



MODELS for Adaptive Forest Management

MOTIVE

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MOTIVE DESTAB meeting, Baden-Baden, 30 Nov 2011

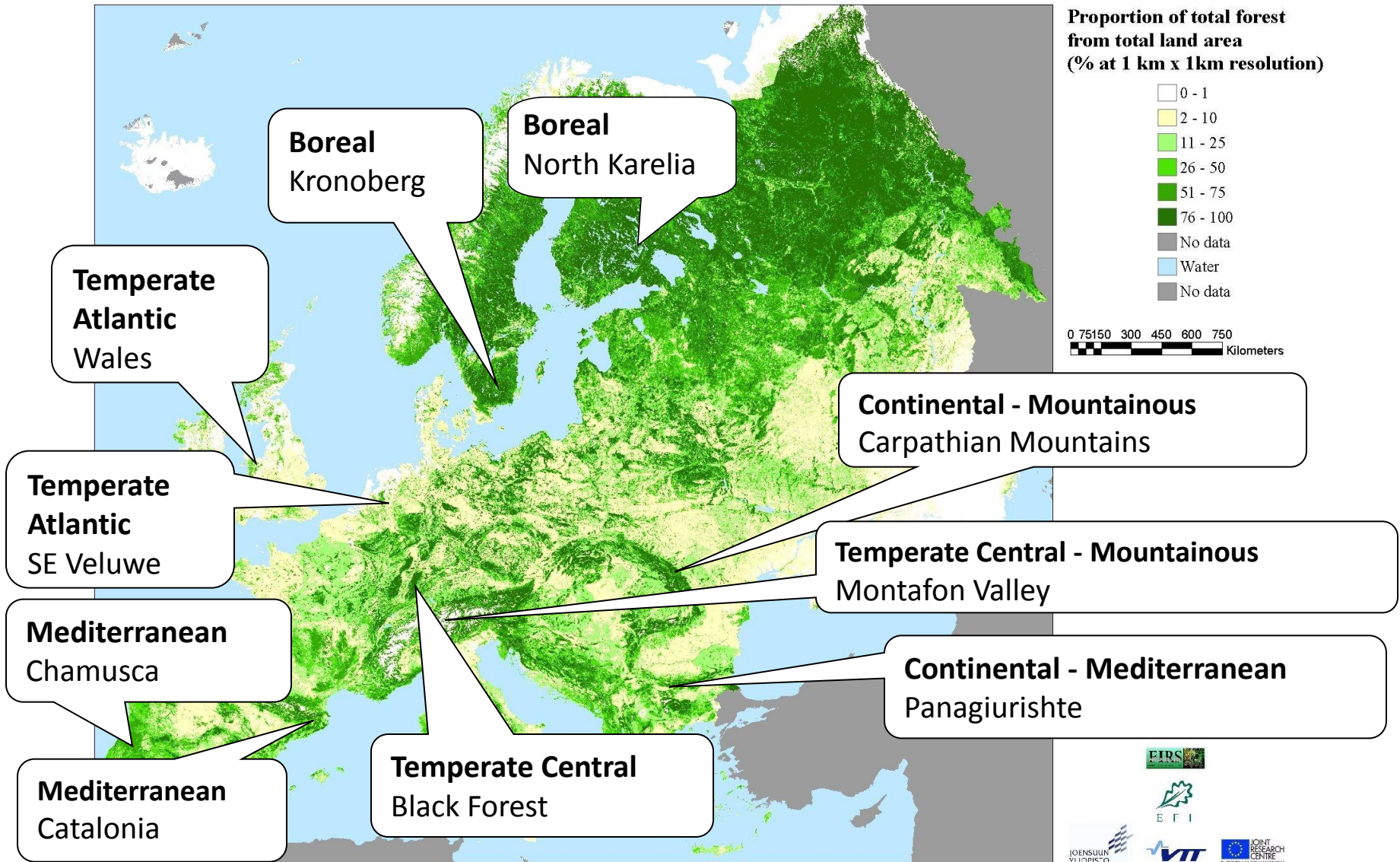
MOTIVE is co-funded by "European Commission's Environment (including Climate Change) Research Programme, as part of FP7", under nr 226544 . Sci officer: Hartmut Barth



MOTIVE Objectives

To provide insights, data and tools to improve policymaking and adaptive forest resource management under climate change

- **Integrated assessment** of forest management strategies
- A comparative assessment across **a wide range of** climatic and socio-economic **conditions**
- Influence of **feedback loops** from socio-economy and policy making on resource management
- Translate scientific state of knowledge into **decision support** for policy makers and forest practitioners
 - European scale analyses as well as 10 landscape level cases
 - Stakeholder involvement and a tool box for adaptive management



Work packages



data



methods

Baseline trends and possible futures for the EU (WP2)

Development of improved models for adaptive forest management (WP3)

Testing & evaluating management options and risks (WP4)

