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40 years of fire history in SE France: What's the story?

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40 years of fire history in SE France : What's the story ?

Anne Ganteaume



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40 years of fire history in SE France : What's the story ?

40 years of fire history in SE France : What's the story ?



Introduction

SE France: the most impacted by wildfires (≈60% of the total ignitions and largest burned areas, EC 2016)

The longest fire history recorded (since 1973 , regional fire database Prométhée)

On-going global change => worsening of the fire issue in some regions

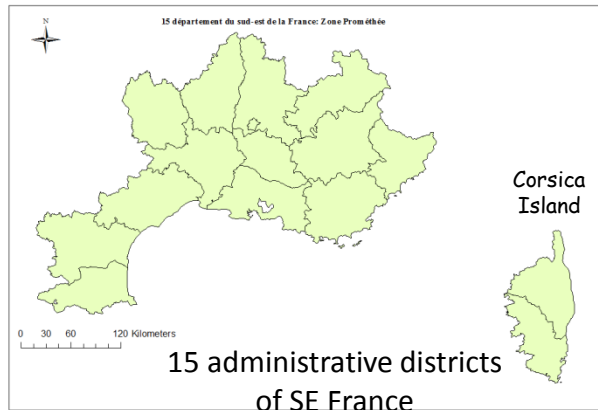
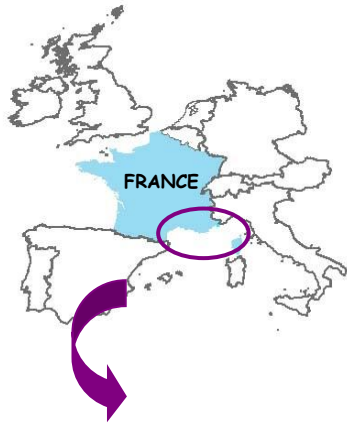
What happened?

- **Is there a spatio-temporal variation of the fire metrics and causes?**
- **What caused this variation?**

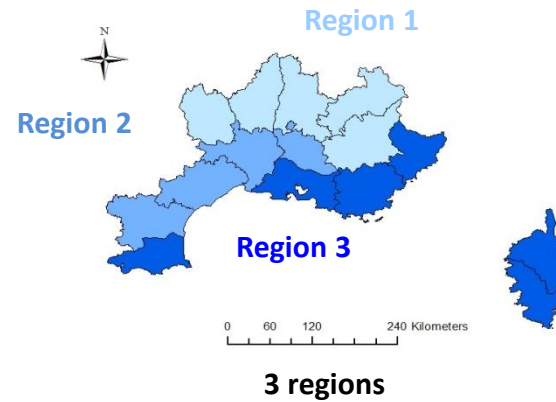
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Methodology

➤ STUDY AREA



SE France



- Climate
- Land cover/Land Use
- Socio-economic context

Methodology

➤ DATA

Regional database Prométhée :

Wildfires recorded in the 15 départements
of SE France since 1973

Parameters recorded for each fire:

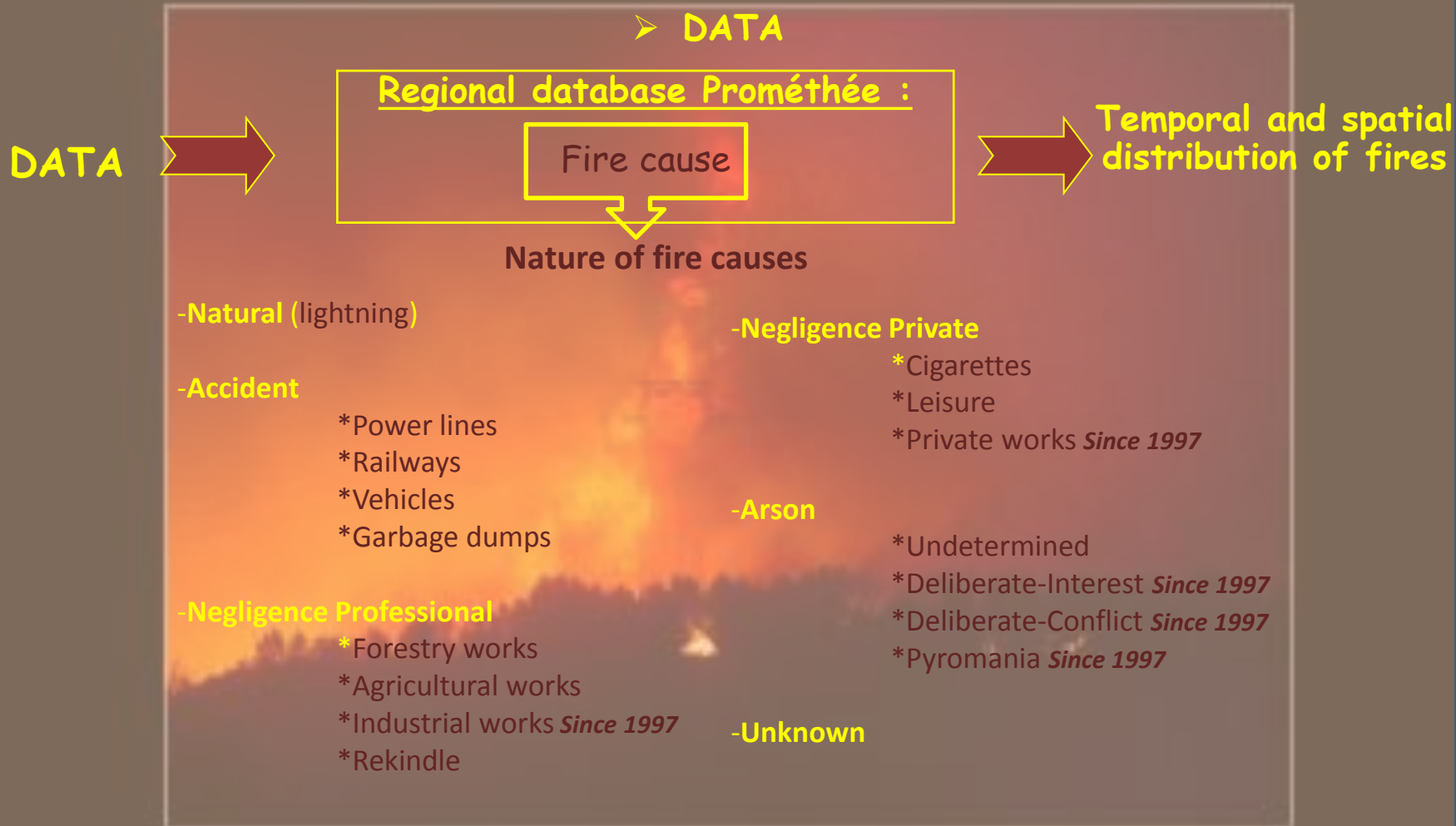
- Date
- Location
- Fire size (ha)
- Fire cause

DATA

Temporal and spatial
distribution of fires

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Methodology

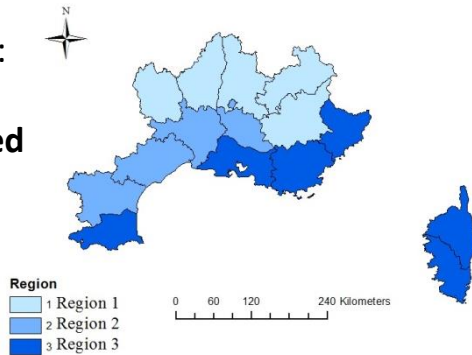


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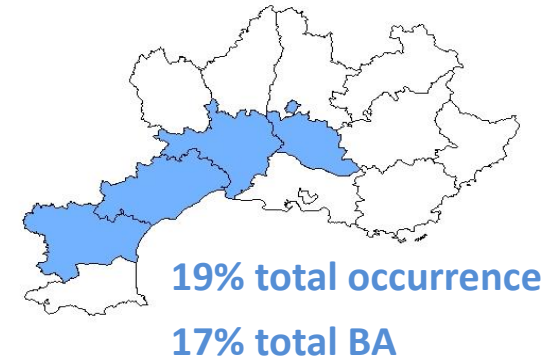
Results

➤ Is there a spatio-temporal variation of the fire metrics ?

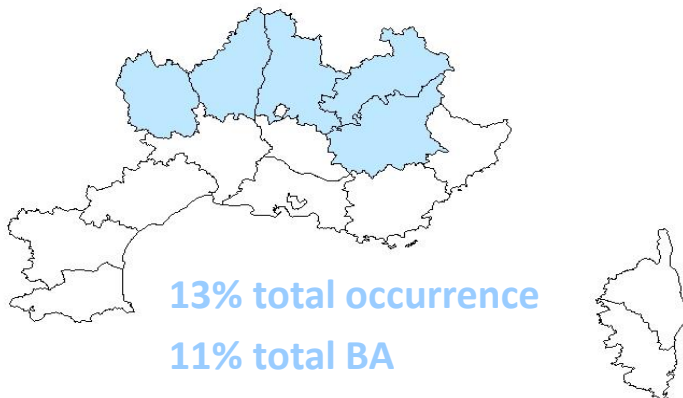
1973-2015 period:
107 097 fires
8 034 640 ha burned



