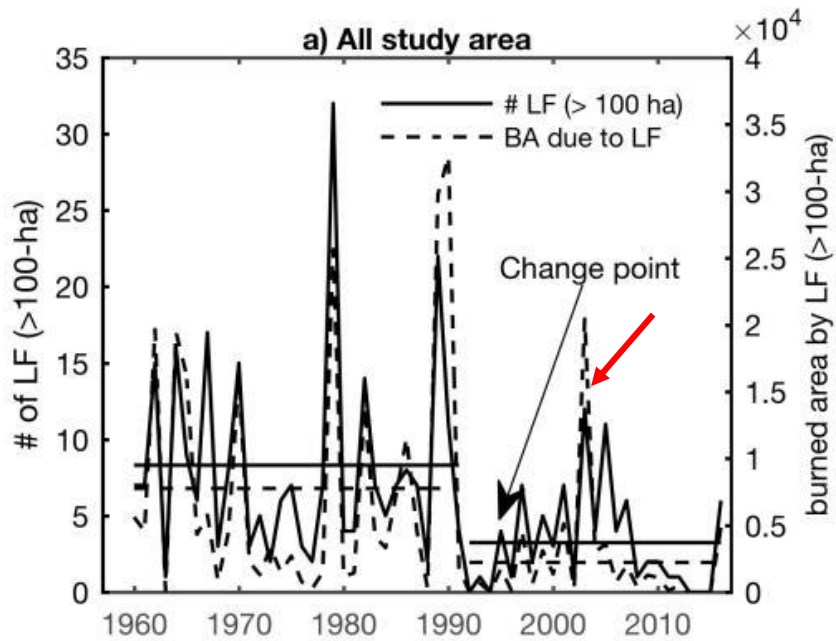
# SOME RESULTS

## ➤ 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

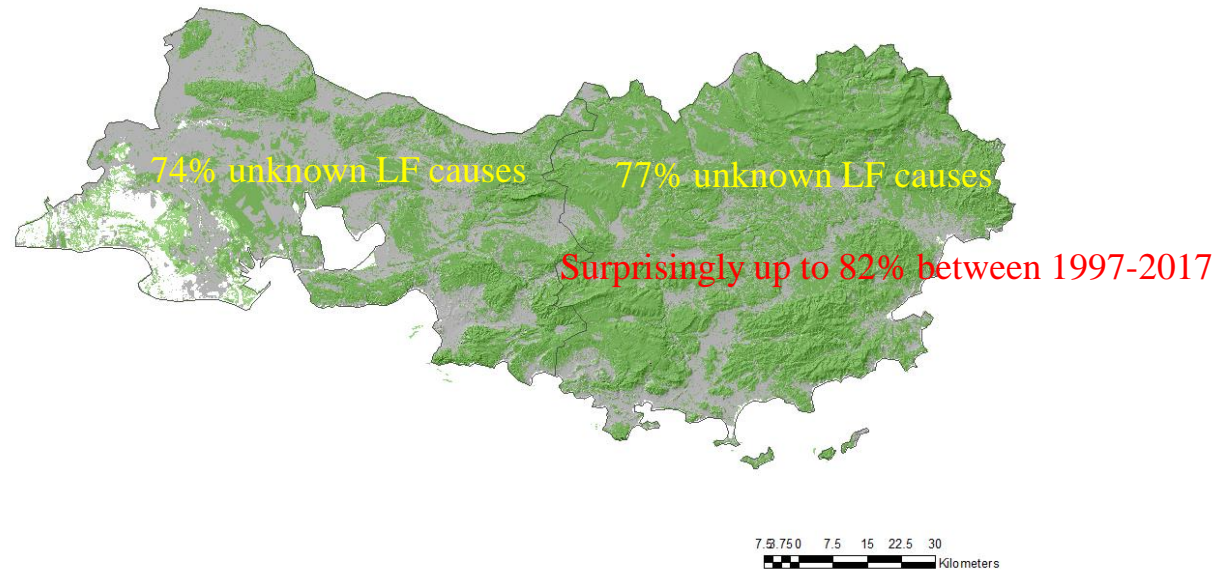


=> Possible outbreaks due to extreme weather conditions (e.g. 2003)

# 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



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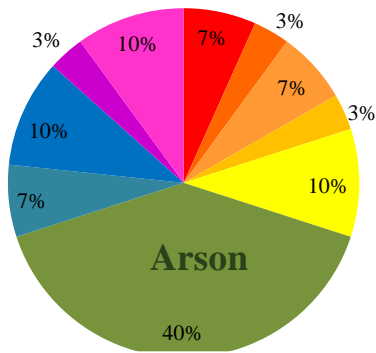
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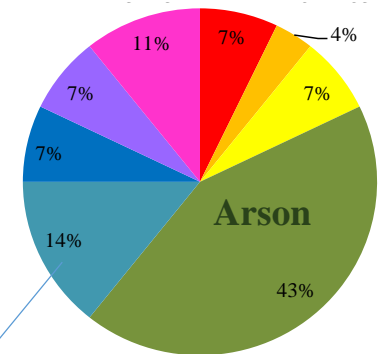


# SOME RESULTS

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



- Negligence during Agricultural works
- Negligence during Glowing objects
- Accident during Vehicles



**Before 1997**

**Before 1997**

**After 1997**

➔ Targeting fire ignitions will differ spatially



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# 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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