



Reinforcing civil protection capabilities into multi-hazard risk assessment under climate change



Funded by
European Union
Humanitarian Aid
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Understanding avalanche synoptic patterns to prevent better risk scenarios in the Pyrenees and discussing novel wildfire-avalanche multi-risk situations

SNOW AVALANCHES

Carles García, Glòria Martí, Manuel Bertrán (ICGC), Eduard Plana, Marta Serra, Chiara Sabella (CTFC), Guillem Canaleta (PCF), Núria Gasulla, David Pagès (DGPC CAT)



ICGC
Institut
Cartogràfic i Geològic
de Catalunya

CTFC



PAU
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protecció civil



Forest Research Institute
Baden-Württemberg



BOISFORUM
BFW
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INSTITUTO
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CTFC



CIVIL PROTECTION-AVALANCHES: CURRENT SITUATION

HIGH DANGER WARNING

What?
Where?
When?



Avis de perill d'allaus

Avis emès el 13/12/2018 a les 13:00

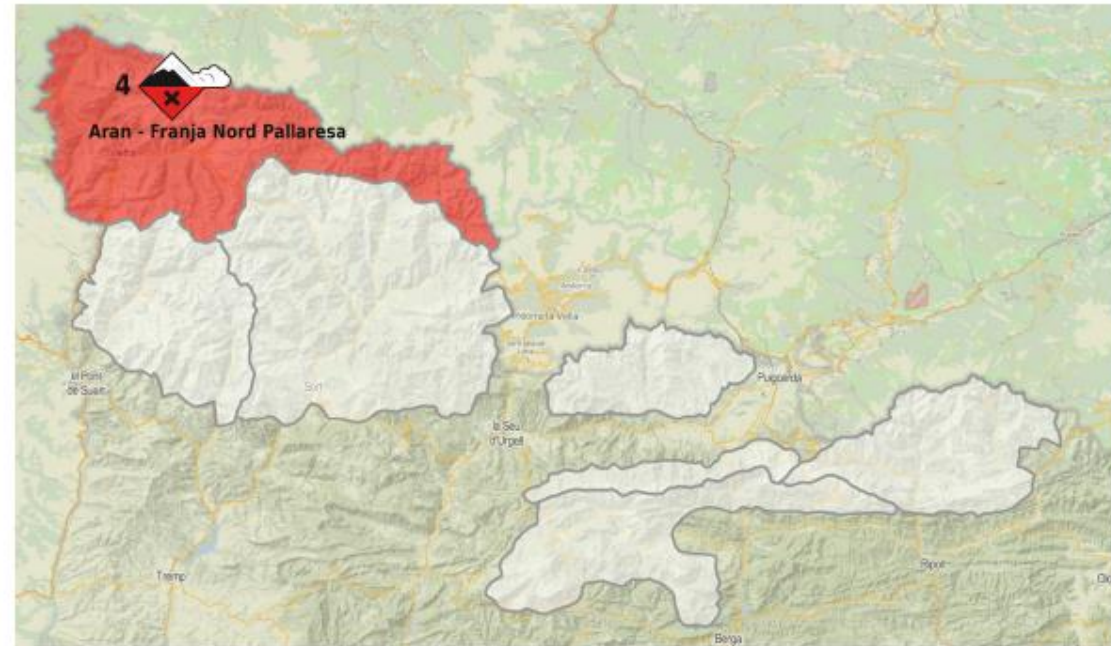
Període: Vàlid fins el 15/12/2019 a les 00:00

Situació: El perill és FORT (4) a l'Aran-Franja Nord de la Pallaresa.

Tendència: L'activitat natural d'allaus minvarà considerablement diumenge.

L'estabilitat del mantell nival ha empitjorat de forma general a l'Aran-Franja Nord de la Pallaresa. El perill és FORT (4) en aquest sector per les nevades, el vent i la pluja del present episodi, i continuarà en aquest grau dissabte degut a l'increment de temperatures i l'efecte del sol. Els principals problemes són de neu humida, per la neu recent i les pluges, i de neu ventada degut a les acumulacions de neu formades pel vent de nord-oest. En conseqüència, s'esperen nombroses allaus naturals de mida 3 (amb capacitat per enterrar un grup de persones) a qualsevol orientació, o fins i tot alguna de mida 4 (amb capacitat per arribar a fons de vall o sepultrar un edifici petit) a orientacions est i nord a cotes elevades.

La probabilitat d'allaus accidentals és molt elevada i es recomana no accedir a terreny allavós.



HOW TO IMPROVE THIS INFORMATION

RELATIONSHIP: ATMOSPHERIC CIRCULATION - MAJOR AVALANCHES – 50 years

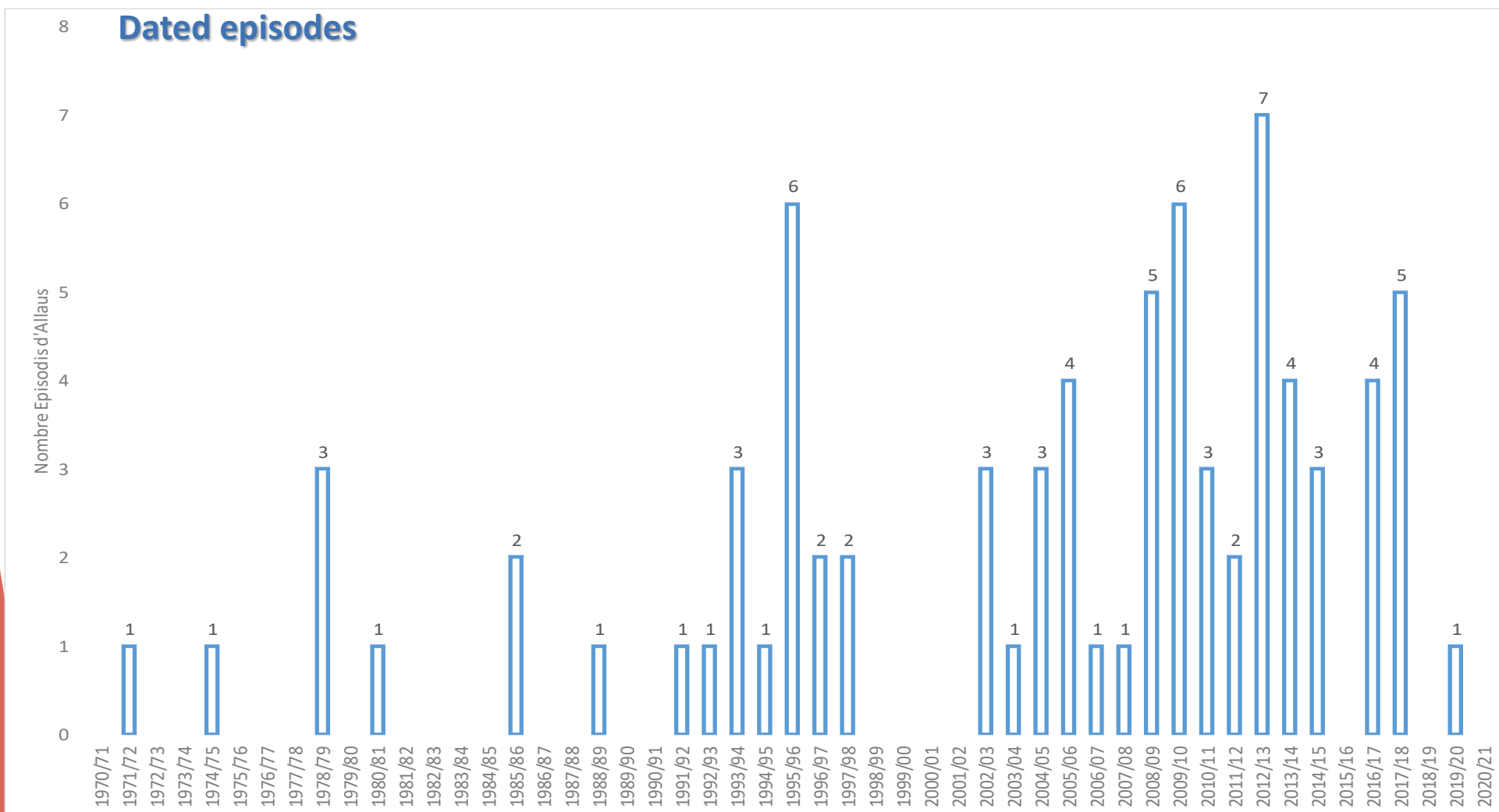
WHICH ATMOSPHERIC PATTERNS LEAD MAJOR AVALANCHES (PCA ANALYSIS).

