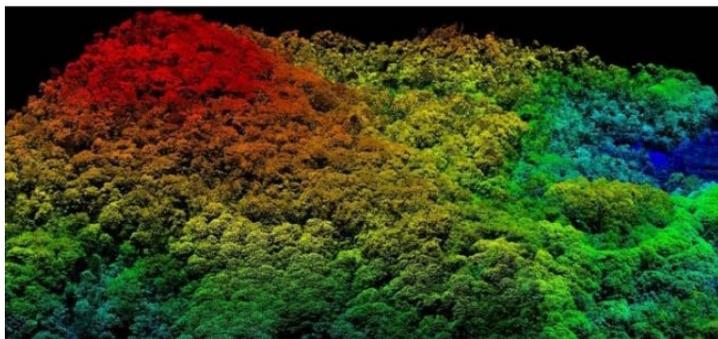


From wildfires to prescribed fires: resilience of heathlands under different fire regime parameters

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<http://ecologiaaplicadayteledeteccion.blogspot.com/>



MINECO AGL2017-86075-C2-1-R

<https://fireseves.blogspot.com/>



SEFIRECYL (LE001P17) <https://sefirecyl.unileon.es/>

Wildfires



Prescribed fires



Resilience

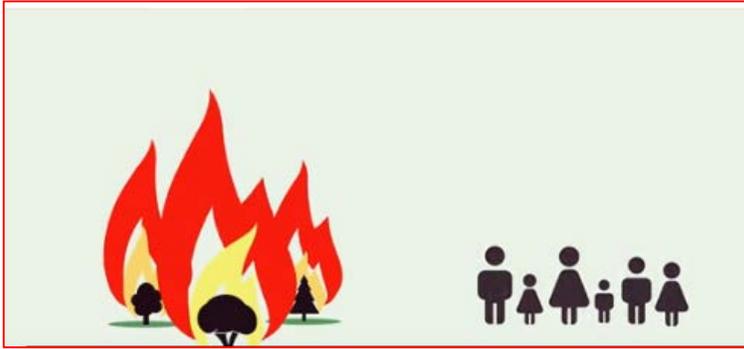


The main objective: to compare the resilience of the same type of ecosystems (heathlands) under two scenarios-
wildfire vs prescribed fires.

Propose management tools to reduce the damage caused by wildfires

1. Why are wildfires a problem?
2. Which are the environmental drivers of burn severity?
- 3.- How resilient are the fire-prone ecosystems after wildfire vs prescribed fires?
- 4.- Are **prescribed fires** a possible solution **to reduce the burn severity** of wildfires?

1. Social impacts



Loss of human lives



California= 81
Portugal= 62
Galicia= 4



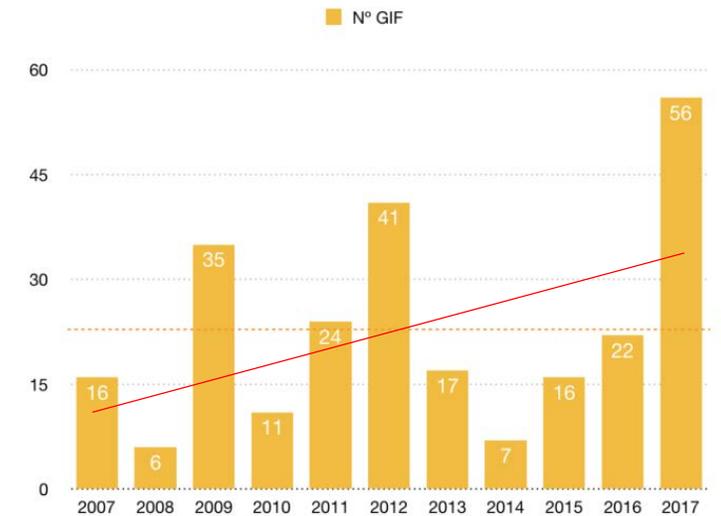
3. Ecological impacts

2. Economic impacts



Serious economic damage

GIF (2007-2017)



Human relationship with wildfires



Arson fires



1.-Rural abandonment results in the expansion of forest



2.- Lack of forest management results in an increase in fuel loads and continuity