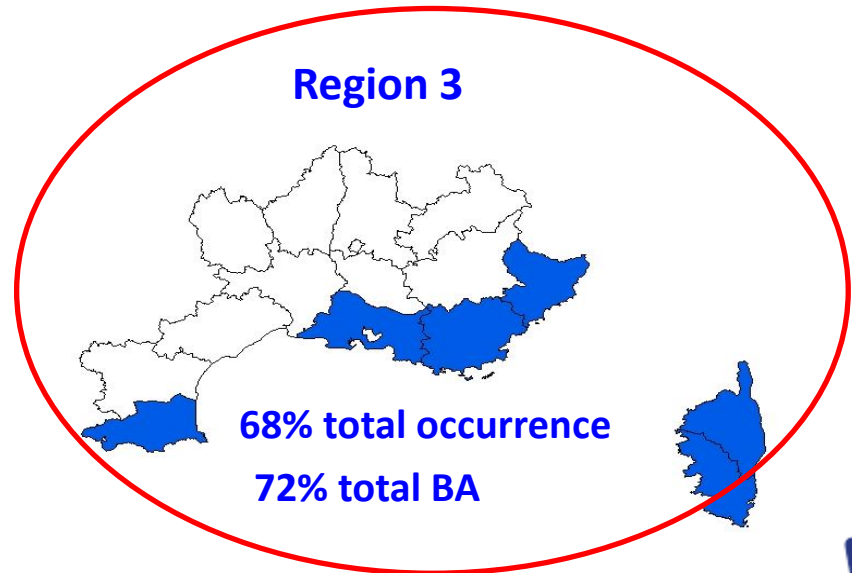
Region 2



Region 1

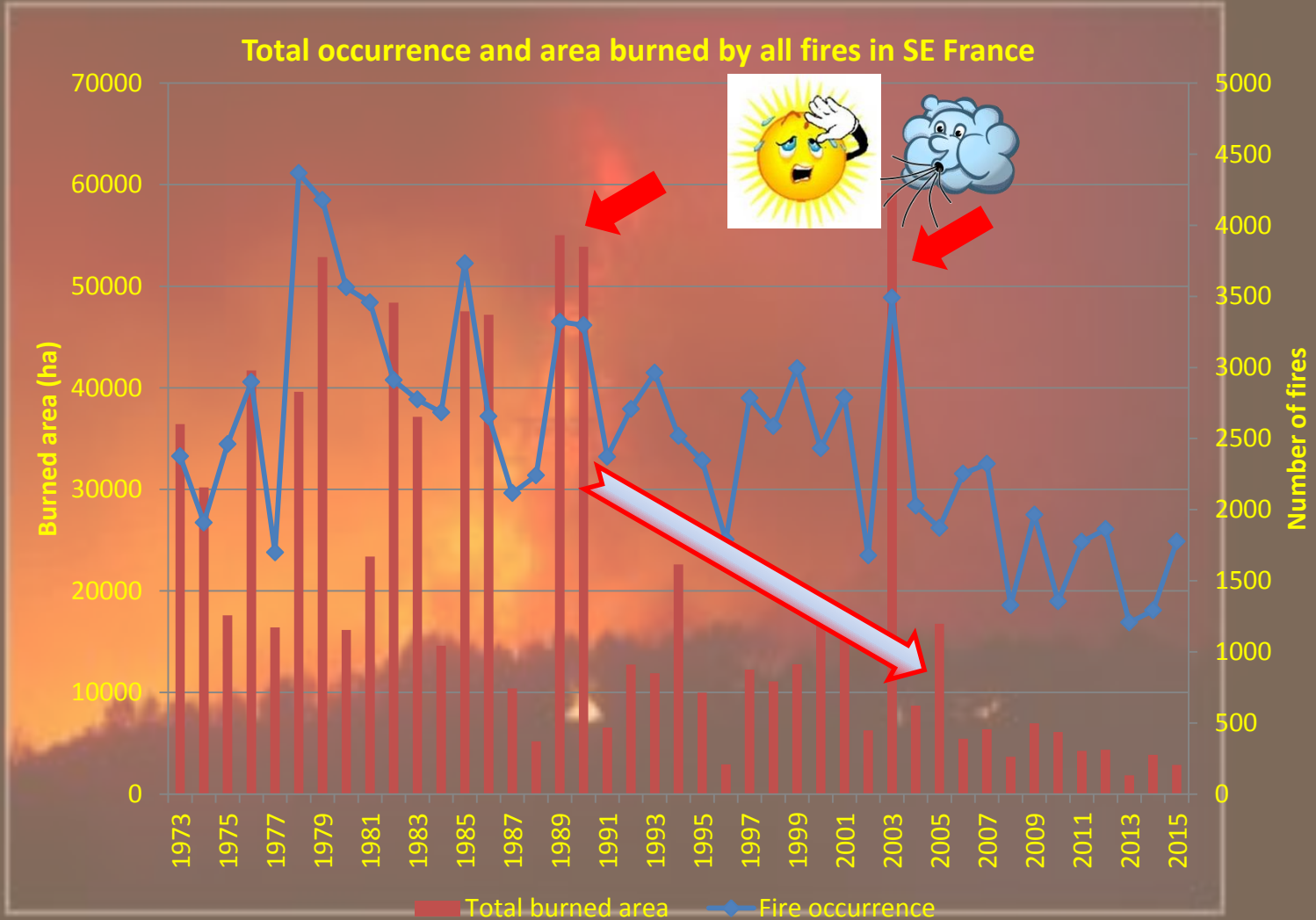


Region 3



Results

➤ Is there a spatio-temporal variation of the fire metrics ?



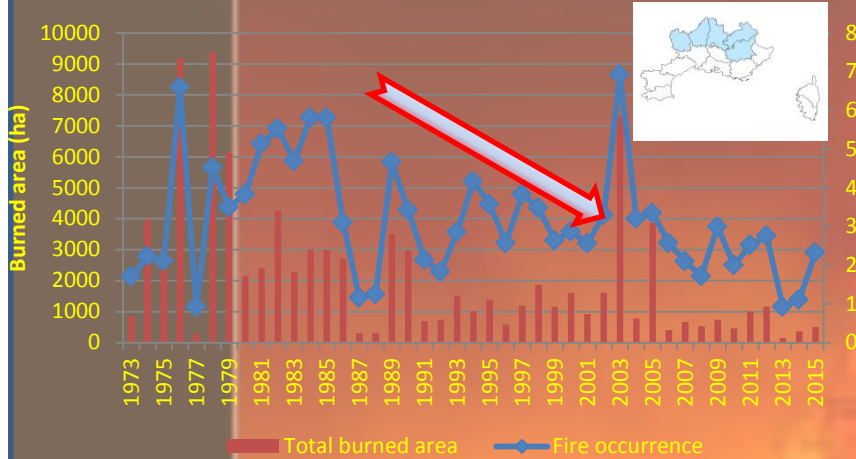
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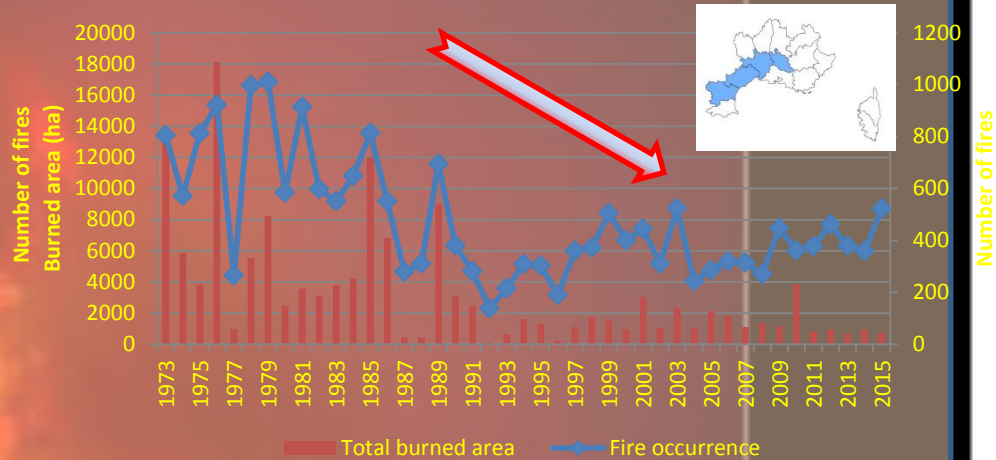
Results

➤ Is there a spatio-temporal variation of the fire metrics ?

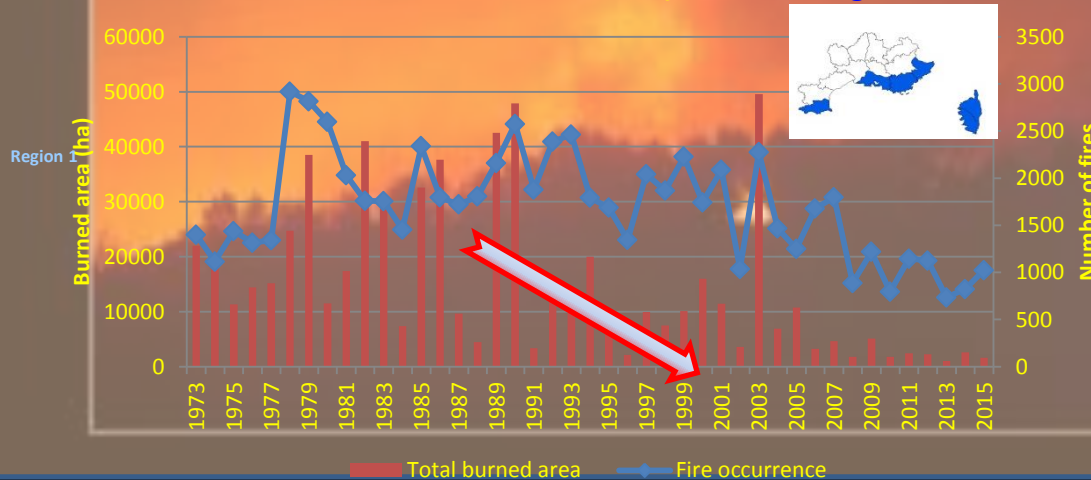
Total occurrence and area burned by all fires in Region 1



Total occurrence and area burned by all fires in Region 2



Total occurrence and area burned by all fires in Region 3



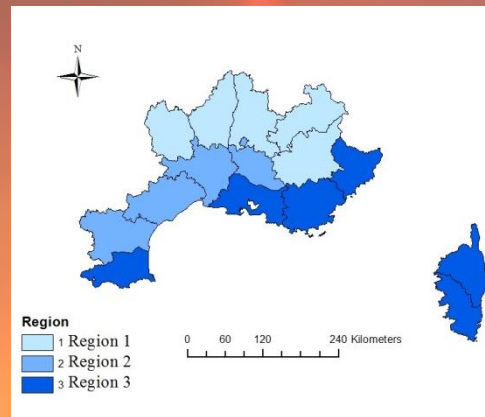
=> Same trend regardless of the region

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Results

➤ Distribution of fire size ?

