

EVALUACIÓN DE LA RESPUESTA DE LA COMUNIDAD VEGETAL POST-INCENDIO EN HELLÍN (ALBACETE). TRATAMIENTO DE PRODUCTOS GEOMÁTICOS PÚBLICOS: ESCENAS DE SATÉLITE Y LiDAR

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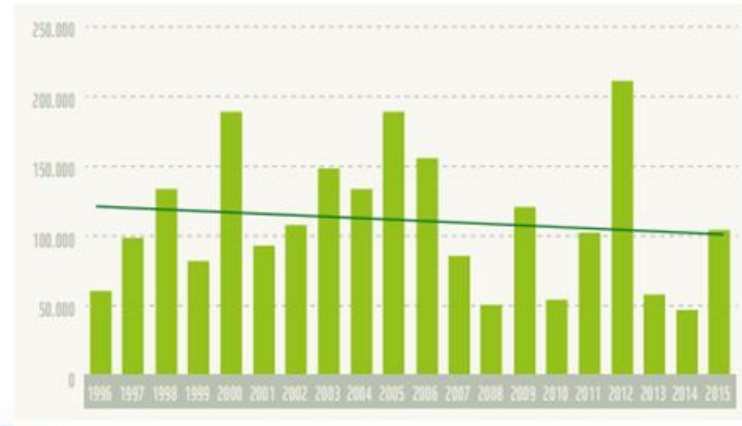
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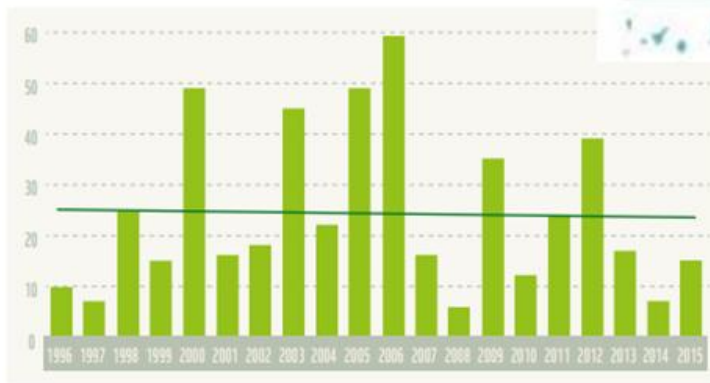
INTRODUCTION



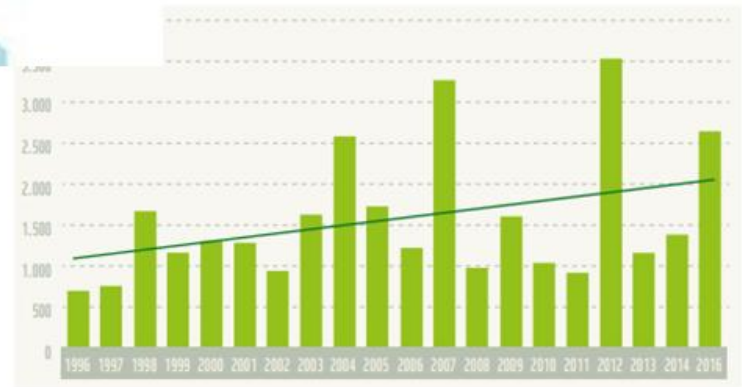
N total wildfires (1996-2015)



Total Surface burned (ha)



N Large Fires (1996-2015)



Large Fires surface burned (ha)

OBJECTIVES

1.- Assess vegetation status according to biomass.

2.- Obtain different vegetation indexes (NDVI, dNBR ...) in different situations (pre-fire and post-fire) from the satellite scene, to assess the evolution of vegetation change after the fire.

3.- Obtain the LiDAR PNOA point cloud with the spatial information of the study area to calculate: the vegetation height model (CHM) and the covered housing fraction in the pre-fire situation.

STUDY AREA

FIRE: 1-6 July 2012

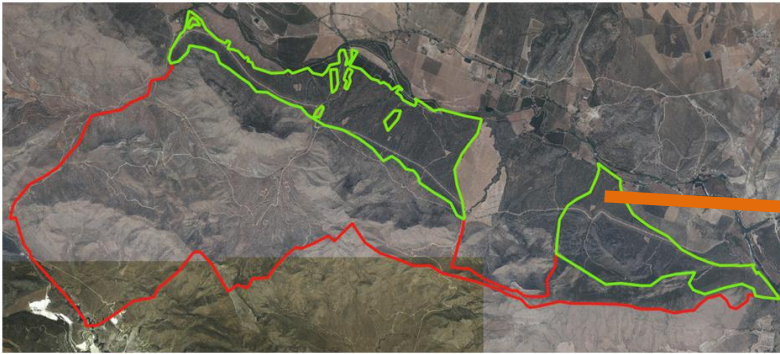
Location: southeast Albacete

Coordinates UTM (zone 30):

X: 607600 - 619100

Y: 4249000 - 4255000





□ Zona no incendiada Donceles □ MUP N°82 "Sierra Donceles"



STUDY AREA

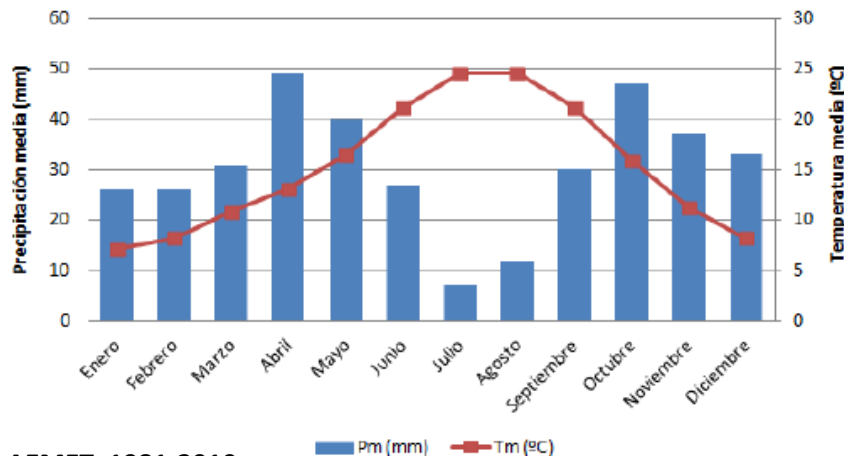
Phytoclimatic subtype: IV₁, **SEMI-ARID!!** → <300mm de precipitación

Vegetation: Aleppo pine (*Pinus halepensis* Mill.)

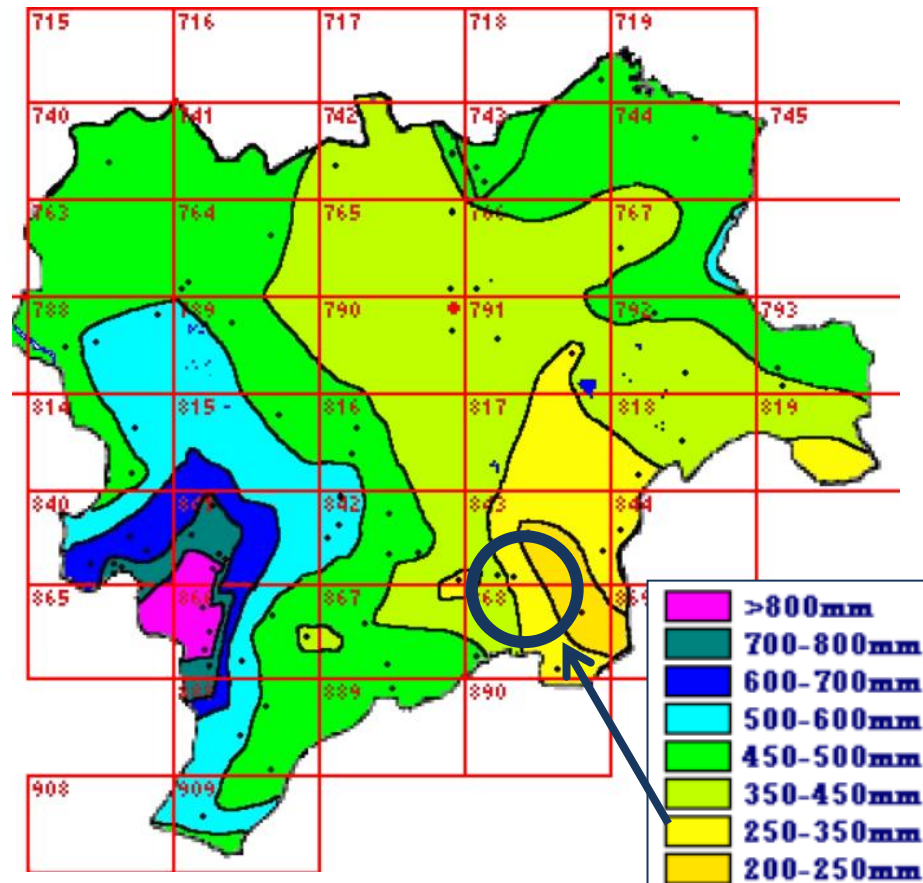
Edaphology : alkaline soils

Hydrography : basin of the Segura river

	E	F	M	A	M	J	J	A	S	O	N	D
Pm (mm)	26	26	31	49	40	27	7	12	30	47	37	33
Tm (°C)	7.1	8.2	10.8	13.1	16.5	21.1	24.5	24.5	21.2	15.9	11.2	8.2