3.- Climate change: increase of temperature and decrease of precipitation

+

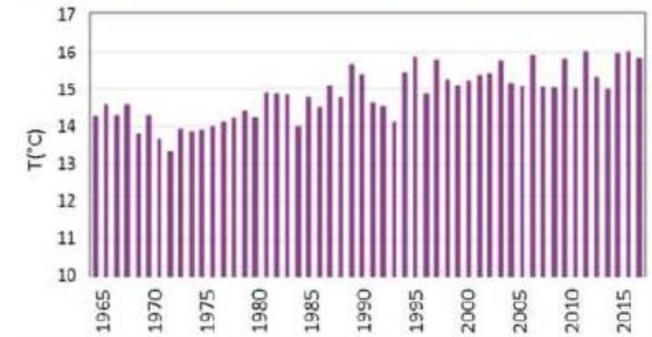
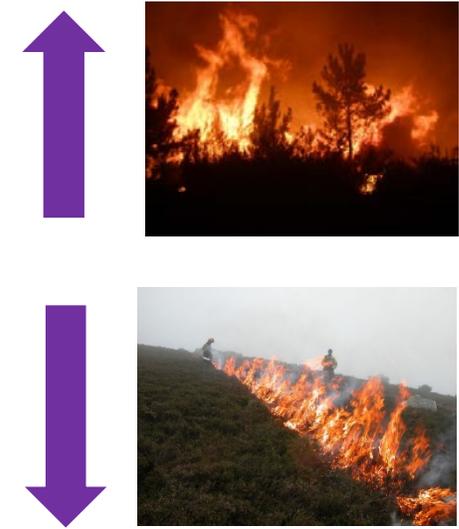
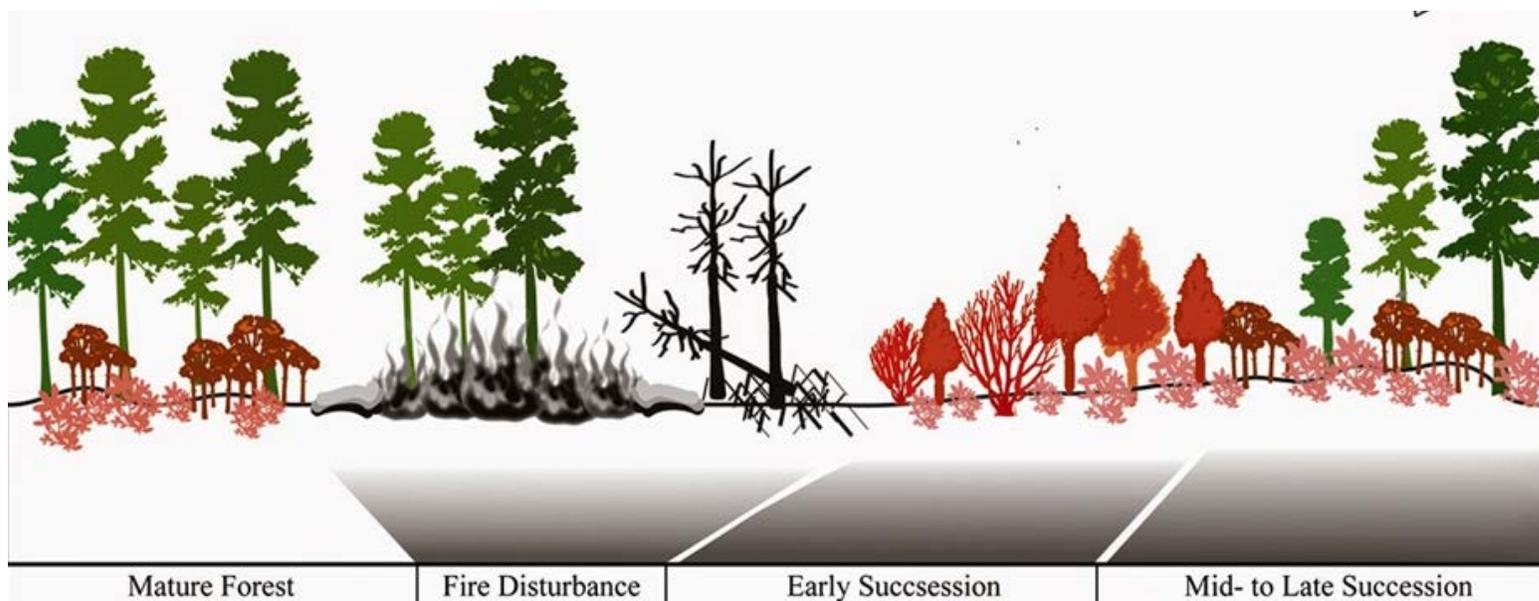


Figure 62. Average annual temperatures in Spain since 1965.

Fire regime: severity

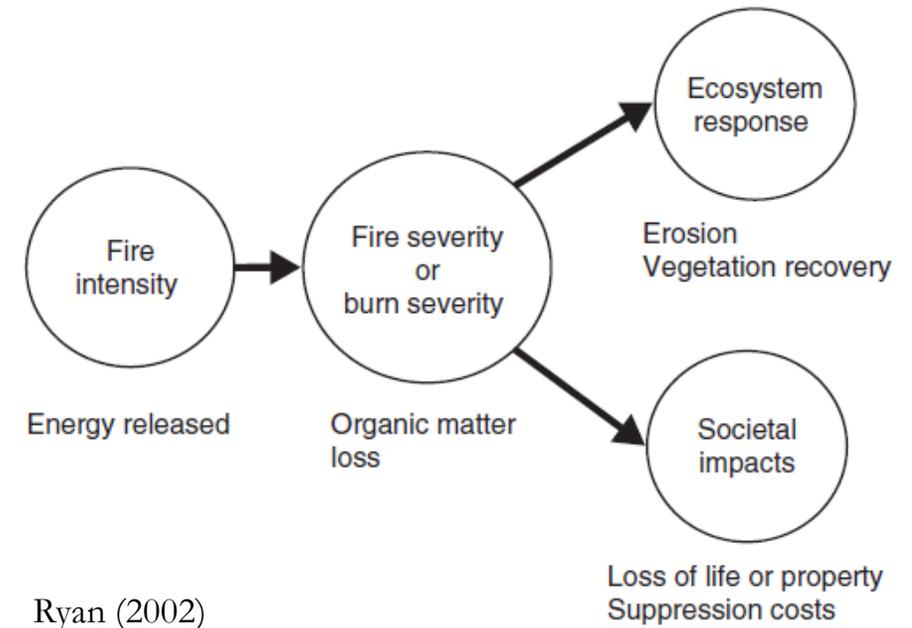
1. Why are wildfires a problem?



The resilience of ecosystems after fire depends on:



- 1.- Fire regime attributes: **BURN SEVERITY**
- 2.- Vegetation traits: Regeneration ability
- 3.- Post-fire conditions: abiotic factors

