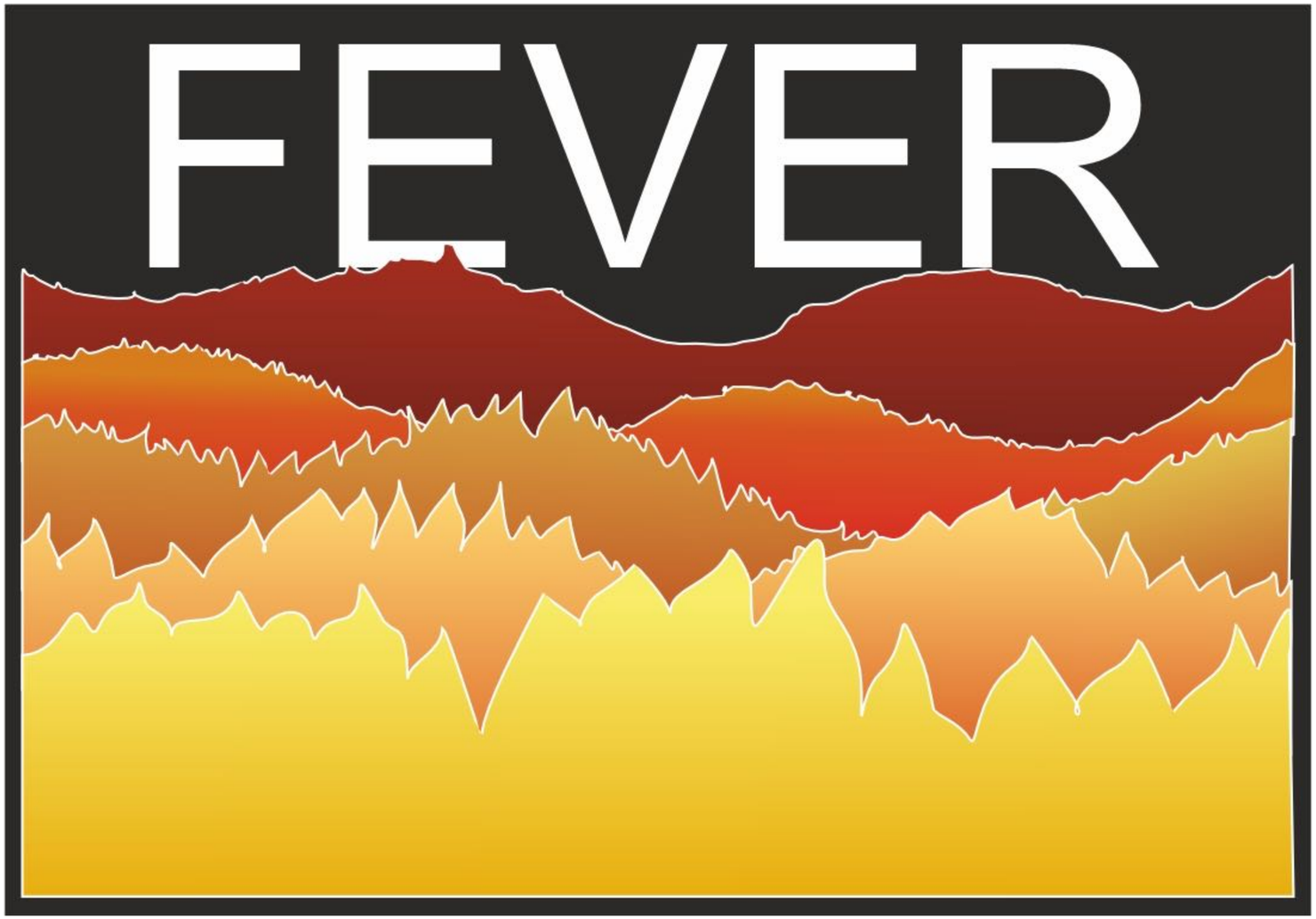
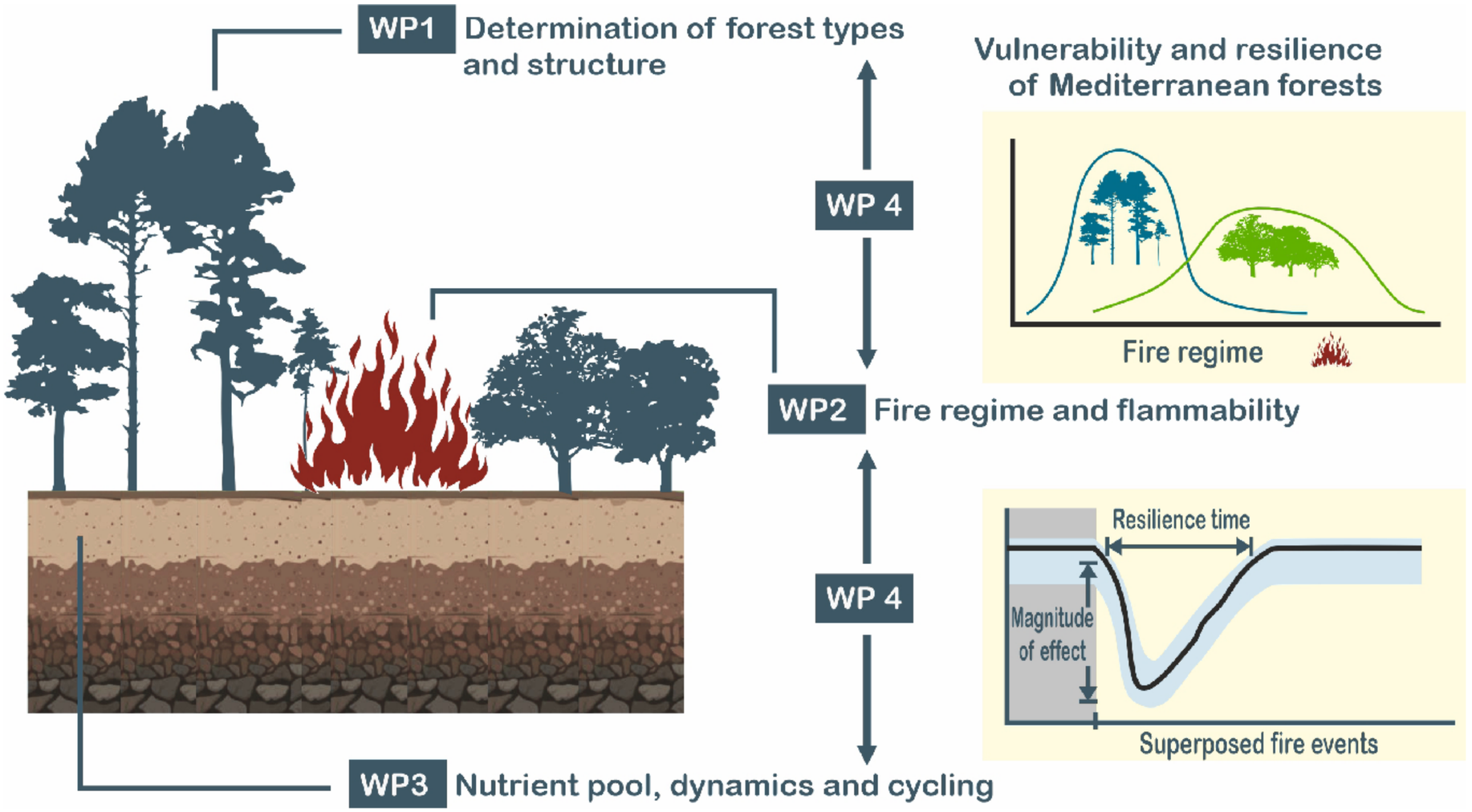
AAP PEPR FORESTT