1973-2015 period:
107 097 fires
8 034 640 ha burned



Mostly in
region 3

Occ: 63%
BA: 1.3%



$S < 1$ ha

Occ: 36%
BA: 27%



$1 \leq S < 100$ ha

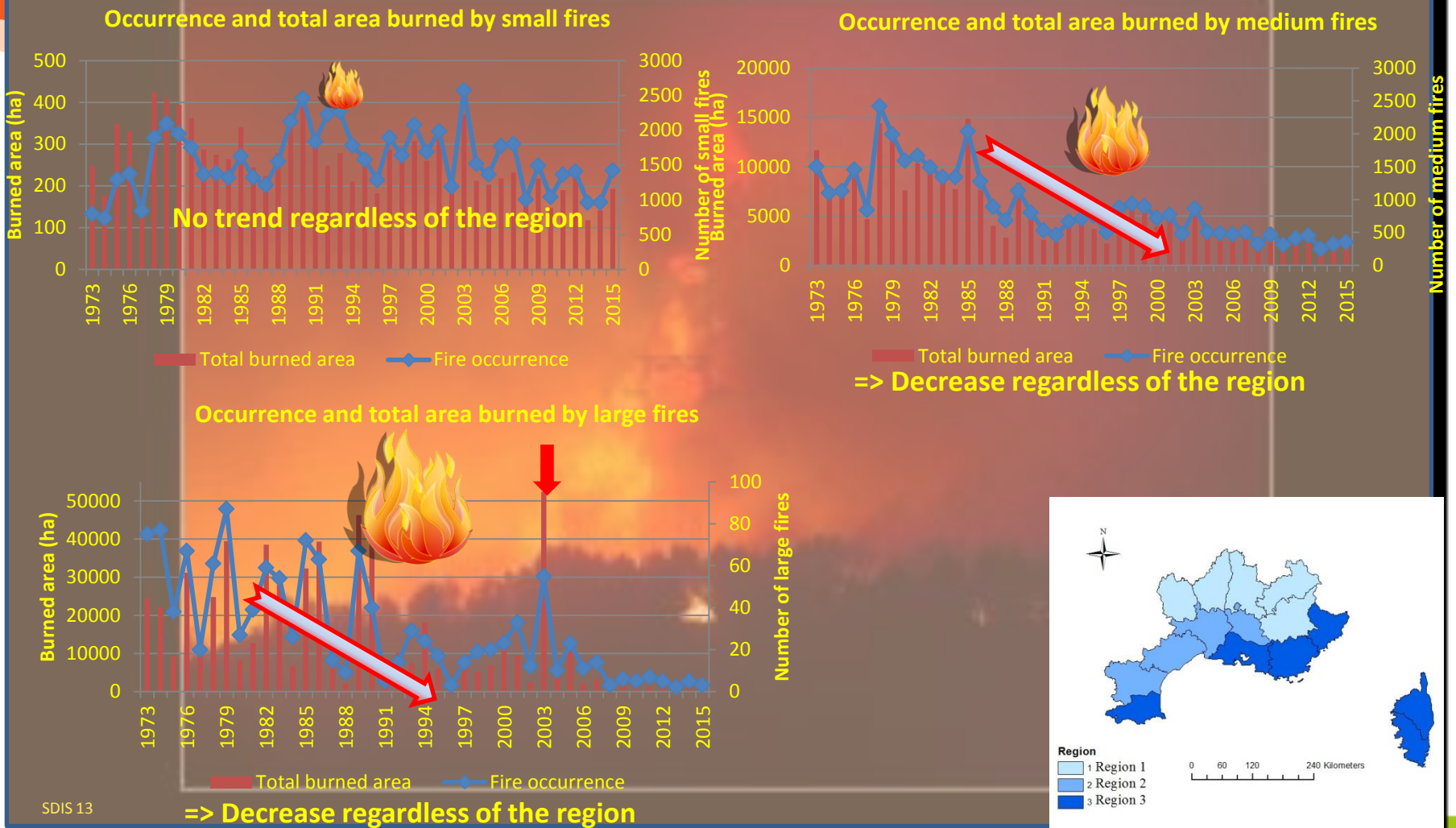
Occ: 1.2%
BA: 71%



$S \geq 100$ ha

Results

➤ Is there a spatio-temporal variation of the fire size ?

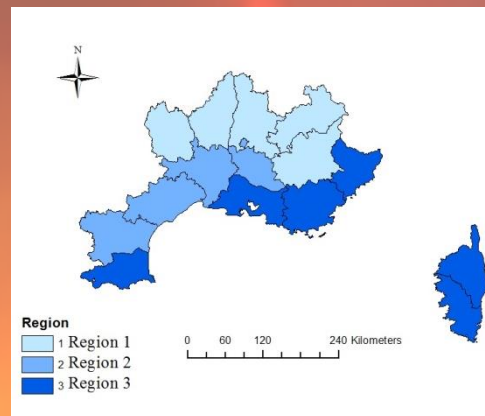


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Results

➤ How good is the knowledge of fires ?

1973-2015 period:
107 097 fires
8 034 640 ha burned



39% occurrence known

42% BA known

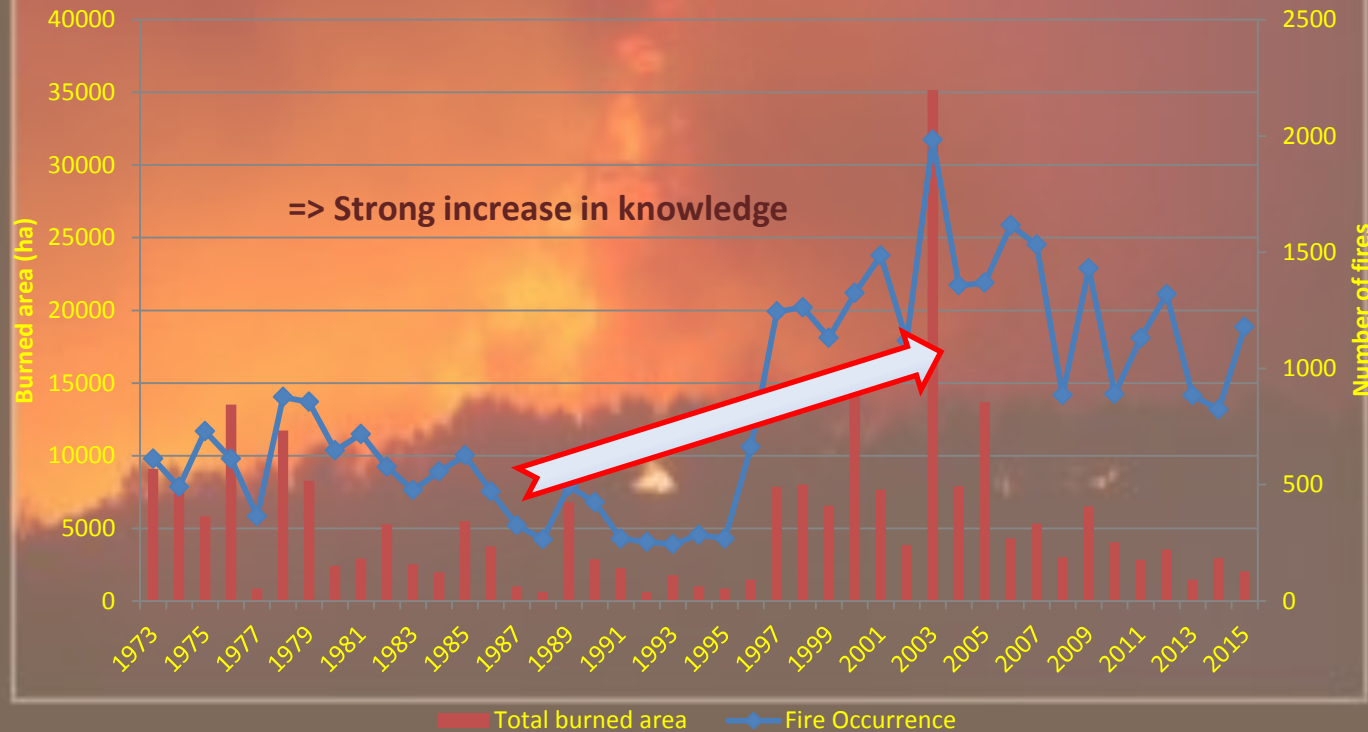
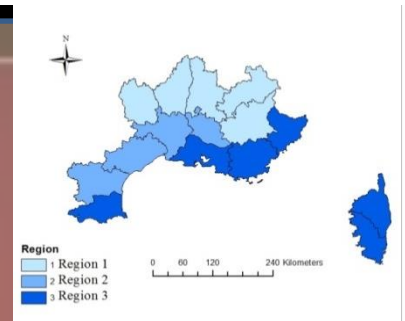
Results

➤ How good is the knowledge of fires ?