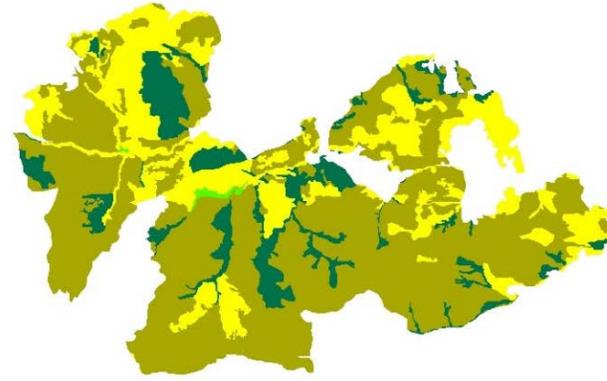
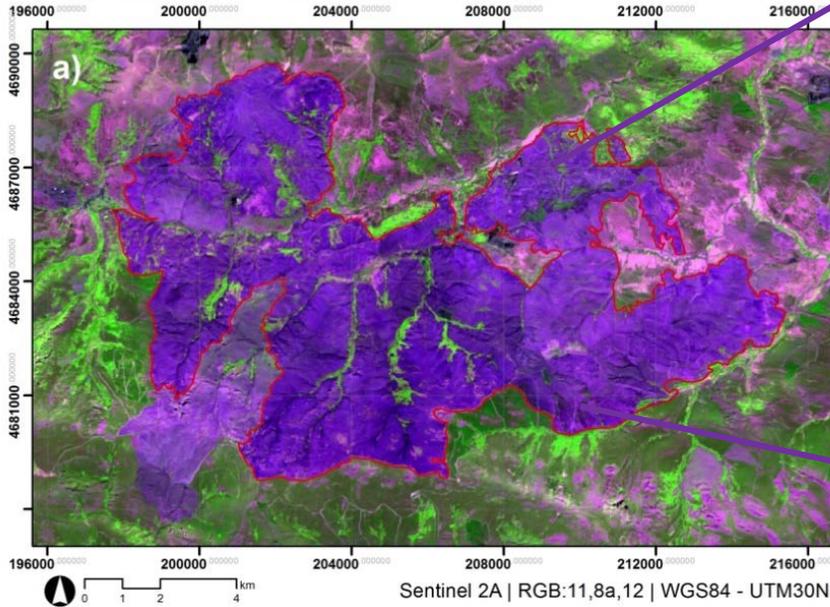


Ryan (2002)

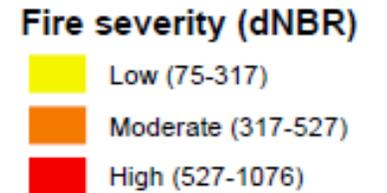
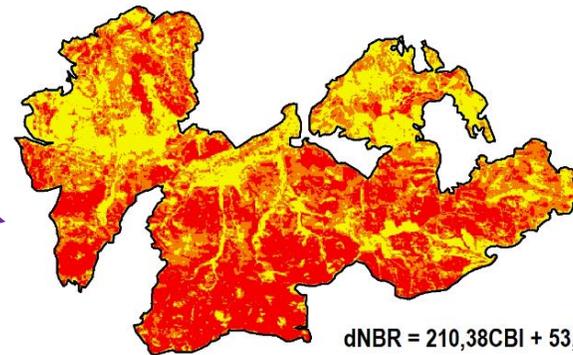
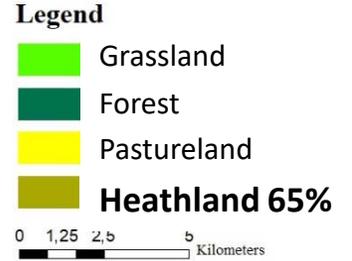
1. Why are wildfires a problem?
2. Which are the environmental drivers of burn severity?
3. How resilient are the fire-prone ecosystems after wildfire vs prescribed fires?
4. Are **prescribed fires** a possible solution to **reduce the burn severity** of wildfires?

2. Which are the environmental drivers of burn severity?

La Cabrera= 9,960 ha burned in August 2017



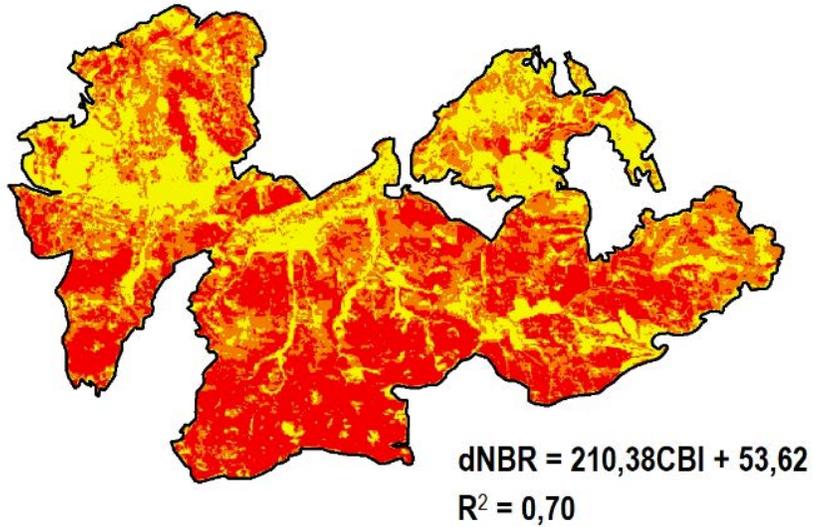
Coordinate System: ETRS 1989 UTM Zone 30N
 Projection: Transverse Mercator
 Datum: ETRS 1989
 False Easting: 500,000,0000
 False Northing: 0,0000
 Central Meridian: -3,0000
 Scale Factor: 0,9996
 Latitude Of Origin: 0,0000
 Units: Meter