Fire in mediterranean forested Ecosystems: Vulnerability, Equilibrium and Resilience



Main objectives and WPs



Key goals:

(i) the effects of repeated fires on vegetation combustibility in four major forest types in southern France,

(ii) soil responses (nutrient pools and nutrient cycling) after fire and the cumulative effects over long timescales,

(iii) the influence of different forest formations on litter combustibility,

(iv) the short- and long-term strategies of these ecosystems.

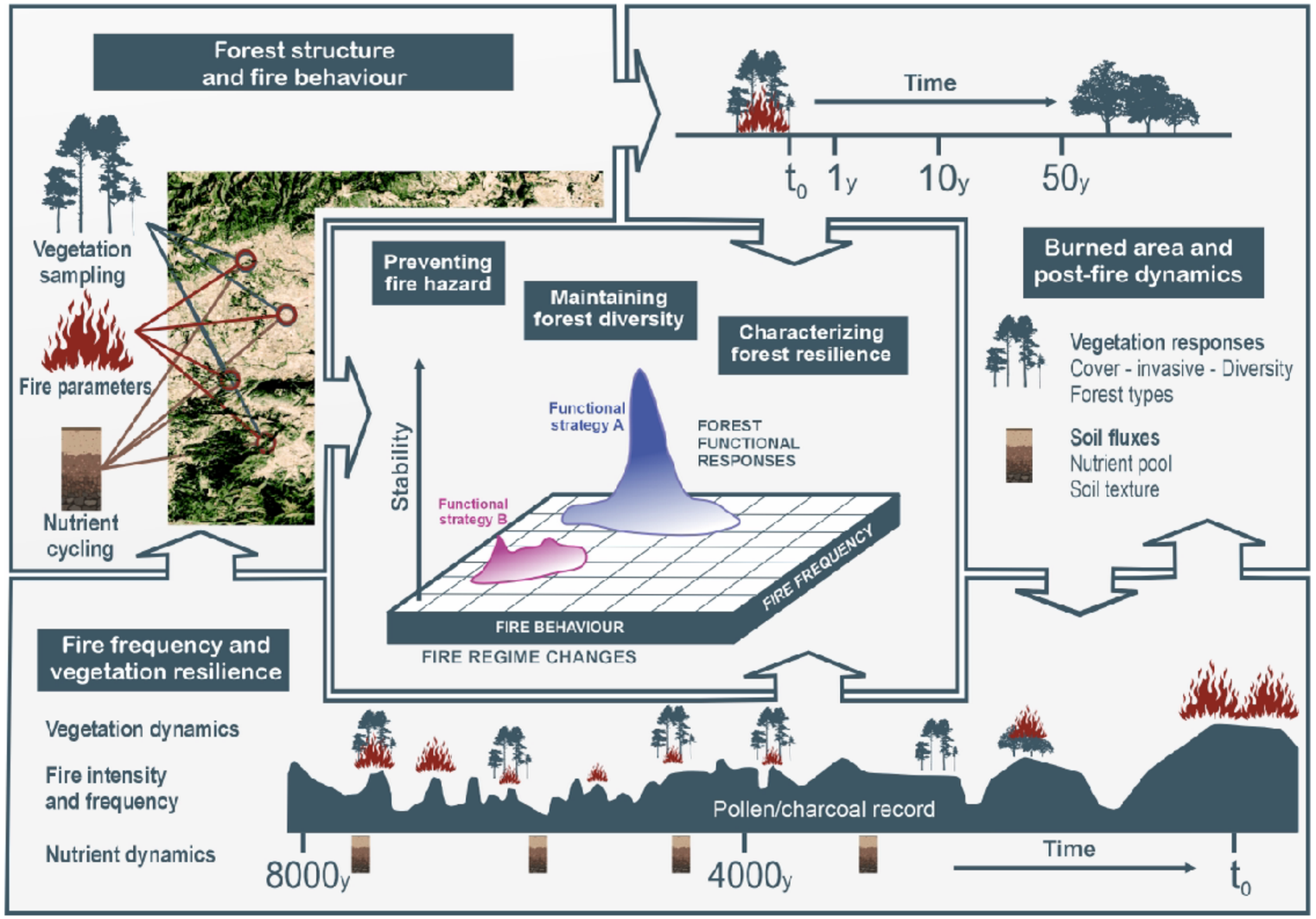
Academic partners

- **UMR AMAP - CNRS DR13**
  - Bérangère Leys - Biogeochemical impacts of fires and vegetation diversity responses
  - Tristan Charles-Dominique - Plant architectures and traits in response to disturbances
  - Immaculada Oliveras-Menor - Nutrient cycling and water potential in plants in response to fires
  - Karim Barkaoui - Mediterranean plant competitions and distribution
- **UMR Recover - INRAe**
  - Anne Ganteaume - Mediterranean fire behaviors (ignition and spread) from experimental data
  - Maxime Cailleret - Mediterranean forest composition and dynamics from field surveys
- **UMR EPOC - Université de Bordeaux**
  - Anne Laure Daniau - Paleofire and vegetation interactions from marine sediment cores
- **UMR Chrono-environnement - CNRS DR06**
  - Damien Rius - Paleofire and vegetation interactions from lacustrine sediment cores
  - Julien Azuara - Long-term vegetation dynamics and diversity indices
- **UMR CEFE - IRD**
  - Florent Mouillot - Spatial and temporal fire size and fire risks from remote data