AEMET, 1981-2010

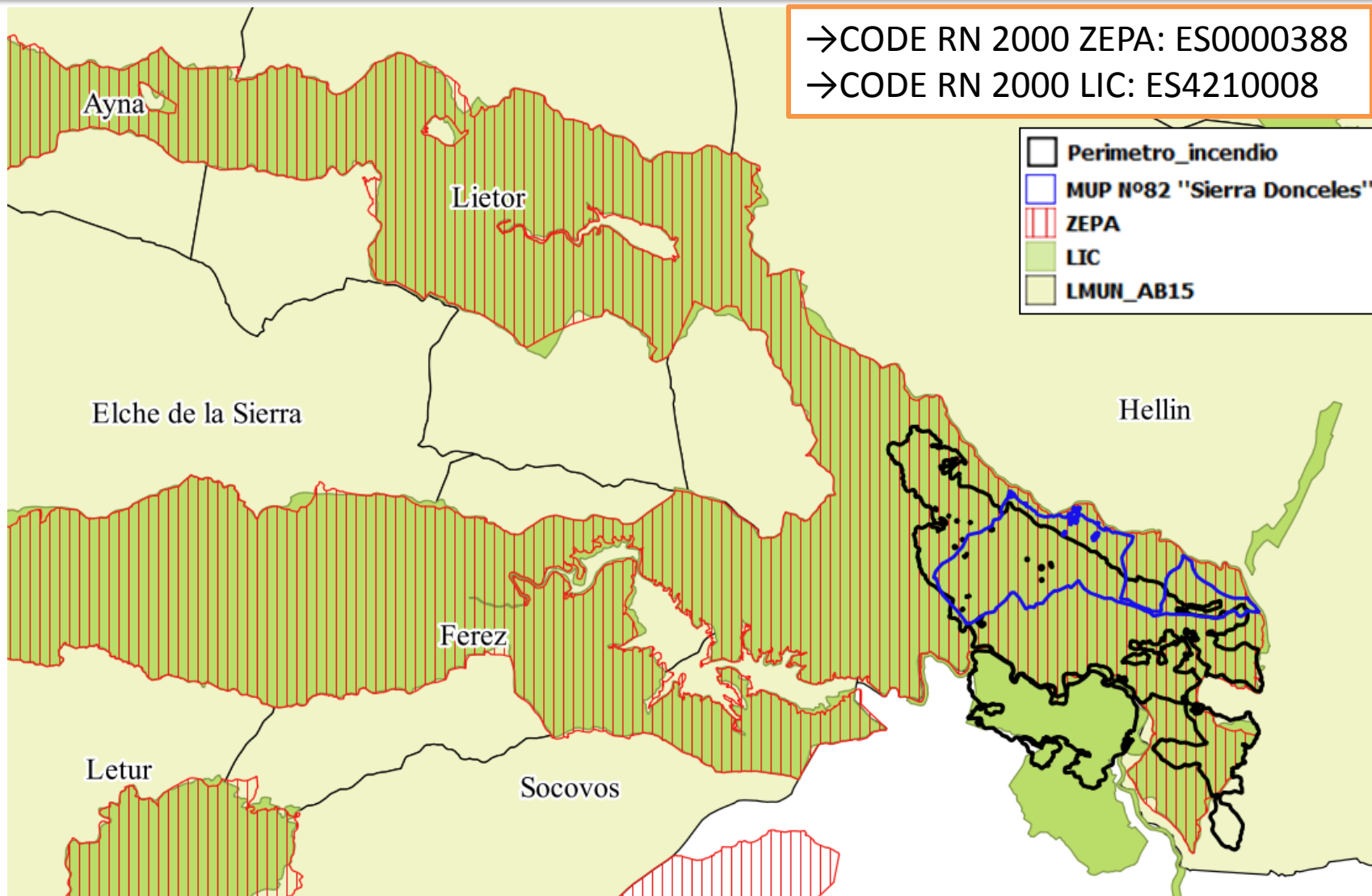


http://sao.albacete.org/joom/images/stories/MARCO_FISICO/mapaAB4.gif

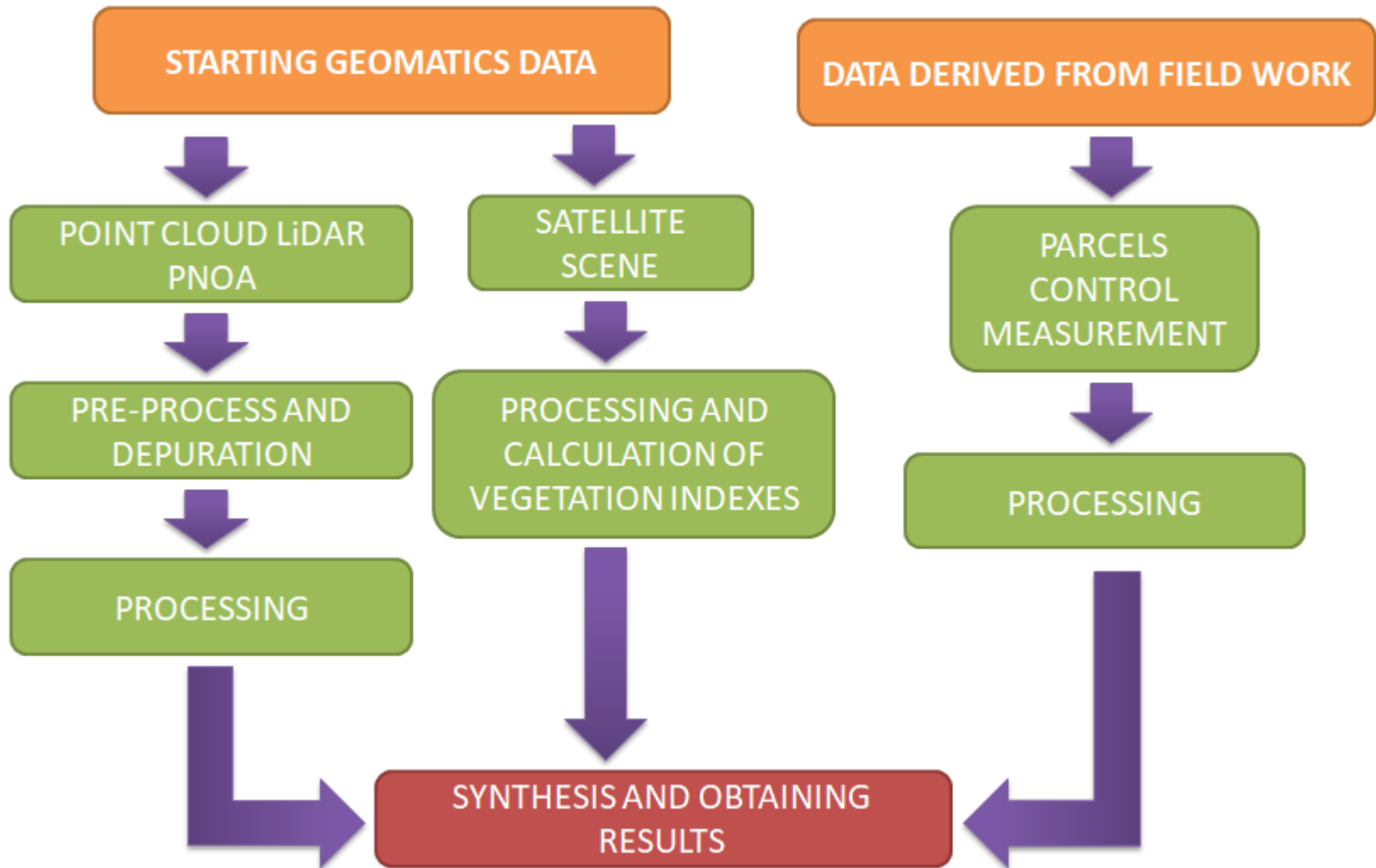
STUDY AREA

→CODE RN 2000 ZEPa: ES0000388

→CODE RN 2000 LIC: ES4210008



METHODOLOGY



TREATMENT OF SATELLITE SCENES

SET OF SATELLITE SCENES TREATED
Landsat-7 (FROM USGS)

CALCULATION
VEGETATION
INDEXES

MODEL BIOMASS-NDVI
ADJUSTMENT AND
APPLICATION TO THE PRE-
AND POST-FIRE SURFACE

BURNED INDEX
(dNBR)

NORMALIZED DIFFERENCE
VEGETATION INDEX (NDVI)

✓ Delimitation of the area
affected by the fire

✓ Pre and post fire variation

LiDAR PROCESSING

PRE-PROCESS

- .LAZ to .LAS
- CATALOG

Datos



Medición en campo

LDV - V163 - USDA Forest Service - Pacific Northwest Research Station



Extracción datos LiDAR de las parcelas

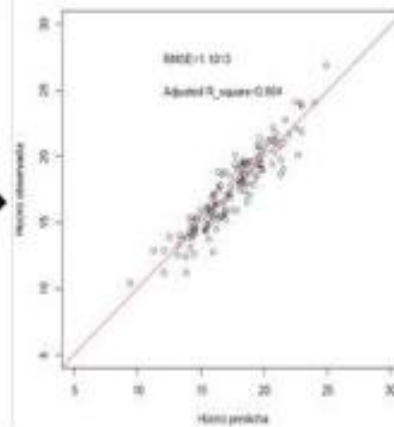


DEPURATION

- LiDAR QC
- FUSION

Modelos

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon$$



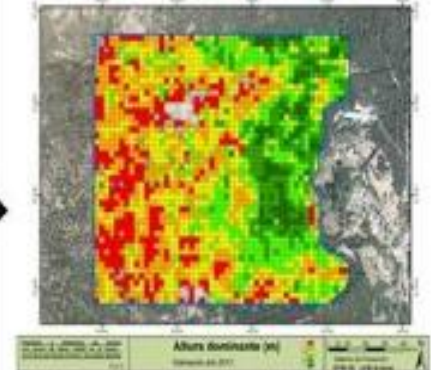
Construcción de modelos de regresión para cada variable



PROCESSING

- DTM
- DSM
- CHM
- FCC

Predicción



Aplicación de los modelos a toda la superficie de estudio

RESULTS

CONTROL PLOTS:

