



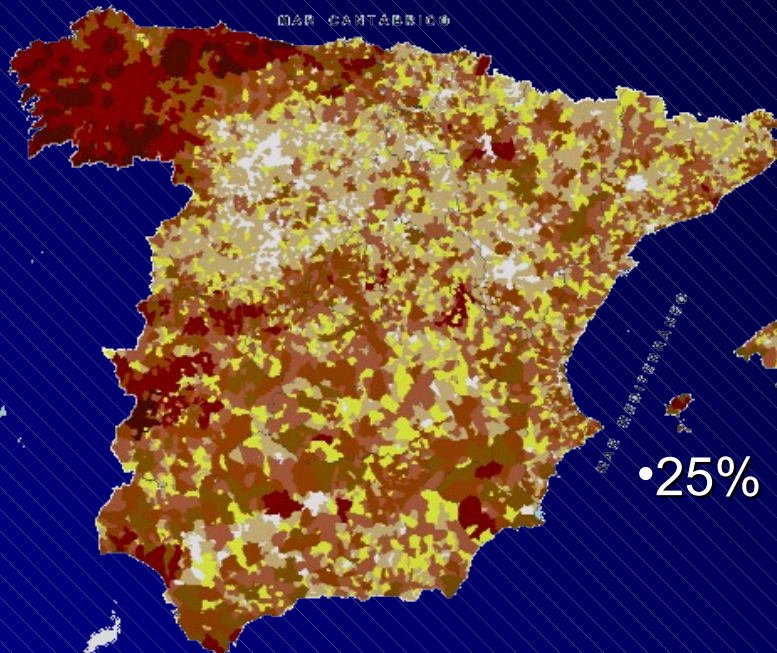
An integrated approach to the management in the prevention and fighting of forest fires

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Ministry of Interior, Spain



A MAJOR RISK FOR SPAIN

- Forest area : 14,4 Millions Ha (30% of Spain).



- 66% Private ownership.
- 30% Municipalities ownership.
- 4% Regions Ownership

- 25% Under some protection measure.

Forest fires by Municipality (2000-2010).





ÁREAS IDENTIFICADAS COMO DE ALTO RIESGO DE INCENDIOS FORESTALES

- 50% of Spain territory has been declared as of high forest fires risk
 - Each High Risk area is covered by a Forest Management Plan
 - The Central Administration and the Autonomous Communities (regional governments) have a Civil Protection Emergency Plan for Forest Fires





⇒ STATISTIC EVOLUTION (2001-2010)