- Major avalanches: >1000 m long, affecting buildings and infrastructures.
- Atmospheric circulation: 500 hPa (medium level), controls weather on surface:
 - Storm profile: precipitation, temperature, wind

MID TERM FORECASTING: 48-72 h OF CRITICAL SITUATIONS

- **Civil Protection: to get ready a response to a likely emergency.**

MAJOR AVALANCHES (1970-2020): N=78 episodes, N=418 events



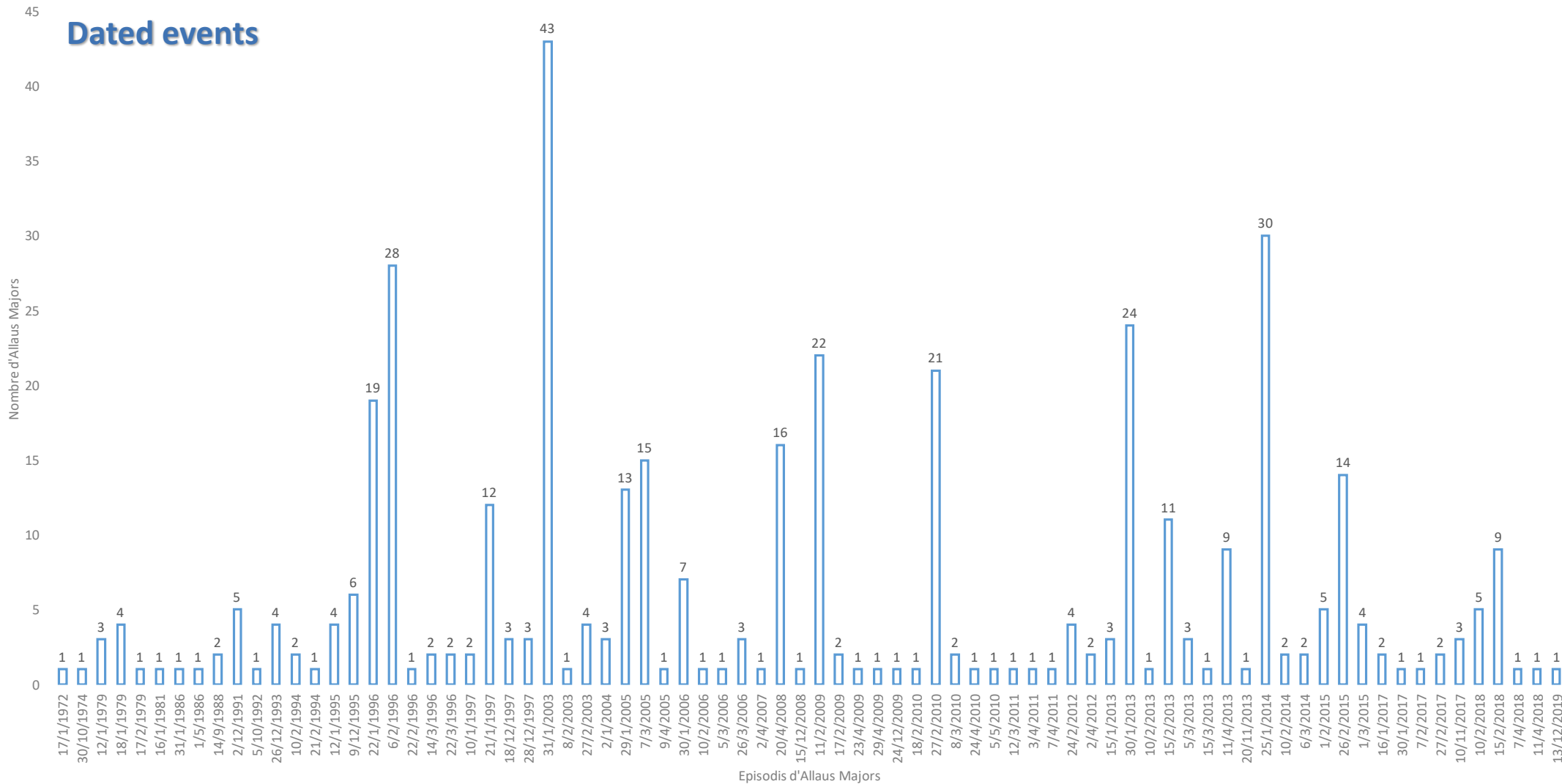


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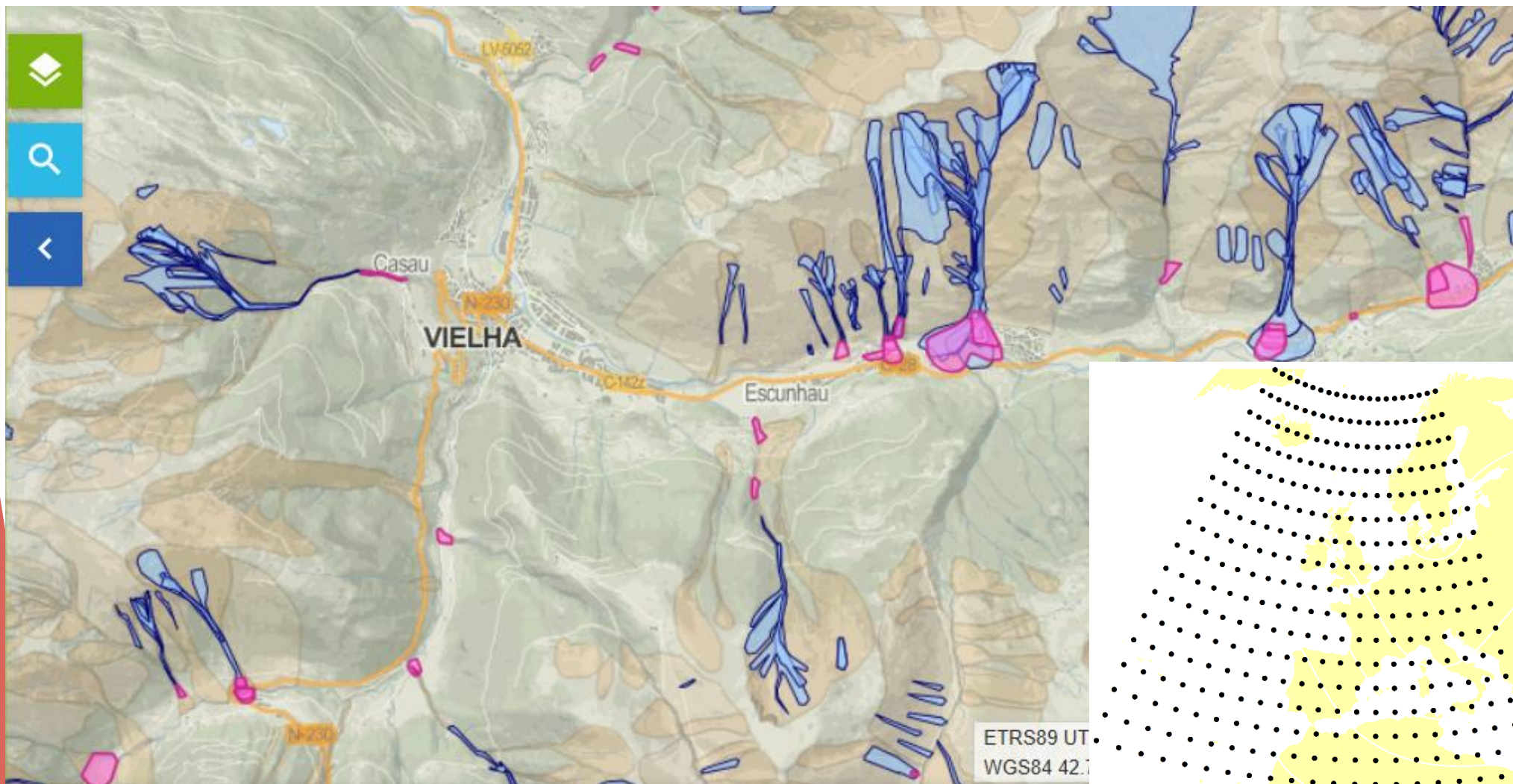