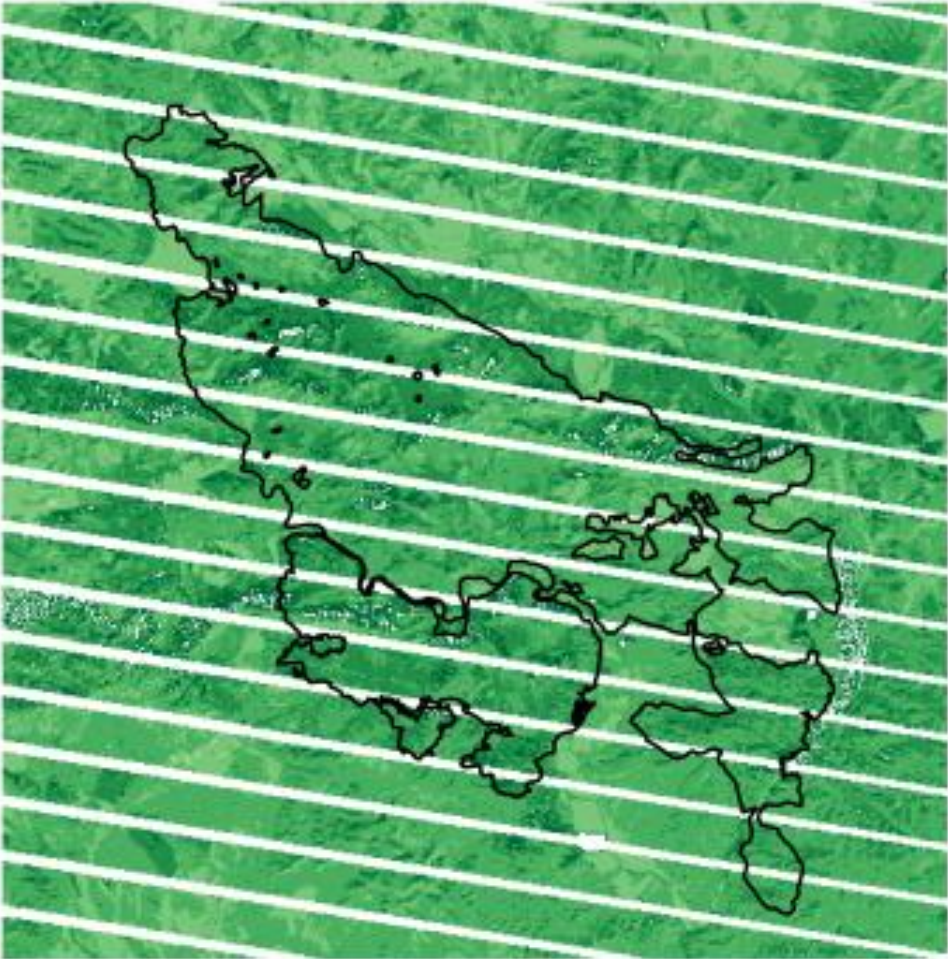
SURFACE (ha): 2084	SPECIES	<i>Pinus halepensis</i>	
		MEAN	SAMPLING ERROR
N° feet/ha (totals):	Nt	219	109
Mean Square Diameter of the main mass (cm):	Dg	14,97	8,42
Basal area of the main mass(m2/ha):	G	2,91	0,88
Average height of the main mass (m):	Hm	4,41	2,03
fraction of tree cover of the main mass(%):	FCC	18,77	10,93
Biomass (kg/ha) (Ruiz-Peinado et all., 2011)	W	3848,13	1612,51

→ $W = 0.0139 * d^2 * h$

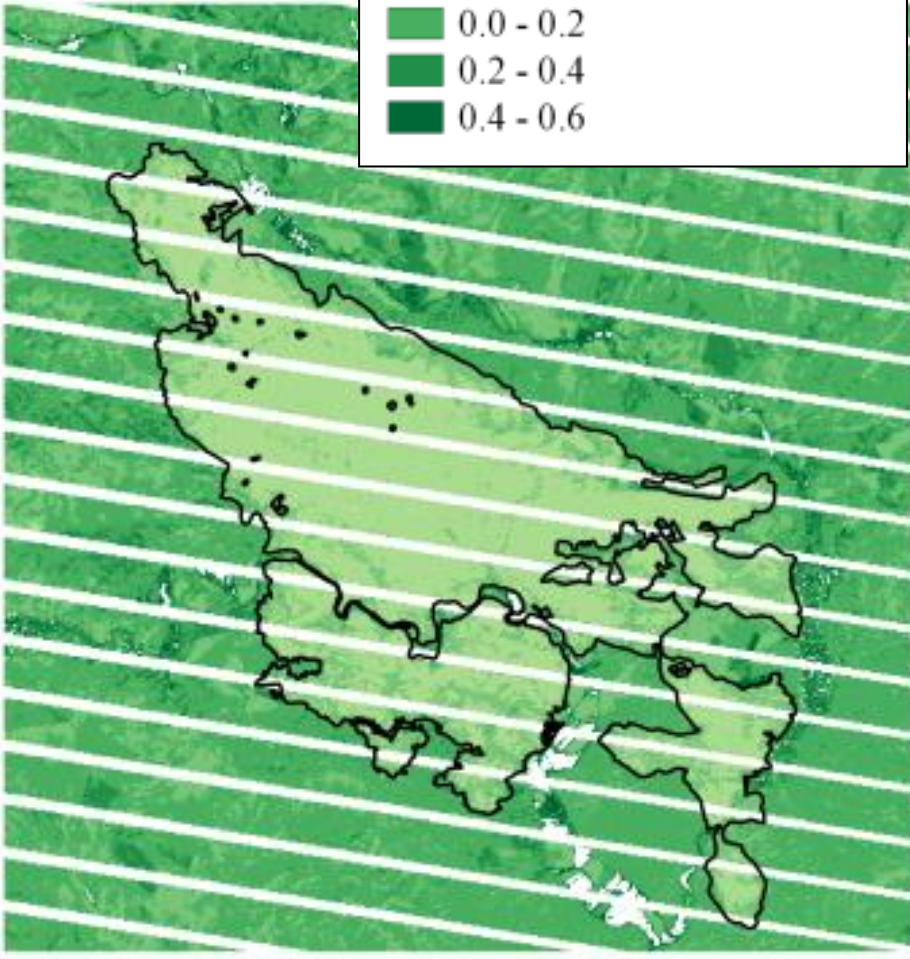
NBR



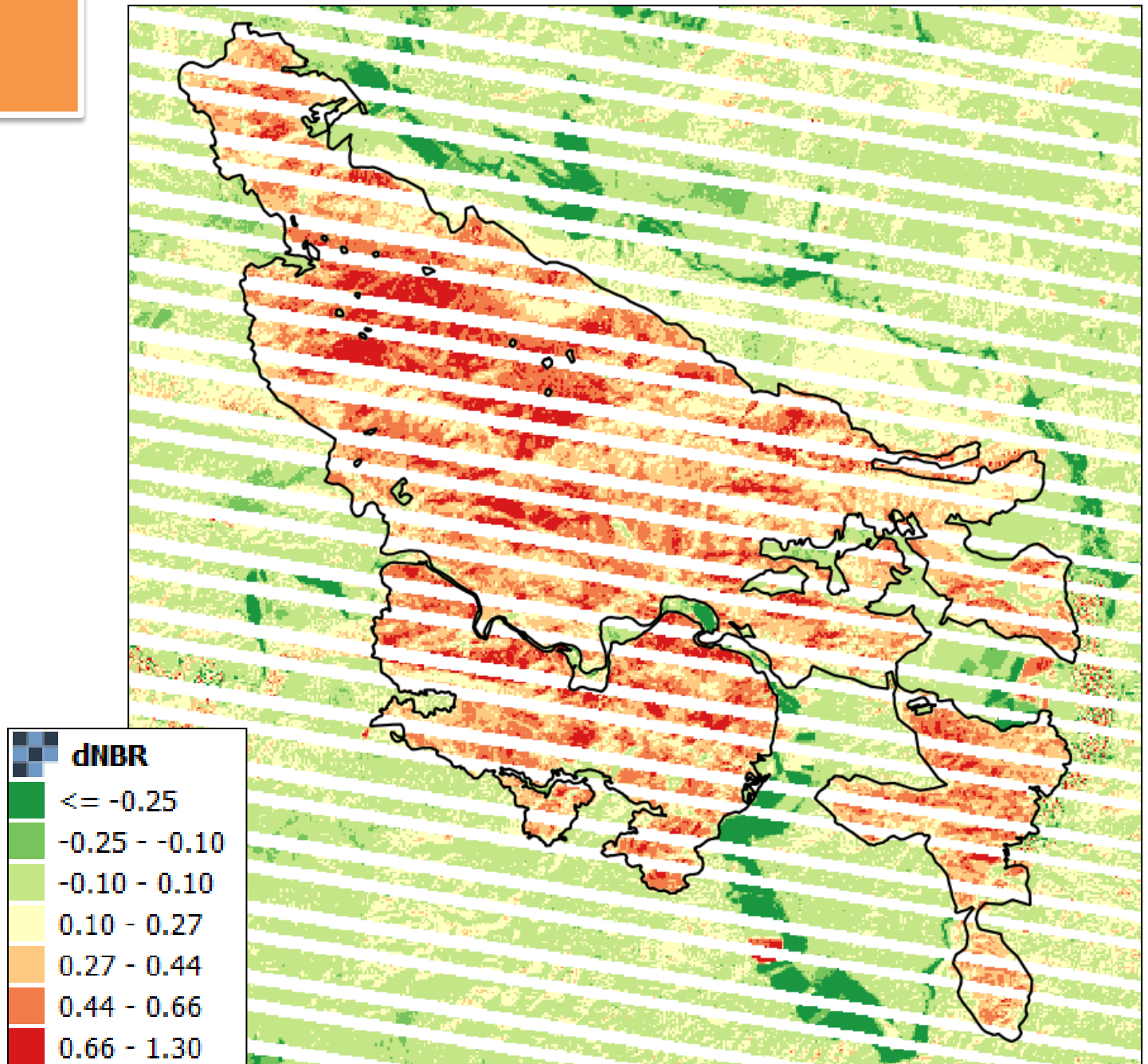
NBR PRE-INCENDIO (ESCENA DE SATÉLITE 15/02/2012)



