

MONTCLIMA

NEWSLETTER

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June 2022

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Sentinel-3 detects extreme heat in Spain and France on 17 June 2020. Source: EU-Copernicus Sentinel-3 imagery



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SAVE THE DATE

MONTCLIMA

NATURAL RISKS AND CLIMATE CHANGE IN MOUNTAIN AREAS

MONTCLIMA

Transnational seminar on Strategies for soil protection against the impacts of climate change: risk of erosion and carbon sequestration

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05 JULY 2022

1

SAVE THE DATE

MONTCLIMA Transnational seminar on Strategies for soil protection against the impacts of climate change: risk of erosion and carbon sequestration

June 2022, 10

We are pleased to announce that the MONTCLIMA SUDOE project is organizing a seminar on Strategies for soil protection against the impacts of climate change: risk of erosion and carbon sequestration that will take place in Bilbao on 5th July 2021.

This transnational seminar will focus on sharing knowledge and experiences concerning good practices on dealing and preventing soil degradation in SUDOE Mountain.

Registration will take place via this registration form online participation or in-person attendance. It will be possible to attend the seminar in a completely virtual way. The Seminar will be held in the Congress Palace of Bilbao (Euskalduna: Abandoibarra Etorb., 4, 48011 Bilbo, Bizkaia). Registration includes coffee break, an informal lunch. Spanish, French and English simultaneous translation will be provided.

We look forward to meeting you and discussing this challenging topic with you!

CONTEXT

In a context of climate change, one of the main risks to be reduced and studied in depth in mountain areas is soil degradation. Sustainable soil management is crucial as soils are a finite resource that provides 95% of the world's food. It should not be forgotten that soils host a quarter of the planet's biodiversity. Moreover, it should not be forgotten that soils can play a fundamental role in mitigating climate change, due to their capacity to act as carbon sinks if properly managed.

In recent years, there has been increasing interest in carbon offsets to help meet climate goals and adapt to climate impacts. However, the proper management of offset crediting mechanisms is a major challenge. These mechanisms must allow for effective carbon offsetting to reduce global warming and cannot be distorted by evolving into a mere "greenwashing" strategy.

OBJETIVE

The aim of the conference, which is part of the MONTCLIMA project, is to provide information on existing local and international strategies for soil protection in mountain areas, to go deeper into the stages inherent to the design of carbon offsetting mechanisms through soils (i) the role of soil in climate neutrality; ii) monitoring systems; and iii) verification systems) and finally, to go deeper into the MONTCLIMA pilot experiences on soil erosion reduction strategies.

The provisional programme is available here.

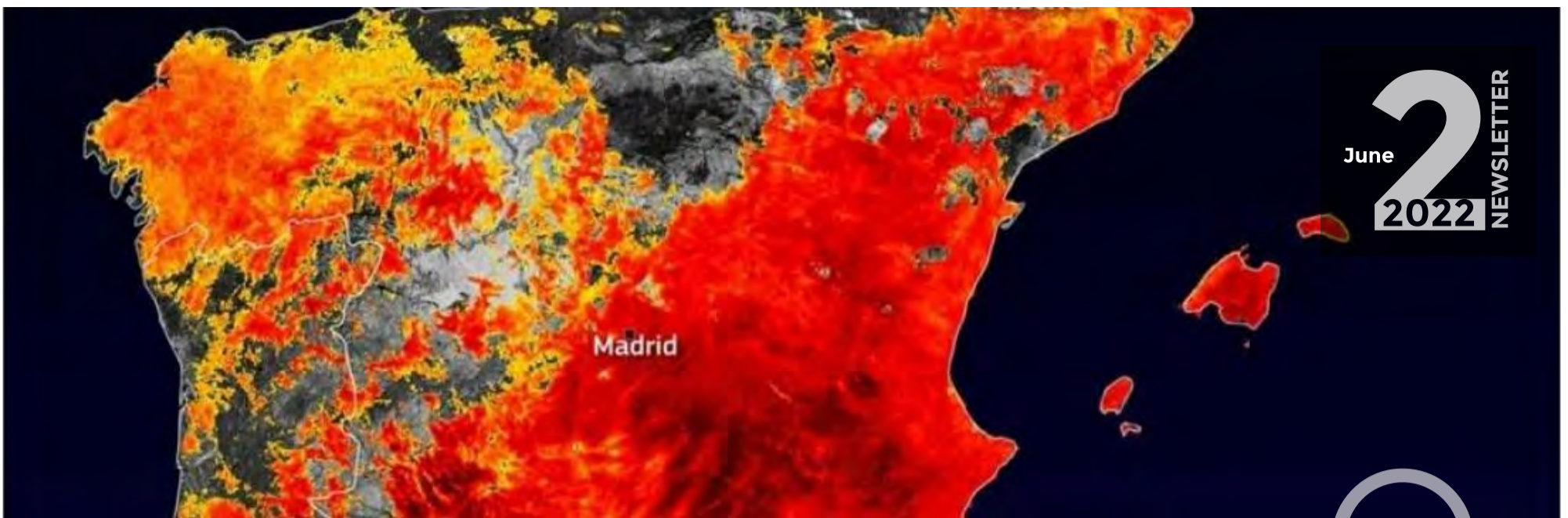
Register to participate here: [ON-LINE PARTICIPATION](#) or [IN-PERSON ATTENDANCE](#)

Program

- 8:45 - 9:00 REGISTRATION
- 9:00 - 09:15 WELCOME
Leire Barañano, General Director of NEIKER
Isabelle Roger, Head of the Interreg-SUDOE Management Authority
Ainara Jauregui, General Secretary of the CTP from the Basque Government
- 9:15 - 10:15 **BLOCK 1: Soil protection: MONTCLIMA project case studies. Chair, Olatz Unamunzaga NEIKER.**
- 9:15 - 9:45 A healthy soil for a healthy planet. Dr. Carlos Garbisu, Scientific director of NEIKER -Basque Institute for Agricultural Research and Development
- 9:45 - 10:15 MONTCLIMA pilot experiences to face the risk of soil erosion.
- NEIKER, Olatz Unamunzaga: Soil management through cover crops in vineyards
 - RTM-ONF, Etienne Ebrard: Erosion measurements after a fire. Experimental device in the municipality of Cervera
 - FORESPIR-SILVAGRINA, Jordi Deu: Control of surface water erosion: The example of revegetation in high mountain areas (Andorra) to prevent the mobilisation of solid materials which seriously affect drinking water supplies
- 10:15 - 10:45 Coffee break
- 10:45 - 12:00 **BLOCK 2: Strategies for soil protection. Chair, Sebastian Chauvin FORESPIR**
- 10:45-11:15 European thematic strategy for soil protection. Mirco Barbero, Coordinator of the Soil Protection and Sustainable Land Use Team, DG Environment European Commission
 - 11:15-11:45 Euskadi 2030 soil protection strategy. Ana Alzola, IHOBE -Public Society for Environmental Management of the Basque Government
 - 11:45-12:00 Soil Alliance of the Pyrenees (ASPIr). Thomas Jacques, President of the French Association for Soil Research