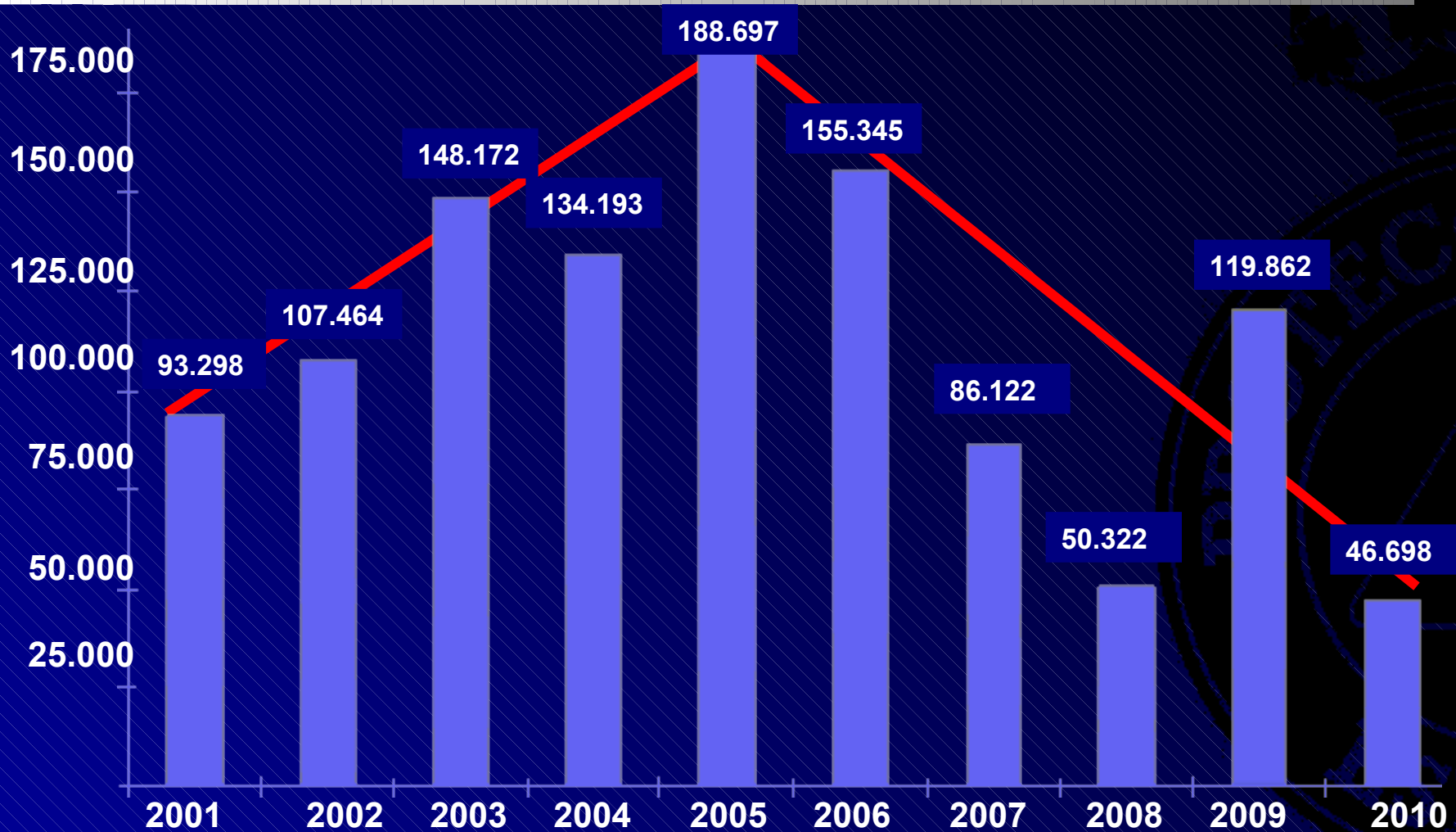
NUMBER OF FIRES.





⇒ STATISTIC EVOLUTION(2001-2010)

BURN FOREST AREAS (HA)





⇒ CAUSES AND MOTIVATIONS > PREVENTIVE MEASURES (I)

PREVENTIVE MEASURES

X Increased use of forest areas

Lack of danger awareness
from urban dwellers

Public awareness Persuasion

Training, Education
and prevention culture

X Fuel building up

Rural area's depletion

Low forest productivity

Preventive forestry

Harvesting and
use of Biomass

Forestry and
Forest Management

X Climate

Temperature, humidity, wind

Early Warning

Remote sensing

Daily risk maps





⇒ CAUSES AND MOTIVATION > PREVENTIVE MEASURES (II)

PREVENTIVE MEASURES

X Motivation

Conflicts over protected areas

Labor conflicts

Revenge



Dissuasive surveillance and prosecution



Penalties

Conciliation of interest

X Uncontrolled burning

Pasture regeneration

Extensive agriculture

Decreased surveillance



Burning procedures regulation



Risk Maps

Technical counseling





⇒ PREVENTIVE MEASURES

CATALOG OF MEASURES (I)

STRUCTURAL MEASURES AND PREVENTIVE FORESTRY

**Pickup of Biomass, Energy use.
Sustainable management of forest.
Forest Management and Defense Plans**

PROSECUTION

**Police and District Attorneys specialized in environmental felonies.
Causes investigation and prosecution.**

PERSUASION

**Training of fire fighting personnel.
Public awareness campaigns in rural areas Schools through conventional
and new technologies of communication.
Media.**





Integral prevention brigades. (EPRIF)
(created in 2005)

- **Technical prevention teams , trained on firefighting and fire behavior.**
- **Promotion of stable jobs in rural areas .**
- **Technical assistance to the rural population on the traditional uses of fire. Control of authorized burning.**
- **Interest conciliation in protected or high risk areas.**