39% occurrence known
42% BA known



Occurrence and total area burned by known fires in SE France



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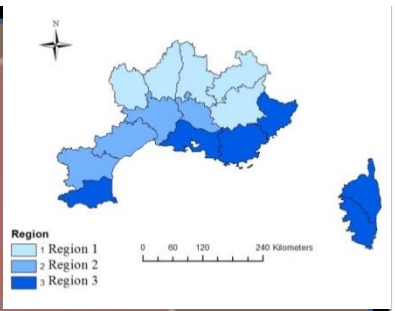
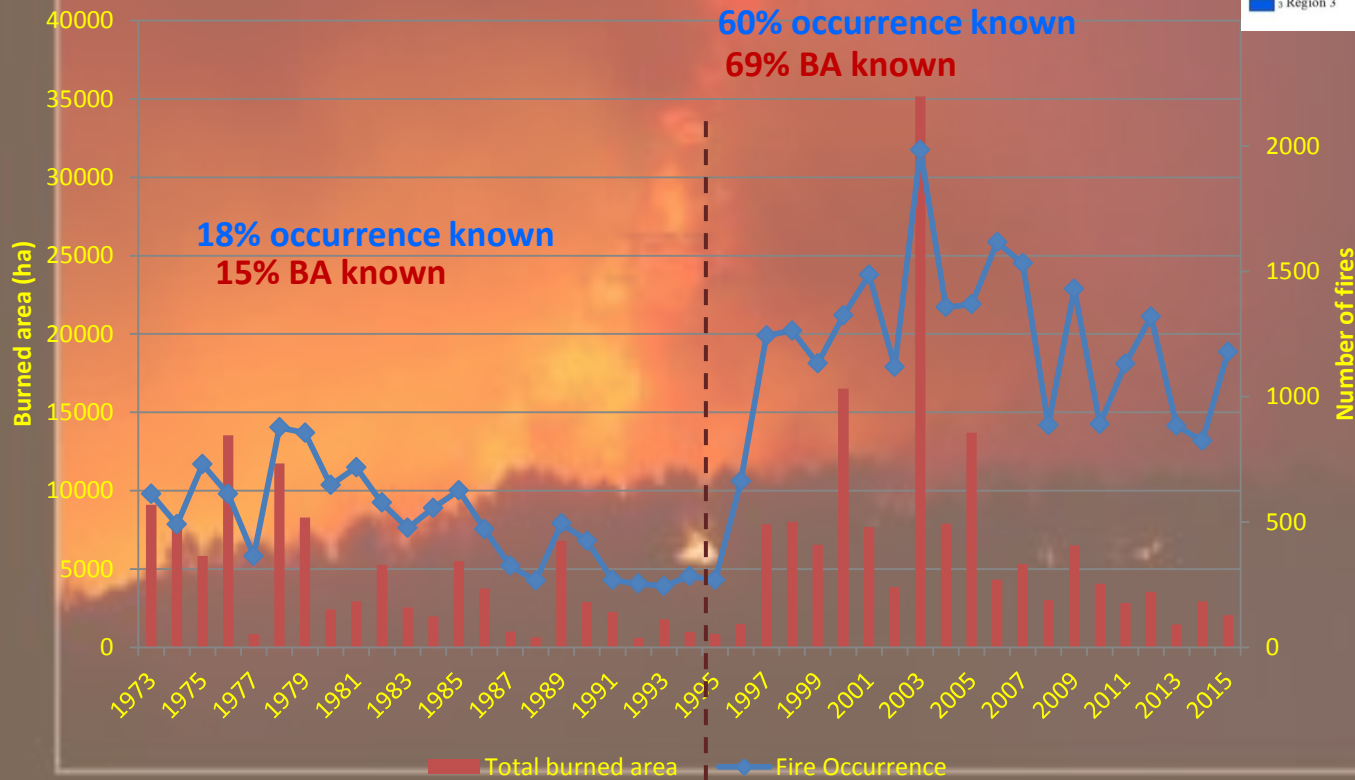
Results

➤ How good is the knowledge of fires ?



Strong temporal variation

Occurrence and total area burned by known fires in SE France

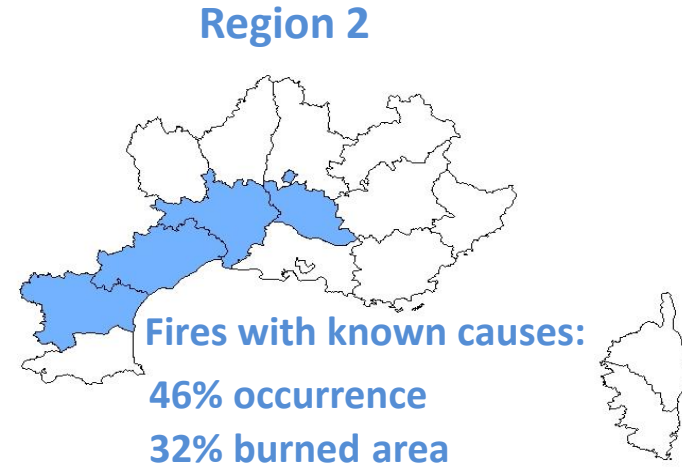
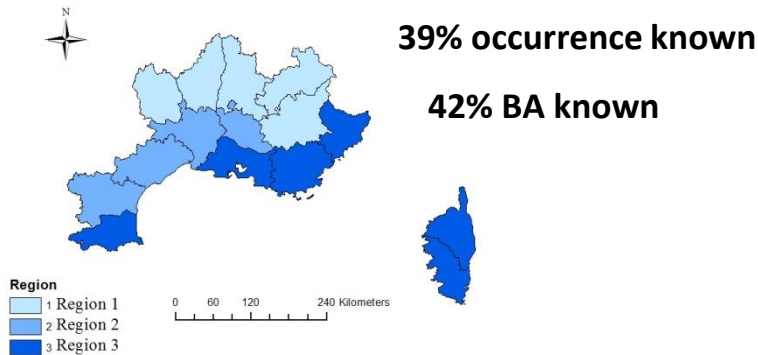


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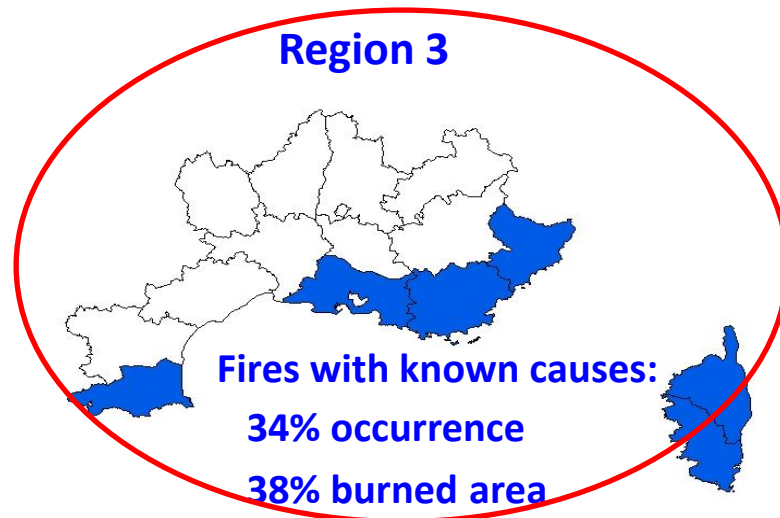
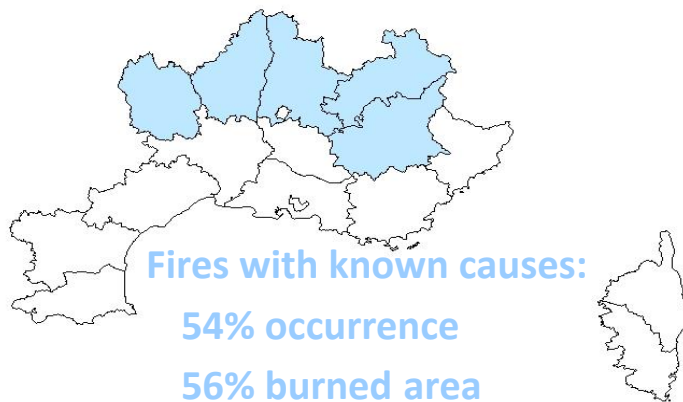


Results

➤ How good is the knowledge of fires?



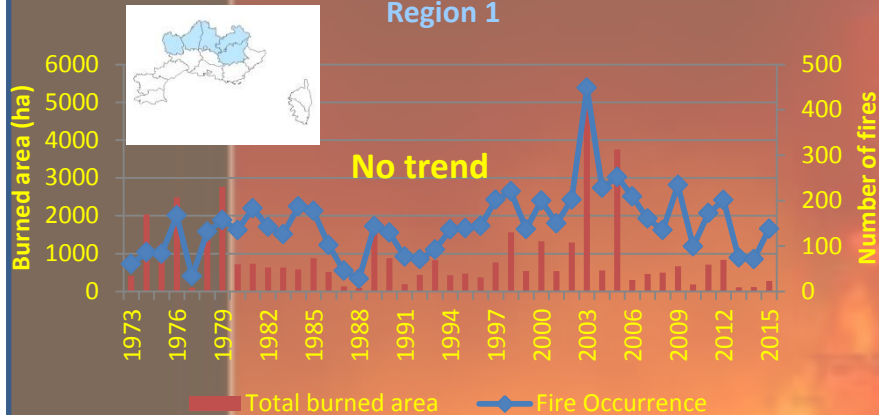
Region 1



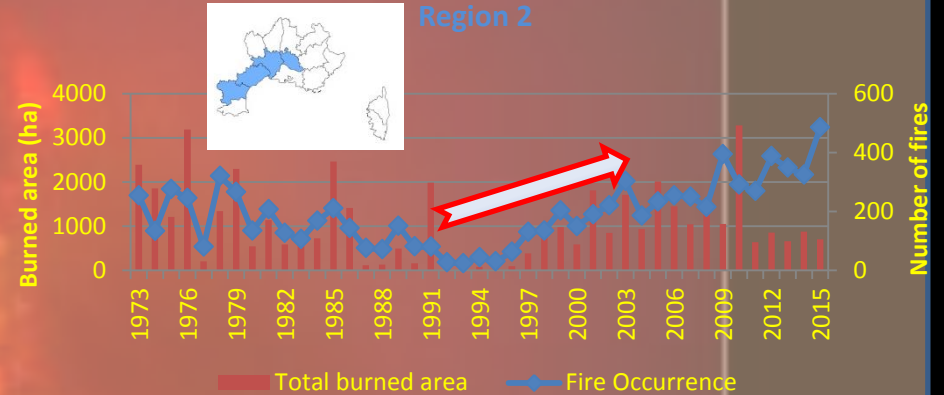
Results

➤ How good is the knowledge of fires?