$dNBR = 210,38CBI + 53,62$
 $R^2 = 0,70$

BURN SEVERITY

1) Spectral burn severity: dNBR

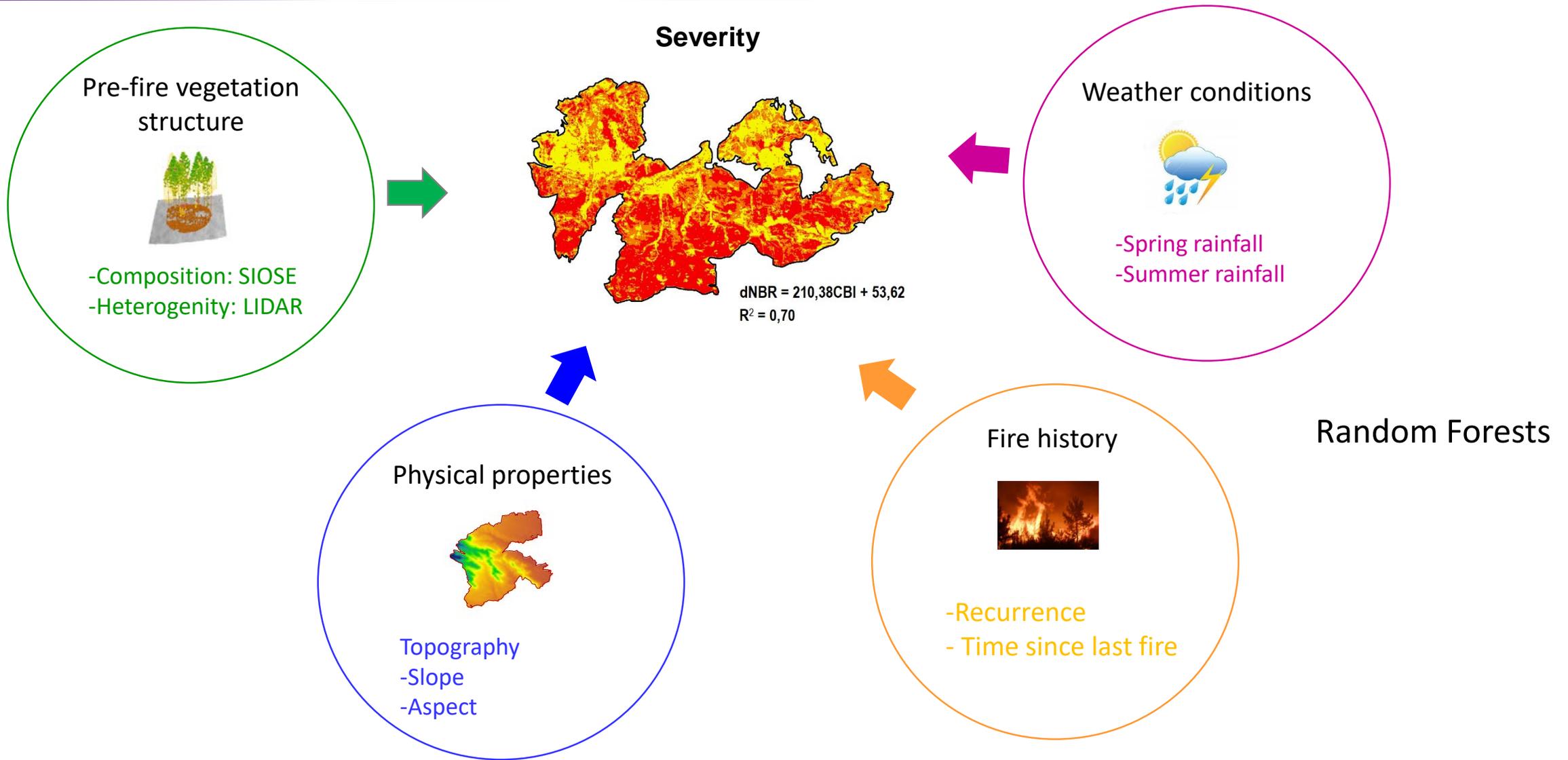


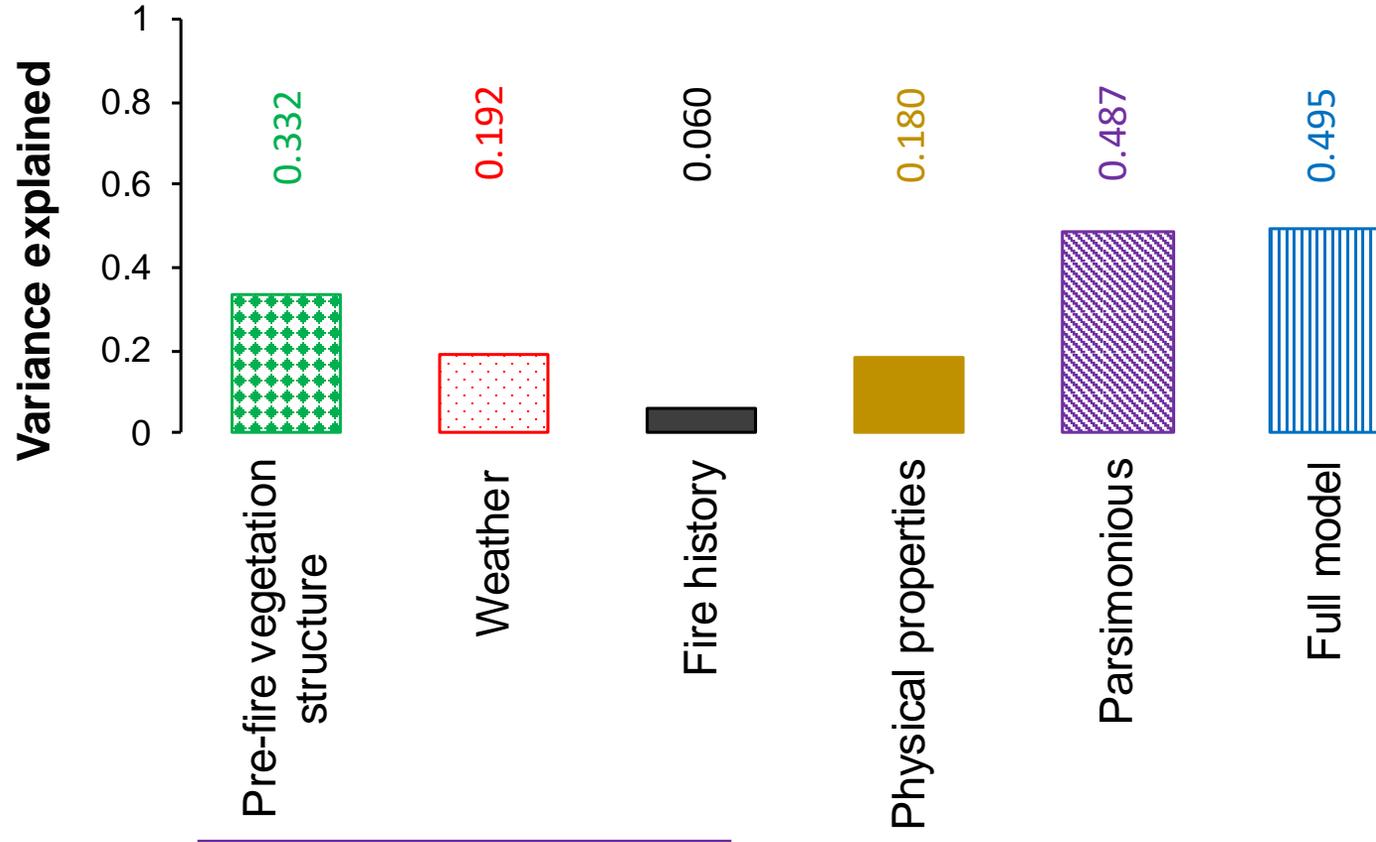
2) Field burn severity: Minimum Twig Diameter of *Erica australis*