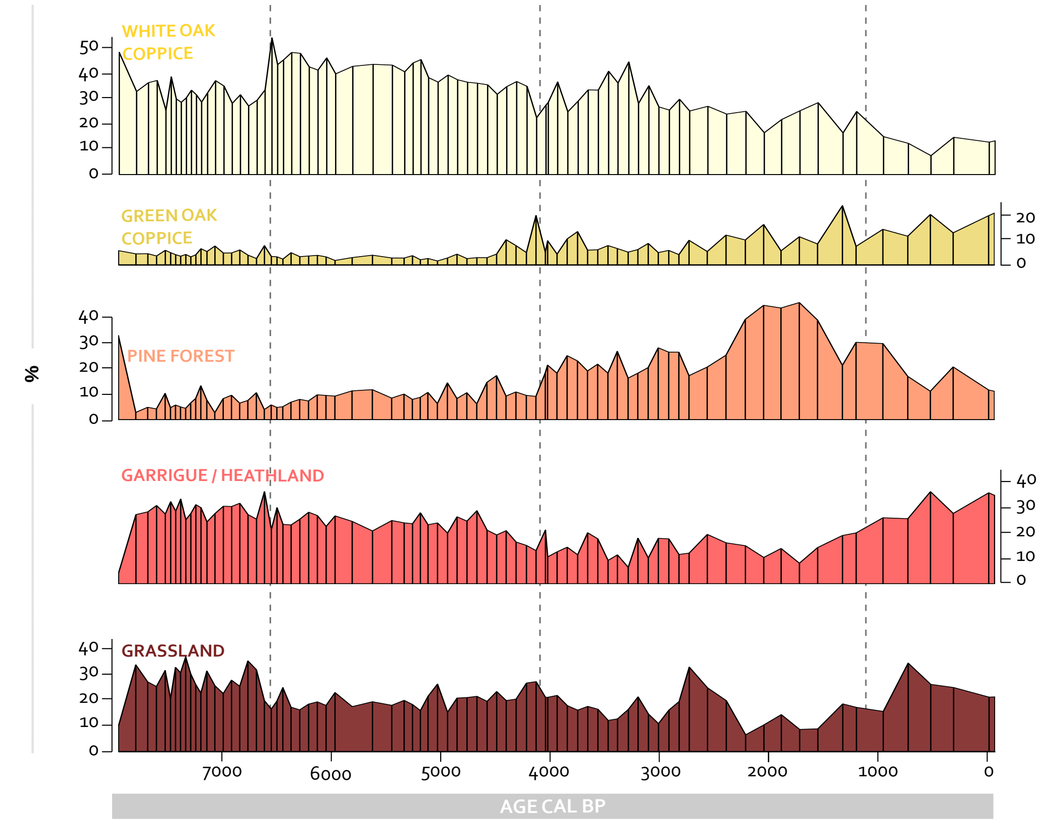
Non academic partners

- **SDIS 13 - Fire fighters in Bouches du Rhône**
  - Vincent Pastor - Unit leader
  - Nicolas Rabouin - Prescribed fire leader
  - Christophe Garcia - Fire origin and cause investigation
- **Warucène - Forest fires coordinator in South of France**
  - Sebastien Lahaye - CEO
- **CEN PACA - Owner and stakeholders of natural areas**
  - Axel Wolf - Division manager of the Crau Plaine
  - Lionel Quelin - Division manager of the Alpes du Sud
- **Département des Bouches du Rhône - Owner and stakeholders of natural areas**
  - Lionel Long - Head of the Protected Natural Area department
  - Stephanie Bertrand - Manager of Forests and Natural areas department
- **Département du Var - Owner and stakeholders of natural areas**
  - Gilles Roubaud - Project manager of Protected Natural Areas

Main challenge:
Linking different spatio-temporal datasets



WP1 - determining forest structure en dynamics by linking ground truth and long-term records (T. Charles-Dominique, M. Cailleret, CEN, CD13)



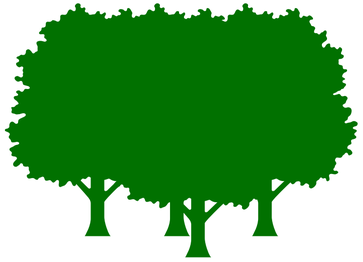
Questions adressed:

- How much precise the definition of black pine, downy oak, green oak and Aleppo pine forests can be settled ?
- What are the structures of each forest types in the Mediterranean area ?
- Is the specific forest type declining or enhancing?
- What is the specific and functional richness of each forest type?

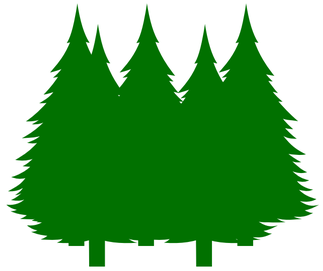
=> Allow drawing general structures of each forest type

=> Allow identifying significant parameters that most define forest stability (random forest, ACP)

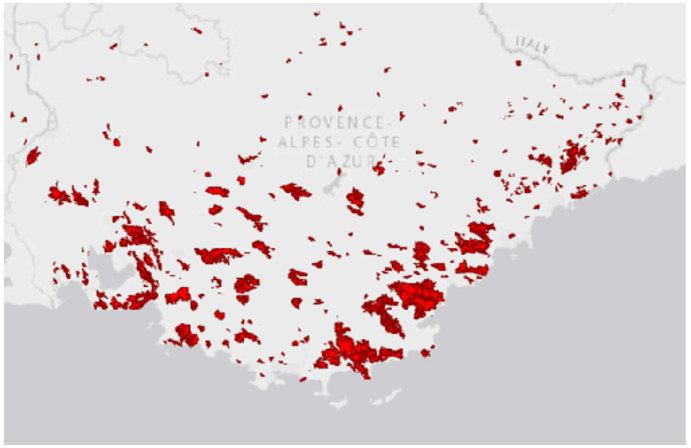
WP2 - connecting prescribed fires, remote sensing fire regime and paleo fire frequency and intensity (A.-L. Daniau, F. Mouillot, SDIS 13)