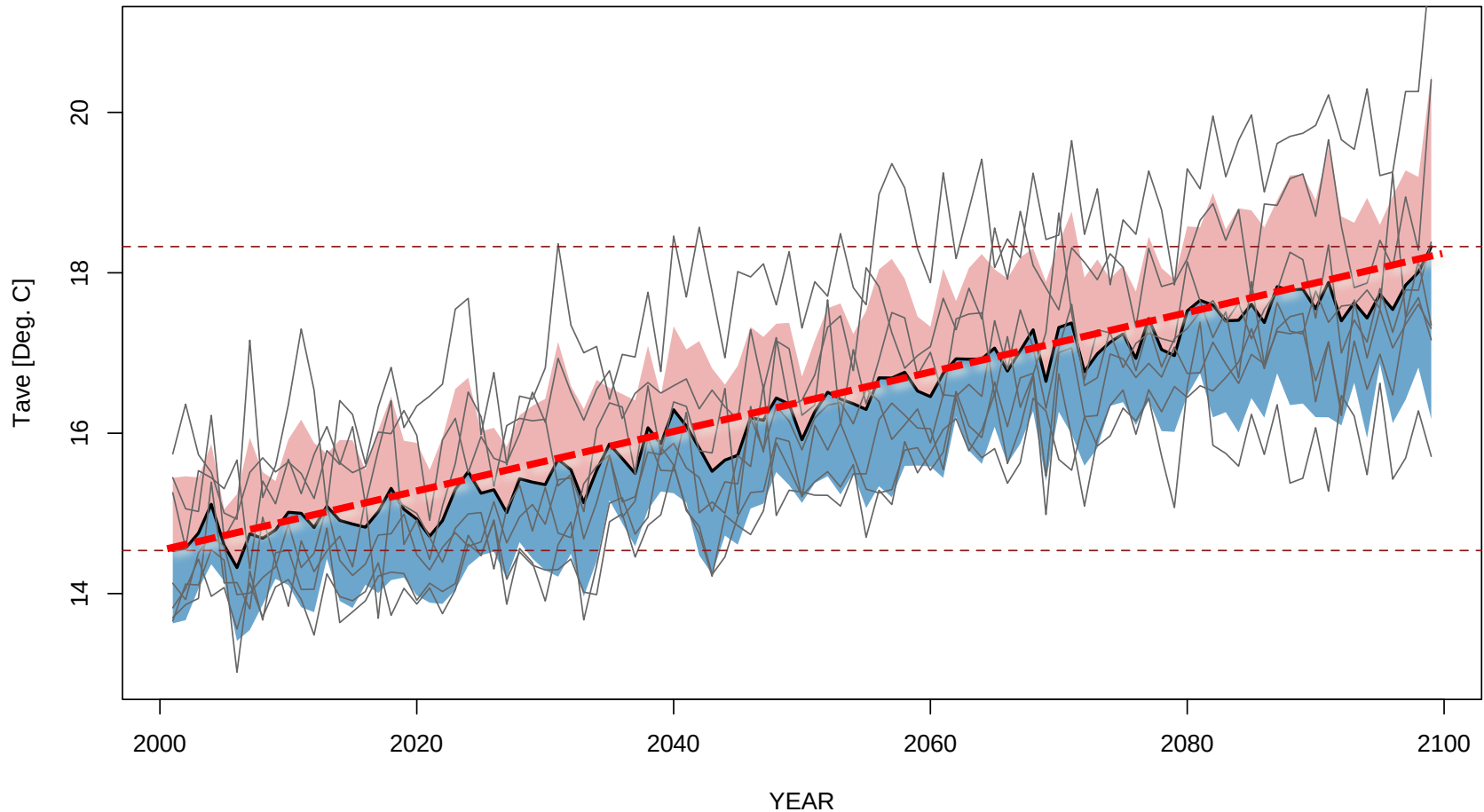
Evaluating and selecting good adaptive forest management strategies (WP5)

Improved decision support in adaptive forest management (WP6)

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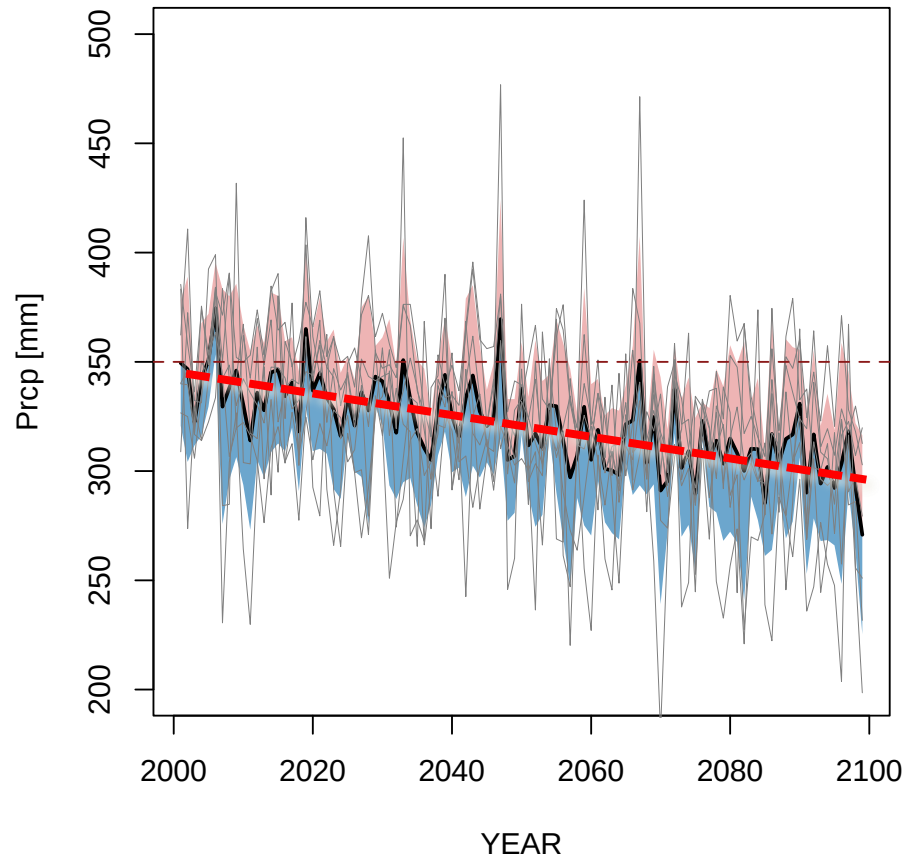
WP 2- trends: Climate change data