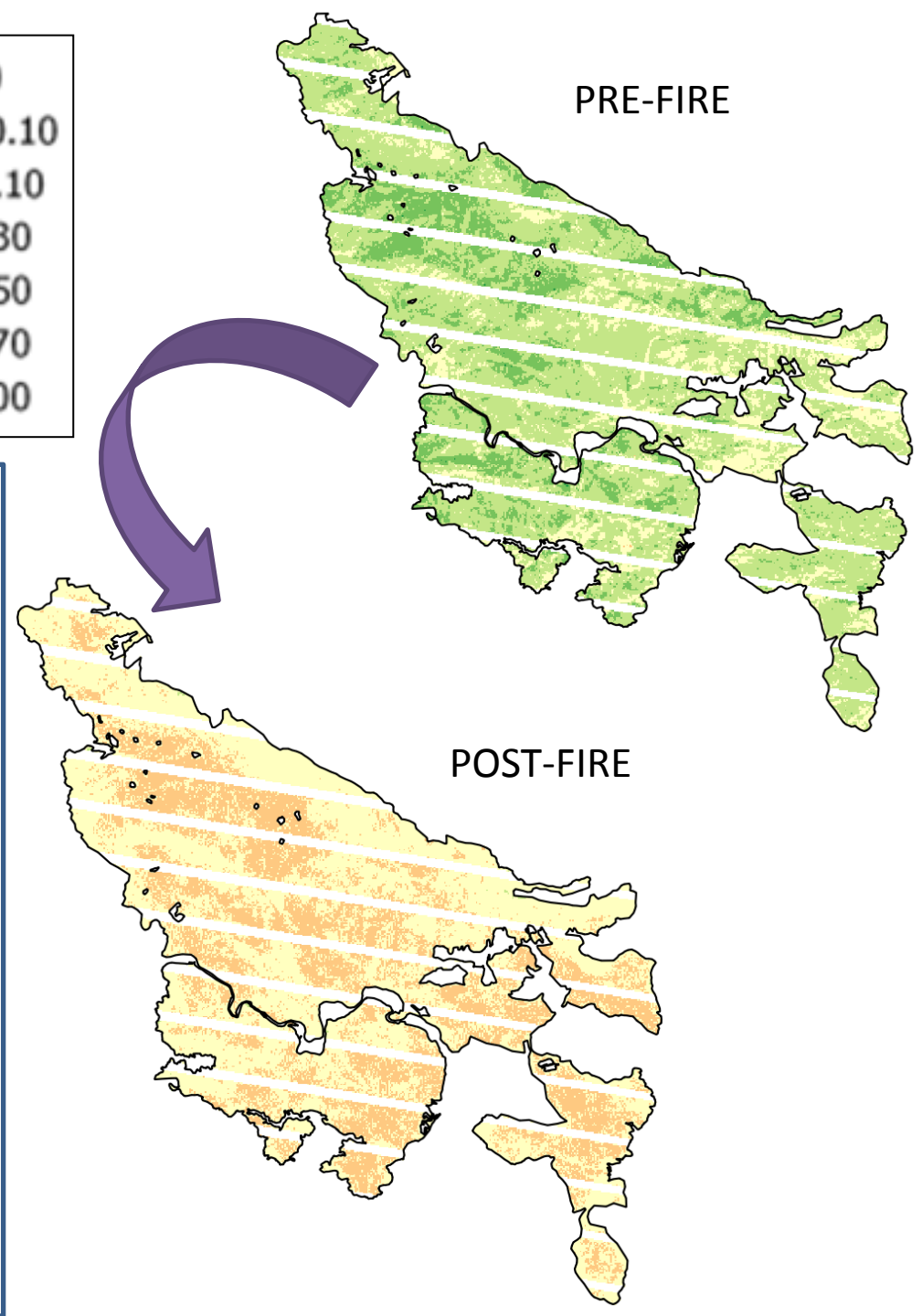
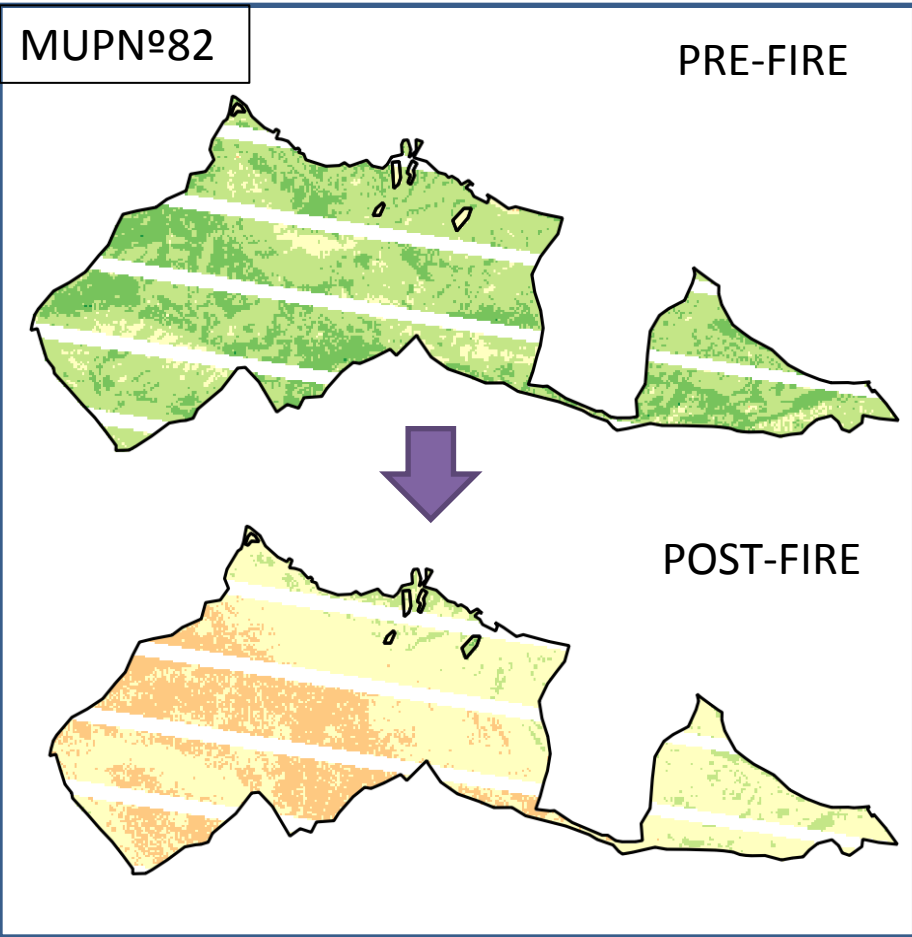
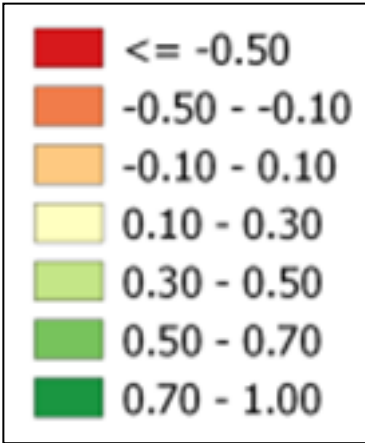
NBR POST-INCENDIO



dNBR



NDVI

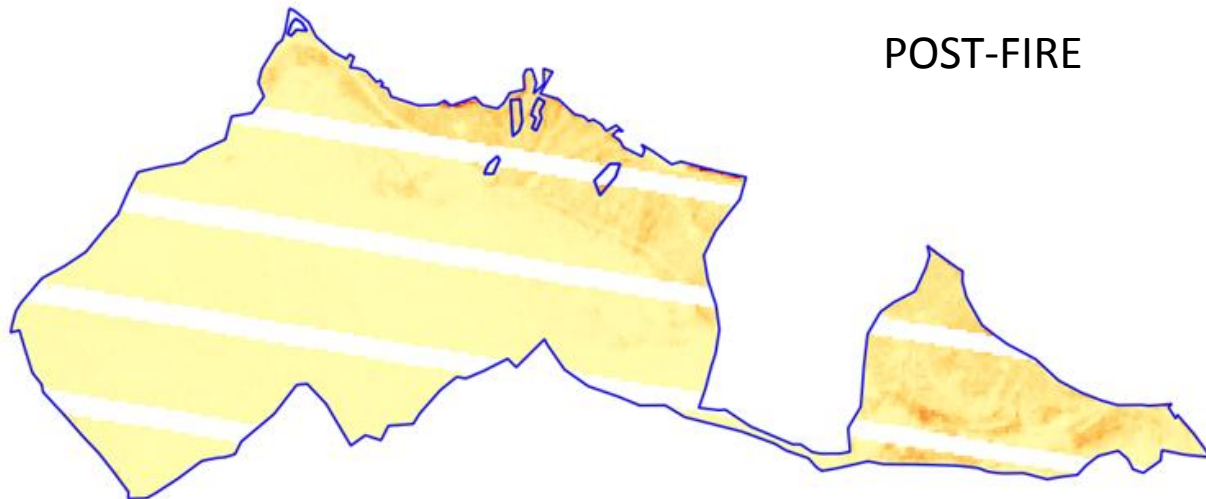
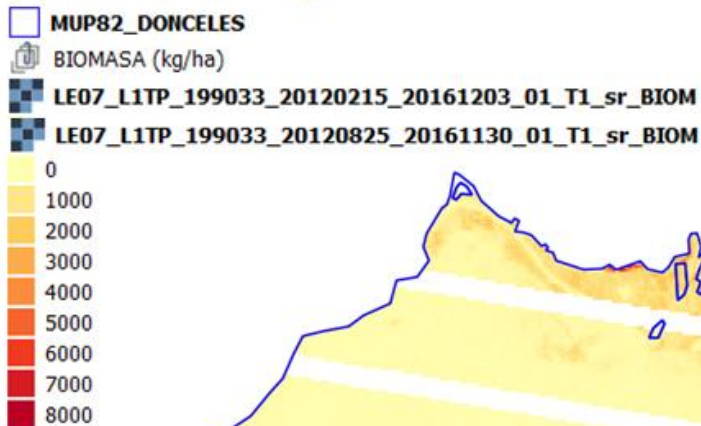
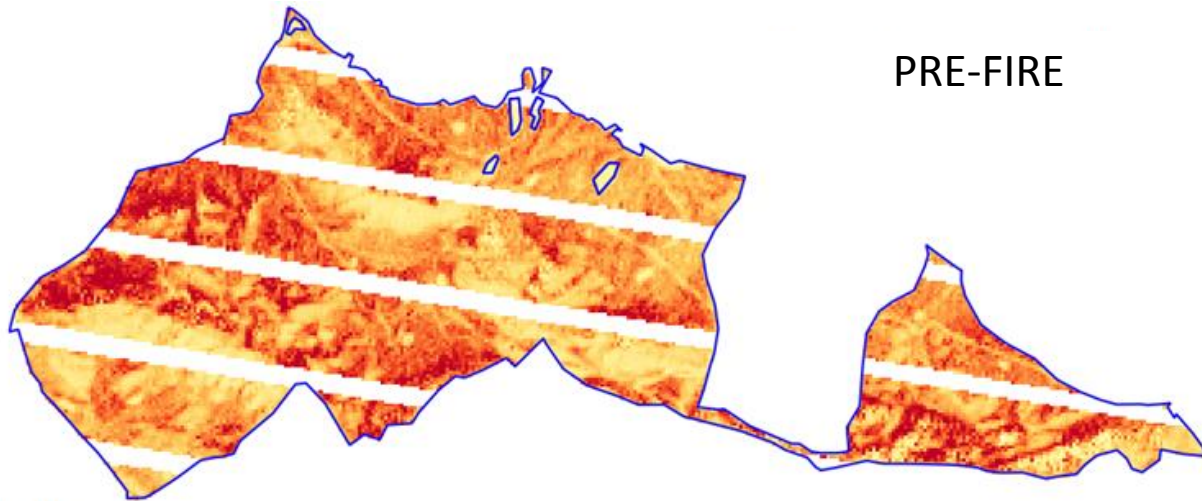


