



EUROPEAN FOREST INSTITUTE  
ATLANTIC EUROPEAN REGIONAL OFFICE - EFIATLANTIC



**INRA**  
SCIENCE & IMPACT



# FORRISK

## Final Conference, Bilbao



**Mapping Wind Risk in Different Regions of FORRISK  
(Aquitaine, Basque Country, Asturias)**

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Andrea Hevia and Ernesto Alvarez (CETEMAS)**





Wind Damage





ForestGALES 2.5

File Mode DAMS Options Window Help

Stand Predictions Through Time - ForestGALES

Average number of years until damage

Return Period (yrs)

Age (yrs)

Controls

- Print Form
- Report
- Help
- Excel Export

Save All

Some of the modelled trees are larger than we have data for.  
Weibull-A calculated from DAMS.

Single stand predictions through time

Stand Characteristics

- Stand ID: ForestGALES
- Soil Group: Freely draining mineral soils - A
- Rooting: Shallow (< 80 cm)

Tree Characteristics

- Species: User-defined species 1
- Yield Class: 2
- Thinning regime: User Defined Type 1
- Initial spacing (m): 2

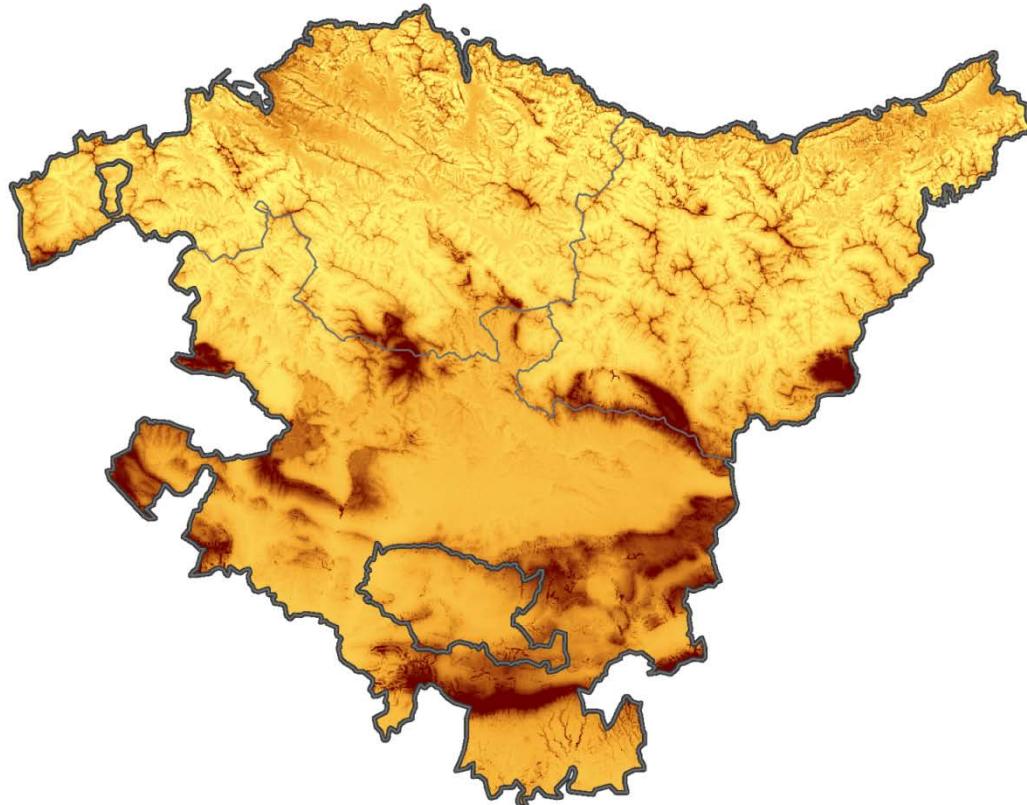
DAMS

- Grid Reference
- Calculation

NH180150 Apply... DAMS Score 15

Controls

- Run
- Print Form
- Help
- Open File
- Save File
- Defaults
- Close



Basque

Weibull A

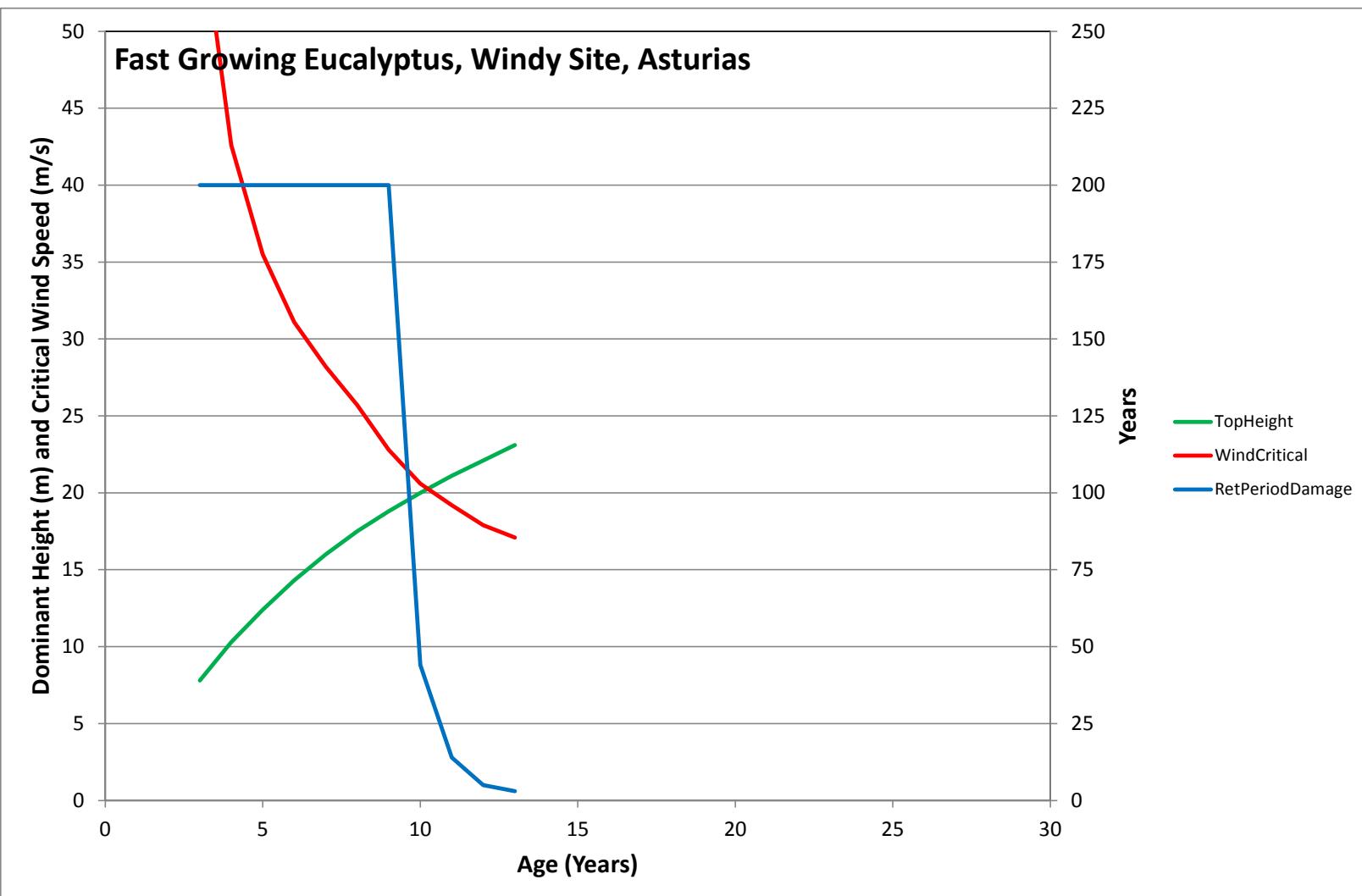
High : 24.65

Low : 0.65