⇒ PREVENTION MEASURES: EARLY WARNING

INDEX

1

Early satellite detection

2

**Confirmation of departure point
and event.**

3

**Scenario analysis through
cartographic Data Bases**

4

**Identification of the population
potentially affected and of
the vulnerability of essential services .**

5

**Dissemination of reports
alerts and monitoring**





⇒ PREVENTIVE MEASURES: EARLY WARNING

SATELLITE DETECTION (I)

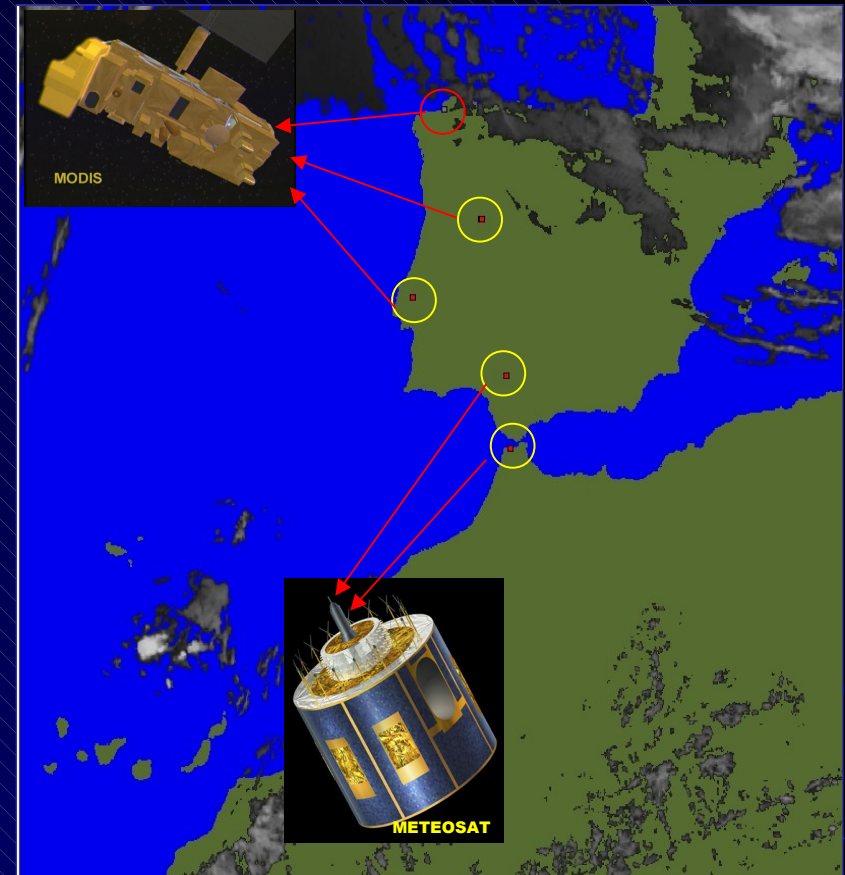
1

Space detection based upon Modis (UN/FAO) and Meteosat satellites.

- Integration of data on topography, meteorological forecast, fuel models and satellite observation on humidity through geographical information systems.

2

- Potential fire path estimation and evaluation of potential effects on population and properties.





2

Automatic e-mail reception of reports and modeling results

De: SACOP

Enviado el: viernes, 06 de mayo de 2011 10:00

Para: Gallego Berruezo, Pilar

Asunto: Hotspot MODIS

Se ha detectado un hotspot MODIS en la siguiente localización:

- Lugar: Abadín, Lugo, Galicia
- Coordenadas UTM-30: 132968, 4812375
- Fecha de detección: 27/04/2011 11:29 UTC
- Probabilidad: 73 %

Se ha realizado una simulación automática, el resultado es que la superficie afectada es de **2012.16 Ha.**