- 12:00 - 14:15 **BLOCK 3: The role of soil in the carbon offset: opportunities and threats. Chair, Carlos Garbisu NEIKER**
- 12:00-12:30 The role of soil in climate neutrality. Dr. María José Sanz, scientific director of BC3 -Basque Center for Climate Change
- 12:30-13:00 Why is a soil observatory necessary? Dr. David Robinson, soil researcher -U.K Center for Ecology and Hydrology
- 13:00-13:30 ZERTICARBON: Afforestation-Digitalization-Monetization. Panu Tornainen, CEO ZERTICARBON -Blockchain Certified
- 13:30-13:45 Open innovation to overcome the challenges of the future. Inazio Martínez de Arano, Director of the Mediterranean Regional Office of EFI -European Forest Institute
- 13:45 - 14:15 Round of questions
- 14:15 -14:30 Conclusions and closing of the meeting. OPCC-CTP Eva Garcia/Juan Terradez

Register to participate here: [ON-LINE PARTICIPATION](#) or [IN-PERSON ATTENDANCE](#)
[More information about the event here.](#)



2

The June heatwave generates extreme temperatures and unprecedented forest fires across Europe

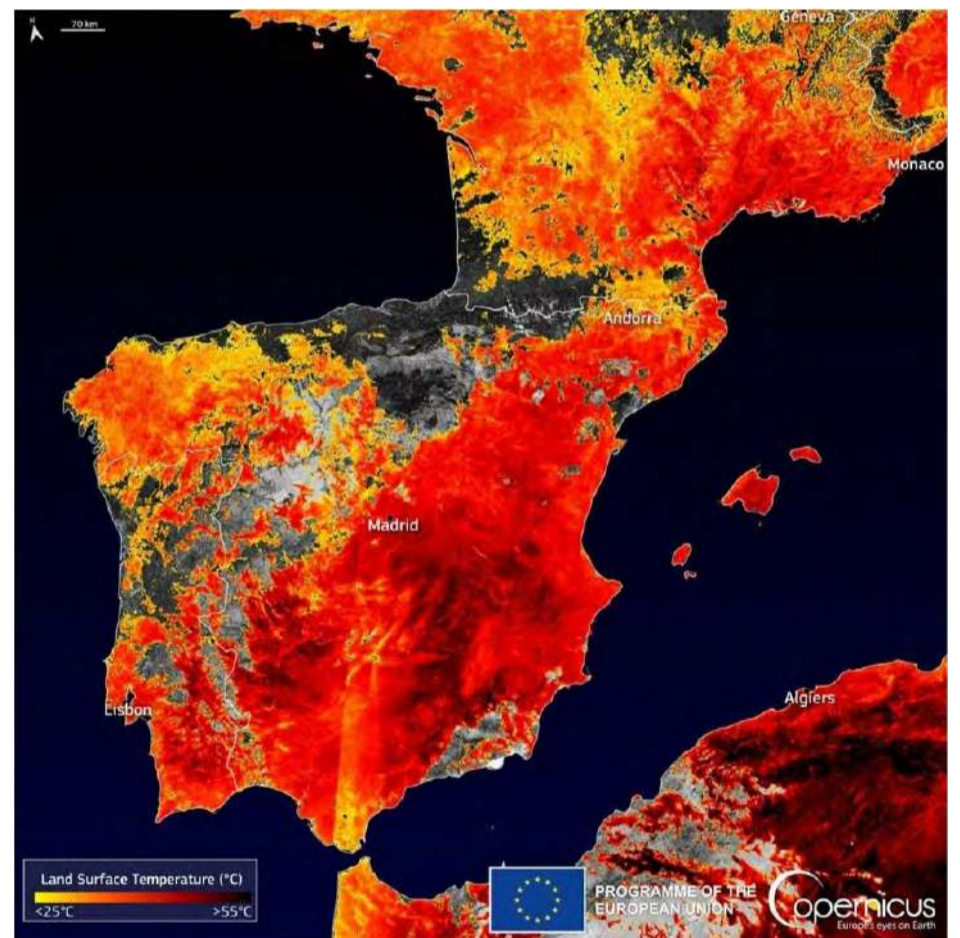
June 2022, 27

Throughout the SUDOE territory, the second half of June 2022 is being suffocating. The heatwave, which has been raging for several days, has caused record temperatures of up to 43°C in Spain and southern France, but also in Germany, Italy and the UK. In Biarritz, one of the most popular seaside resorts in the south of France, a record high of 42.9°C was recorded, according to Météo-France. Heat records for June were broken in France on Friday in at least 11 municipalities, including Carcassonne, where it reached 40.4°C: "This is the earliest heatwave recorded in France since 1947," said Matthieu Sorel, climatologist at Météo-France, who insists that this is a "climate change indicator". Situations like these happen when very warm air masses are forced to move from North Africa to southern Europe. Many meteorologists call these extremely warm air masses the African Monster. Generally, this circulation pattern develops when a low pressure system is located east of Portugal and allows southerly flow to consolidate over the Iberian Peninsula.

On 17 June 2022, land surface temperatures in parts of Spain exceeded 53 °C, according to the Sentinel-3 Land and Sea Surface Temperature Radiometer (SLSTR) data visualisation map. The ground temperature should not be confused with the air temperature which, although it is also very high these days, does not reach the values that accumulate on the earth's surface. But this may be a more interesting indicator to be aware and raise awareness of the real risks to our ecosystems and therefore to all activities that rely on the soil.

Heatwave and fires: How and why?

This heatwave, in addition to being particularly early, intense and long-lasting, has generated a devastating wave of forest fires. In less than a week, more than 100 fires of varying severity have broken out across the Iberian Peninsula. Thirteen towns in Navarre have been evacuated due to the fires and eight roads of the secondary and principal network have been closed to facilitate the fight against the fires in the region.



Sentinel-3 detects extreme heat in Spain and France on 17 June 2020. Source: EU-Copernicus Sentinel-3 imagery

Photograph of the desperate situation in the Sierra Culebra fire.



In Sierra de la Culebra, an environmental enclave that is part of the Meseta Ibérica biosphere reserve, and which has the highest concentration of wolves in the Iberian Peninsula, around 30,000 hectares have been burnt. The fire, which seems to have originated from natural causes (a dry storm), has been intensely fanned by high temperatures, low fuel humidity and winds of up to 70 kilometres per hour.

In Catalonia, where on Saturday there were more than thirty simultaneous fires, strong gusts of wind in the region of Lleida and the simultaneity of fires have been the main elements with which firefighting specialists have fought in Artesa de Segre, active since Wednesday and affecting more than 2,700 hectares. Still studying the causes, since, although the day this fire started there was lightning, agricultural work was also carried out. Catalonia has suffered some 200 forest fires since last Wednesday, an average of 50 a day. In Valencia, work continues to extinguish the forest fire in Caudiel (Castellón), which was brought under control on Sunday.