0 12.5 25 50 Kilometers

## Wind Climate







Xynthia

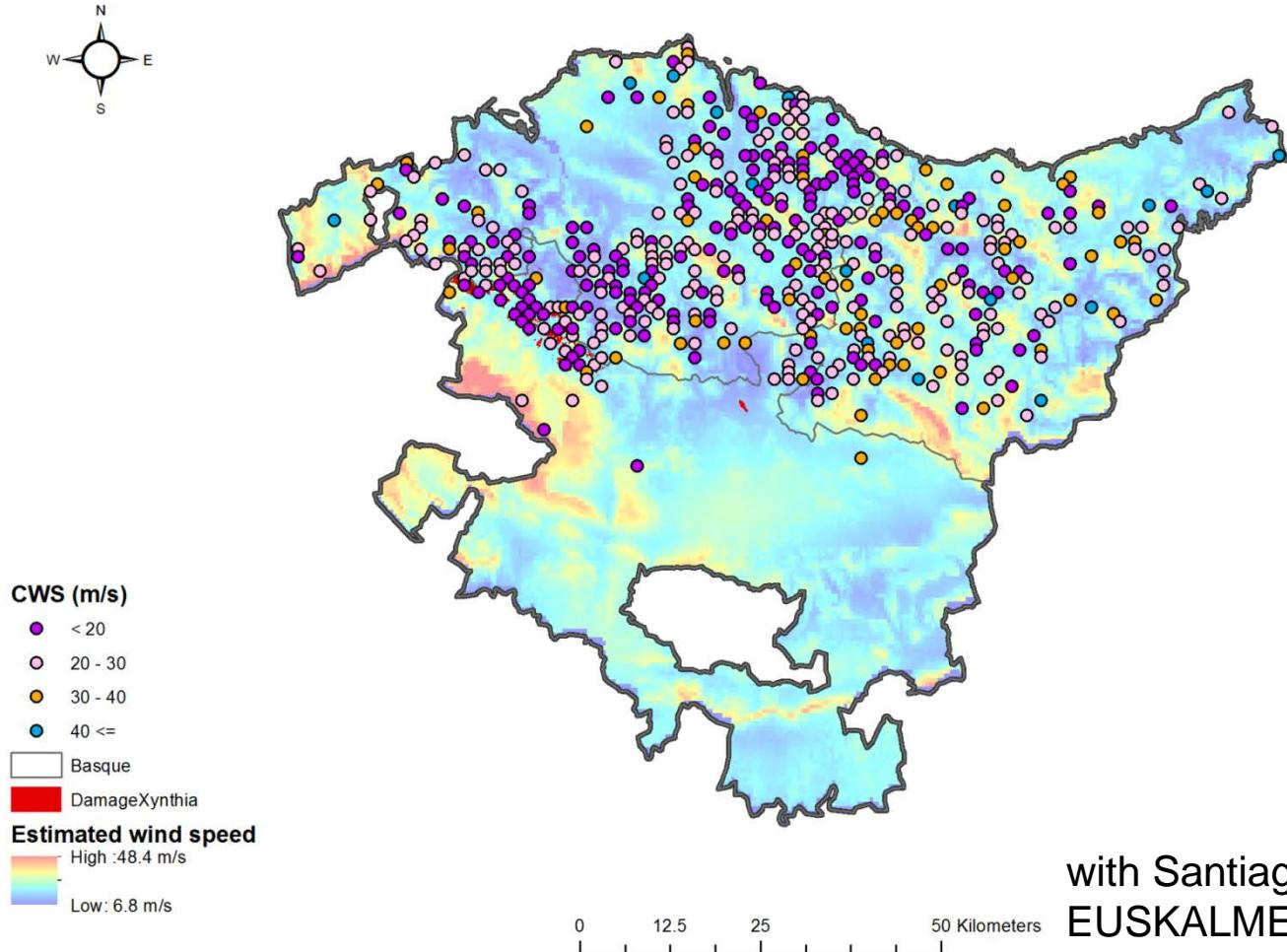


Klaus



## Validation Data



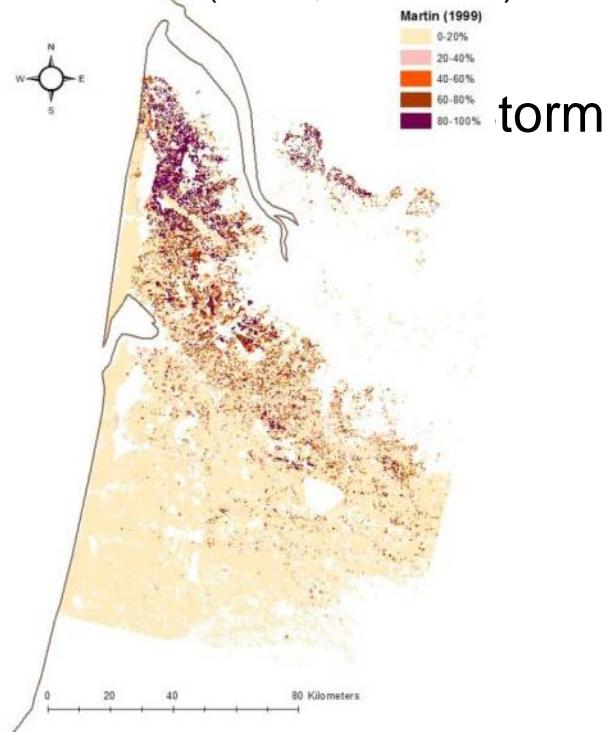


with Santiago Gaztelumendi,  
**EUSKALMET**



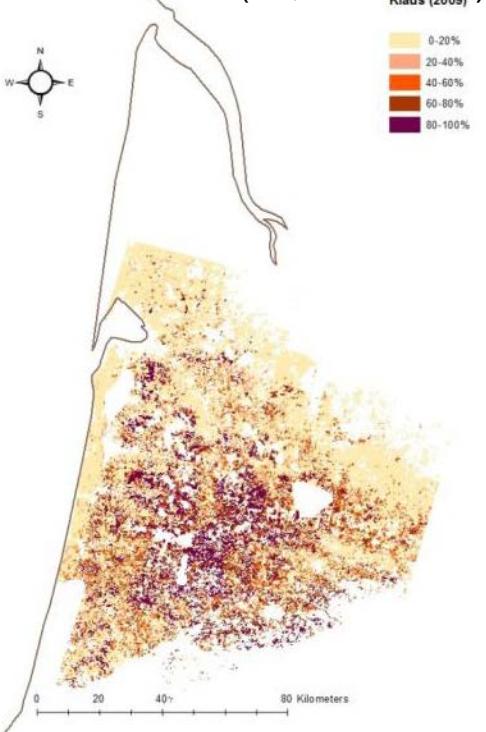


Storm Martin (26-28, Dec. 1999)



23 million m<sup>3</sup> of maritime pine was damaged.

Storm Klaus (24, Jan. 2009)



37 million m<sup>3</sup> of maritime pine was damaged.