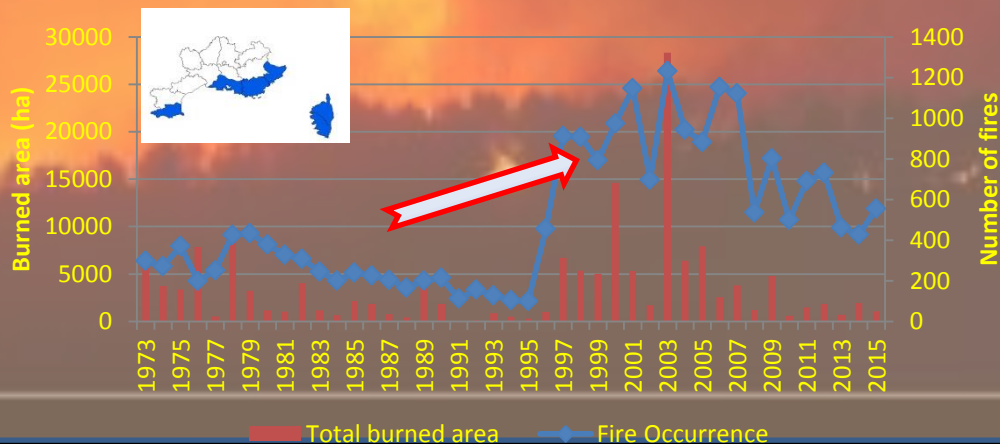
Occurrence and total area burned by known fires in Region 1



Occurrence and total area burned by known fires in Region 2



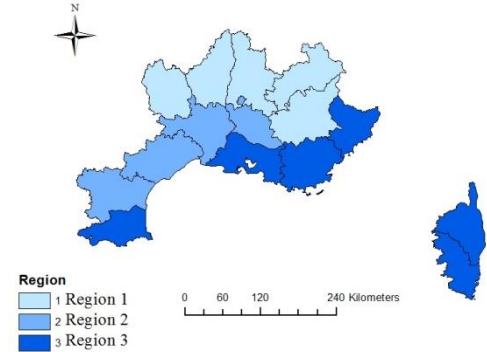
Occurrence and total area burned by known fires in Region 3



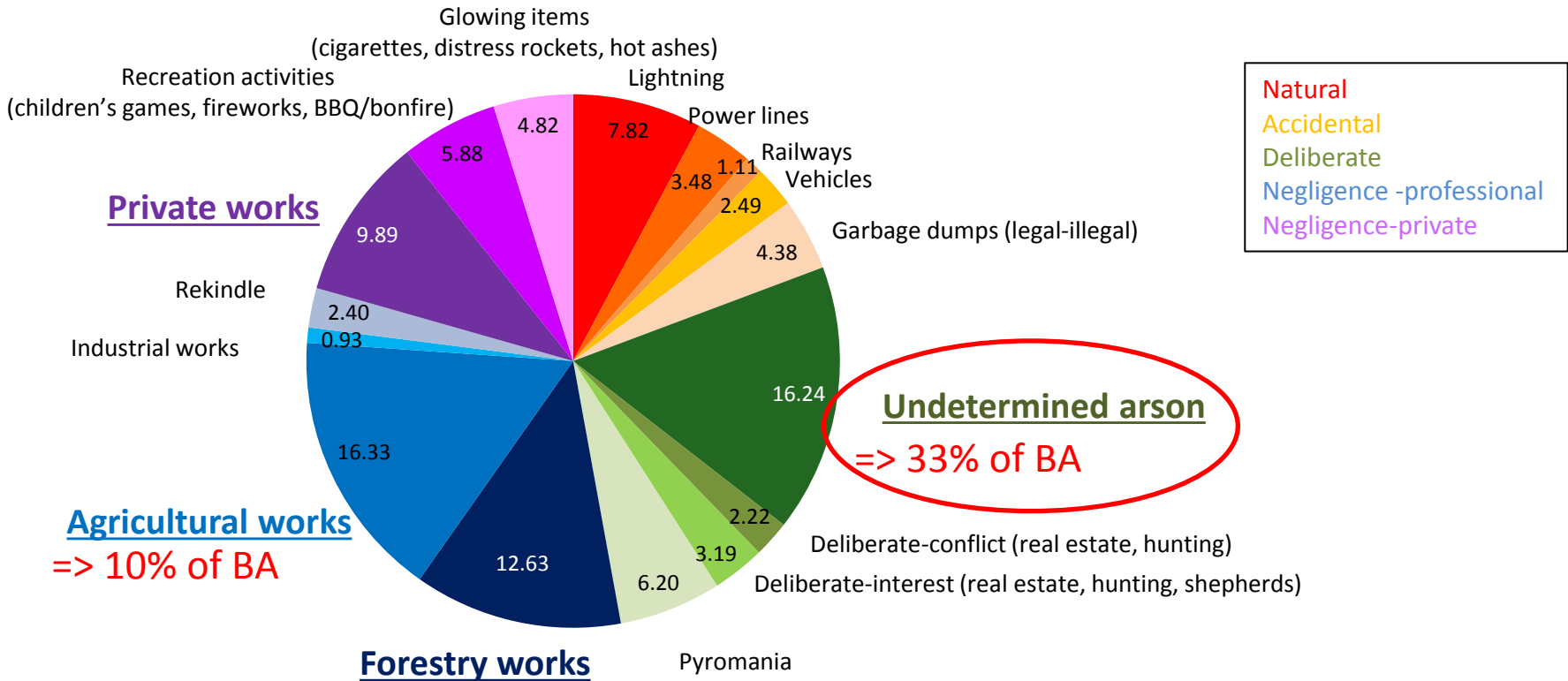
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Results

➤ Distribution of fire causes?

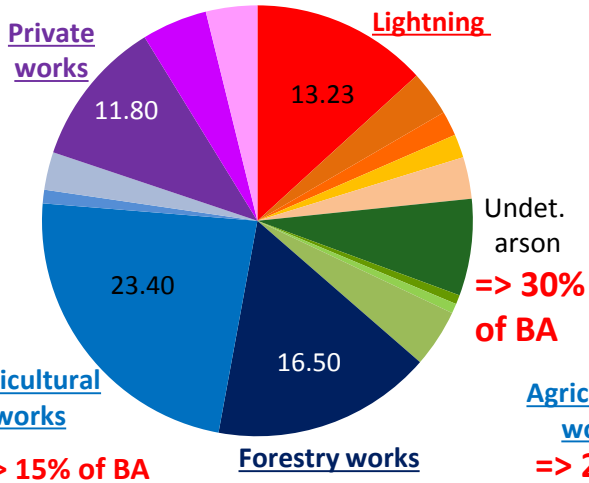
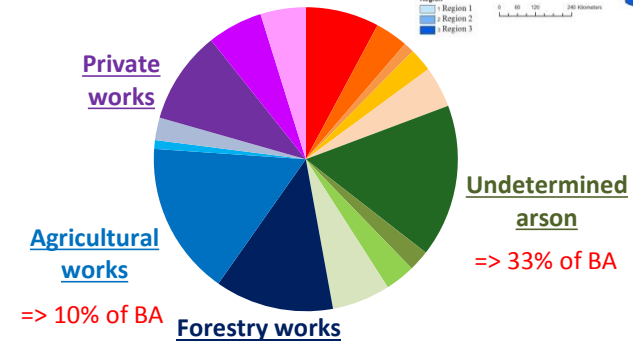
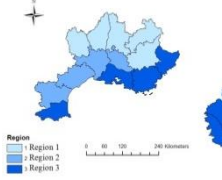


Fire metrics according to the nature of fire causes



Results

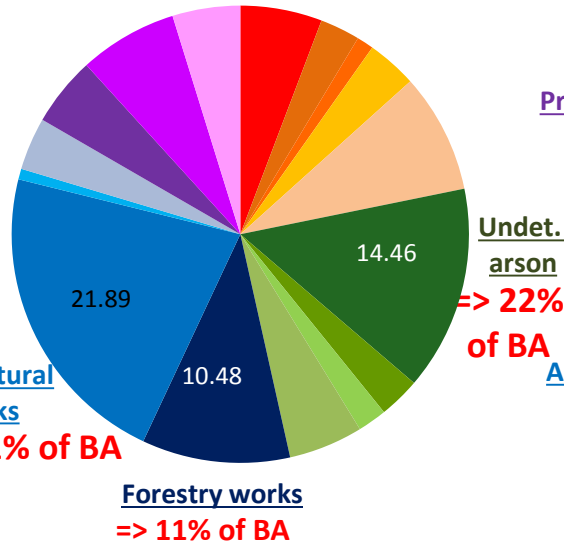
➤ Is there a spatial variation of fire causes?