SACOP

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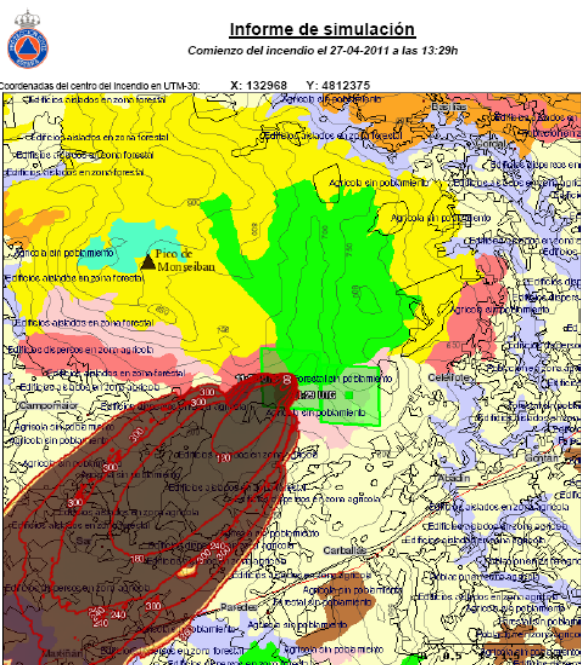
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⇒ PREVENTIVE MEASURES: EARLY WARNING

SATELLITE DETECTION (III)

Automatic e-mail reception of reports and modeling results

3



Parámetros de simulación

| Horas | 13h | 14h | 15h | 16h | 17h | 18h | 19h | 20h |
|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Humedad de Combustible Vivo | 11 | 8 | 8 | 8 | 11 | 10 | 10 | 13 |
| H.C.F. Muerto (%) | 21 | 24 | 28 | 30 | 30 | 30 | 29 | 31 |
| Mod.Viento (Km/h) | 47 | 43 | 44 | 45 | 47 | 46 | 45 | 43 |
| Dir.Viento (°) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Características de la zona

| Coordenadas (UTM-30) | Municipio | Pendiente media | Orientación media | Modelo de combustible predominante |
|-------------------------|-----------|-----------------|-------------------|------------------------------------|
| X: 132968 Y: 4812375 | Abadín | 6.3 % | SE-S (151-180°) | Mod-1 1765.8 Ha. (87.8%) |

Resultado de la simulación

| Superficie afectada | Dirección dominante de máxima propagación | Velocidad media de propagación | Longitud de llama media |
|---------------------|---|--------------------------------|-------------------------|
| 2012.16 Ha. | SO(211-240°) (100.0%) | 27.8 m/min | 122.7 cm |

| Superficie afectada | Tipo de vegetación |
|---------------------|---|
| 1517.9 Ha. | Cultivos agrícolas |
| 244.2 Ha. | Prado de siega |
| 191.4 Ha. | Fraga dietidica de Quercus robur y Betula celtiberica |
| 58.5 Ha. | Tojar extramediterráneo. Mezcla de spp. de Ulex o bien tojar con matorral mixto |
| 0.1 Ha. | Pinus pinaster |

Combustibles afectados (Ha.) y porcentaje sobre el total de la superficie quemada

| Minuto | Mod-1 | Mod-5 | Mod-6 | Mod-7 | Mod-9 |
|--------------|----------------------------|-------------------------|-------------------------|--------------------------|------------------------|
| 30 | --- | 0.32 0.1% | --- | --- | --- |
| 60 | --- | 1.8 0.1% | --- | --- | --- |
| 90 | 7.04 0.4% | 4.08 0.3% | --- | --- | --- |
| 120 | 70.16 3.9% | 3.36 0.2% | --- | --- | --- |
| 150 | 146.66 7.3% | 4.62 0.3% | --- | --- | --- |
| 180 | 247.72 12.4% | 4.8 0.3% | --- | --- | --- |
| 210 | 349.26 17.4% | 5.32 0.3% | --- | --- | --- |
| 240 | 54 2.7% | 3.88 0.2% | --- | --- | --- |
| 270 | 156.2 7.8% | 2.36 0.2% | --- | --- | --- |
| 300 | 308.76 15.4% | 2.16 0.1% | 0.24 0.1% | 29.8 1.5% | 0.08 0.1% |
| 330 | 231.24 11.5% | 3.16 0.2% | 0.8 0.1% | 87.16 4.3% | 0.12 0.1% |
| 360 | 194.88 9.7% | 3.12 0.2% | 18.4 1.0% | 90.96 4.5% | 0.12 0.1% |
| Total | 1765.8 Ha. 87.8% | 38.9 Ha. 2.0% | 19.4 Ha. 1.0% | 167.7 Ha. 9.4% | 0.3 Ha. 0.1% |