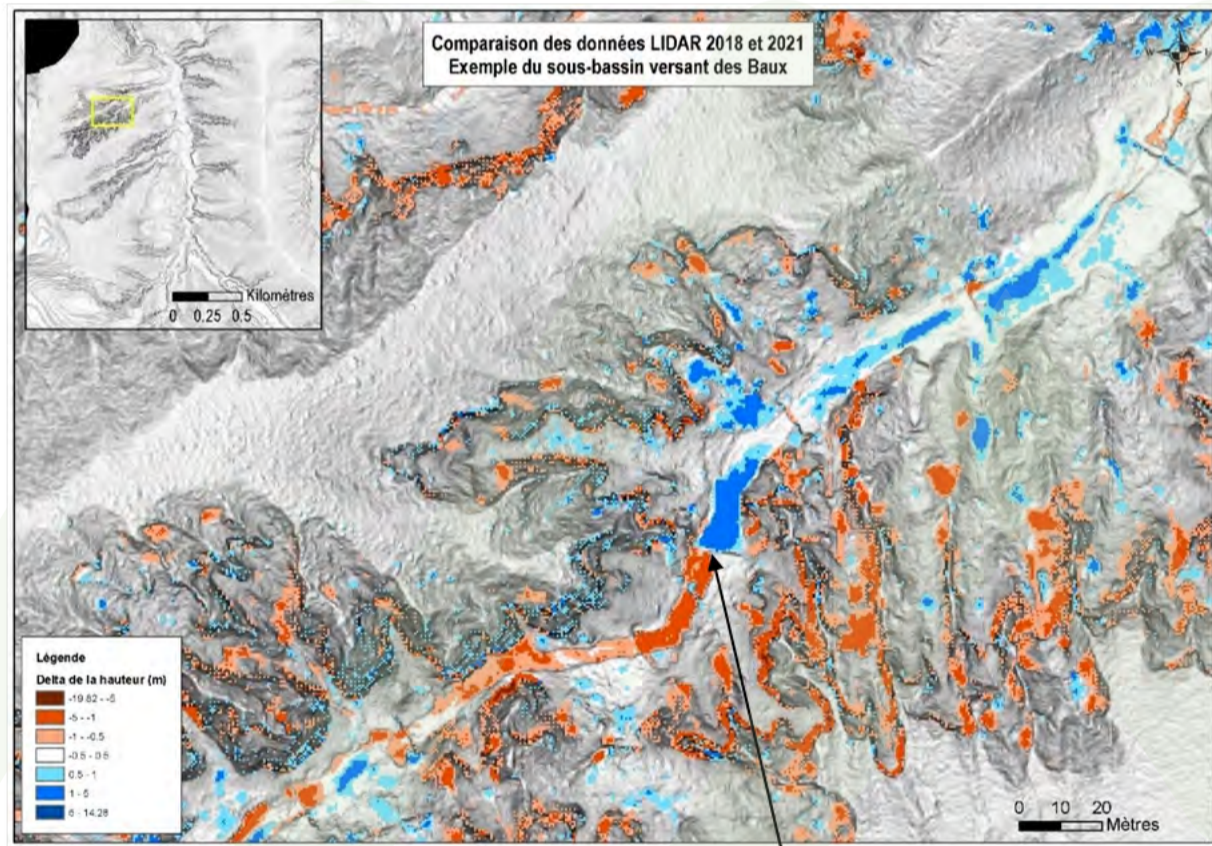
Heatwaves, fires and climate change.

The uniqueness of this heatwave is due to its intensity and extent and the fact that it occurred during the first weeks of June, with areas recording temperatures some 10 °C above average temperatures for this time of year. The temperature of the extremely warm air mass affecting much of south-western Europe is extraordinary. "This heatwave of historic proportions is doped, and that can only be explained in a climate change scenario," argued

González Alemán, a researcher at the Spanish Meteorological Agency (AEMET) in an interview with the newspaper el País.

There can be little doubt that these phenomena are the result of a new climatic context that we must learn to combat as a matter of urgency. The consequences of global warming - higher temperatures, more frequent heat waves, lower rainfall - together with the abandonment of the rural world and of traditional uses of forests, have resulted in forests that are highly vulnerable, causing more intense, virulent and difficult to extinguish fires. Climate change does not ignite the forest, although it does mean that the forest is under constant water stress and is therefore highly flammable. An aggravating factor is the large amount of biomass material accumulated by the abandonment of traditional activities in fields and forests, which become fuel for fire. Added to this is the current management of fire fighting, which continues to focus on extinguishing fires rather than on prevention. We have stressed and weakened forests, which were formed in a climate quite different from today's, so they are more prone to burn, and we continue to react only at the time of disaster, where technical and personnel means are limited and have great difficulty in proving effectiveness.

According to experts, the footprint of climate change is becoming increasingly important. In fact, they also agree that the rate of occurrence of heat waves is accelerating in recent years across the Mediterranean basin. Spain has experienced 20 heatwaves since 2015, which equates to a frequency of 2.8 heatwaves per year. The same number of heatwaves was recorded during the period from 1995 to 2015, with a recorded frequency of 1 heatwave per year, demonstrating a very significant acceleration of the process. And predictions for the future do not paint a better picture, quite the contrary. The main climate projections coincide in forecasting the increasingly premature onset of these heat extremes, bringing their arrival earlier into the summer months, as has been the case in 2022.