Lightning => 10% of BA

Undet. arson
=> 30% of BA

Agricultural works
=> 21% of BA



Private works

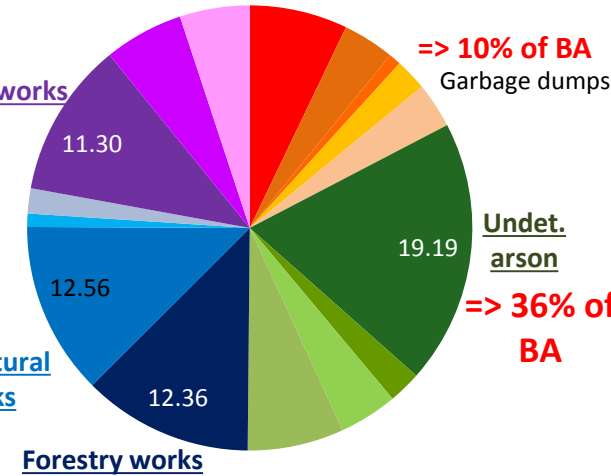
Undet. arson
=> 22% of BA

Agricultural works

Forestry works

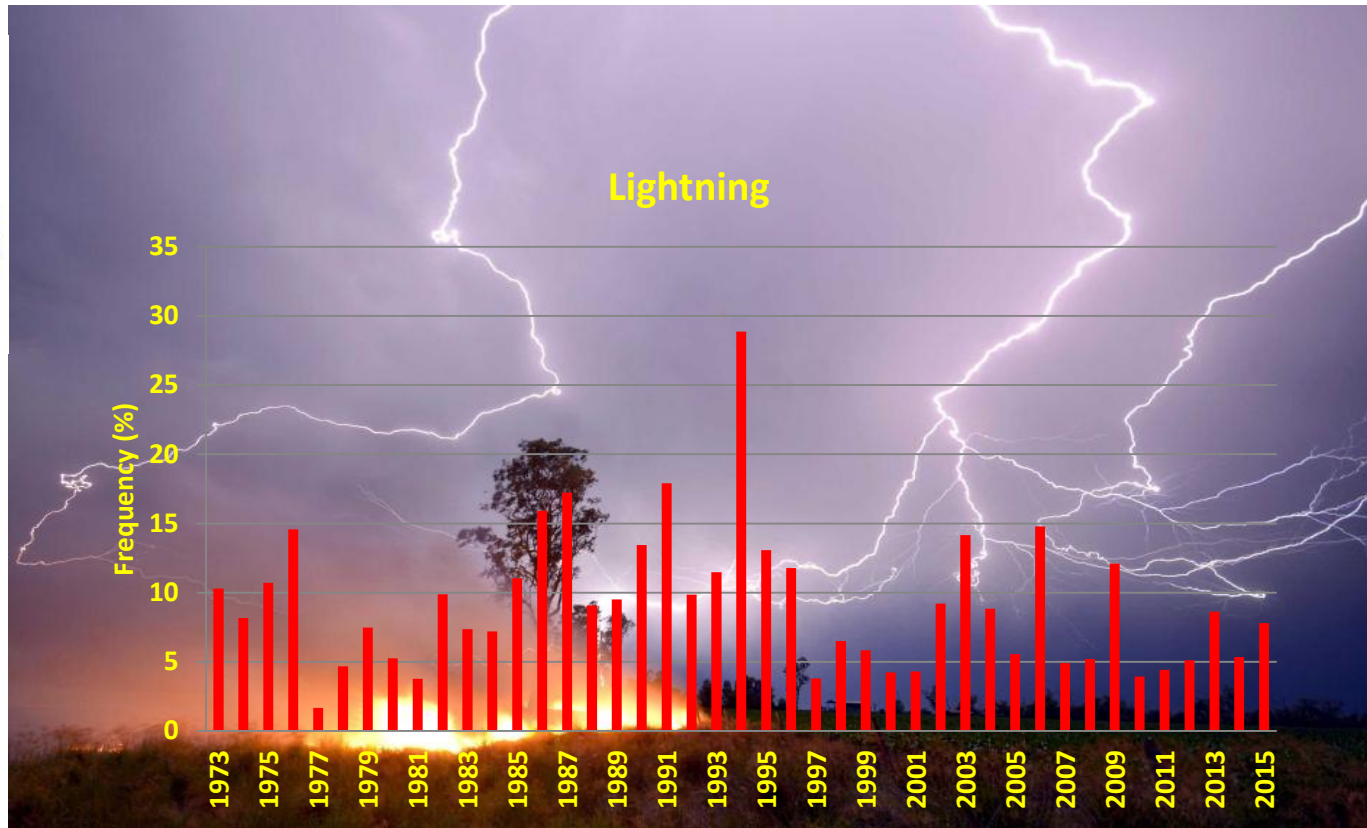
Garbage dumps
=> 10% of BA

Undet. arson
=> 36% of BA



Results

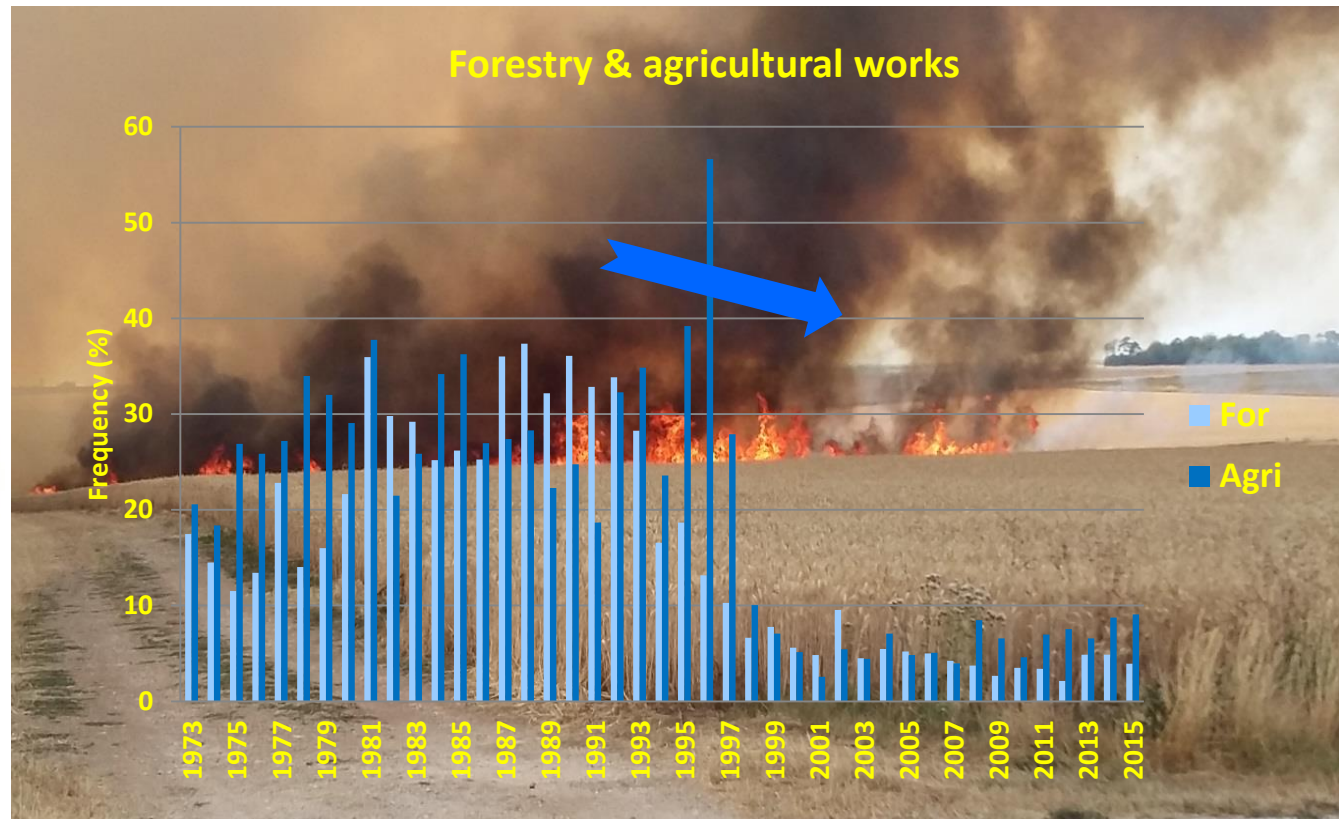
➤ Is there a temporal variation of fire causes?



=> No temporal trend regardless of the region
(mostly in R1)

Results

➤ Is there a temporal variation of fire causes?



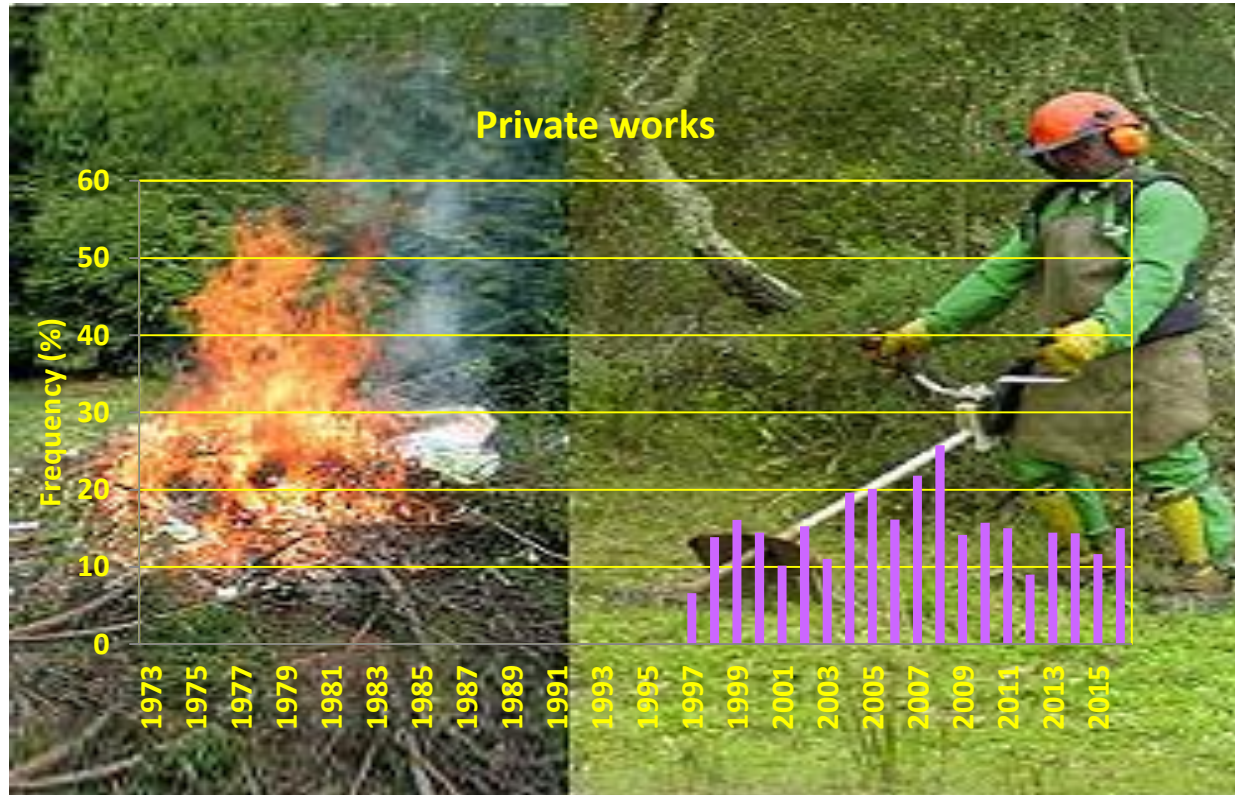
=> Same trend in the 3 regions

⇒ Change in activities : less professional works ?

⇒ Better management of these activities ?

Results

- Is there a temporal variation of fire causes?