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Dated events



MAJOR AVALANCHE EVENTS – capture of the atmospheric situation (grid 500 hPa)





RECIPE

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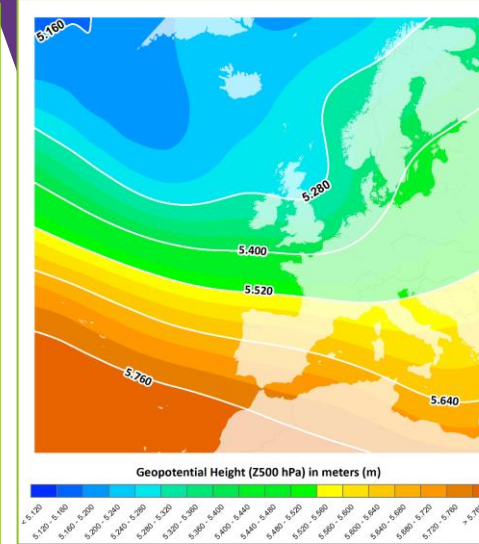
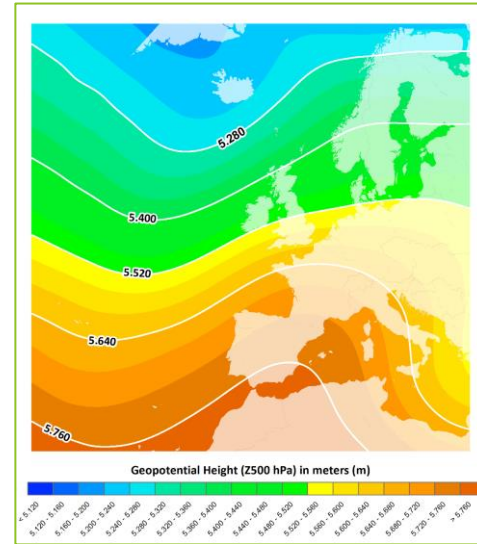
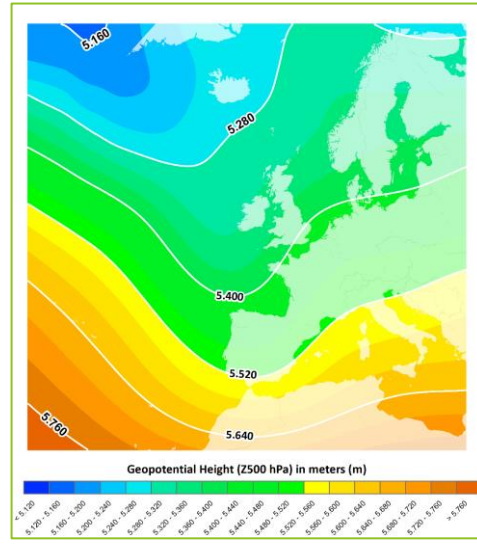
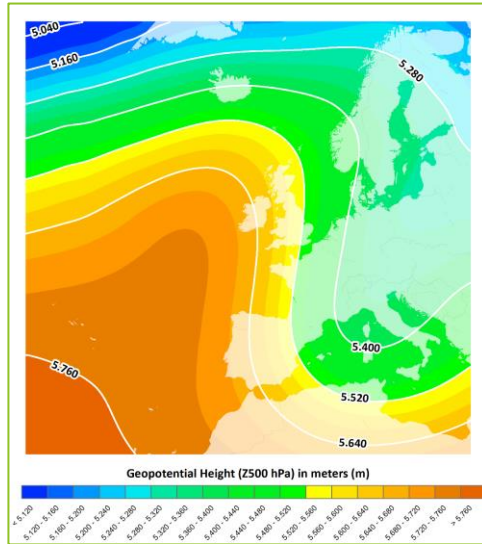
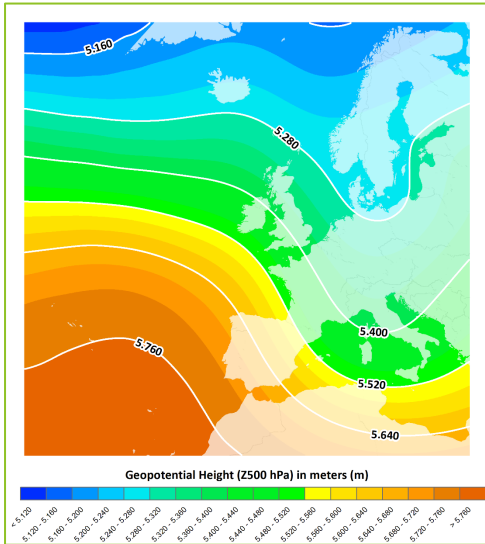
PATTERN 1: NW

P2: N

P3: TROUGH

P4: MEDIT. HIGH PRESS.