Heathlands with large shrub skeletons retaining small twigs indicative of fire severity.

Keeley, 2009



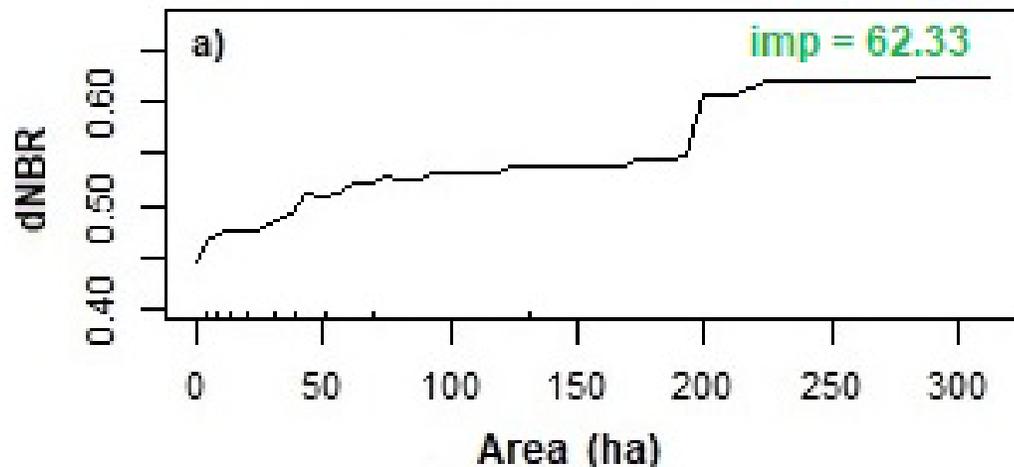


Pre-fire vegetation structure is the main factor driving burn severity in fires occurred in heathlands

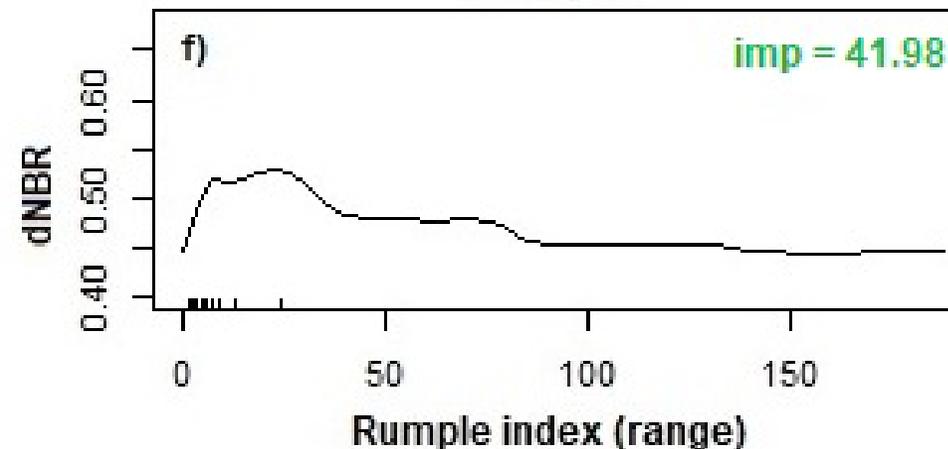
Fire severity variance explained by Random Forest models using different categories of predictors: pre-fire vegetation structure, weather conditions, fire history and physical properties. The figure also shows the results of both the most parsimonious model and the full model.

Among Pre-fire vegetation structure we identified:

Shrub cover area



Heterogeneity



Partial dependence plots showing the relationship between fire severity (dNBR) and the most significant explanatory variables included in the most parsimonious model. Numbers within each plot show the normalized importance of each variable in the model measured as % IncMSE (imp =).

- 1) High shrub (fuel) accumulation= high severity
- 2) High spatial heterogeneity= low severity