Velocidad de propagación (m/min) y porcentaje sobre el total de la superficie quemada

| Minuto | 1-5 | 6-15 | 16-25 | 26-35 | 36-50 | Media (m/min) |
|--------------|--------------|---------------|---------------|--------------|---------------|-------------------|
| 30 | 0.1 | --- | --- | --- | --- | 2.7 |
| 60 | 0.1 | 0.1 | --- | --- | --- | 5.4 |
| 90 | 0.1 | 0.2 | --- | 0.4 | --- | 22.6 |
| 120 | 0.1 | 0.2 | --- | 1.4 | 2.2 | 34.3 |
| 150 | --- | 0.3 | --- | 0.2 | 7.2 | 37.2 |
| 180 | 0.1 | 0.3 | --- | --- | 12.4 | 40.0 |
| 210 | --- | 0.3 | --- | --- | 17.4 | 40.0 |
| 240 | 1.0 | 0.2 | 0.4 | --- | 1.4 | 24.0 |
| 270 | 3.1 | 0.1 | 4.8 | --- | --- | 16.3 |
| 300 | 2.3 | 1.5 | 13.3 | --- | --- | 20.6 |
| 330 | 0.6 | 3.4 | 11.2 | --- | --- | 20.7 |
| 360 | 0.4 | 5.5 | 9.6 | --- | --- | 19.4 |
| Total | 7.2 % | 11.7 % | 39.1 % | 1.8 % | 40.4 % | 27.8 m/min |