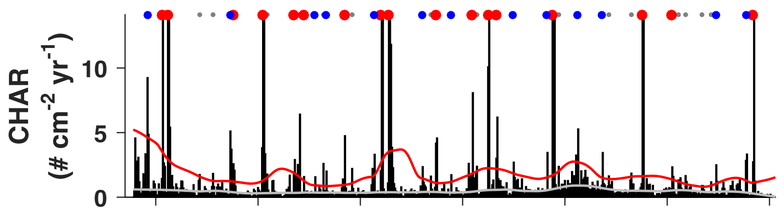


Oak forests



Pine forests





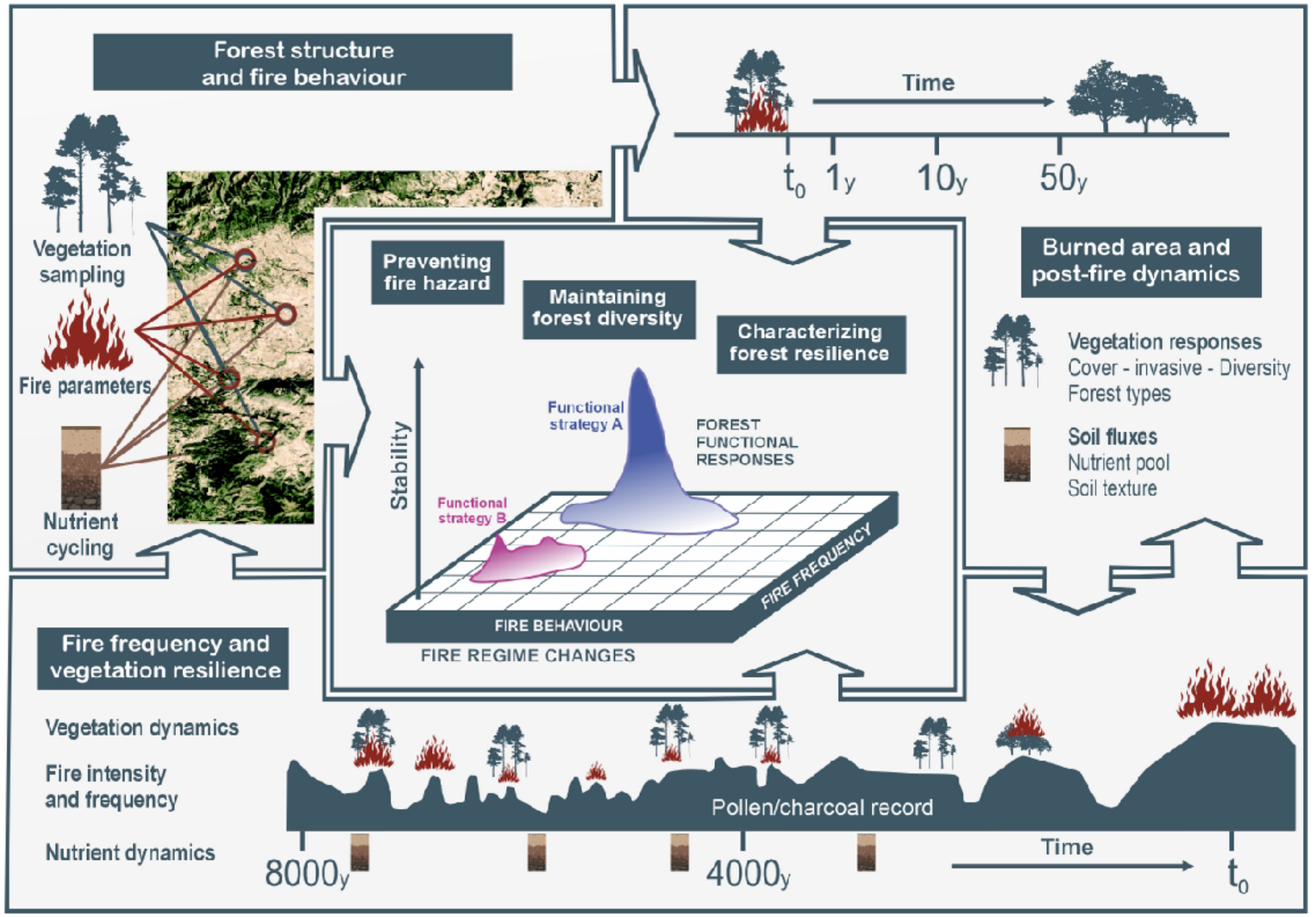
Questions adressed:

- What are the intervals of fire episodes (minimal fire occurence) experienced by each forest type ?
- Is the specific forest type experiencing fires nowadays?
- How fire size and intensity affect the different forest types?
- How the fire behavior (heat, size of the flame, type of fuel burned) affects the forest cover?