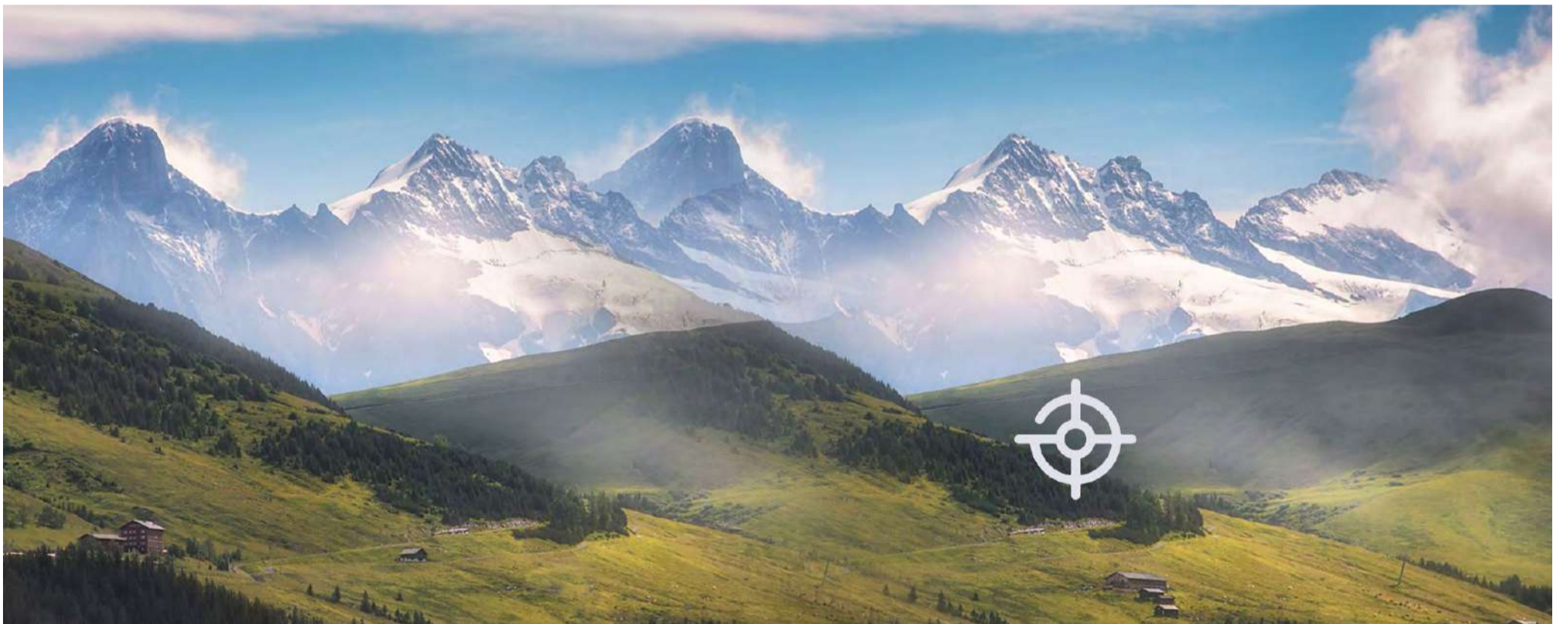


Evolution of the number of people exposed to heatwaves in Europe under different scenarios of rising temperatures.



Representation of the value of the Fire Forecast Index on 21 June 2022. Source: EFFIS - European Forest Fire Information System

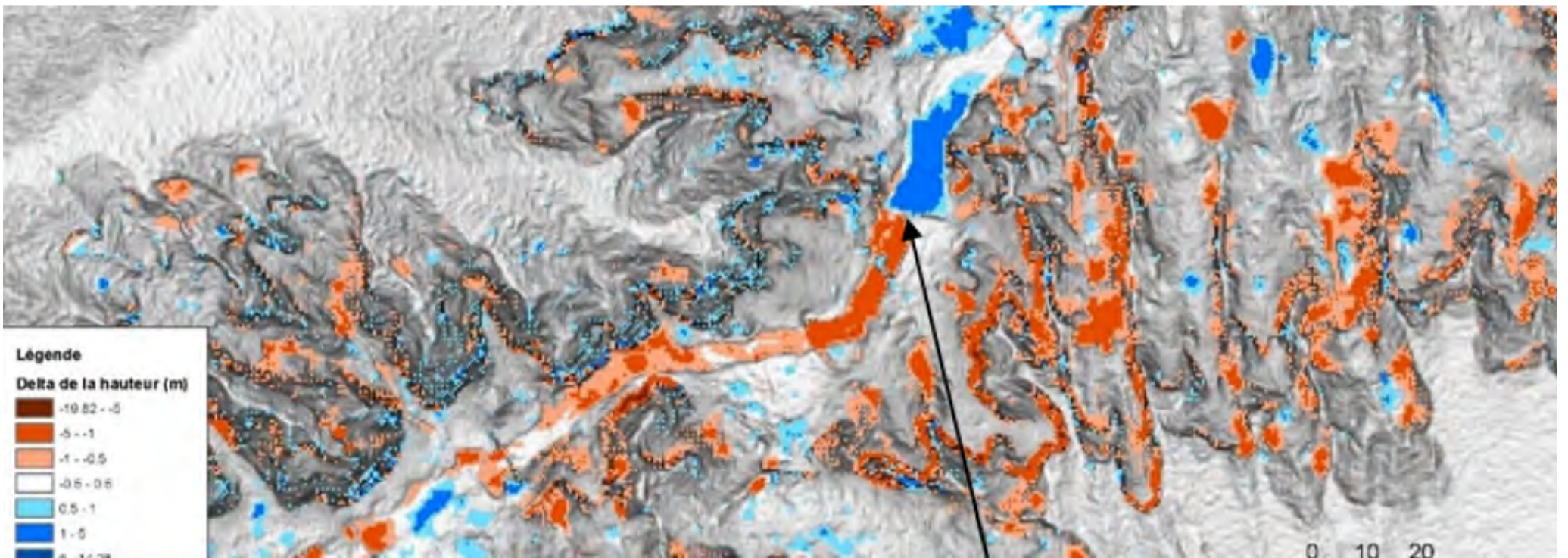
When an extreme event encounters a territory that is highly vulnerable and ill-prepared to anticipate these impacts, a catastrophe occurs that generally entails significant direct and indirect economic costs, often unquantifiable. Will we ever really know the cost of this week's heatwave and fires, and will we ever know the cost of all the immediate and future losses and the cost of all the resources made available when an extreme? Adaptation is not just a question of building barriers or some green buildings or putting up a park, making a bike path or making a city greener. The real adaptation is to become aware that nothing will ever be the same, that all activities at all times must be analyzed in terms of risks, that the administration must be able to respond and support prevention, in order to avoid the escalation of processes that at a given moment can overwhelm however many means. It requires citizen empowerment and, above all, a socio-economic reflection on the behaviour of citizens, such as trying to make them aware that we can achieve an acceptable standard of living despite the impacts of climate change but this requires, as the European adaptation strategy says, a smarter, systemic and faster approach to really work to avoid new records and new irreparable losses.



3

The Baillmarsane basin: the MONTCLIMA pilot case on sediment dynamics and erosion following a major fire

May 2022, 30



The Baillmarsane catchment area is located in the foothills of the Canigou mountain in the Pyrénées- Orientales. It is a very dynamic catchment in terms of torrentiality, erosion and land movements. In January 2020, the Baillmarsane was impacted by storm Gloria, which was very intense in terms of rainfall and snowfall, unusual for the winter season. In some places, the equivalent of 4 to 5 months of rain fell in 72 hours, which generated exceptional flooding on the scale of the department.



Figure 1: Response of one of the tributaries of the Baillmarsane River during storm Gloria.



4

3rd MONTCLIMA seminar on management strategies for the prevention of drought impacts on SUDOE mountain forests

October 2021, 15



Around 120 people participated in the 3rd MONTCLIMA seminar on management strategies for the prevention of drought impacts on mountain forests in the SUDOE. The seminar, which took place on 30 September in the emblematic building of the "Institut d'Estudis Catalans", was another opportunity to transfer MONTCLIMA's pilot experiences and lessons learned, as well as to share some of the leading practices and initiatives in the management and prevention of drought risks in the forests of the SUDOE region.

The day was structured in a theoretical part in a plenary session with the main presentations, complemented by a field trip to the experimental plots of the MONTCLIMA project in Montnegre-Corredor.

Eva García, coordinator of the OPCC, insisted on the need to share information and experiences in order to improve the management and prevention of natural risks in the Southwest European area, especially in the context of climate change. In this regard, she emphasised the need for a multi-risk approach to cope with natural risk management in mountain areas, stressing cooperation as a key element.