P5: W ed by

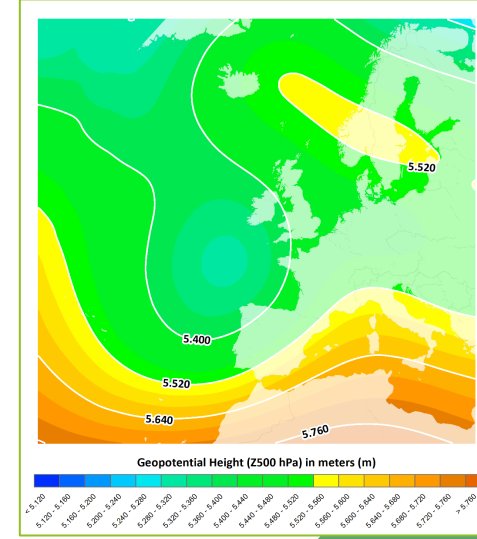
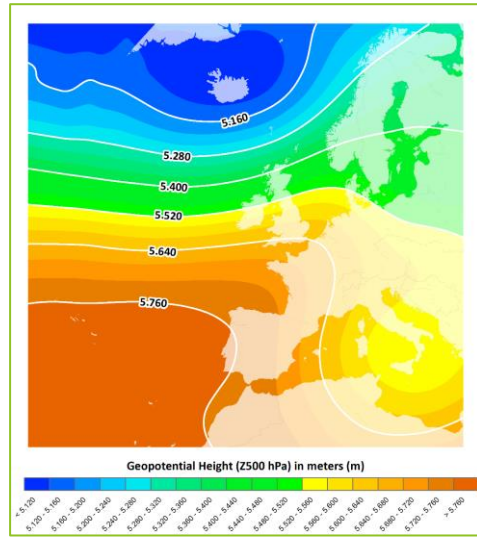
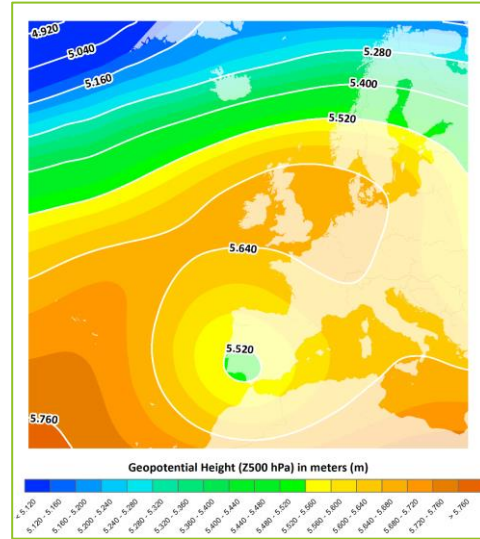
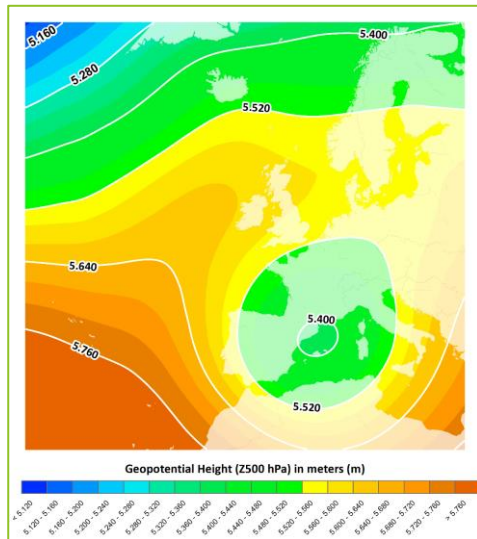


P6: COLD LOW

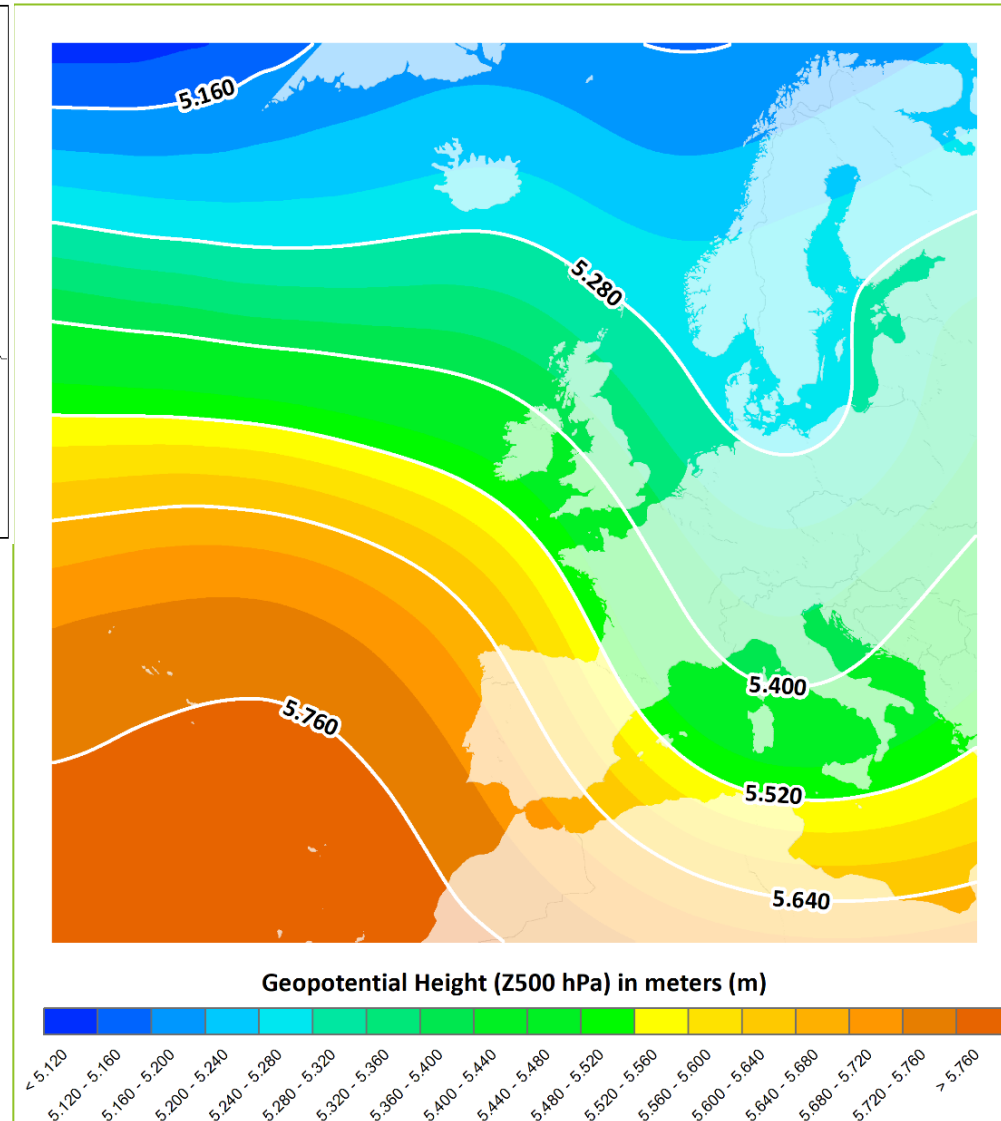
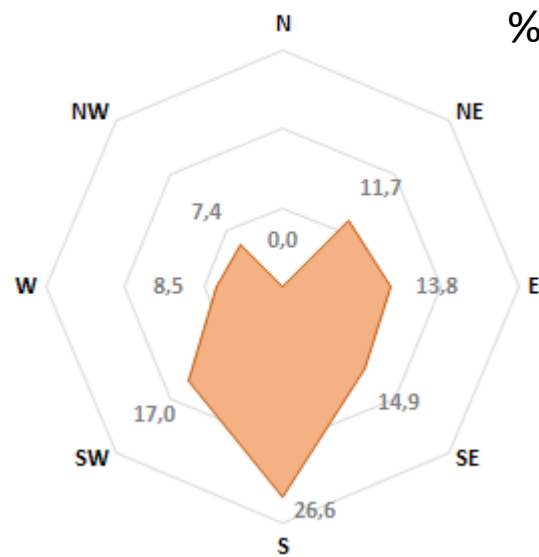
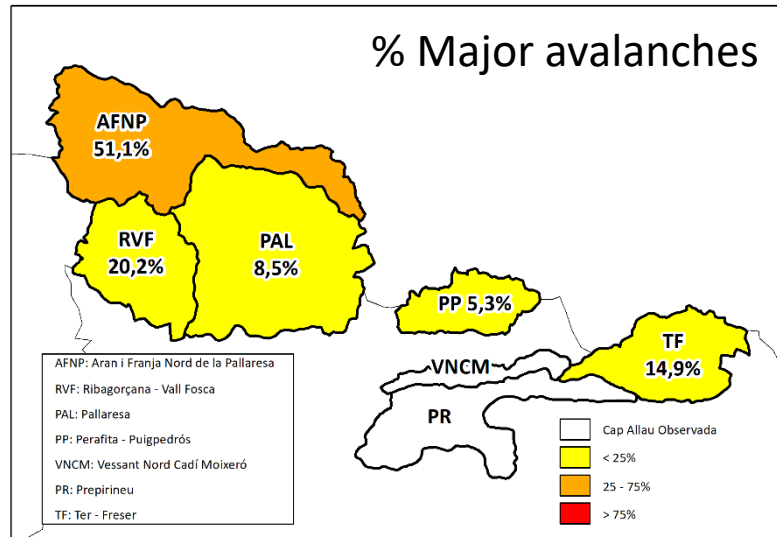
P7: E

P8: ATLANT. HIGH PRESS.