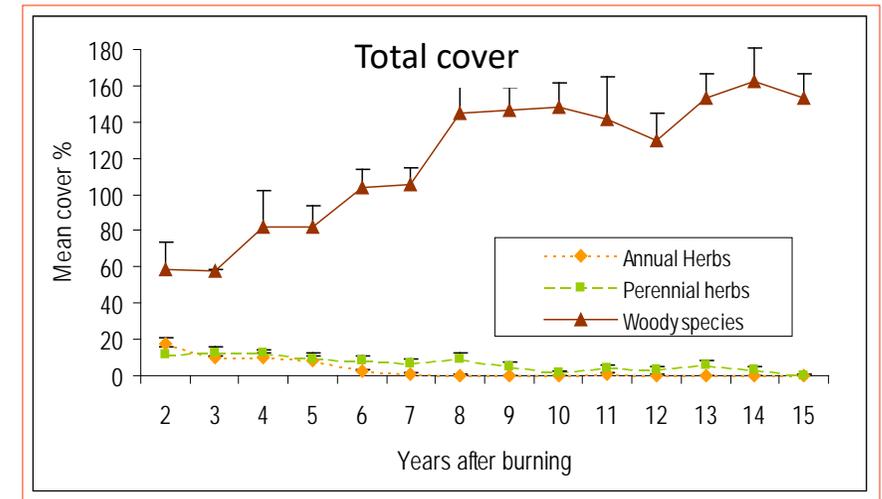
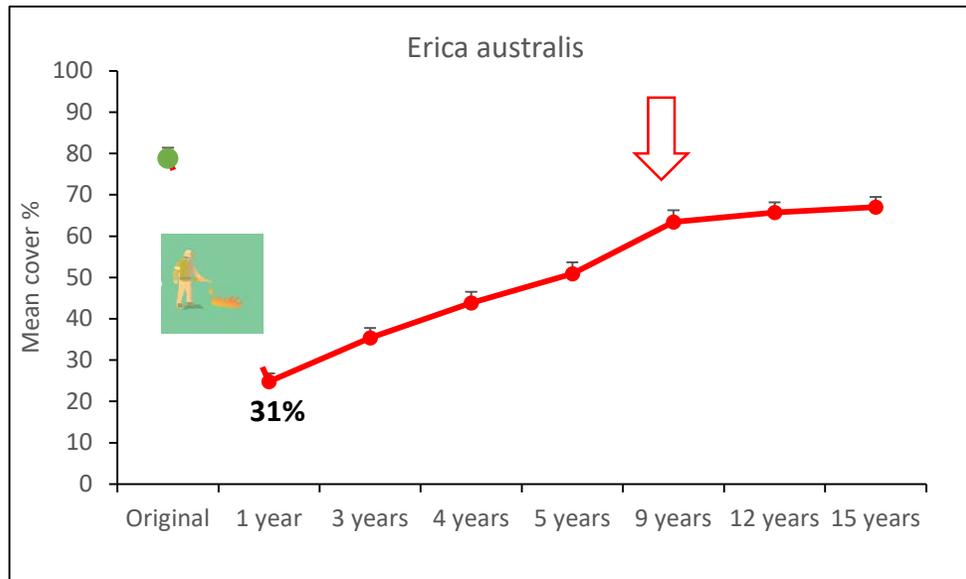
Prescribed fires could be an appropriated management tool to **increase heterogeneity**

1. Why are wildfires a problem?
 - Dimensions of wildfires
2. Which are the determining factors of burn severity?
- 3.- How resilient are the fire-prone ecosystems after wildfire vs prescribed fires?
- 4.- Are **prescribed fires** a possible solution to **reduce the burn severity** of wildfires?