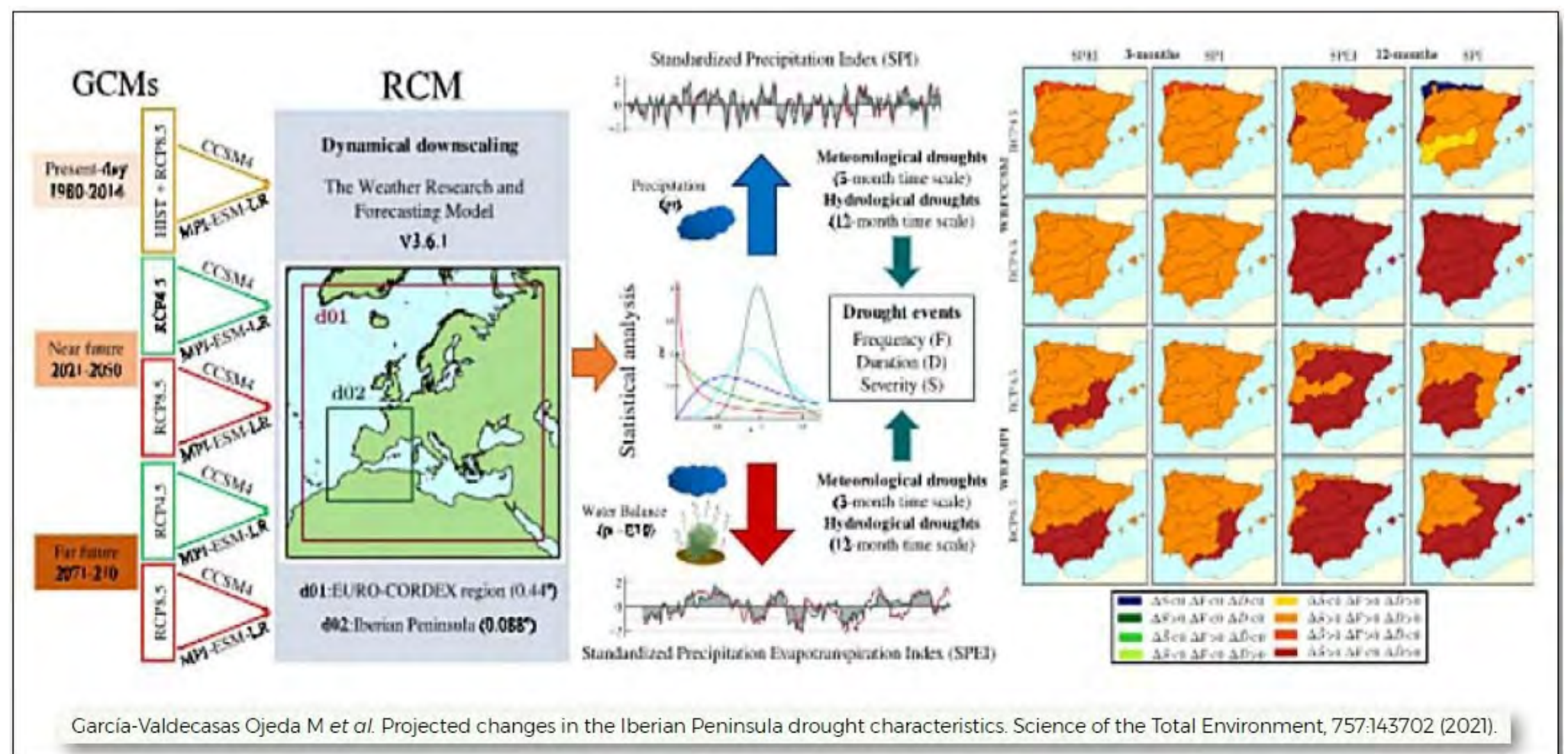
Rosa Amorós i Capdevila, General Secretary of the Working Community of the Pyrenees, emphasised the importance of cooperating in the fight against climate change and natural disasters at a time when the scientific community has once again highlighted the global climate urgency in the 6th IPCC report. In this sense, initiatives such as the EPICC (Pyrenean Climate Change Strategy), which is being developed in cooperation with the 7 territories of the CTP, are crucial.

Joan Pino, Director of the CREA, underlined the increasing stress that European forests are suffering due to the greater frequency and intensity of climatic extremes. In this sense, the study and knowledge of the forest's ecology and their interaction with human activity is fundamental for the proper adaptation of forests to climate and global change.

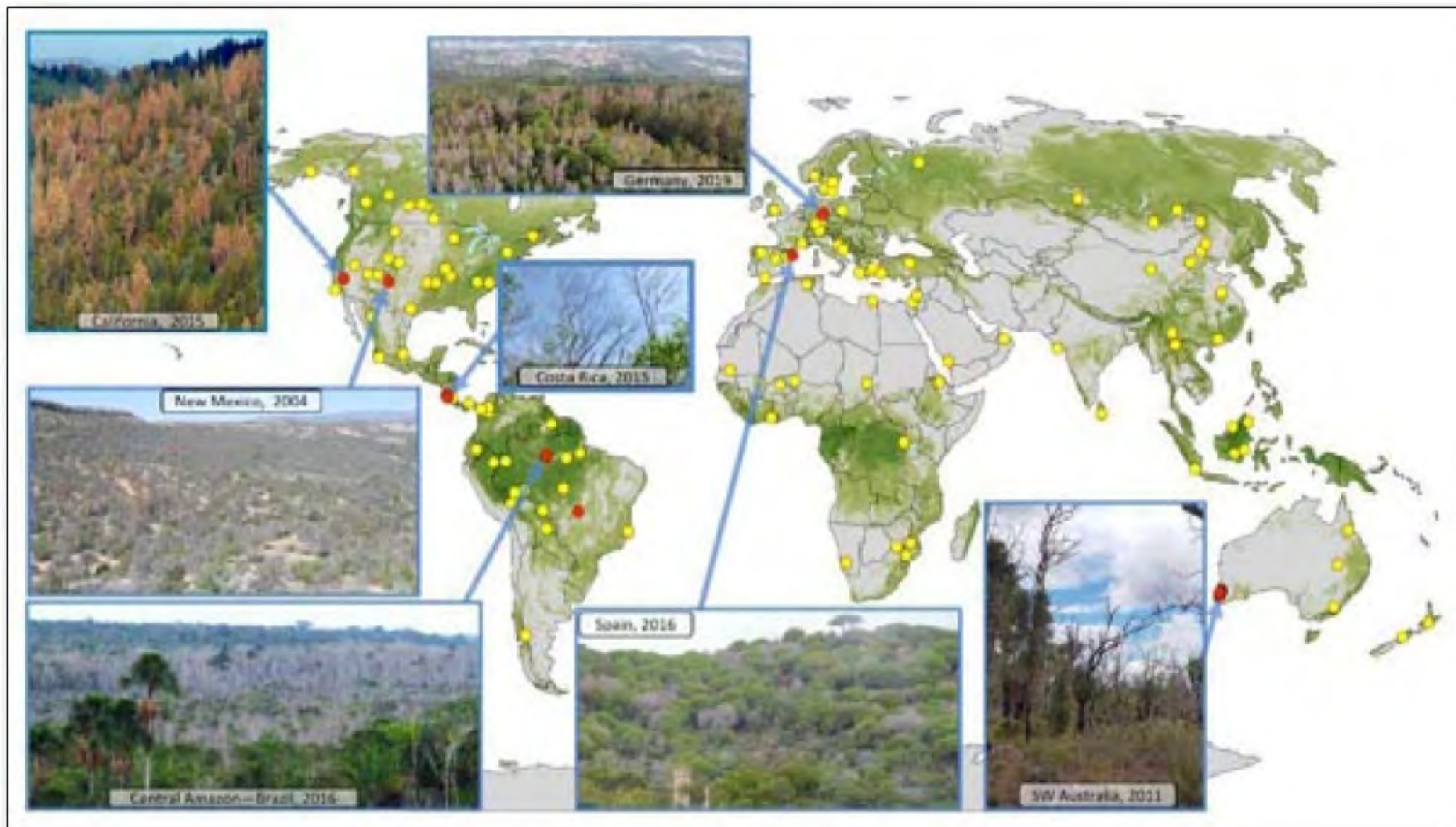
BLOCK 1: RISK OF DROUGHTS IN THE SUDOE SPACE - HISTORICAL DATA AND FUTURE PROJECTIONS

In this block, Sergio M. Vicente-Serrano from IPE-CSIC indicated that droughts are a recurrent phenomenon that is difficult to predict, even if this extreme event have caused notable impacts throughout history. In fact, droughts are an extreme meteorological phenomenon with high spatial and temporal variability also in the SUDOE area.