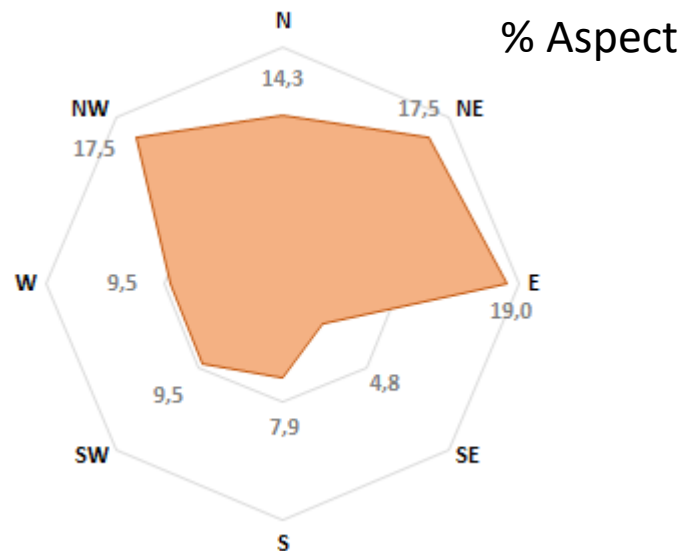
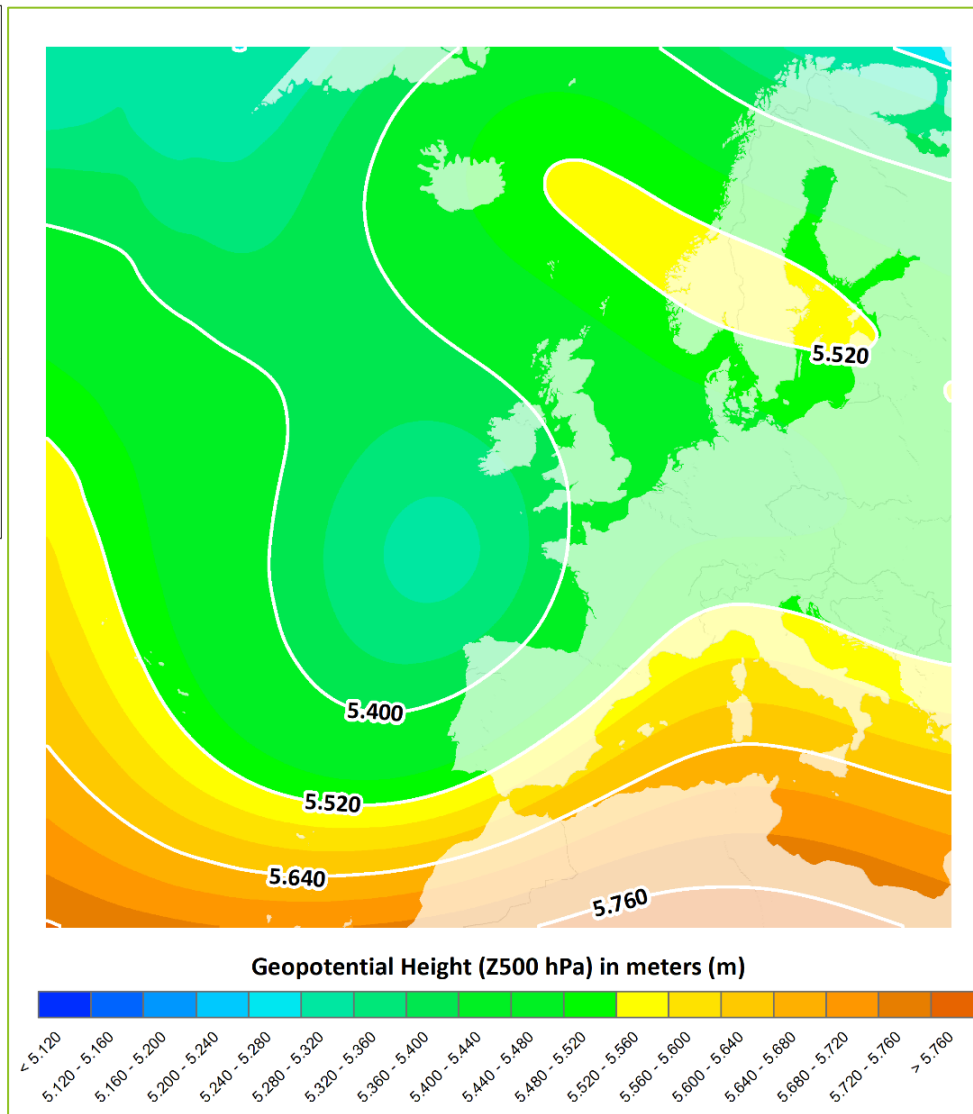
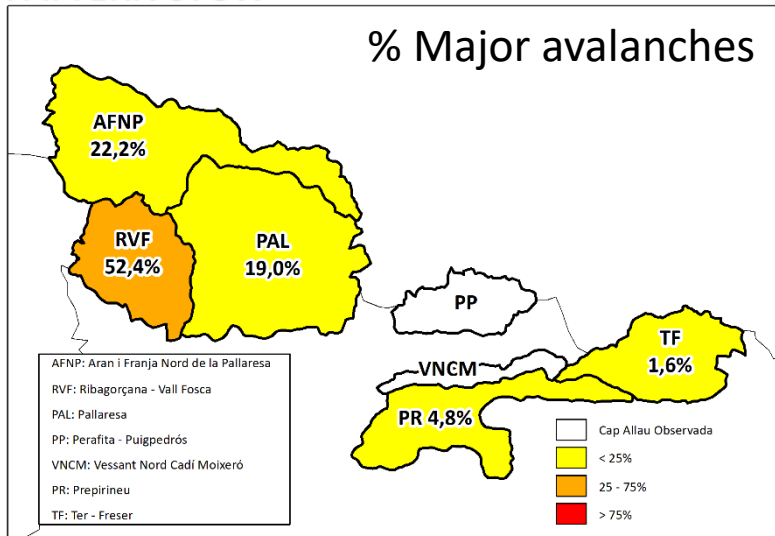
P9: SW