Summer Temperature

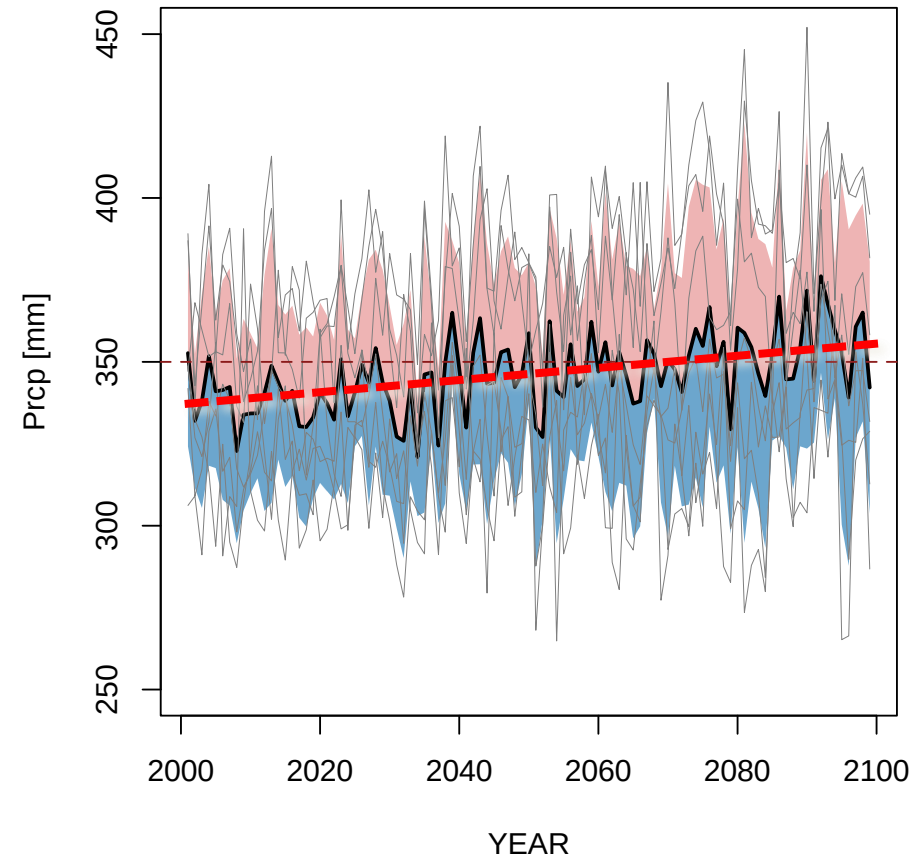


WP2 – trends: Climate change data

Average Summer Precipitation

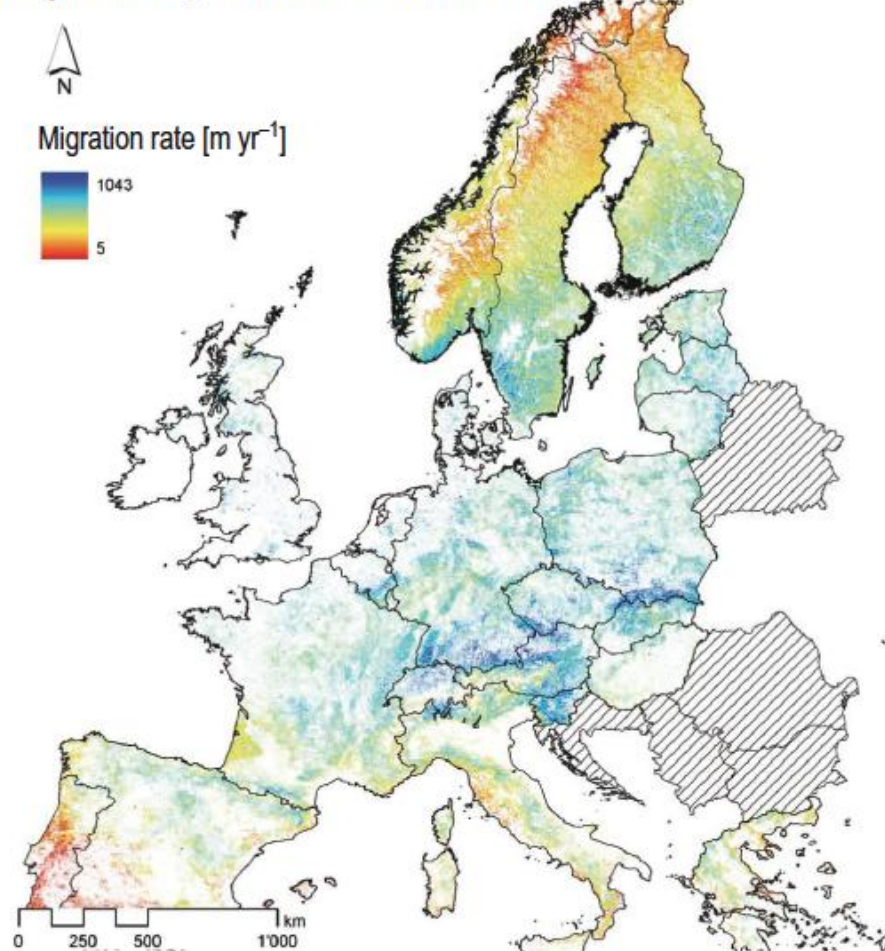


Average Winter Precipitation

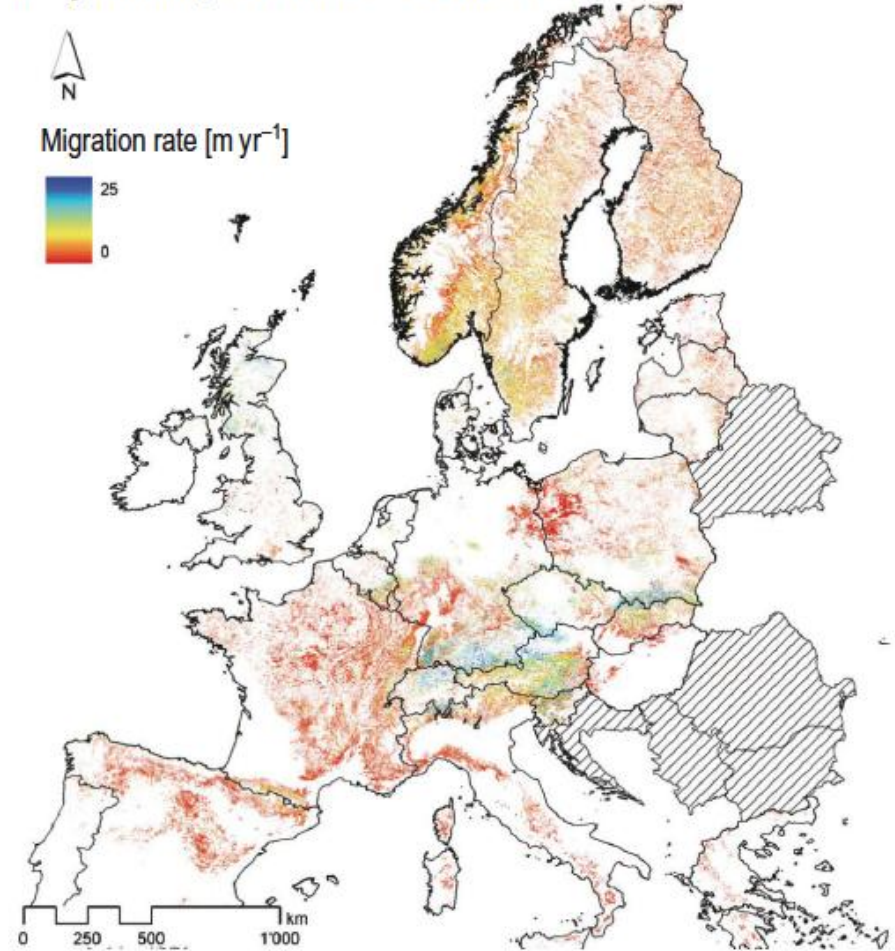


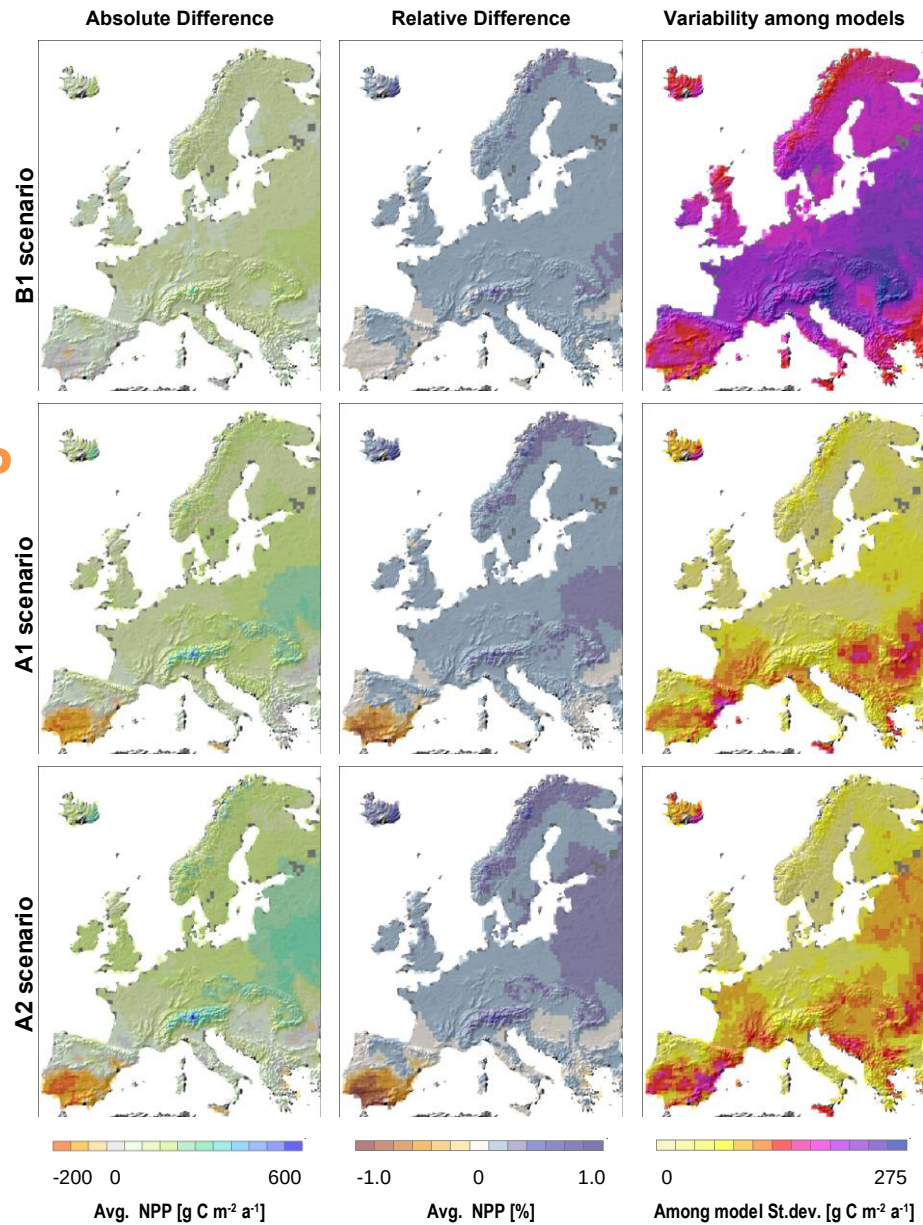
European level: annual migration rate: drastic changes

B.pendula, B1/SEDG 2000-2100



F.sylvatica, B1/SEDG 2000-2100





WP 2- trends: NPP

Work packages



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Evaluating and selecting good adaptive forest management strategies (WP5)

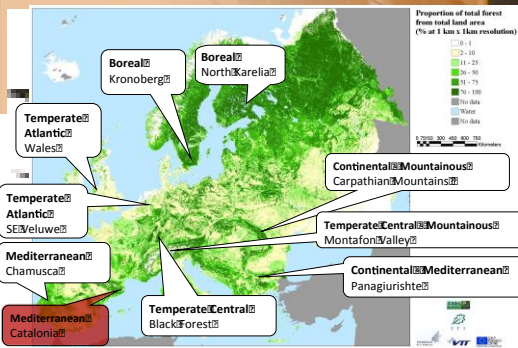


Improved decision support in adaptive forest management (WP6)