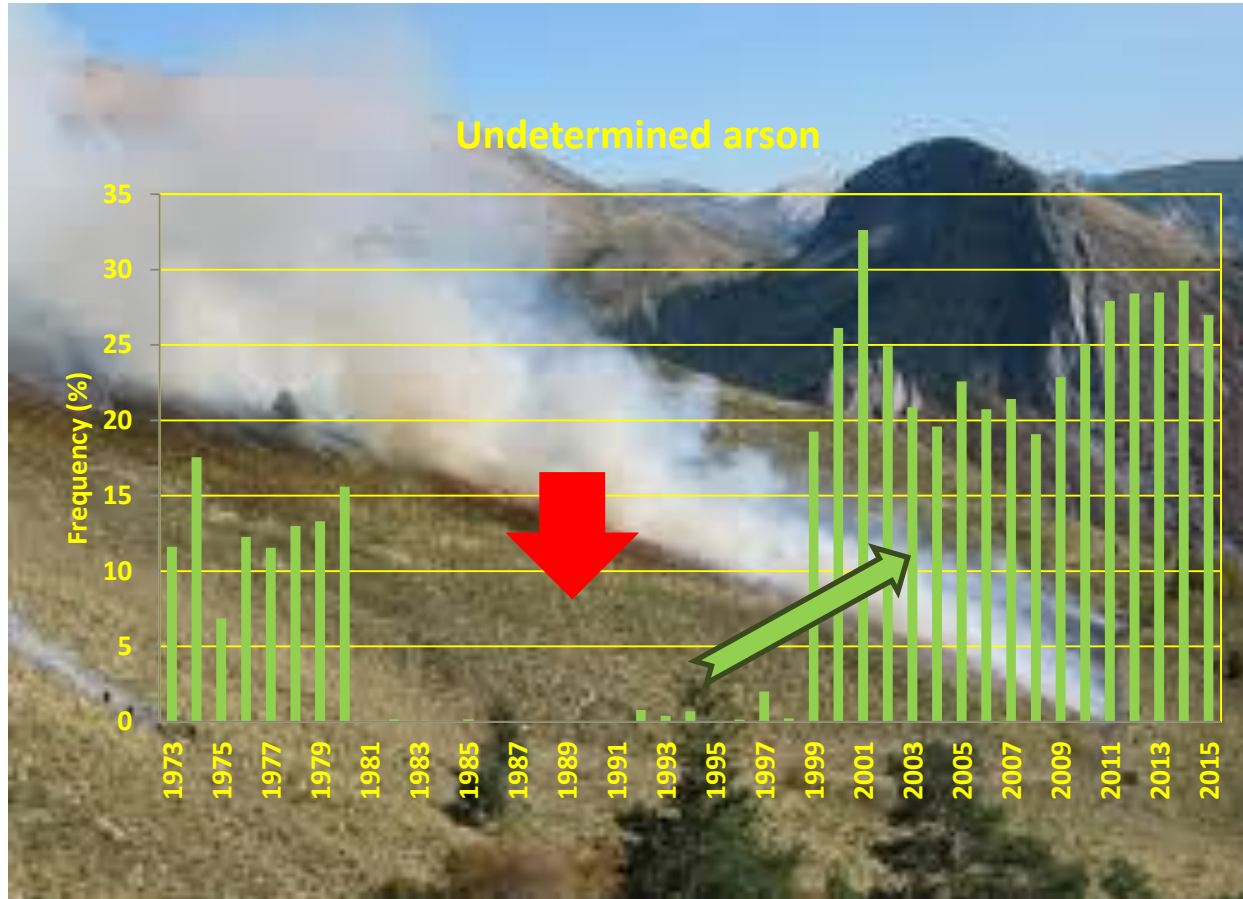
Cause added to the classification scheme in 1997

=> No temporal trend since 1997 (mostly in R1 & R3)

⇒ **Better recording of causes : better differentiation between professional & private works**

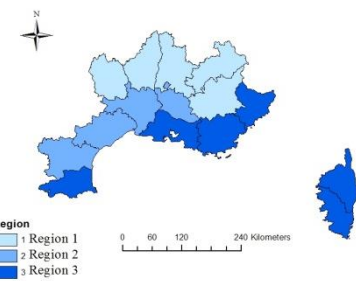
Results

➤ Is there a temporal variation of fire causes?



=> Same trend in R2 & R3 mostly

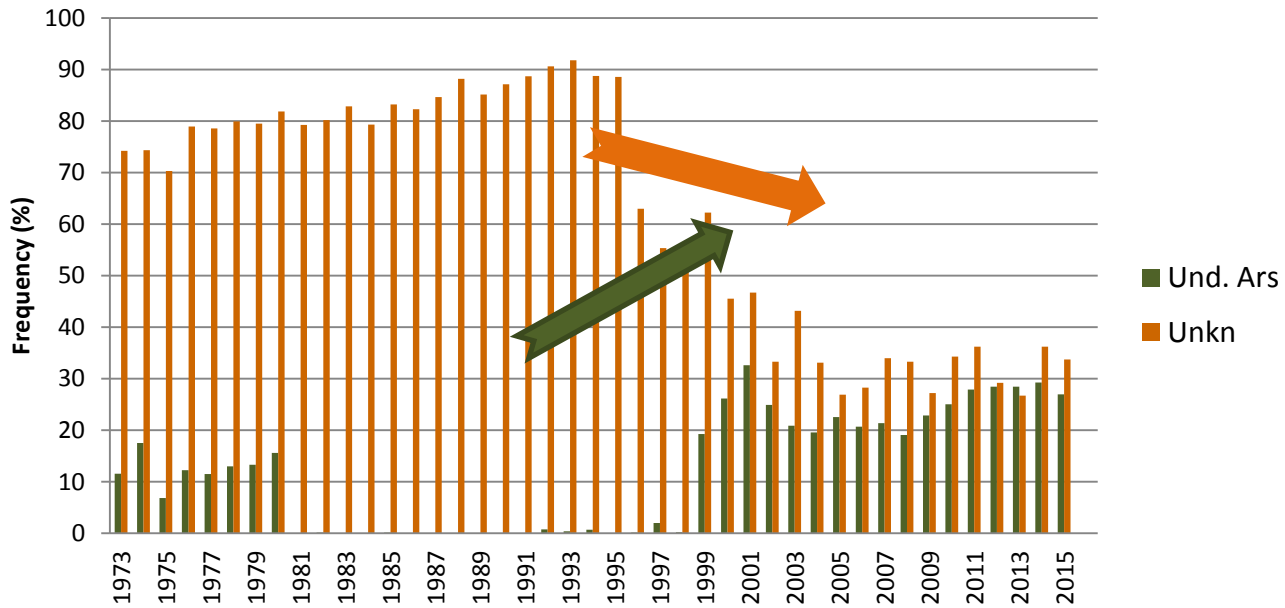
⇒ Better recording of arson fires (better knowledge of fire causes) since 1997



Results

➤ Is there a temporal variation of fire causes?

Undetermined Arson & Unknown



=> Same trend in R2 & R3 mostly

⇒ Fire knowledge improved

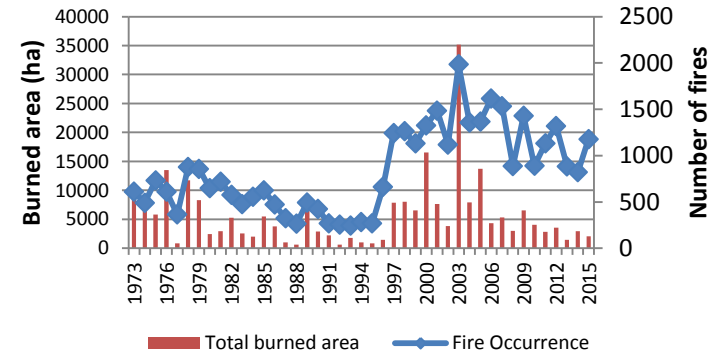
⇒ Most fires of unknown causes => arson fires

Results

➤ Is there a temporal variation of fire causes?

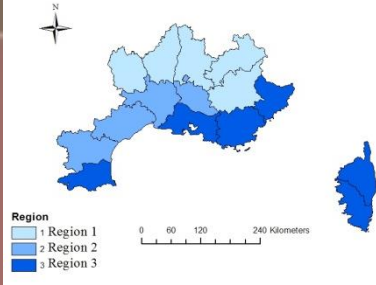
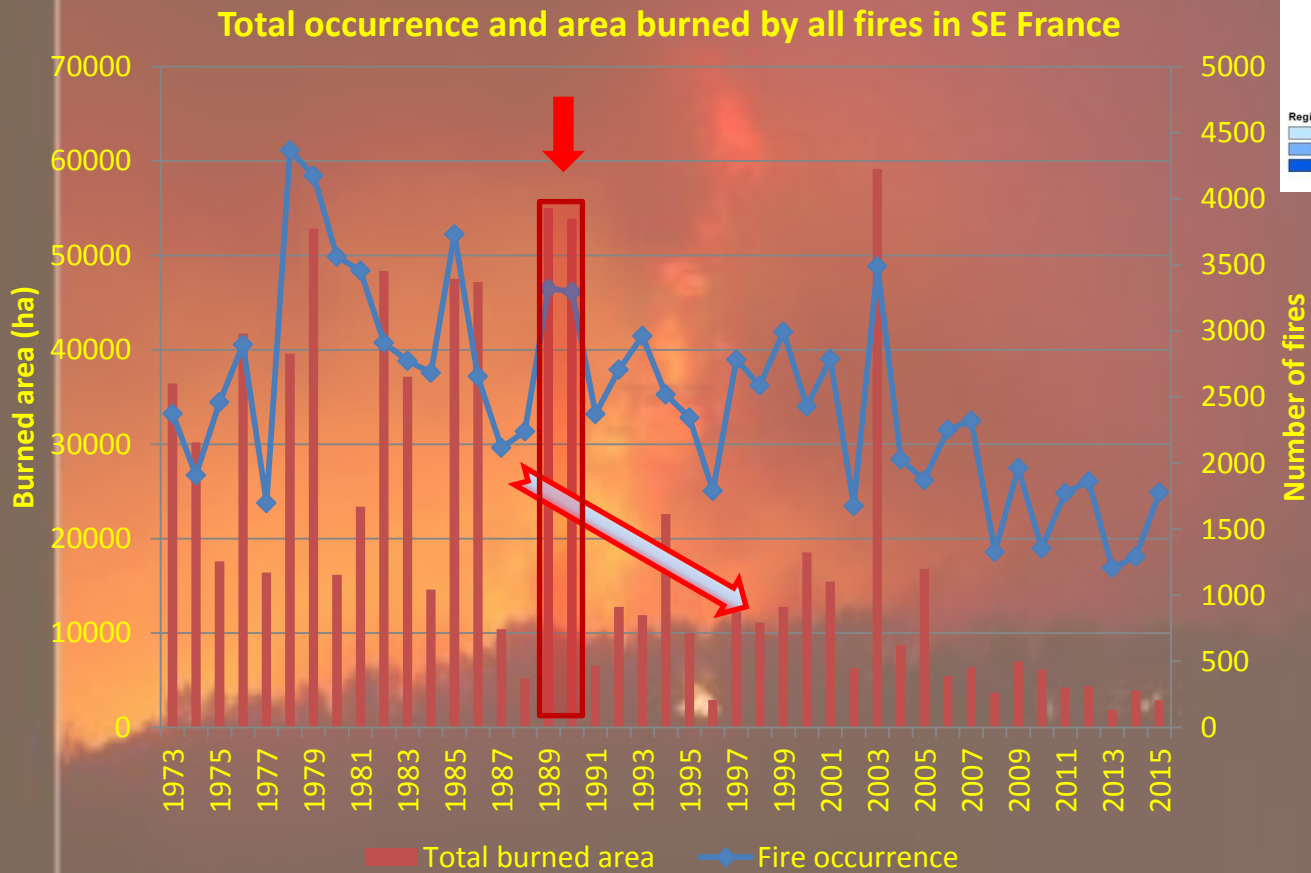
⇒ Fire knowledge improved