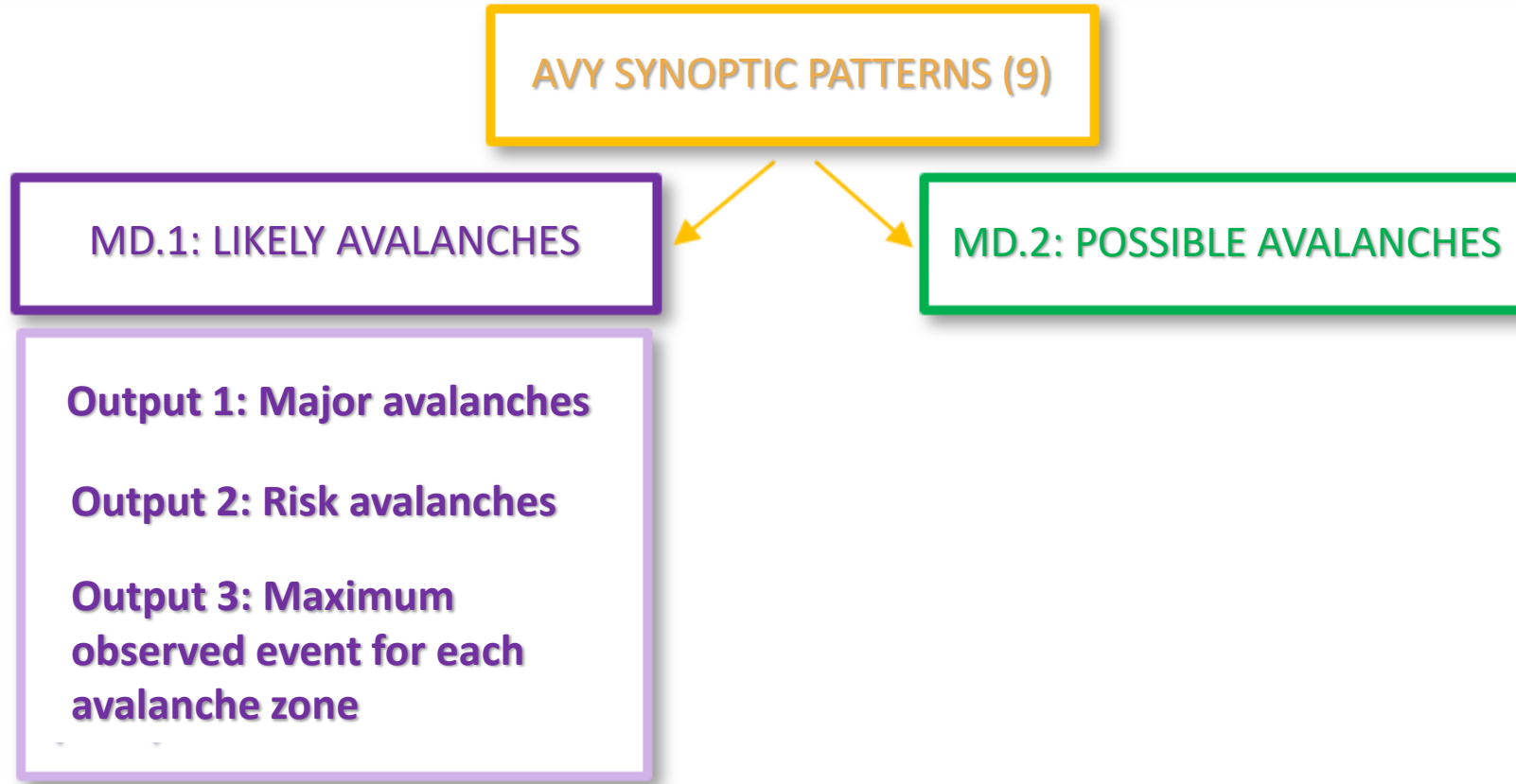
PATTERN 1: NW



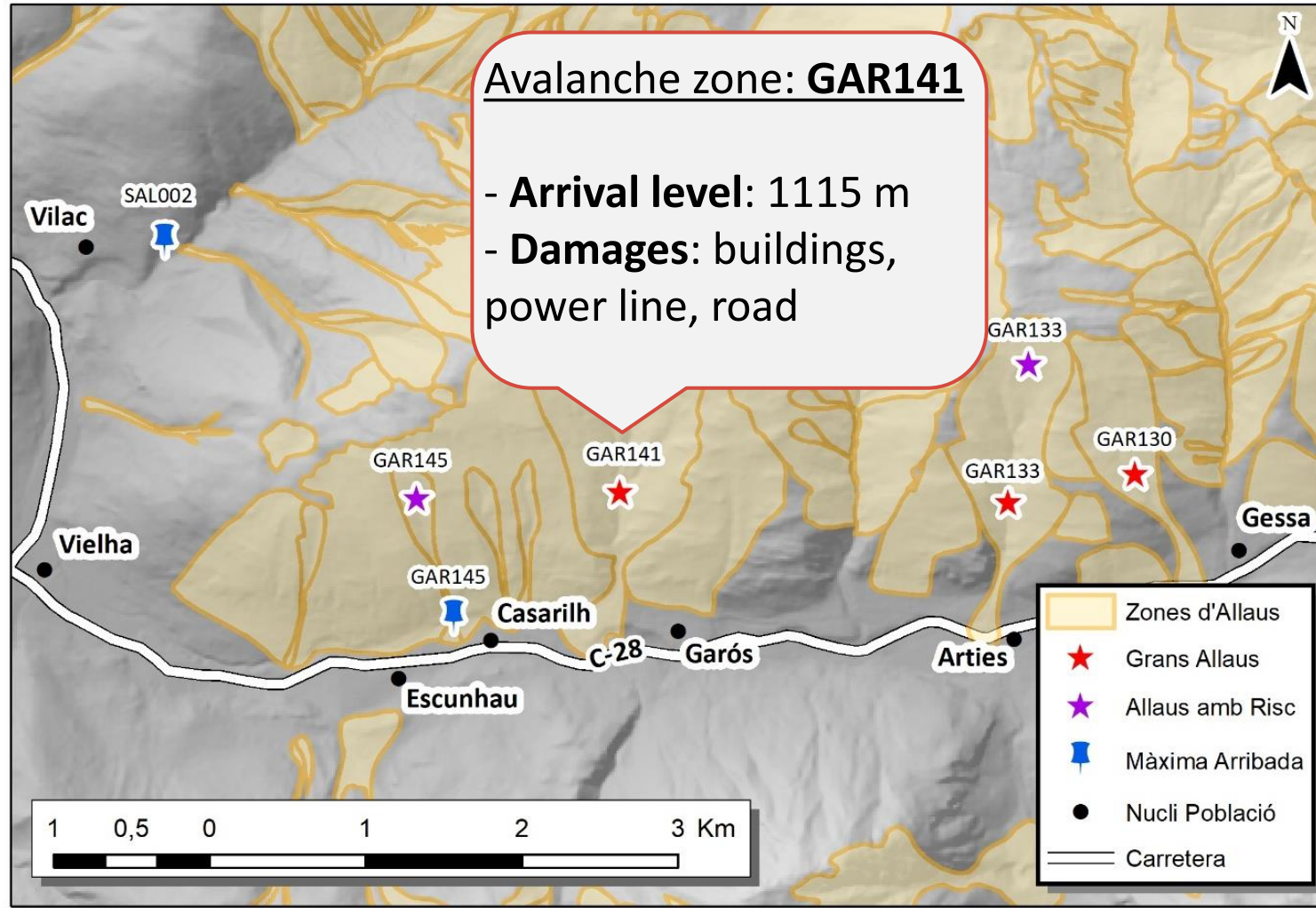
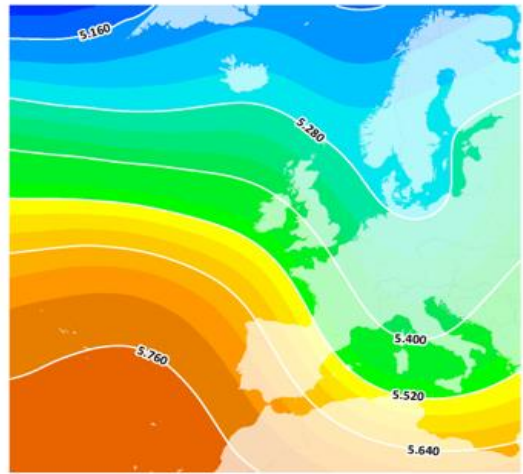
PATTERN 9: SW