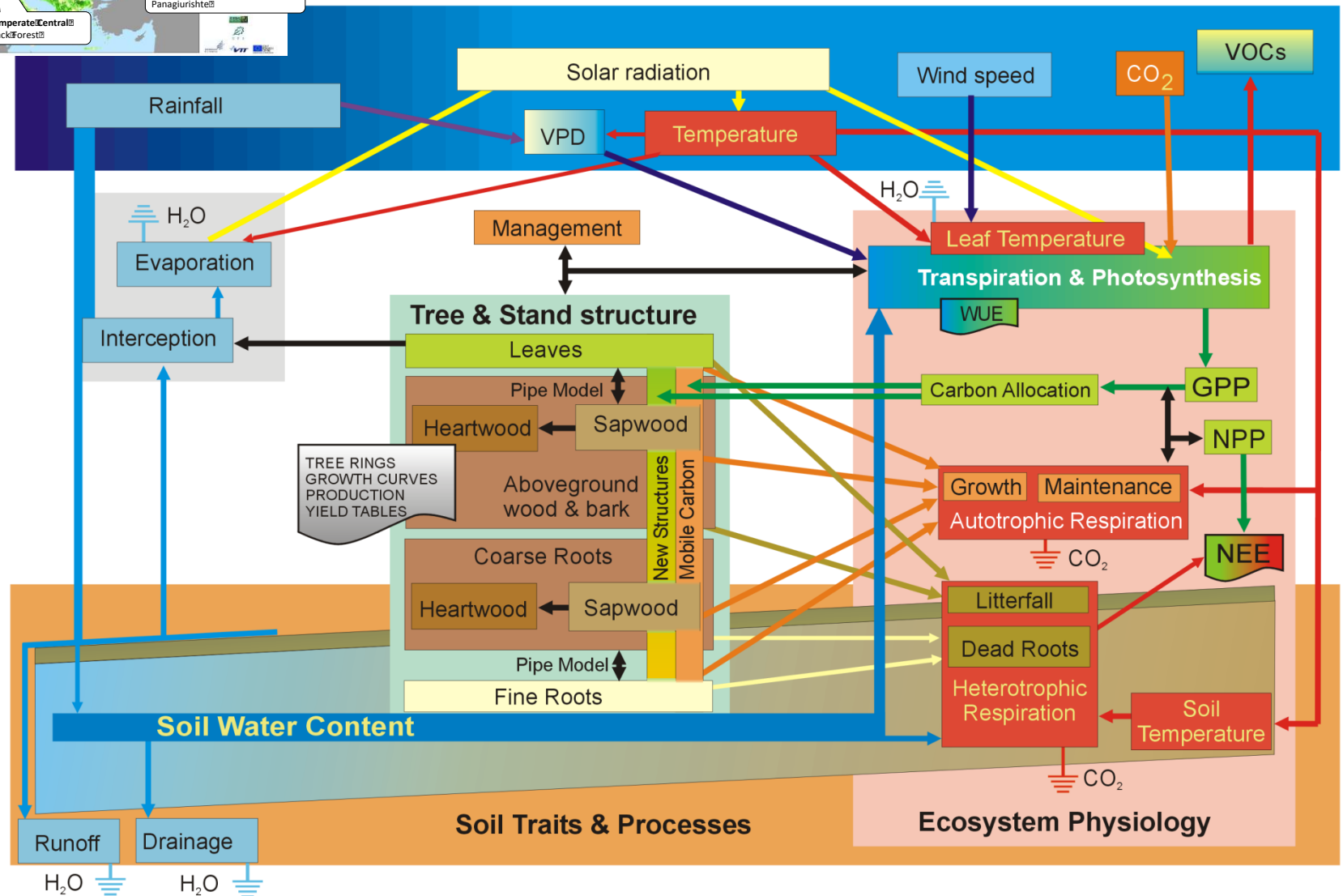


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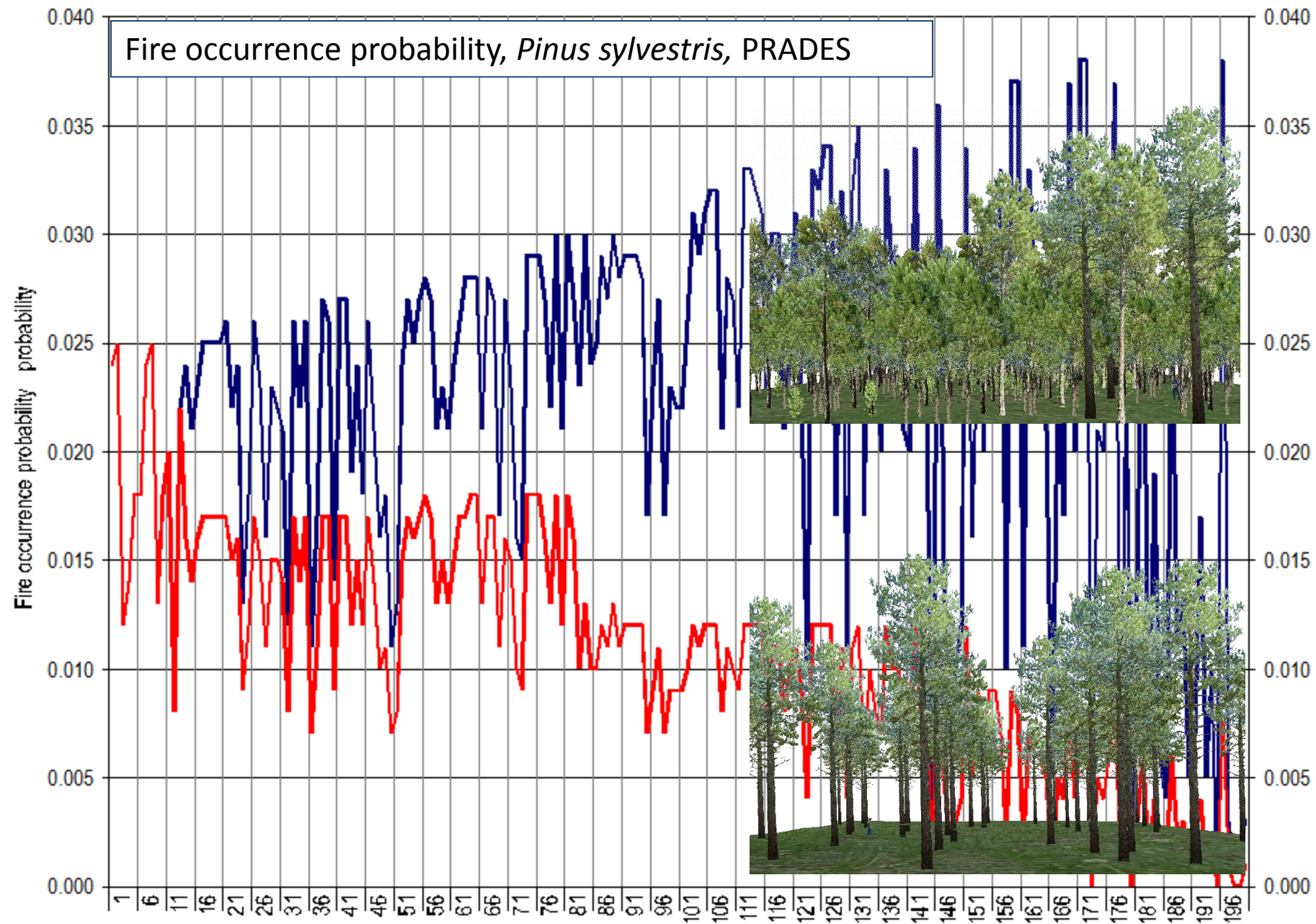