BIOMASS-NDVI



$$Biomasa (W) = 36209 \times NDVI^{2.9975}$$

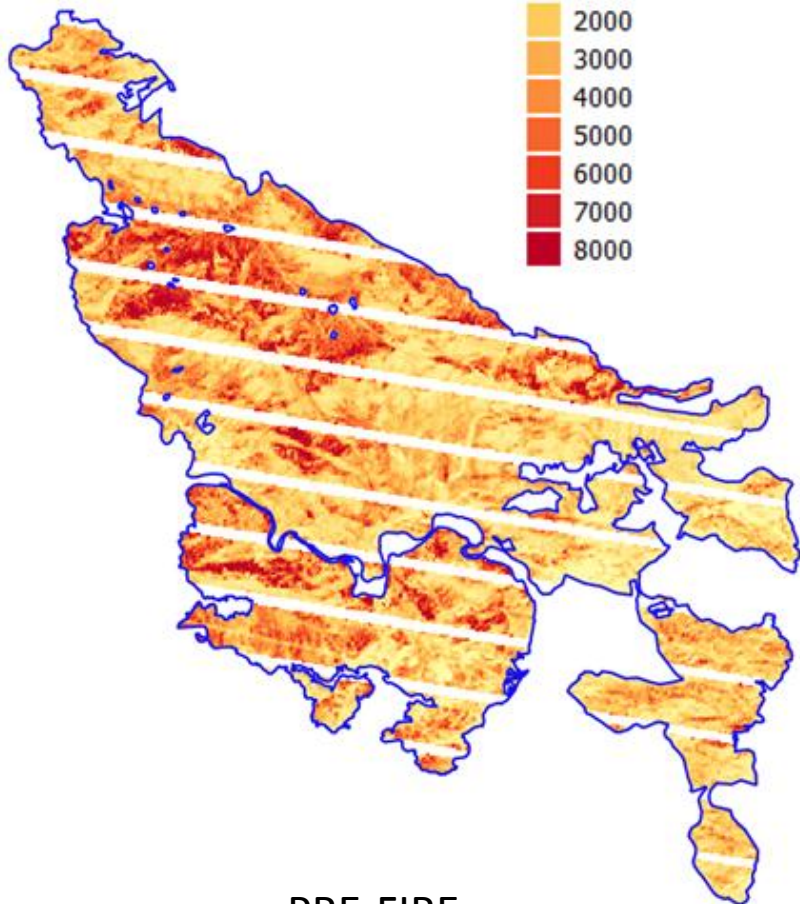
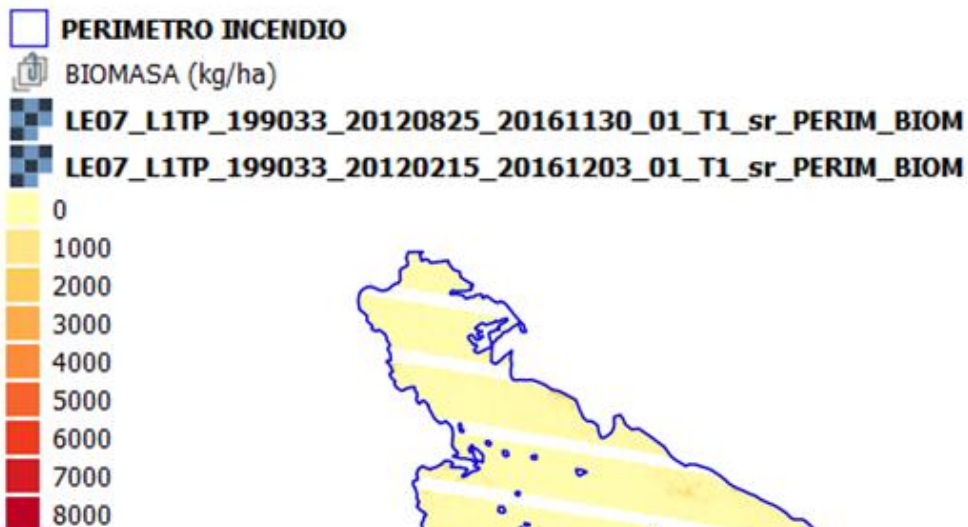
R2= 0.98



BIOMASS-NDVI



$$Biomasa (W) = 36209 \times NDVI^{2.9975}$$

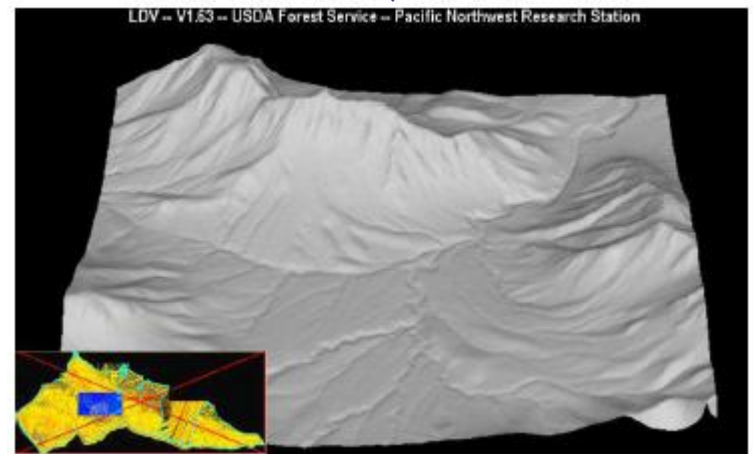
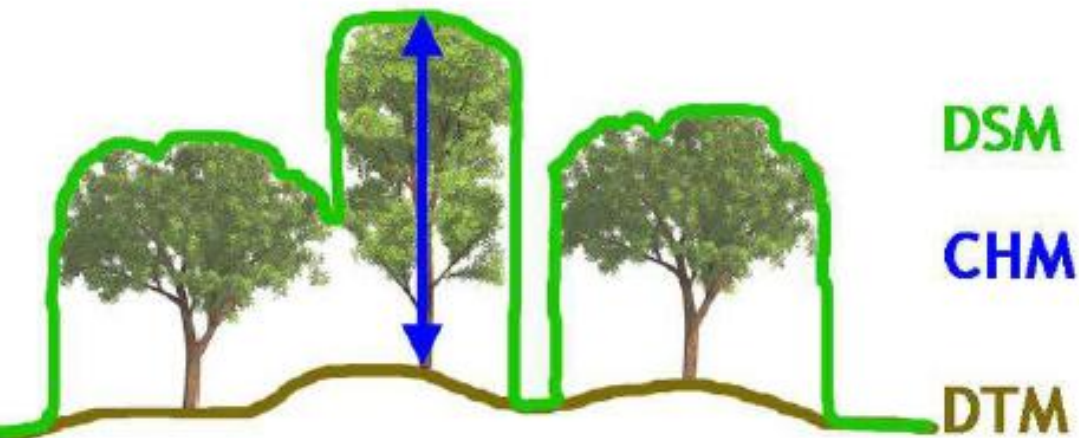
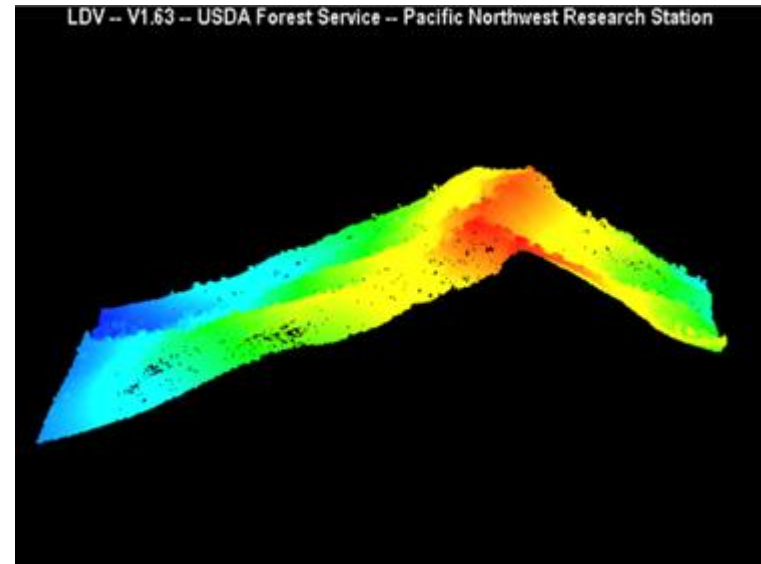
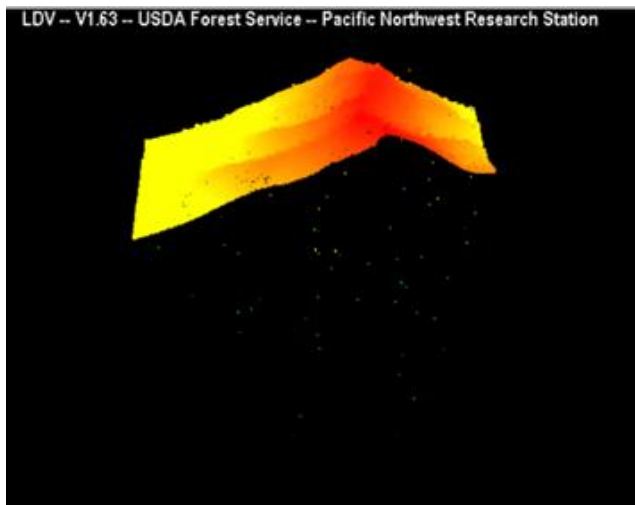