VISUALIZER TOOL FOR MANAGING AVALANCHE EMERGENCIES



22/Dec/2020, Pattern NW



- ★ Major avalanche
- ★ Risk avalanche
- 📌 Maximum arrival observed



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Thanks for your attention



RECIPE





3rd Workshop Reinforcing civil protection capabilities to cope with natural hazards in a climate change context. Findings from RECIPE project and challenging issues
October 20-21th 2021



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Understanding avalanche synoptic patterns to prevent better risk scenarios in the Pyrenees and **discussing novel wildfire-avalanche multi-risk situations**

WILDFIRES & SNOW AVALANCHES

Eduard Plana, Marta Serra, Chiara Sabella (CTFC), Carles Garcia, Glòria Martí, Manuel Bertran (ICGC), Guillem Canaleta (PCF), Núria Gasulla, David Pagès (DGPC CAT)



Prescribed burnt in Val d'Aran, Catalan Pyrenees

FOTO: E.PLANA



Wildfires in Cerdanya, C. Pyrenees (August 2012)



FOTO: E.PLANA

Fire vs. Wildfire in mountain areas: Expanding sever and large wildfires hazard in a climate (+ land use) change context ...

Managing natural fires (lightning). Guingueta d'Àneu, C. Pyrenees (2016)



Restoring forest protection after a wildfire (Trin, Switzerland)

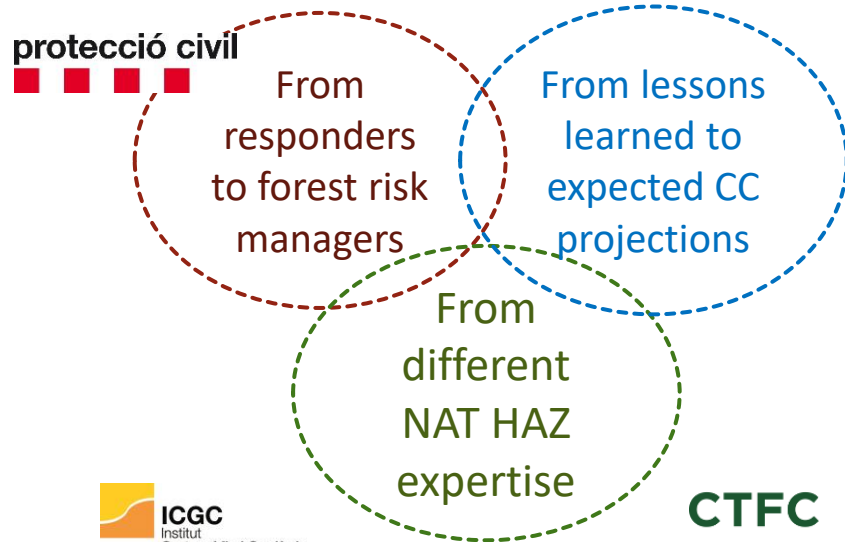


... jeopardizing forest protection function (multi-risk cascading effect)

Wildfire-avalanche multi-risk cross links based on:

- Tabletop exercise simulating a late summer large wildfire event followed by an early fresh snowfall to all attitudes (DGPC CAT, ICGC, CTFC)
- Forest management prescriptions towards common wildfire-avalanche risk mitigation approach at forest stand level (ICGC, CTFC)
- Case study exercise assessing potential wildfire-avalanche risk situation in Núria Valley (Catalan Pyrenees) (CTFC, ICGC, PCF)

- Tabletop exercise simulating a late summer large wildfire event followed by an early fresh snowfall to all attitudes

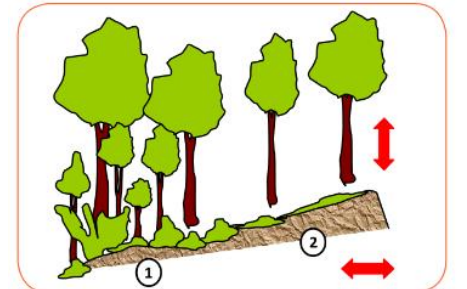
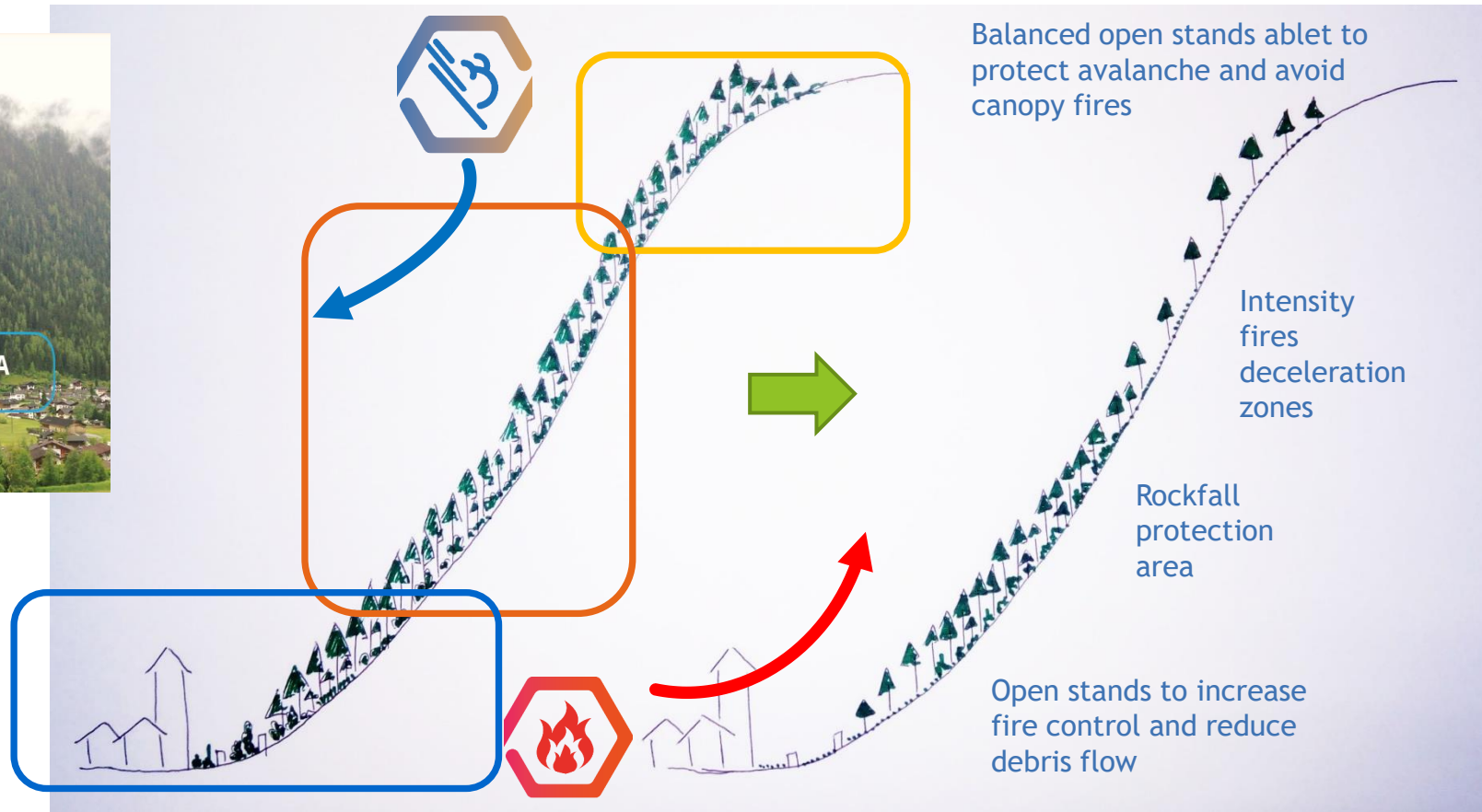
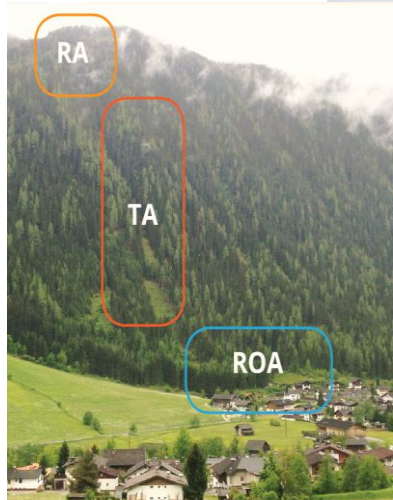