The IPE-CSIC researcher insisted that the study of trends in this phenomenon is complex, and varies according to the spatial and temporal scale. It is done through the definition of different indicators. Sergio was frank in acknowledging that the sign of a greater frequency or intensity of this phenomenon is not very clear in the Mediterranean basin, although he did make it clear that the increased water demand by the atmosphere derived from the increase in average temperatures, and this has a direct effect on the levels of evapotranspiration in atmosphere.



According to a recent study on the future projection of droughts throughout the 21st century, carried out with the indicators mentioned so far, in Spain, both under the IPCC RCP4.5 and RCP8.5 emission scenarios, droughts are likely to increase in terms of frequency, duration and severity as a consequence of climate change and linked to the increased need for water in the atmosphere.



The impact of drought on forests differs according to the level of tree cover. In the case of sparsely covered forests there is clearly a slow recovery impact, clearly affecting productivity (GPP index).

This phenomenon has negative effects on forests when water availability is low - mainly in summer - generating water stress (stomatal closure, decay, reduction of carbon fixation...). The researcher concluded that if the scenarios of rising average temperatures will be confirmed in the future, it would place significant stress on forests, especially if accompanied by an increase in the frequency and intensity of droughts.

"Water demand will increase in the future as the average temperature increases due to global warming".

BLOCK 2: STRATEGIES FOR MANAGING AND PREVENTING DROUGHT IMPACTS IN FORESTS IN THE SUDOE MOUNTAINS

How does drought affect forests in the SUDOE area?

In this block, Jordi Martínez Vilalta, CREAM researcher, stressed that there are more and more cases of forest decline worldwide due to droughts, especially in mountain areas. According to Jordi, all models agree in predicting a higher incidence of this phenomenon in the coming decades. Specifically, this phenomenon manifests itself through changes in the area, density and composition of forest stands, and it is foreseeable that it will do so with greater intensity in the coming decades. However, when and where a catastrophic decline event will occur is more complex to predict due to the existence of compensatory mechanisms (and natural resilience) of forest stands.

Water availability determines the distribution and functioning of forests. Forest decline associated with drought and high temperatures is a phenomenon that particularly affects mountain areas worldwide.

The CREAM researcher showed that the main historical changes detected in forests are mainly due to changes in land use and other human factors, in combination with

climatic factors.

He also stressed that functional diversity increases the resilience of forests to disasters. On the other hand, he also explained that the impact of droughts on forest mortality is a complex process that we are not yet able to model accurately. Nevertheless, it has been estimated that the decline has already affected 3.3% of Catalan forests between 2012 and 2020.

"It is imperative to consider all disturbances that affect forests, and monitoring and tracking programmes are crucial to this end".

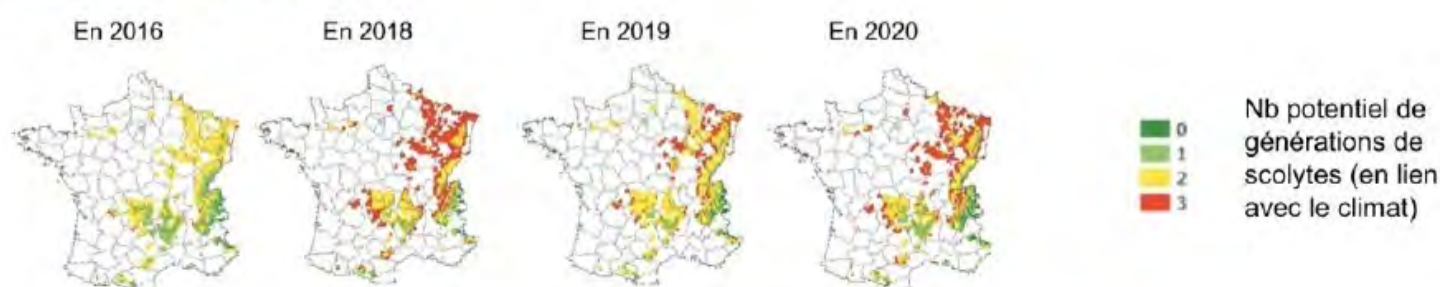
How to monitor the impacts of droughts on forests?

For this section, 3 virtuous experiences were selected.

Célia Gouveia, from the University of Lisbon, presented a study based on the analysis of satellite images to analyse surface alterations and degradation of vegetation cover in the Iberian Peninsula (NDVI index). This type of index based on satellite images is, according to the researcher, a powerful tool for quantifying the impact of droughts on vegetation. According to this preliminary study, in this study area, evergreen and larger trees seem to be more resilient to droughts in general.

Morgan Goudet from France illustrated the participants with an explanation of a monitoring typology developed in France that allows the monitoring of all the elements related to forest health that are carried out by the French forest health monitoring network (DSF). It is a system of records that allows detailed monitoring of the areas affected by droughts. The huge amount of data stored in a single database on decay, pests, etc., allows all this information to be cross-referenced with meteorological information and future climate projections, thus identifying the areas where forests could be most vulnerable.

Estimations cartographiées



FICHA DE CAMPO

Fitxa de camp DEBOSCAT
 Dades bàsiques de l'espècie d'afectació:

Codi: _____ Contorn (7/8) _____ Orientació forestal (forestal)

Tipus de sòl (segons el tipus de sòl): Sòl molt sec (segons el tipus de sòl) Sòl sec (segons el tipus de sòl)

Hi ha arbres molt afectats: Sí No hi ha arbres molt afectats

L'estat del bosc respecte l'any anterior és: millor igual pitjor altre

Desenvolupament del muntanyà:

Tipus: _____ Responsores del muntanyà: _____

Característiques generals de la zona afectada:
 Distribució dels arbres afectats (seleccionar només una opció):

Afectat (per les altes): En bandes i zones En petites zones i bosquets Homogeni

Causa que ha pogut contribuir a l'episodi de declivi (podeu seleccionar més d'una opció):
 Desequili Sèc Sagn Abandó Incendi Cap altra causa

Taula d'afectació
 Espècies presents, percentatge de recobriments, percentatge d'arbres sans i percentatge d'arbres afectats.