PRE-FIRE



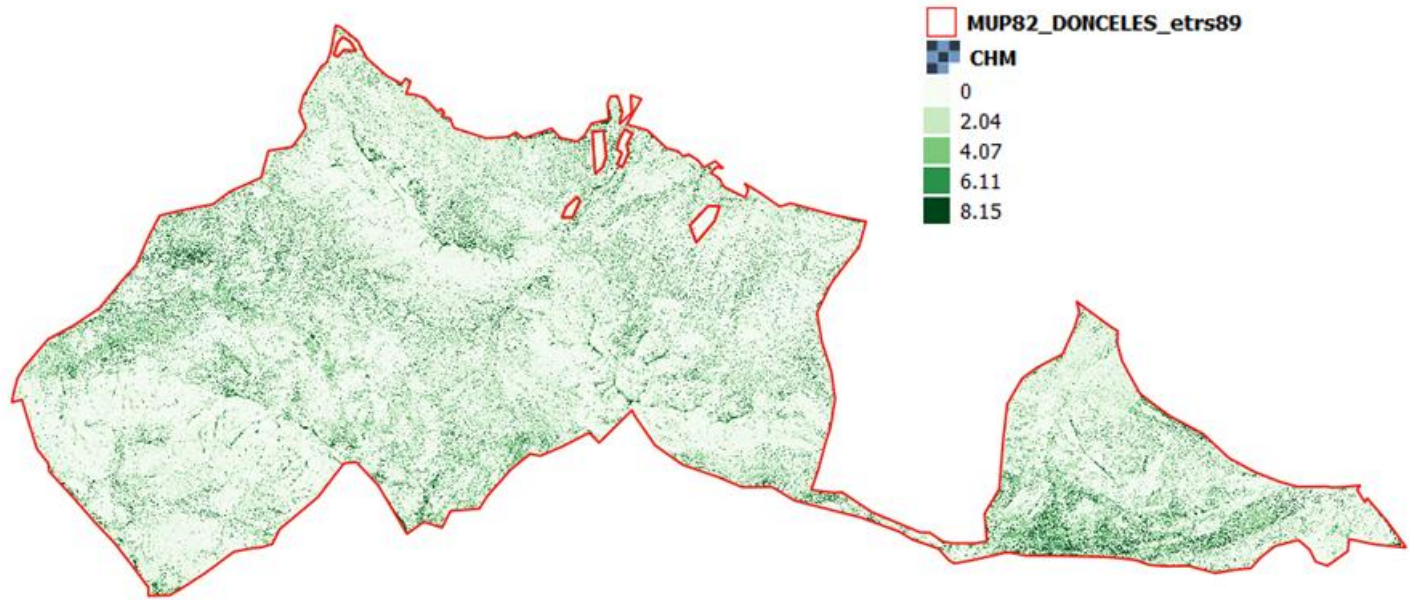
POST-FIRE

LiDAR RESULTS

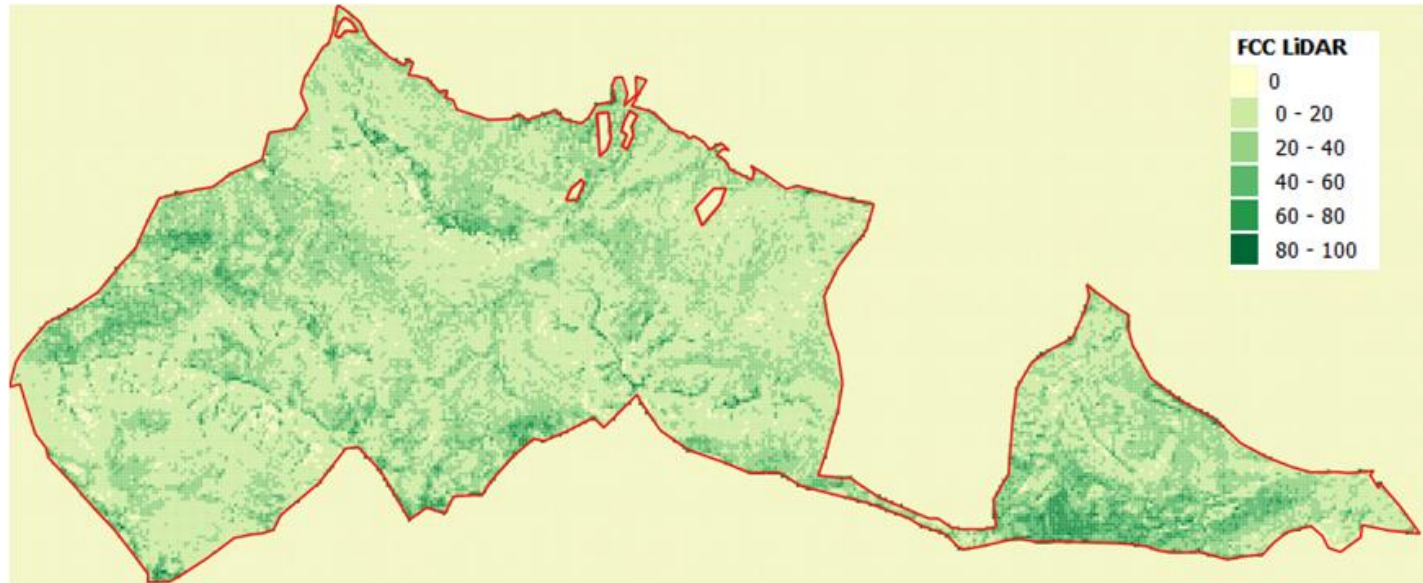


LiDAR RESULTS

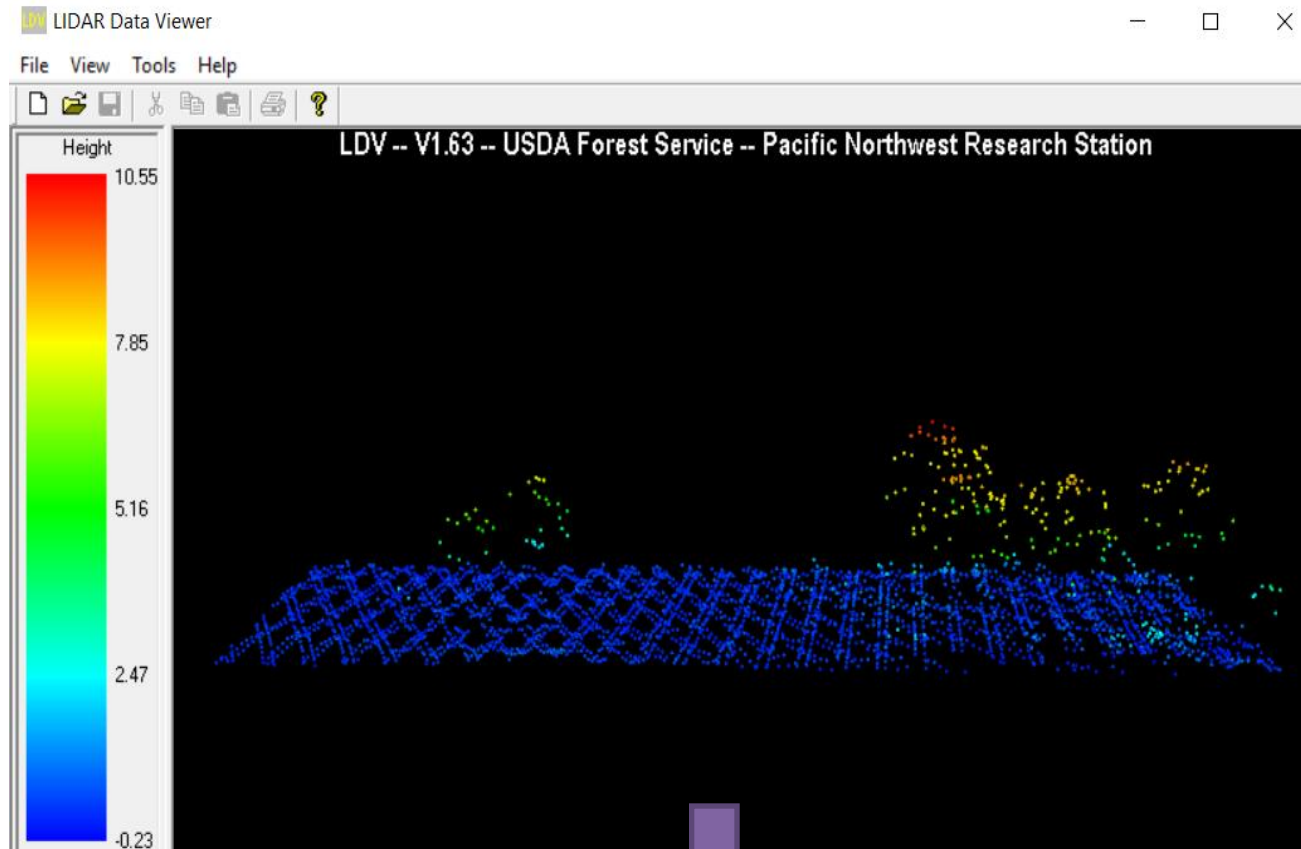
Canopy Height
Model
(CHM, m)