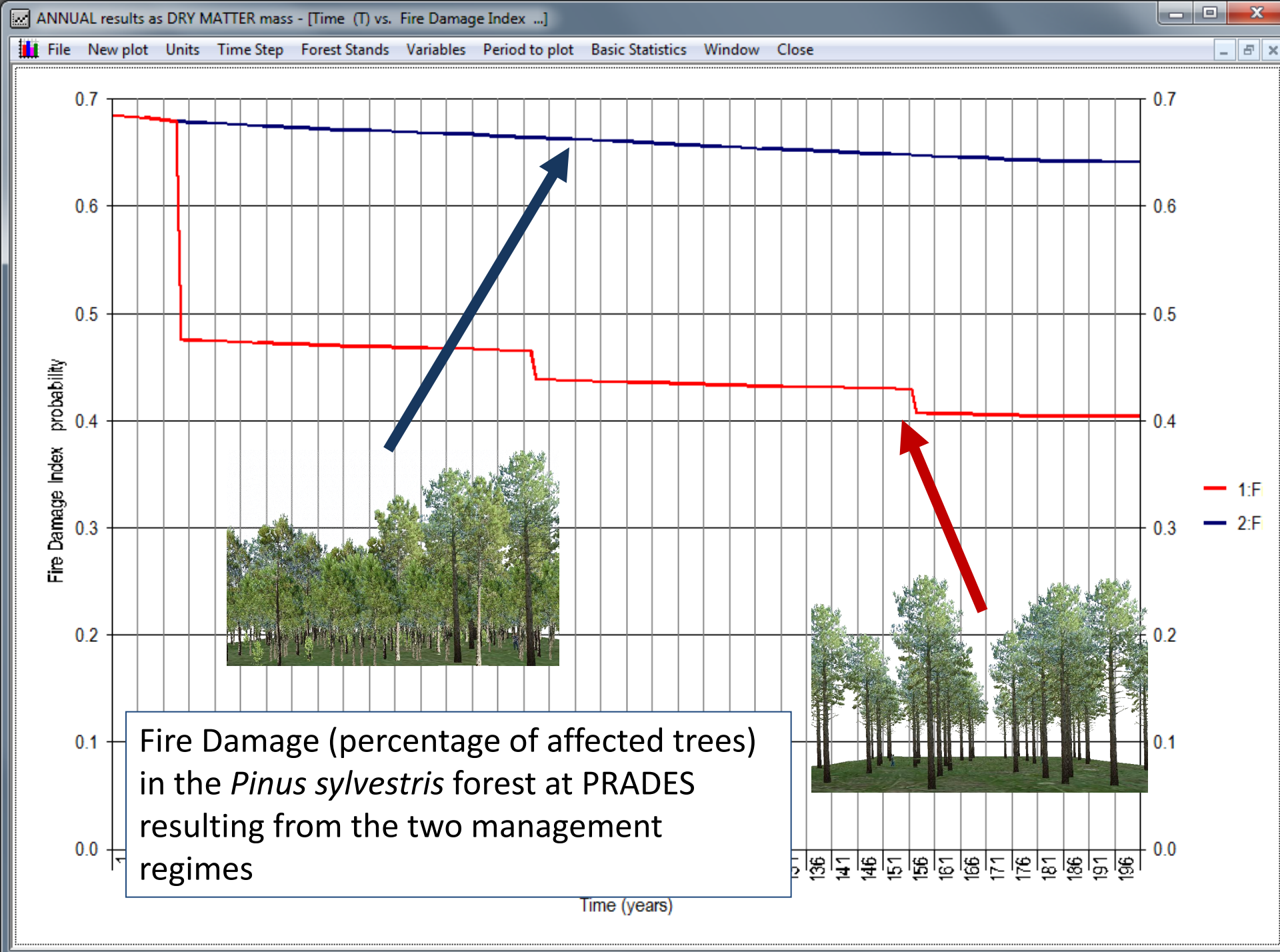
The Gotilwa+ model (Gracia and Sabaté, 1998, 2008)

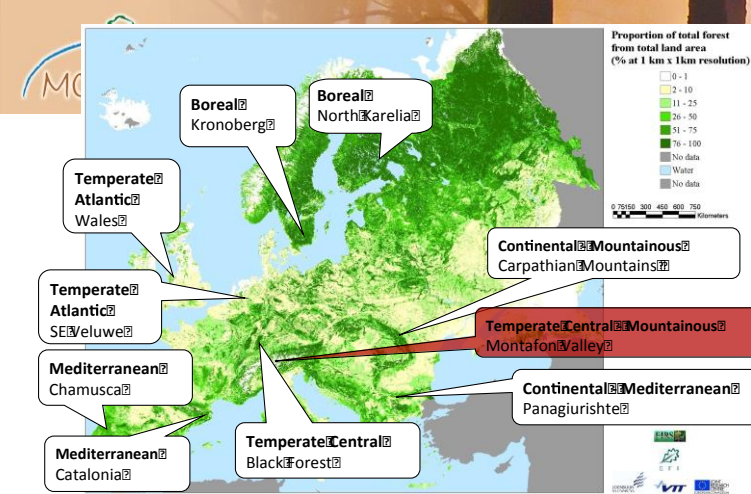


Main questions and challenges:

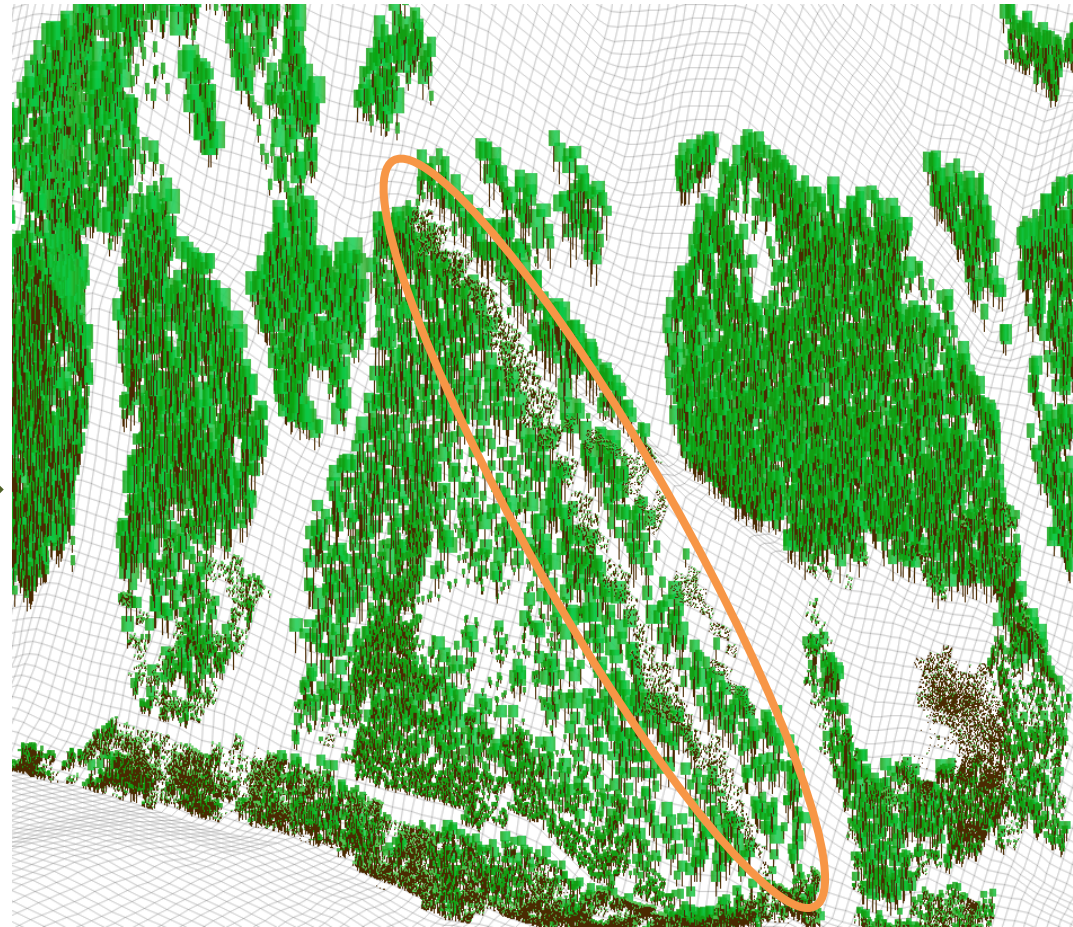
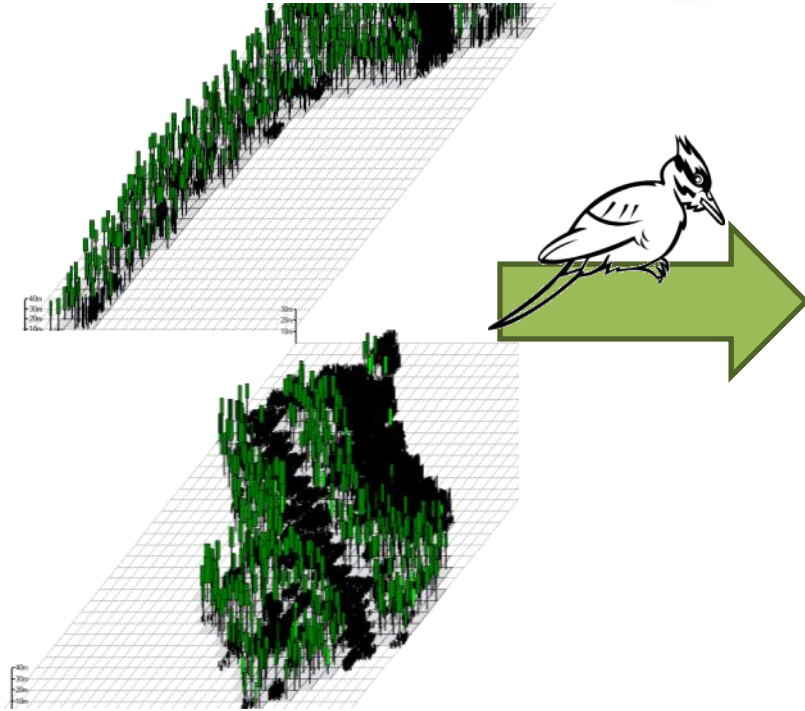
- Water Yield and Forest Drought.
- Fire risk
- Optimization tools to address adaptive forest management





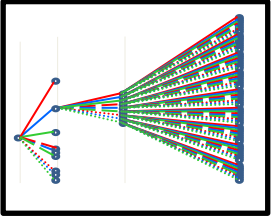


From stand to slope



from stand scale to slope scale for a spatially explicit assessment of ecosystem services

Exploring adaptive management (AM)