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Tipus d'afectació: M: Mortalitat, DF: Defoliació, DC: Decoloració. El total de DF i DC han de sumar almenys un 50% i/o la mortalitat ha de ser major a un 5%. M + DF + DC = % arbres afectats. El % d'arbres sans + % d'arbres afectats = 100%.

Taula d'afectació
 Espècies presents, percentatge de recobriments, percentatge d'arbres sans i percentatge d'arbres afectats.

Espècie	FCC (%)	% arbres sans	% arbres afectats	Canvi respecte l'any anterior			Rebrots
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How to manage forests and the forest landscape to reduce the impacts of drought at the local level?

In this section, we had the opportunity to learn first-hand about 4 experimental experiences of adaptive forest management in the SUDOE territory, including the MONTCLIMA pilot case of adaptive forest management in a mid-mountain forest in Montnegre-Corredor (Catalonia) and the Andorran pilot case of enhancing the multifunctional role of the Andorran forests.

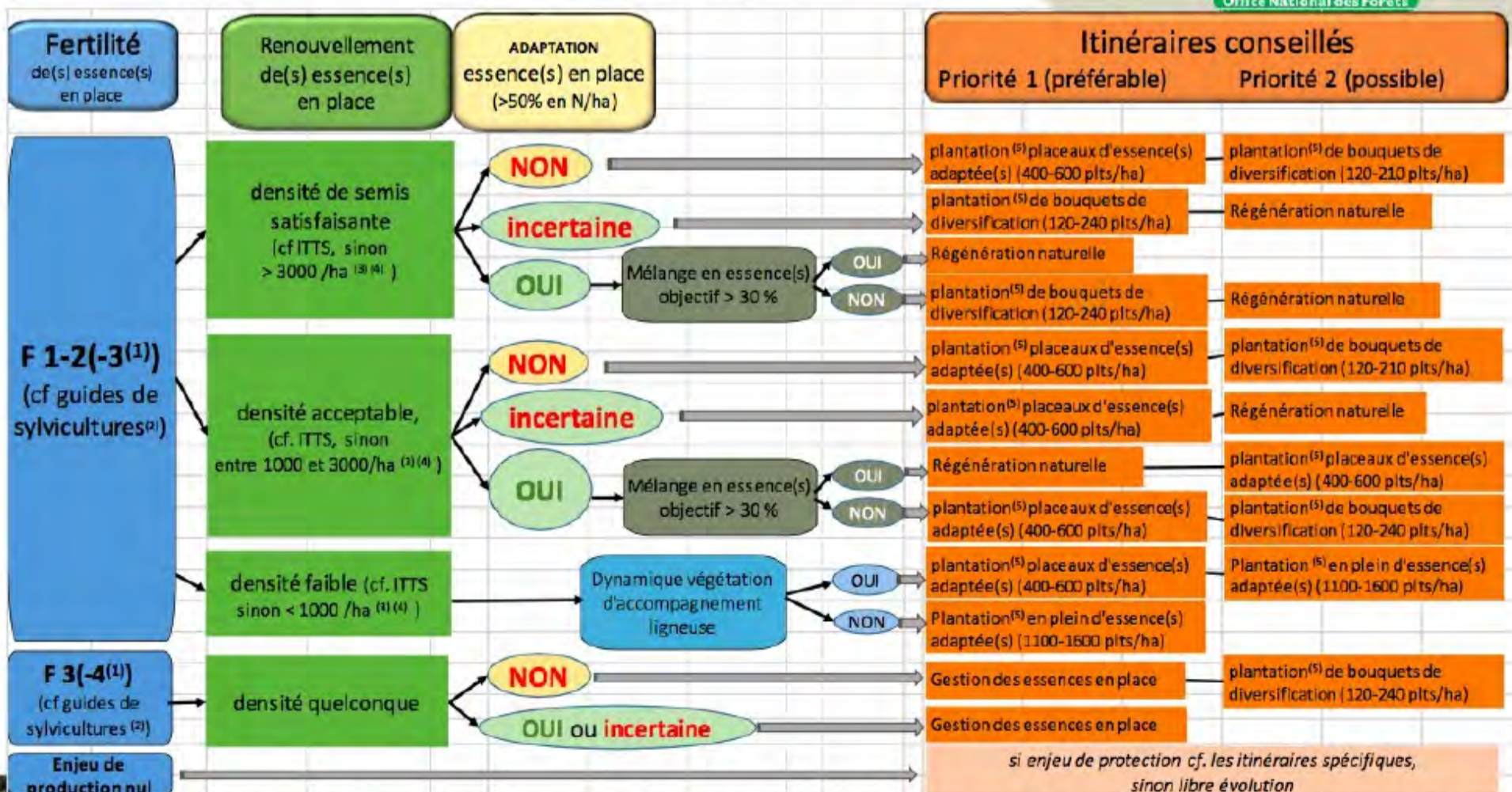
Alfonso Gonzalez Romero, from the Regional Government of Castile and Leon, spoke about the sustainable forest management actions being carried out in the pine forests of Valladolid. In this study area, the P. Pinaster forest stands seem to be particularly affected by the decline phenomenon. According to the administration's technician, the cause seems to be a combination of climatic factors (droughts), human factors (overexploitation of water resources) and geological factors (sandy soils with low H2O retention capacity). Specifically, they have developed a monitoring device to study the recovery process of pine forests after episodes of decline.

"It is necessary to implement increasingly flexible management methods (stands) to limit the decay phenomenon."

Thierry Sardin, from the ONF, spoke about the strategies and tools for silvicultural management in French public forests. The overall objective of these tools is to ensure the maintenance of the multifunctionality of forests, to increase their resilience to climate change by prioritising the right decisions and measures, thus avoiding "maladaptation".