Fraction
cover
canopy
(FCC, %)



BIOMASS-LiDAR



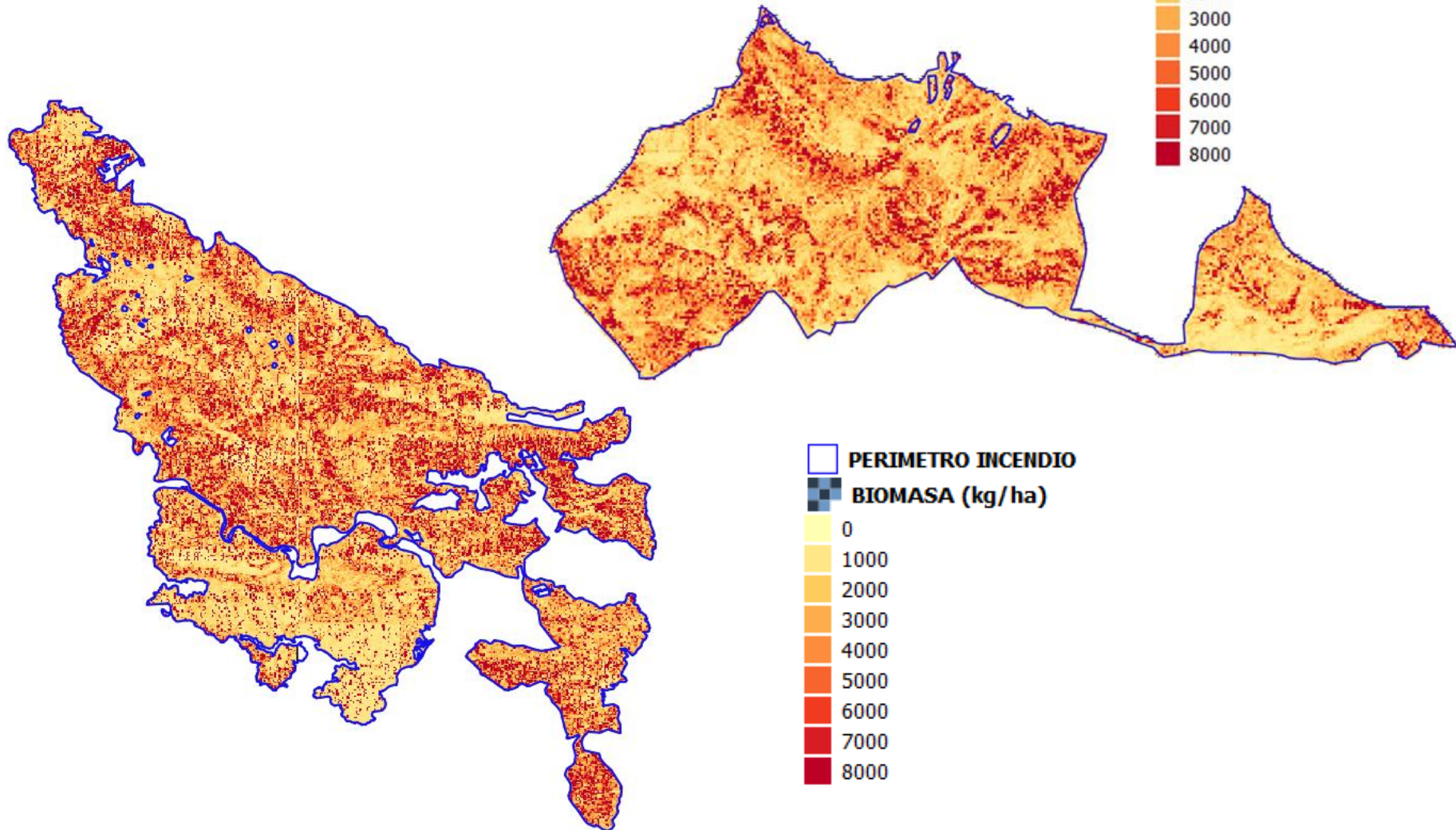
$$W \text{ (kg/ha)} = 225,896 + 312,713 * \text{Elev_kurtosis}$$

R² = 0.72

BIOMASS-LiDAR

R² = 0.72

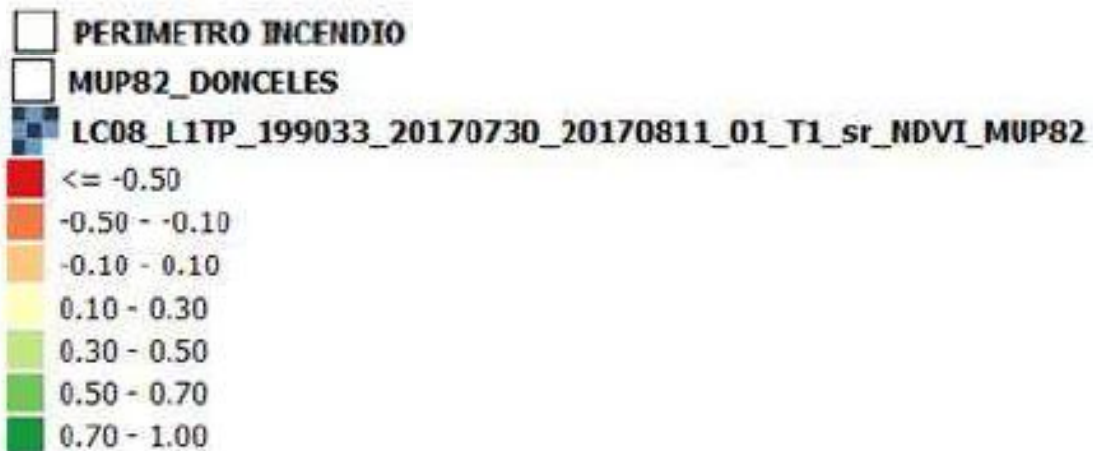
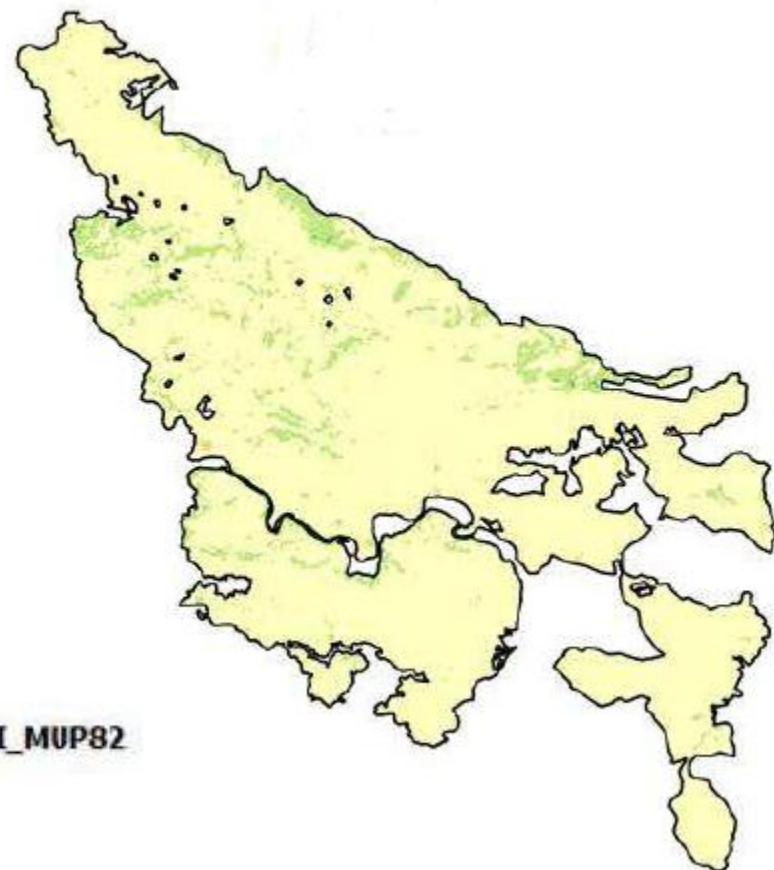
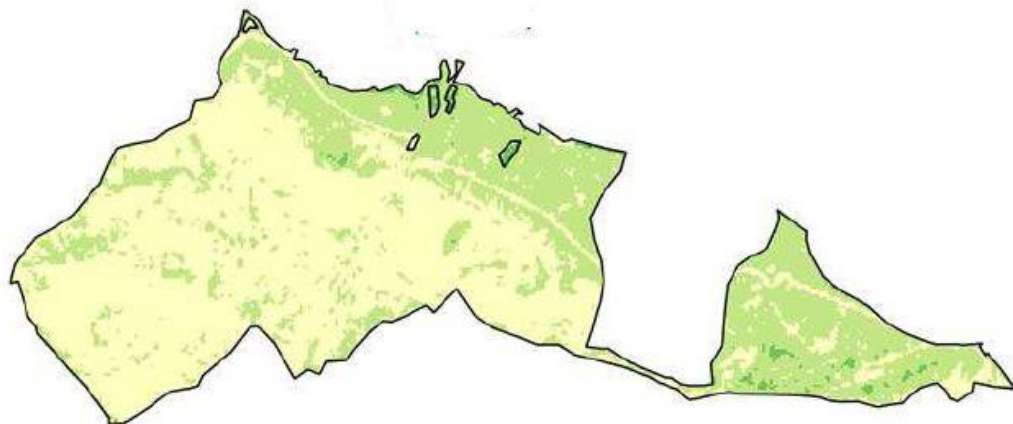
$$W \text{ (kg/ha)} = 225,896 + 312,713 * \text{Elev_kurtosis}$$