Damage caused by Storm Klaus



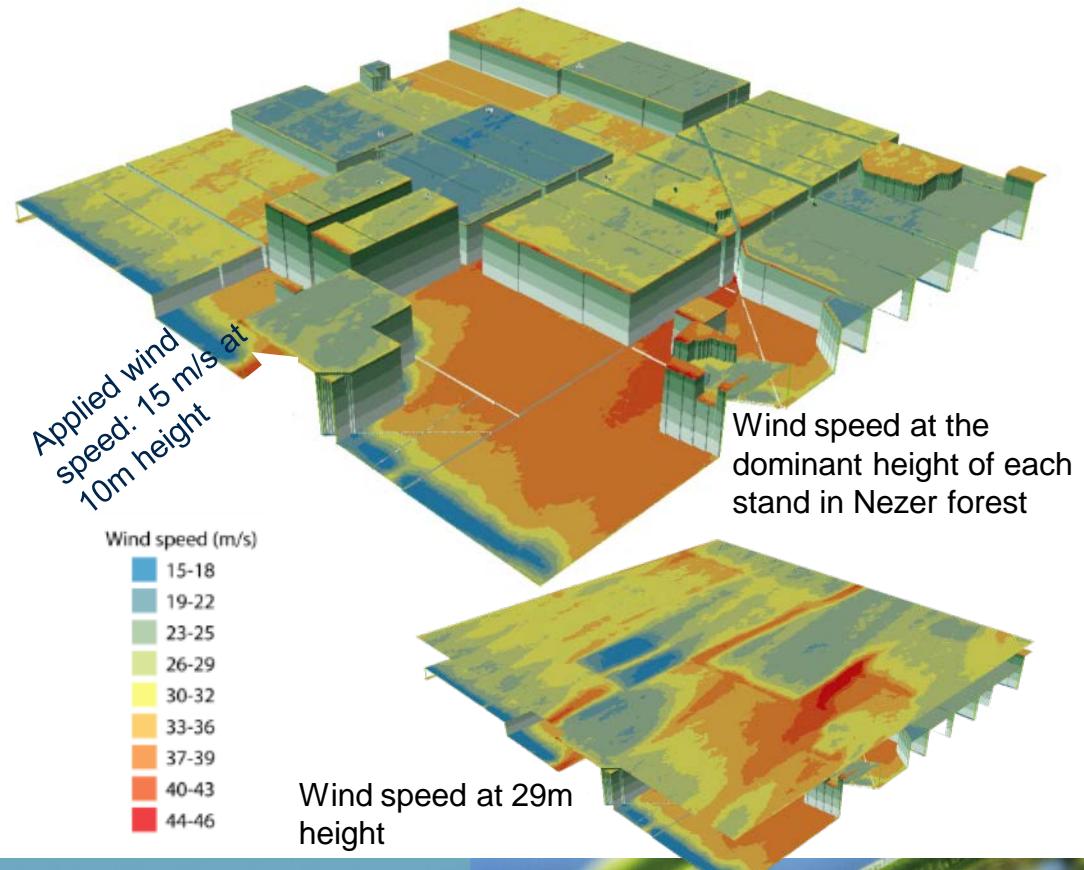
By Christophe Orazio





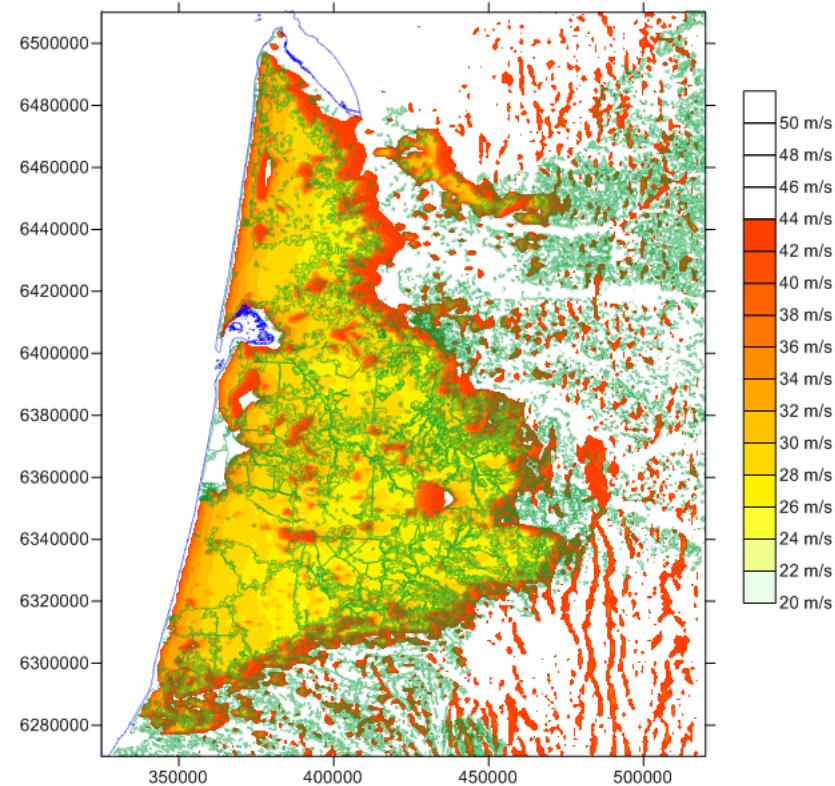
Martin

## Estimated wind speed in Nezer Forest using ARPS (by Sylvain Dupont)



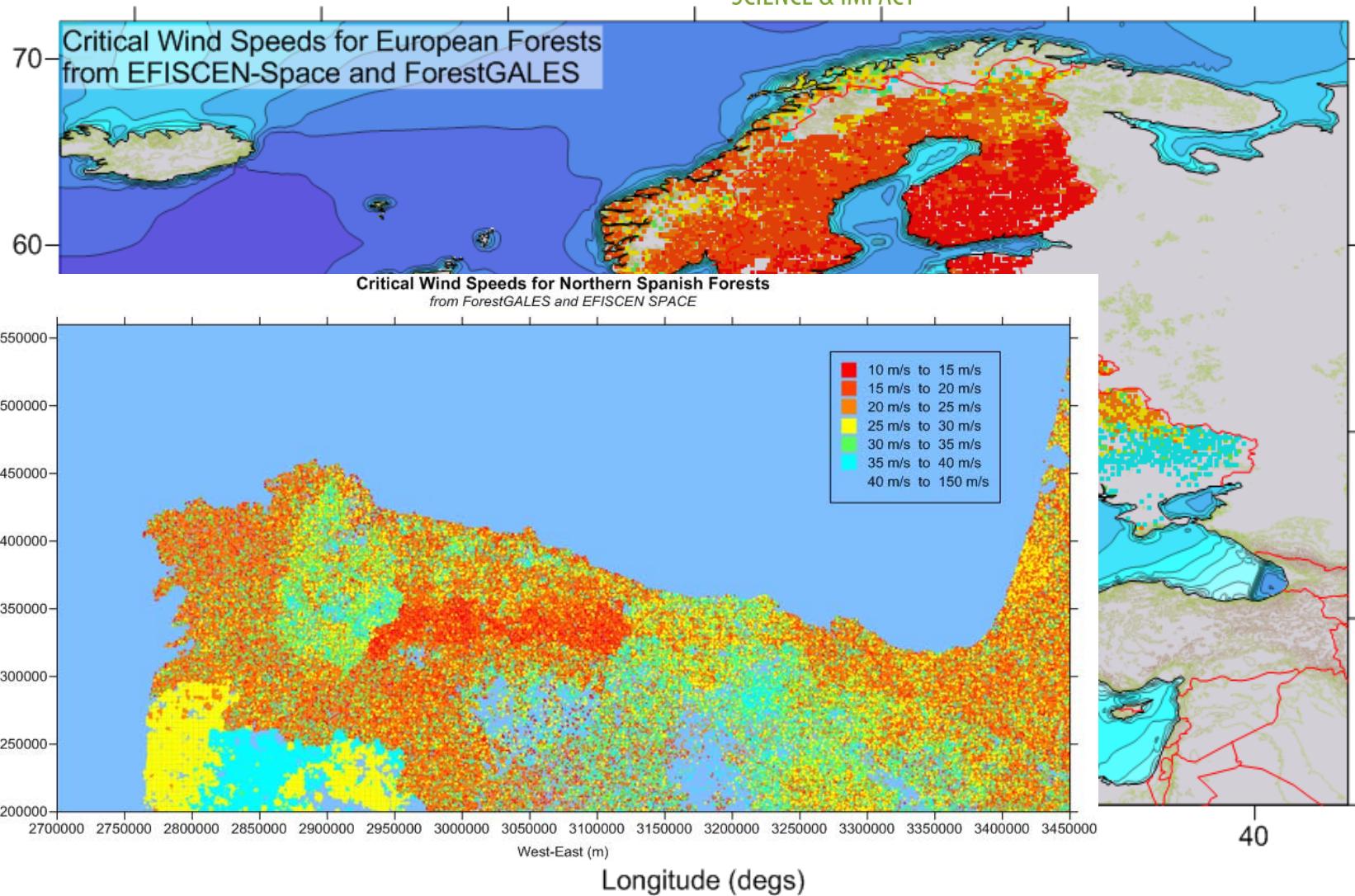
Klaus

## Estimated wind speed at 29m height in Aquitaine using WAsP



Validation Test







## Summary of Activities

1. ForestGALES wind risk model parameterised for maritime pine in Aquitaine, radiata pine in the Basque country (data from Spain and New Zealand) and eucalyptus globulus in Northern Spain. Latest version (FG2.5) available very shortly online in English (October 2014)
2. Map constructed of Weibull A and Weibull k parameters for assessing the wind climate of the Basque Country (function of elevation, topographic shelter & distance from the sea)
3. ForestGALES used to predict stands in Basque National Forest Inventory that were most at risk of damage in Storm Xynthia on 27<sup>th</sup> February 2010
4. Initial validation of ForestGALES using wind damage from storms Martin, Klaus and Xynthia

## Future Activities

1. Tree pulling of radiata pine in Basque country to improve ForestGALES model (Oct 2014)
2. Tree pulling of *fagus sylvaticus* in Basque country to add beech to ForestGALES (Early 2015)
3. Further validation of ForestGALES with data from Storms Klaus and Xynthia
4. ForestGALES model for Northern Spain and Aquitaine in Spanish and French (2015)

**THANK YOU**