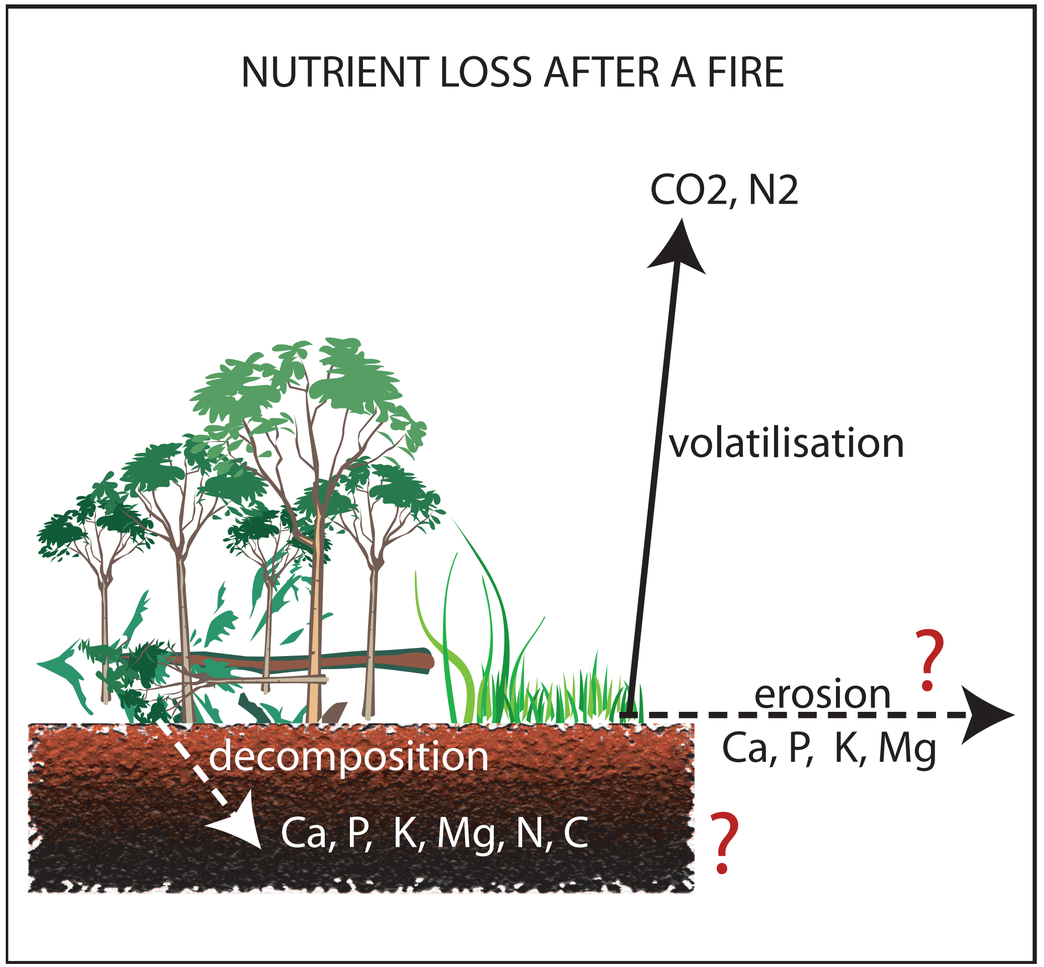
=> Allow drawing general conclusions of fire regime for each forest type

=> Allow identifying significant parameters that most affect forest stability (random forest, ACP)

Main inovation:
Deciphering fire impacts on nutrient pools and resilience of Mediterranean forests