Avalanches Wildfires

Multi-risk scenarios – Civil Protection procedure

1. Risk analysis. Expert Working Group.
2. Identify preventive measures to eliminate or mitigate the chain effect. Creation of an executive committee.
3. Emergency Planning. For unresolved situations (scenarios) through prevention mechanisms, assessment of the new scenario in the derived plan (e.g. floods due to forest fires)
4. Implementation of new procedures - operational information (to operatives)
5. Assessment of citizen collaboration and information measures
6. For scenarios of simultaneity or assessment of triggering in the very short term.

➤ Forest management prescriptions towards common wildfire-avalanche risk mitigation approach at forest stand level

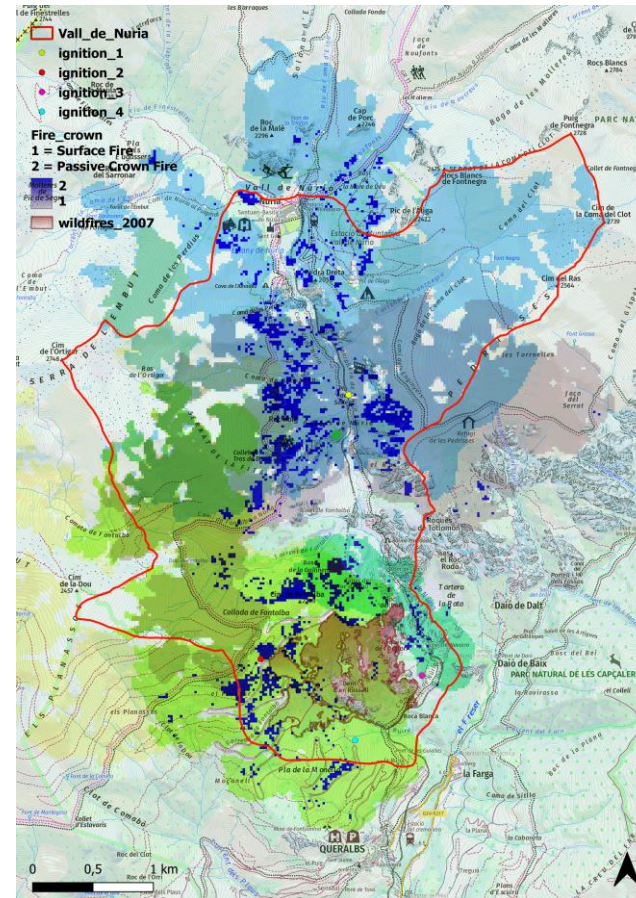
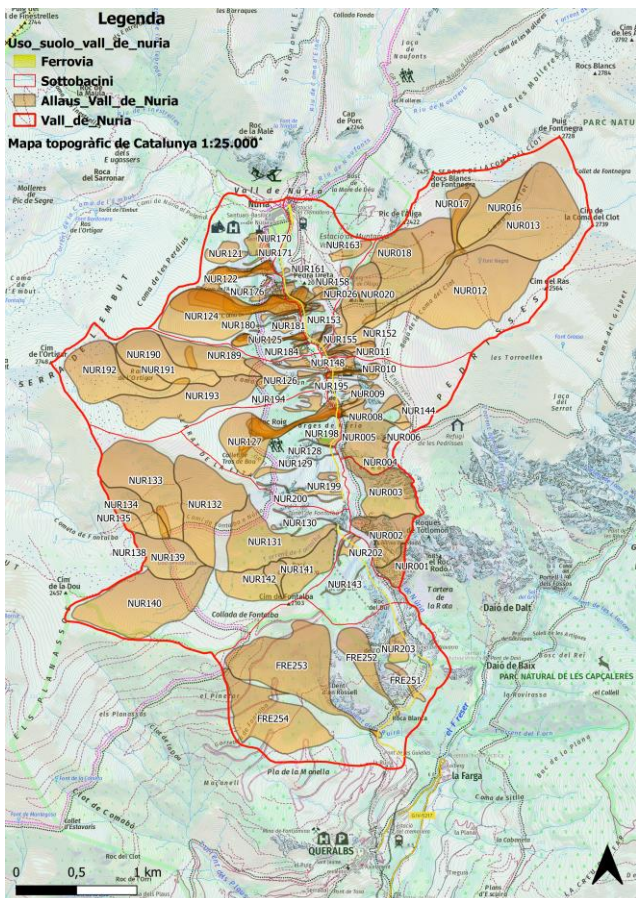


Diferents estructures de bosc generaran diferents tipus d'incendis, dins i fora la capacitat d'extinció. L'estructura 1 presenta una gran densitat i continuïtat entre els diferents estrats, mentre que la 2 està oberta i amb poca continuïtat



Foto superior: foc d'alta intensitat afectant tots els estrats de vegetació, fora de la capacitat d'extinció. Foto inferior: crema controlada de baixa intensitat per eliminar sotabosc i mantenir estructures de bosc resistents al foc i dins la capacitat d'extinció. Autor: Bombers de la Generalitat de Catalunya

➤ Case study exercise assessing potential wildfire-avalanche risk situation in Núria Valley (Catalan Pyrenees) (CTFC, ICGC, PCF)



Some key findings

At landscape
scale level

- ✓ Improve data availability to cross-analyse:
Forest protection function (mapped?) ↻ ↻ Potential high intensity fire areas (affecting canopy) ↻ ↻ Exposed elements of the territory
- ✓ In case of multi-cascade (rare) event: Multi-agency protocol to manage the temporal loss of protection function (short time for restoring it before snow season) ✂ Reinforce Preparation/Response (EWS) meanwhile Prevention is restored

At forest stand
level

- ✓ Improve knowledge about forest stand prescriptions meeting requirements for avalanche protection and low intensity fires (fire ecology of dominant spp.)

At individual/
societal/expert
level

- ✓ Make aware local communities (farmers, tourist sector) about increasing wildfire risk in mountain areas (reinforce prevention function of prescribed burns)
- ✓ Proactive expert knowledge exchange among WF-A risks managers
- ✓ Reinforce common multi-agency prevention and civil protection plans



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RECIPE

REINFORCING CIVIL PROTECTION
CAPABILITIES INTO MULTI-HAZARD
RISK ASSESSMENT UNDER
CLIMATE CHANGE

✓ All detailed info in Deliverable 4.6

<https://recipe.ctfc.cat/>

@NATHaz_recipe 

recipe@ctfc.cat

Thanks for your attention