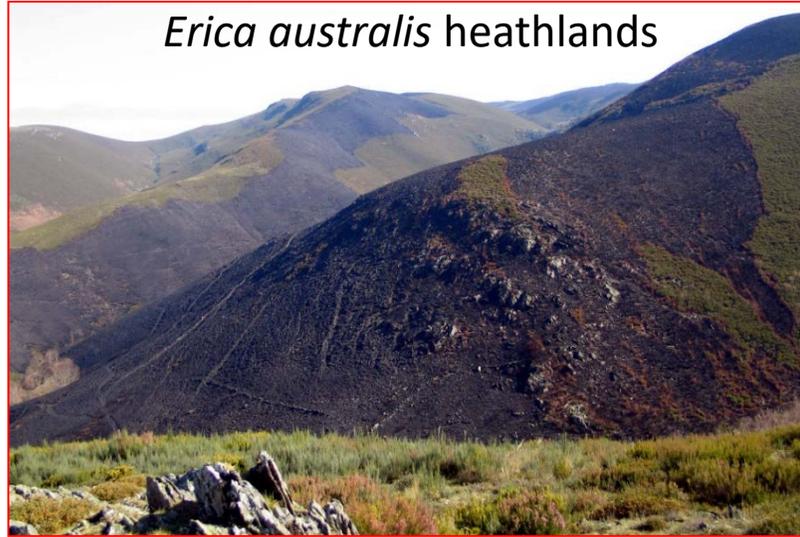
Erica australis heathlands



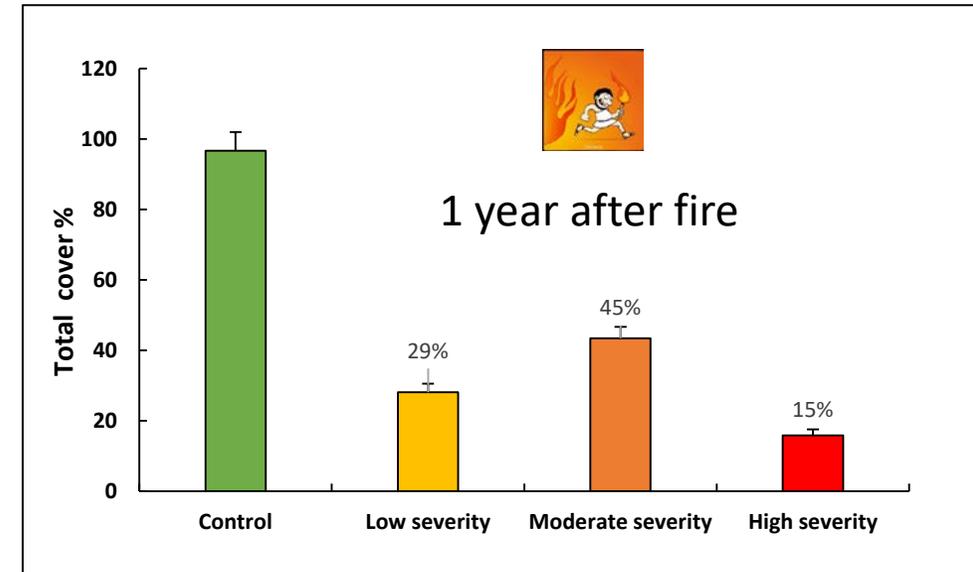
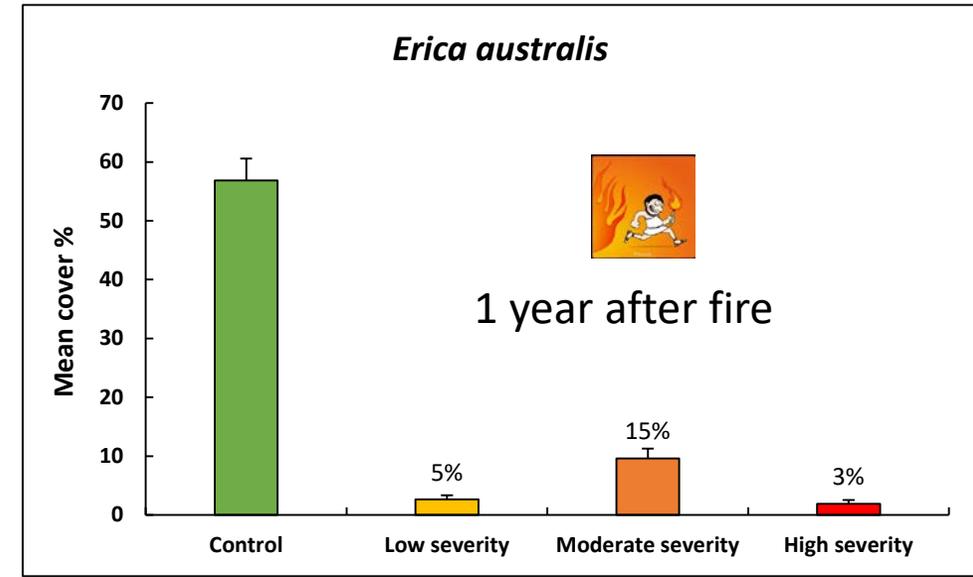
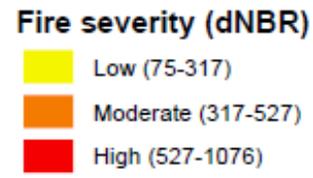
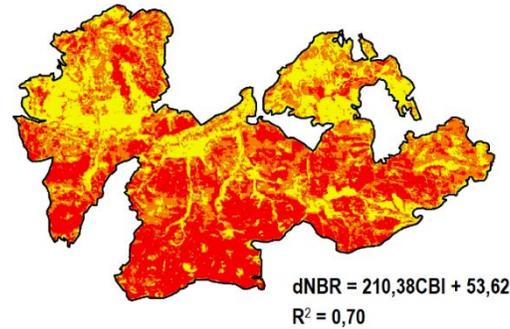
Prescribed fires