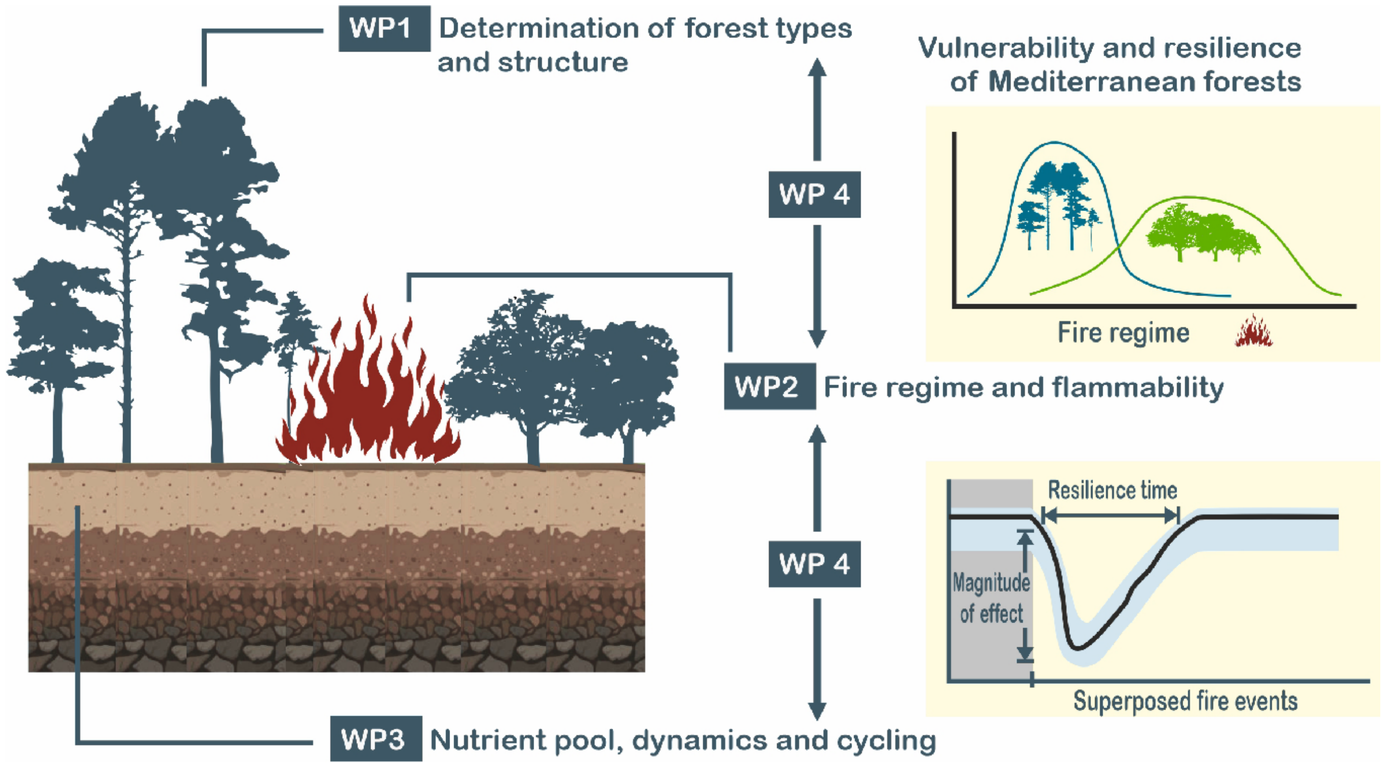


WP3 - Linking fire events and nutrient pool responses and trajectories (I. Oliveras Menor, B. Leys, CEN PACA)



Trend	Possible Meaning
High soil, low plant	Poor availability / antagonism / blocked uptake
Low soil, high plant	Foliar application / hyperaccumulator behavior