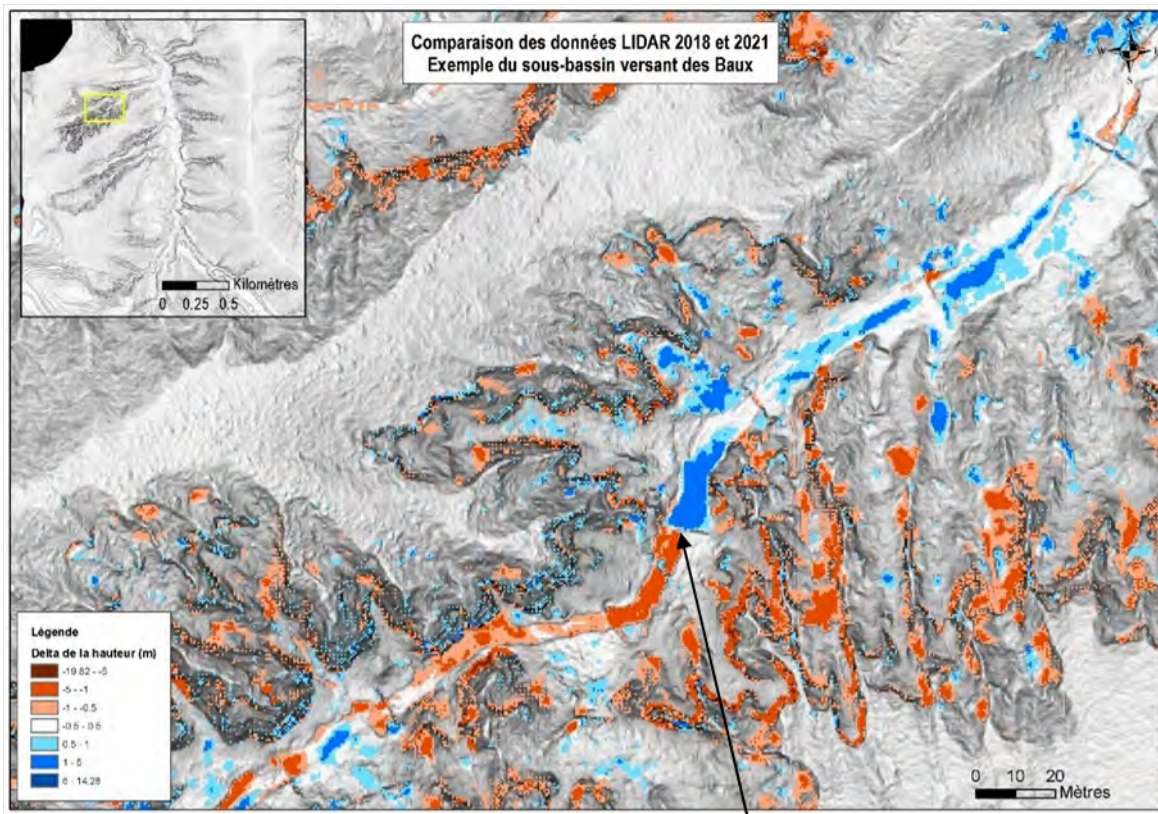
Les grandes actions à mener : 6 – Clé de choix de l'itinéraire



(1) pour les essences avec 4 classes ; vérifier la césure pour qu'elle corresponde entre les fertilités où la plantation est donnée possible dans les ITTS et celles où elle ne l'est pas ;

(2) idéalment de l'essence à introduire, mais l'information sur l'essence en place suffit souvent et est plus facile d'accès, SAUF pour le pin sylvestre dont le lien station/essence est complexe

(3) stade avec hauteur MOYENNE des semis entre 30 et 80 cm, les semis comptent à partir de 10 cm (20 cm pour les chênes) ; densité sur 20% de l'ensemble de la



Representation of the value of the Fire Forecast Index on 21 June 2022. Source: EFFIS - European Forest Fire Information System

The catchment area is largely located in a RTM state forests (from the reforestation policy at the end of the 19th century). In this context, the mountain land restoration department of the Office National des Forêts (French National Forestry Office) drew up a risk basin study (EBR). This is a study as complete as possible on the history of the land and the occurred events, the phenomena that have taken place, with a particular focus on hydraulics, the analysis of the hazards, but also the state and effectiveness of protection systems by civil and biological engineering. The objective of this kind of studies is to understand, qualify and quantify the various phenomena that are taking place in a given area. For this purpose, the RBA requires many days of fieldwork and the compilation and treatment of big amounts of data.

Thanks to the MONTCLIMA project and its WG3 on pilot demonstration cases, we already have some preliminary results from the study of this area with LIDAR technology that we present here.

LIDAR (Light Detection and Ranging or Laser Imaging Detection and Ranging) is a device for determining the distance from a laser emitter to an object or surface using a pulsed laser beam. Until the MONTCLIMA project, LIDAR data were used in the area to physically analyze the land studied. They were used also to identify issues, map phenomena precisely, calculate slopes and exposures, sub-catchment areas or talweg lengths for hydraulic purposes. In the context of the Baillmarsane, the opportunity represented by the fact that we have data from a first LIDAR flight in 2018 as well as data from a second LIDAR flight in 2021, some time after a major event such as storm Gloria, opens up the possibility of new uses for these data.

The processing consisted of comparing the 2018 and 2021 data at several levels of resolution, from 1m to 20cm. The first objective was to map the extent of the phenomena and their physical evolution on the land, for example the retreat of banks or the formation of a riprap. The second objective was

to quantify these phenomena by carrying out sediment balances and correlations between erosion zones and deposition zones. In view of the variation in the results, the use of ranges of values rather than fixed values was chosen.

The knowledge of the terrain, the photographic inventories and the event surveys carried out by the RTM service make it possible to compare the data obtained with the reality on the ground in order to reduce bias as much as possible.

The Baillmarsane RBA is currently being finalised. The next steps include the formalisation of a programme of works on the various tributaries in line with the phenomena and different hazards. This study will then be presented to the public authorities (local authorities and the departmental directorate for the territories and the sea) to share information and provide funding for the targeted interventions.



"Species diversity is the key."

Diana Pascual, CREAM researcher, presented the SUDOE MONTCLIMA pilot project on adaptive forest management in a holm oak forest in the Montnegre-Corredor massif (Barcelona). According to preliminary results obtained in this pilot case, adaptive forest management seems to be key in enhancing the resilience of mid-mountain forests to drought and fire risk.

On the other hand, Marc Font from Andorra Recerca + Innovació, presented the experiences of the SUDOE MONTCLIMA project on the impact of future droughts on the resilience of forests in Andorra, and the effects it could have on their protective role against gravitational mountain hazards (mainly falling blocks and landslides).

Modelling tools for increasing drought resilience through the implementation of forest management strategies.

In this last theoretical block of the day, 3 new tools that are being developed in France, Spain and Portugal were presented.

Xavier Bartet, from ONF-RMT presented the CLIMESSENCES tool, developed to project the possible future evolution of different forest species due to climate change. This tool, based mainly on the combination of 3 indicators, is useful for the elaboration of Forest Management Plans. Specifically, the model is based on IPCC scenarios for obtaining future scenarios of distribution of the main forest species (probability of presence/absence). In this way, the model generates 2 types of maps: the so-called climate analogue maps and the climate compatibility maps.

On the other hand, María González Sanchís from the Universitat Politècnica de València (UPV) presented the forest management model developed in the LIFE RESILIENT FORESTS (C.A.F.E.) project. The aim of this model is to develop silvicultural treatments of improvement and regeneration that allow operational improvements in management, thus supporting decision-making in forestry. This model aims to promote sustainable forest management and can include up to 5 objectives weighted according to the user's interest (list of possible solutions).

On the Lusitanian side, João A. Santos, Universidade de Trás-os-Montes e Alto Douro, presented the results of a study on the potential changes in the climatic niches of the main forest species in Portugal (49 species). The model consists of combining the observed bioclimatic indices in order to perform an analysis with climate scenarios. The areas of distribution "liberated" by the expected climatic changes could be colonised by thermophilic species more adapted to the new conditions.

After a round of questions from the audience, the intense but interesting day of presentations gave way to an illustrative visit to the pilot plots in the Montnegre-Corredor Massif. The participants who joined the guided tour had the privilege of learning about this experimental area from CREAM and local managers. The presentations of the day are available here.

For those who were unable to attend the seminar, you can consult the report of the conclusions of the seminar on our website.

We bid farewell by inviting you to participate in the next MONTCLIMA transfer seminar on erosion risk, which will take place in the Basque Country in June 2022.

Don't miss it!