CURRENT STATUS OF THE STUDY AREA

satellite scene 07/30/2017

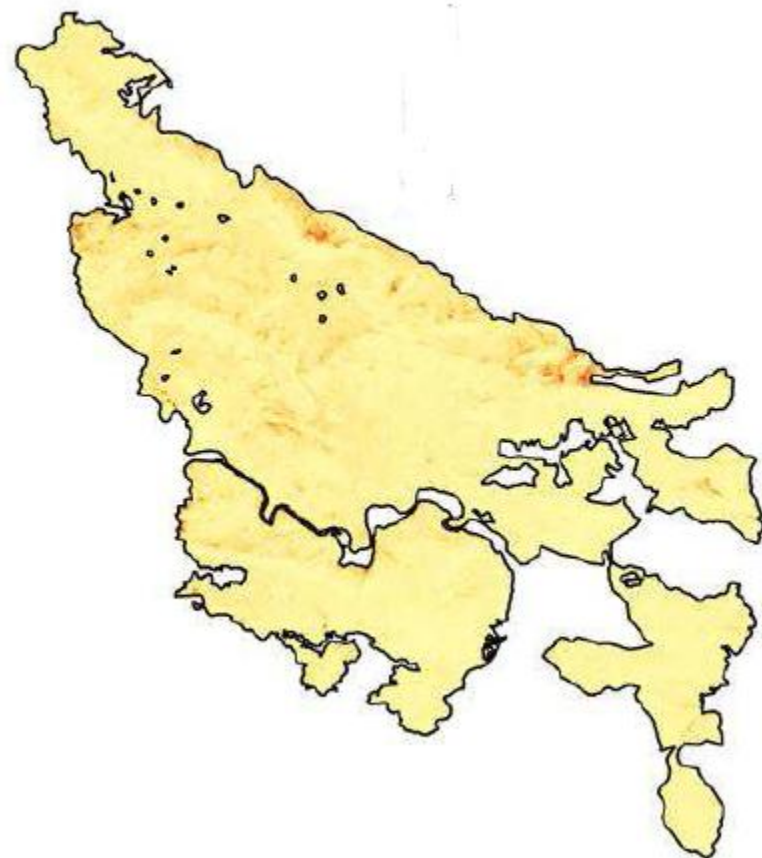
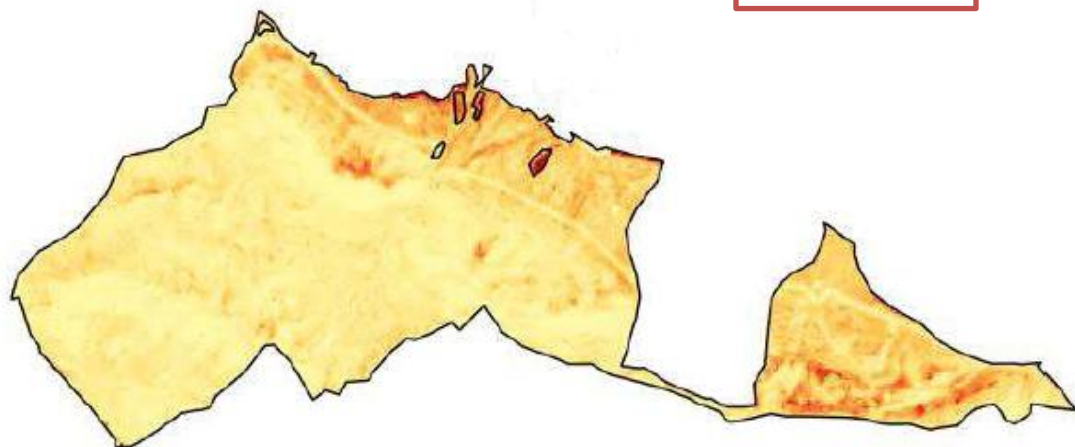
NDVI



CURRENT STATUS OF THE STUDY AREA

satellite scene 07/30/2017

BIOMASS

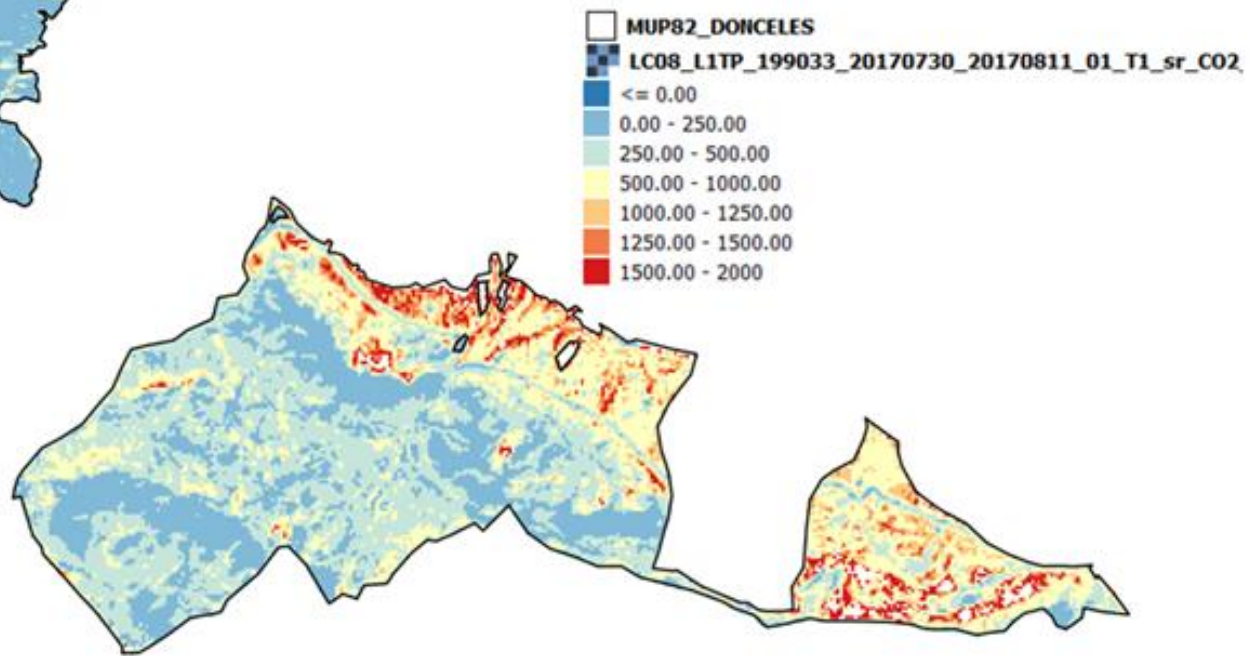
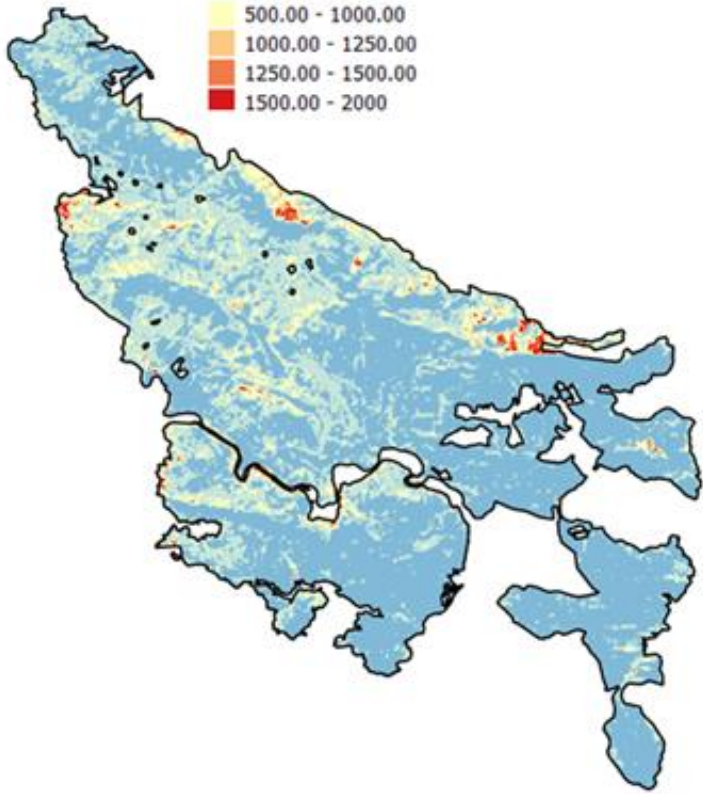




CALCULATION RESULTS OF THE AMOUNT OF CO2 SEQUESTERED DURING THE PERIOD (July 2012-July 2017)

satellite scene 07/30/2017

$CO_2 \text{ (kg/ha)} = 0.5 * \text{Biomass}$



CONCLUSIONS

dNBR + NDVI



Vegetation change after fire

Data derived from LiDAR



Characterizing pre-fire mass

CHM
FCC
W

Control plots



Contrasting and validating the results

Information	MODEL	RESULT (kg/ha)	E (kg/ha)	Ex (%)
Biomass Ruiz-Peinado	$W = 0.039 \times d^2 \times h$	3848,13	1612,51	41,90
Biomass-NDVI	$W = 36209 \times NDVI^{2.9975}$	3568,54	1058,90	29,67
Biomass-LiDAR	$W = 225,896 + 312,713 * Elev_kurtosis$	3711,62	1173,86	31,63

IN THE NEAR FUTURE...

PROJECT TITLE: Integrated vulnerability of forest systems to wildfire: implications on forest management tools “VIS4FIRE”

Restoration of post-fire forest ecosystems

SE Spain (Yeste, Hellín, Liétor)

Remote sensing: LANDSAT, LiDAR,...

Severity and recurrence of disturbances in the scenario of global change



THANKS!