Longitud de llama (cm) y porcentaje sobre el total de la superficie quemada

&

4





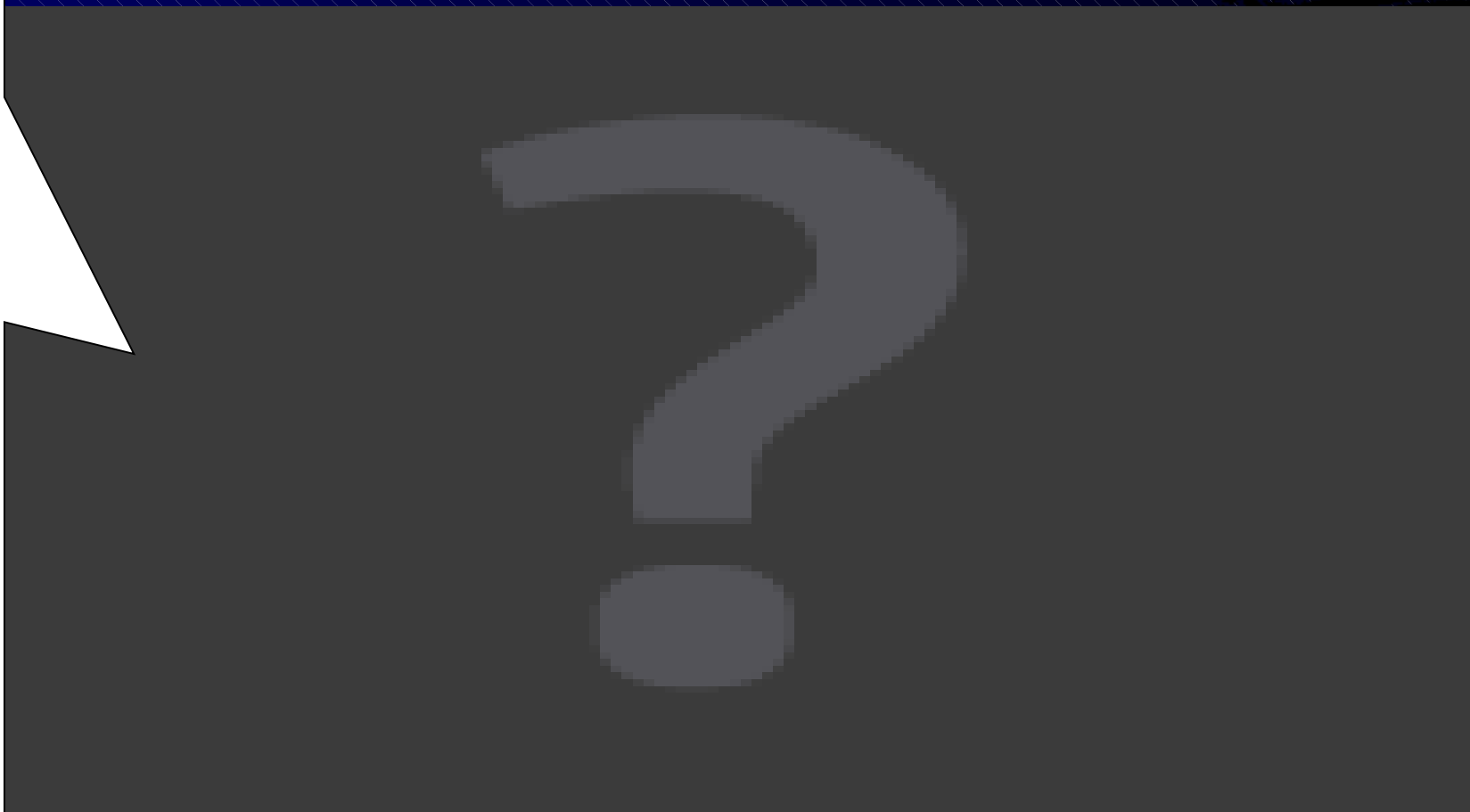
⇒ PREVENTION MEASURES: EARLY WARNING

MODELING AND SIMULATION OF FIRES

3

&

4





⇒ PREVENTIVE MEASURES. EARLY WARNING

ALERTS DISSEMINATION

5

Dissemination from the National Emergency Room



Government

Members of the
National
coordination body

Organizations in charge
at regional level.
Representatives
of Central Government
In regions and provinces

To the population
through media and
Web portals



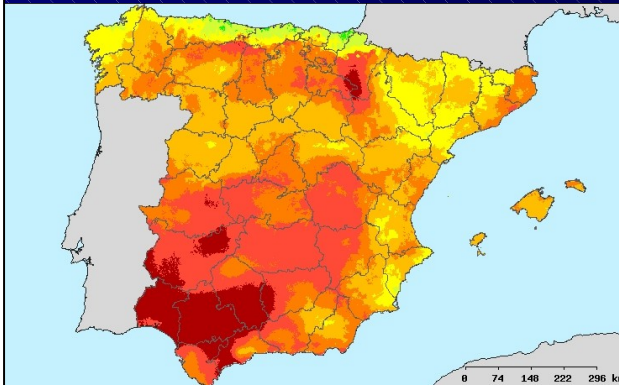


⇒ PREVENTIVE MEASURES. EARLY WARNING

ALERT DISSEMINATION

5

Publication of daily forecasts on the meteorological and fire risks



www.proteccioncivil.es

www.inforiesgos.es

Media



⇒ PREVENTIVE MEASURES. COORDINATION

FOREST FIRES FIGHTING ANNUAL PLAN

Coverage from 15th June to 30th October

11 Ministries

Regions

UME (Military Emergency Unit).





⇒ PREVENTION MEASURES. ASSETS DEPLOYMENT

AIR ASSETS. 2010

CENTRAL GOVERNMENT ASSETS

Human resources: about 500 persons

Aerial means: Total 62

| | |
|---------------------------------------|-----------|
| Amphibious planes (5 in reserve) | 28 |
| Land water resupply | 9 |
| Helicopters (3 from UME) | 31 |
| Communications and observation Planes | 2 |
| Total | 70 |

TOTAL OF SPANISH ASSETS 2010



| | |
|-------------------------|---------------|
| Human resources: | 20.916 |
| Aerial Means: | 286 |

REGIONAL ASSETS

| | Human resources | Assets | | | | | Aerial Assets | |
|--------------|-----------------|---------------|-------------------|--------------|----------------------------------|---------------|---------------|-----------|
| | | Fire Vehicles | Meteo Mobile Unit | 4x4 Vehicles | Heavy duty Public work equipment | Miscellaneous | Helicopters | Planes |
| TOTAL | 20.416 | 931 | 10 | 1.536 | 48 | 3 | 170 | 46 |





PREVENTIVE MEASURES . ASSETS DEPLOYMENT

MILITARY EMERGENCY UNIT

Human resources: 30 sections:
1.500 personnel + 1.500 personnel support.

Assets

Fire fighting vehicles: 170

Feeders: 42

Helicopters: 3

Command, control and logistic support equipment



BIEM II
"GANDO" & "LOS RODEOS"
DETACHMENT



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