High correlation (r > 0.7)	Strong nutrient-soil uptake relationship
Low or negative correlation	Nutrient interactions, mobility differences

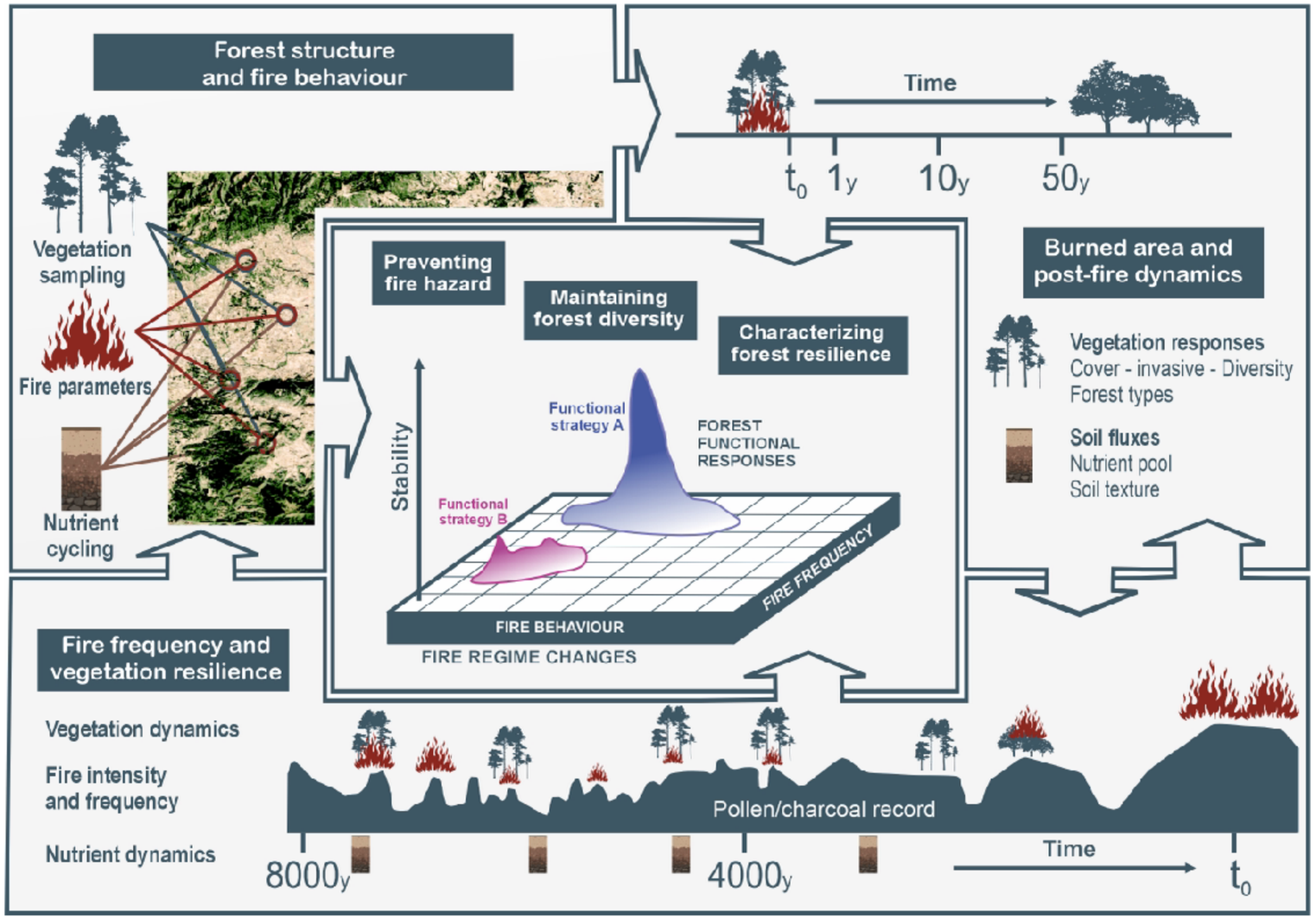
WP4 - Linking fire regime and vegetation dynamics and ecosystem functioning (A. Ganteaume, D. Rius)