➔ Since 1997: Team for the investigation of fire cause



Results

➤ What caused this variation?



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Results

- What caused this variation?
=> Better fire suppression

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Since 1990 (then in 2003):

⇒ Increase in means (more aircrafts, more trucks, etc.)

⇒ Early attack on the fire

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Results

- What caused this variation?
 - Better fire suppression
 - **Better fire prevention**



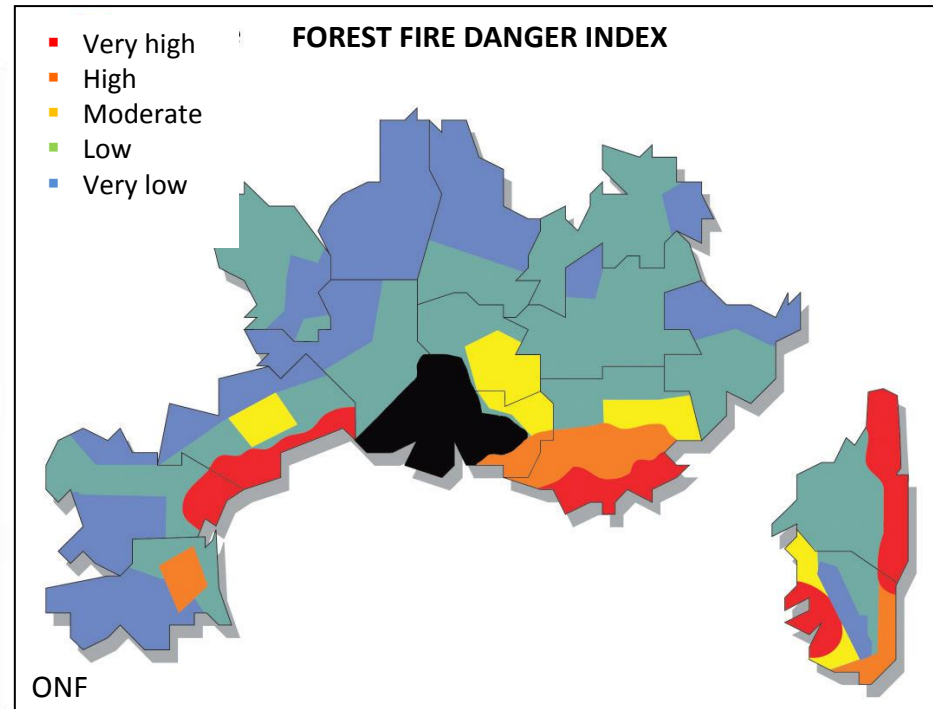
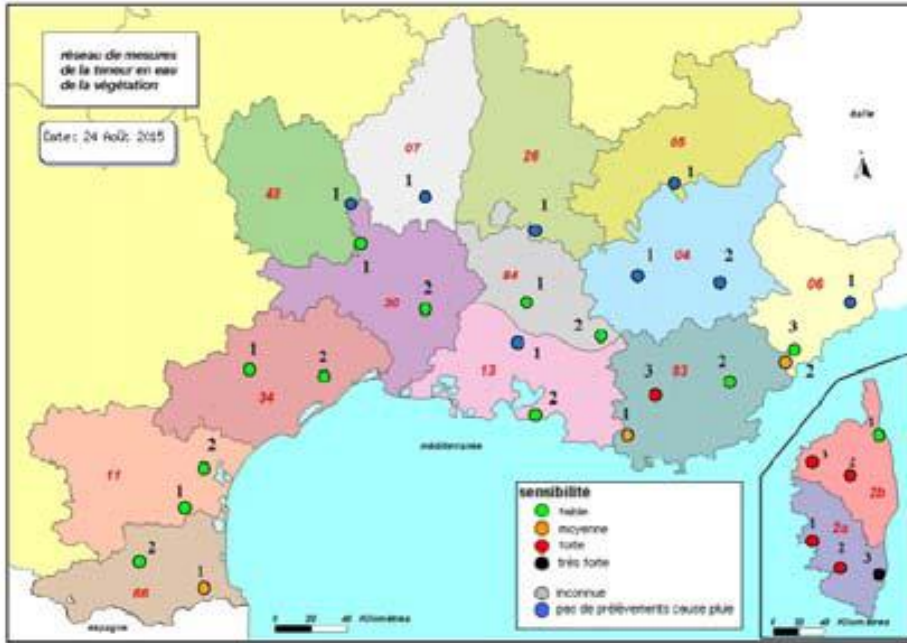
New regulations since 1990 (reinforced in 2003):

- **Mandatory brush clearing** around housing in WUI, roads, power lines and railways
- **Limiting or banning the use of fire**
- **Limiting the access to forests when high FWI**
- **Implementation of plans for protection of forests against fire**

Results

➤ What caused this variation?

- Better fire suppression
- Better fire prevention



Monitoring of the vegetation dryness in summer => **Forecasting the Forest Fire Danger Index**



Results

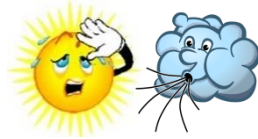
- What caused this variation?
 - Better fire suppression
 - **Better fire prevention**



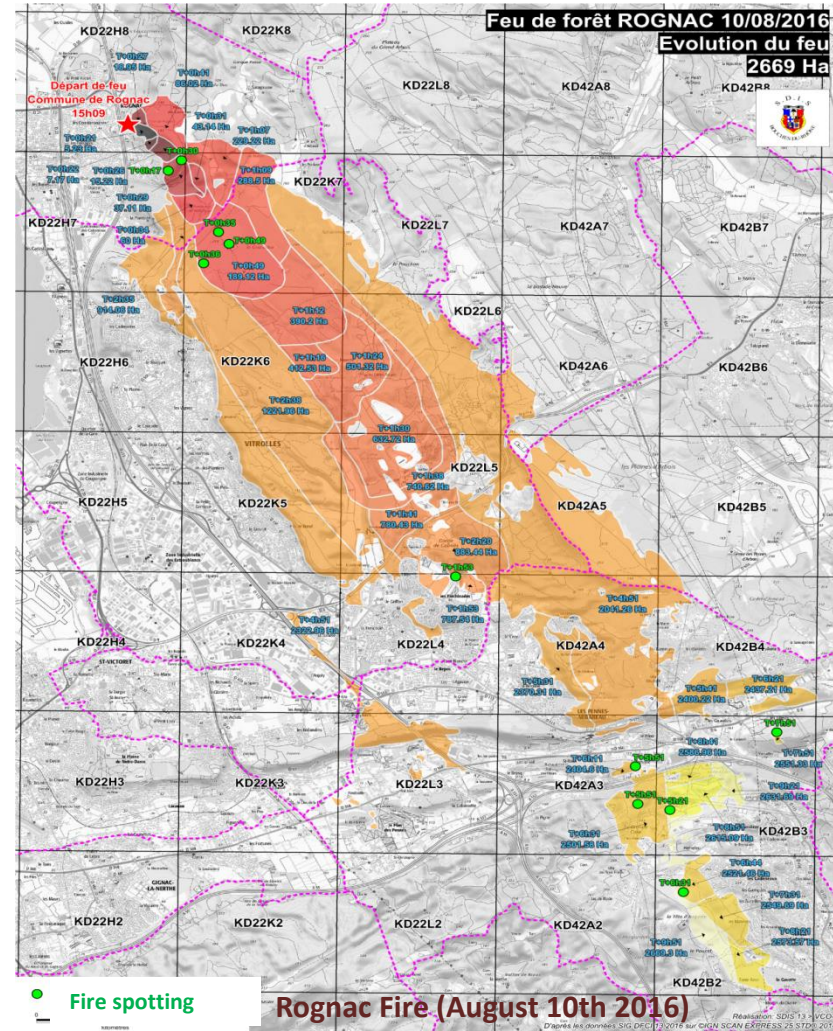
More means for **hydrants, networks of forest tracks, watchtowers**

Results

However, sometimes it is not enough... when extreme fire weather conditions occurred



Maures Massif Fire (August 2003)



Conclusions

So, what's the story in SE France?

- Is there a spatio-temporal variation of the fire metrics ?

- R3 the most impacted by fires, especially large fires
- Decrease in number of fires (medium and large sizes) and burned area especially since 1990, regardless of the region

- What caused this variation?

Better suppression & prevention

BUT

not always efficient especially when severe fire weather conditions occurred

- How good is the knowledge of fire causes ?

- Poor knowledge on average, R3 having the worst
- Improvement since 1997

- Is there a spatio-temporal variation of fire causes?

- Spatial variation but undetermined arson => largest impact
- Temporal variation except for lightning & private works



Thank you for your attention!



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