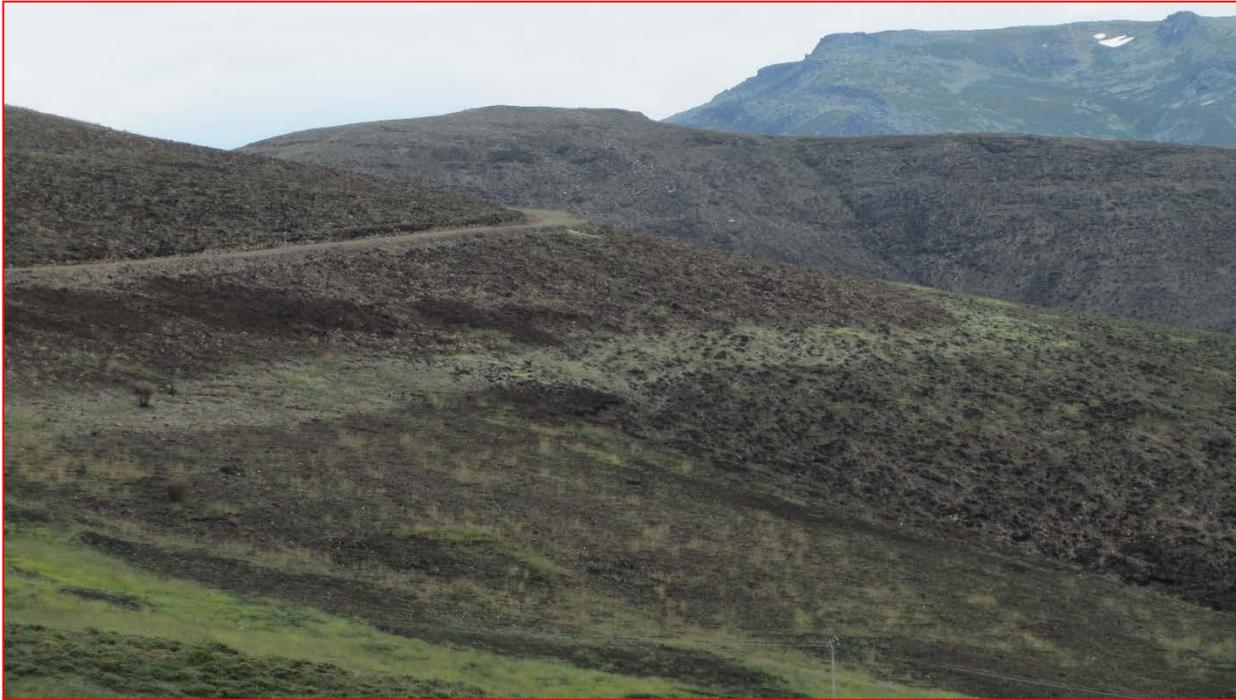
Wildfires



Erica australis heathlands



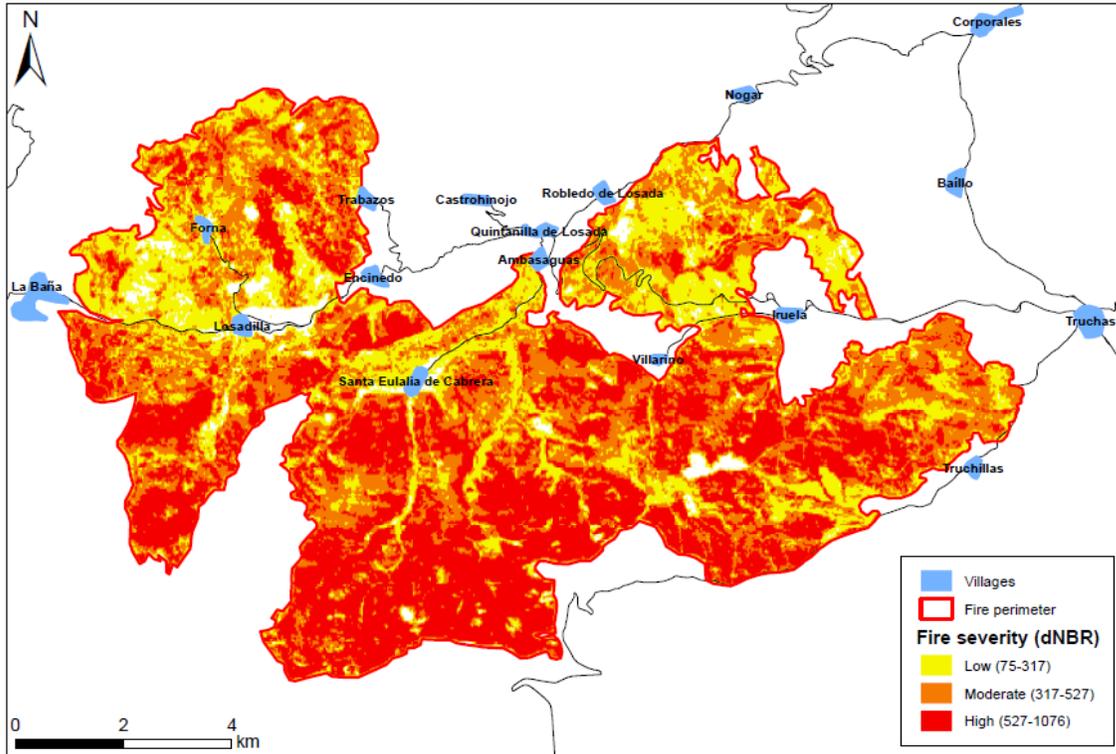
1. Why are wildfires a problem?
2. Which are the determining factors of burn severity systems?
- 3.- How resilient are the fire-prone ecosystems after wildfire vs prescribed fires?
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- We need a new vision about wildfires, where the focus is shifted from **fire suppression** to **fire prevention**: managing our forestry systems to be **more resilient**.

Proposal: **prescribed fires** to create a more heterogeneous landscape and enhance the resilience of ecosystems

Severity map of "La Cabrera" wildfire

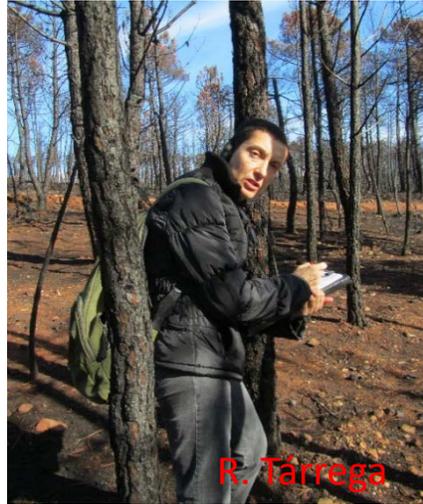


- New challenges associated with the problematic of **wildland-urban-interfaces (WUI)**

Proposal: in areas with low population density plus abandonment of traditional land use, we should consider the application of **prescribed fires** to reduce the fuel loads around the villages to **prevent** the negative social, economic and ecological impacts of larges wildfires



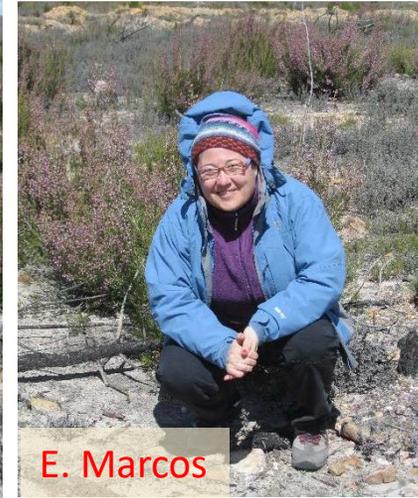
S. Suárez L. Calvo



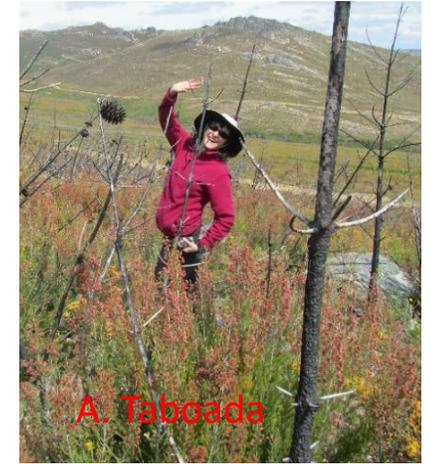
R. Tárrega



L. Valbuena



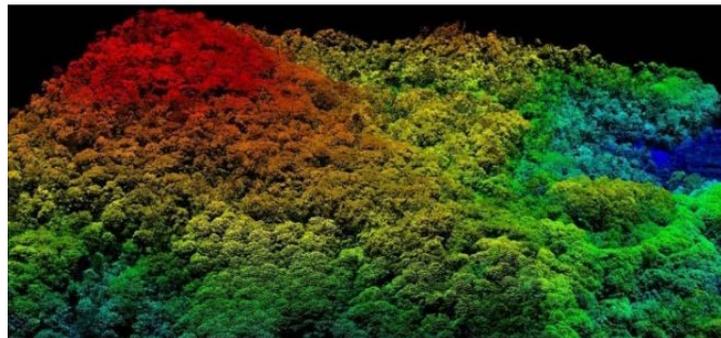
E. Marcos



A. Taboada

Thank you for your attention

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