Questions adressed:

- How do different forest types respond to varying fire frequencies and intensities?
- What are the ecological thresholds for these responses?
- How do fires impacts on vegetation influence nutrient cycling?
- What are the functional units in the Mediterranean area?

Main outcome:
Answering land managers and fire risks concerns



WP0 - outcomes of the project and link with NGOs (B. Leys and Warucène)

- co-constructed research questions with land managers
- Involved at each step of the project (sampling, lab, first results…)
- Already flyers and all public courses at Etang des Aulnes

=> Involvement with land managers of sites in FEVER already actives

WP0 - outcomes of the project and link with NGOs (B. Leys and Warucène)

Main questions of SDIS13

- Are prescribed fires impacting the forest dynamics and health?
- Are prescribed fires impacting forest cover at the district level?
- Are prescribed fires impacting forest diversity?
- Are they protected forest from more impacted fires (wild or accidental)?

Main questions of land managers

- Is my system new? Established? Stable?
- What's its relationships with fires?
- Is the configuration of today dangerous regarding fire risks?

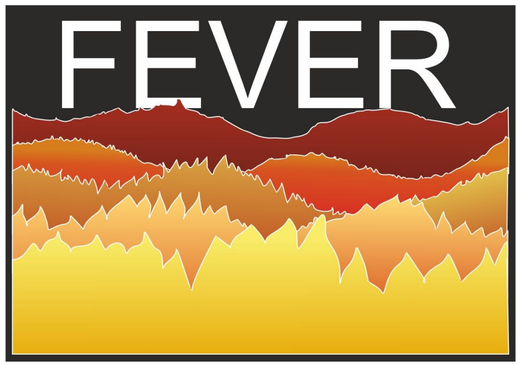
WARUCENE
Vivre avec le feu de forêt

- leads the national fire management network
- 560 members from agriculture, firefighting, and forestry across 39 French districts
- Annual event days on sharing experience in tactical fire, prescribed burnings and stubble burning

FIRE-ADAPT

- 24 partners in 10 countries (Europe and Latin America)
- knowledge-sharing: researchers, wildfire management agencies, and non-profit organisations
- Integrated Fire Management Provide impacts on the societal needs
- Develop shared methodologies to plan and execute IFM practices

PI: I. Oliveras Menor
WP leader biodiversity: T. Charles-Dominique



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cnrs

INRAE
la science pour la vie, l'humain, la terre

université de BORDEAUX

IRD
Institut de Recherche pour le Développement
FRANCE

Conservatoire d'espaces naturels Provence-Alpes-Côte d'Azur

POMPIERS 13
DES BOUCHES-DU-RHÔNE

VALABRE

WARUCENE
Vivre avec le feu de forêt

13
DÉPARTEMENT BOUCHES-DU-RHÔNE

VAR
LE DÉPARTEMENT

UTS

WP3 - Linking fire events and nutrient pool responses and trajectories (I. Oliveras Menor, B. Leys, CEN PACA)

XRF

Nutrients

Erosion / crustal element

Pollutants