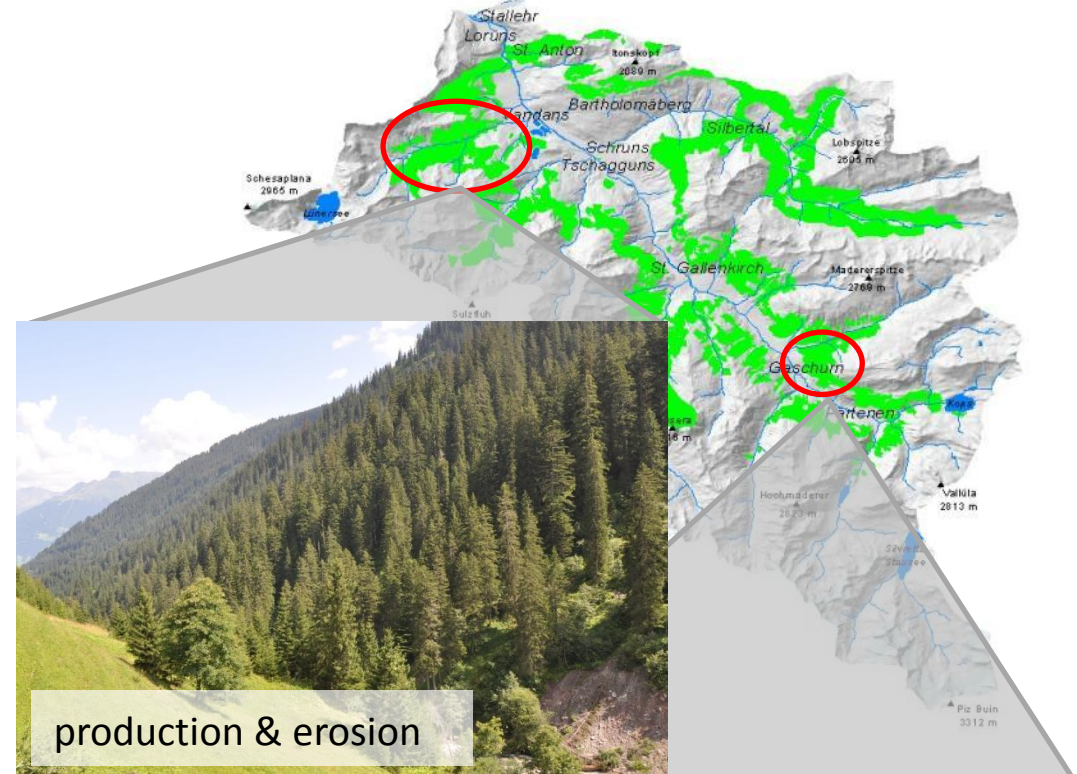
AM scenario:

- modified skyline slits
- artificial regeneration of larch in wider parts of existing/ new slots
- artificial regeneration of maple at lower elevations



Issues addressed

- effect of climate change and disturbances on ecosystem services
- effect of adaptive management on ecosystem services
- trade-offs between ecosystem services



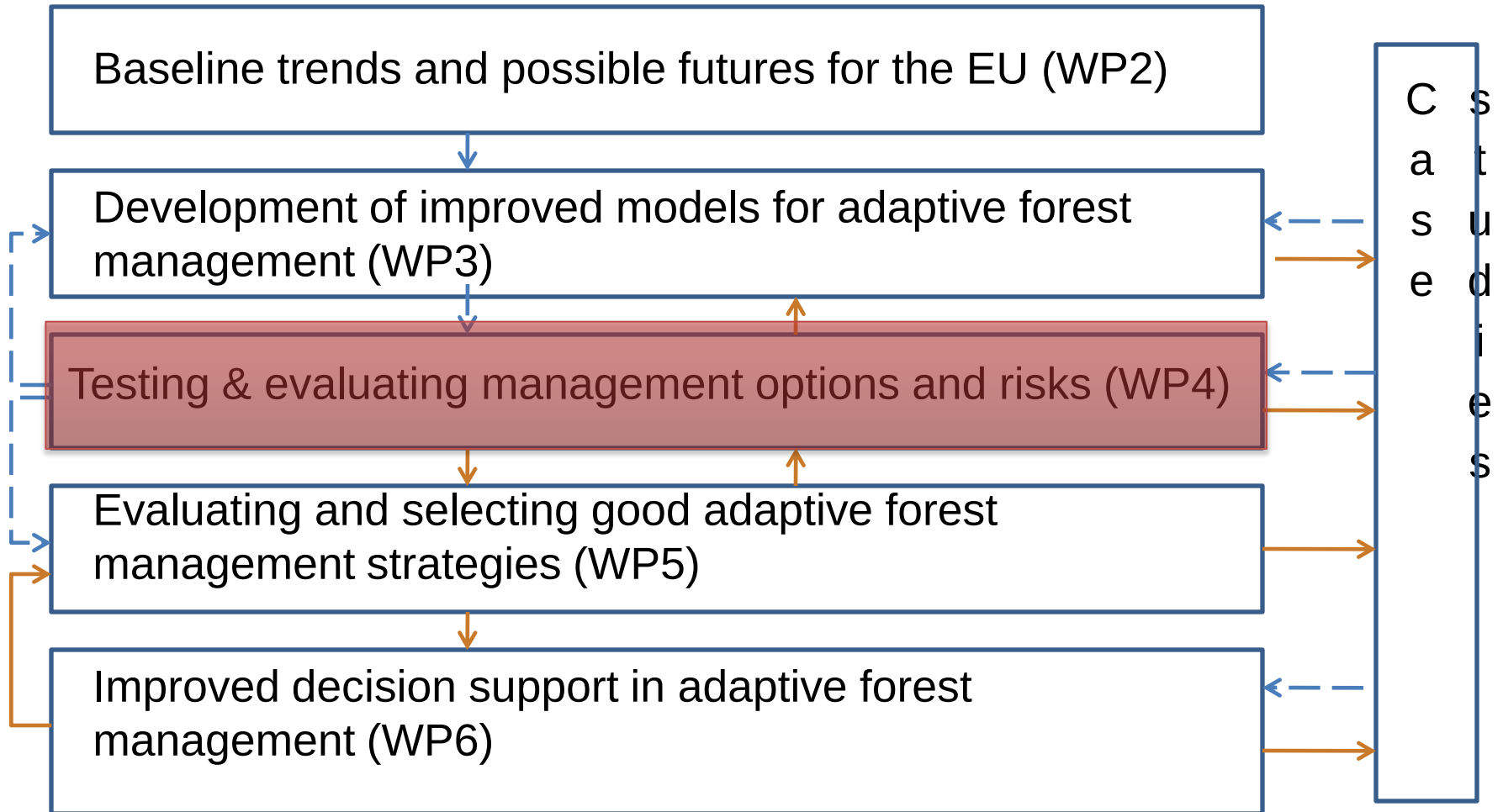
Work packages



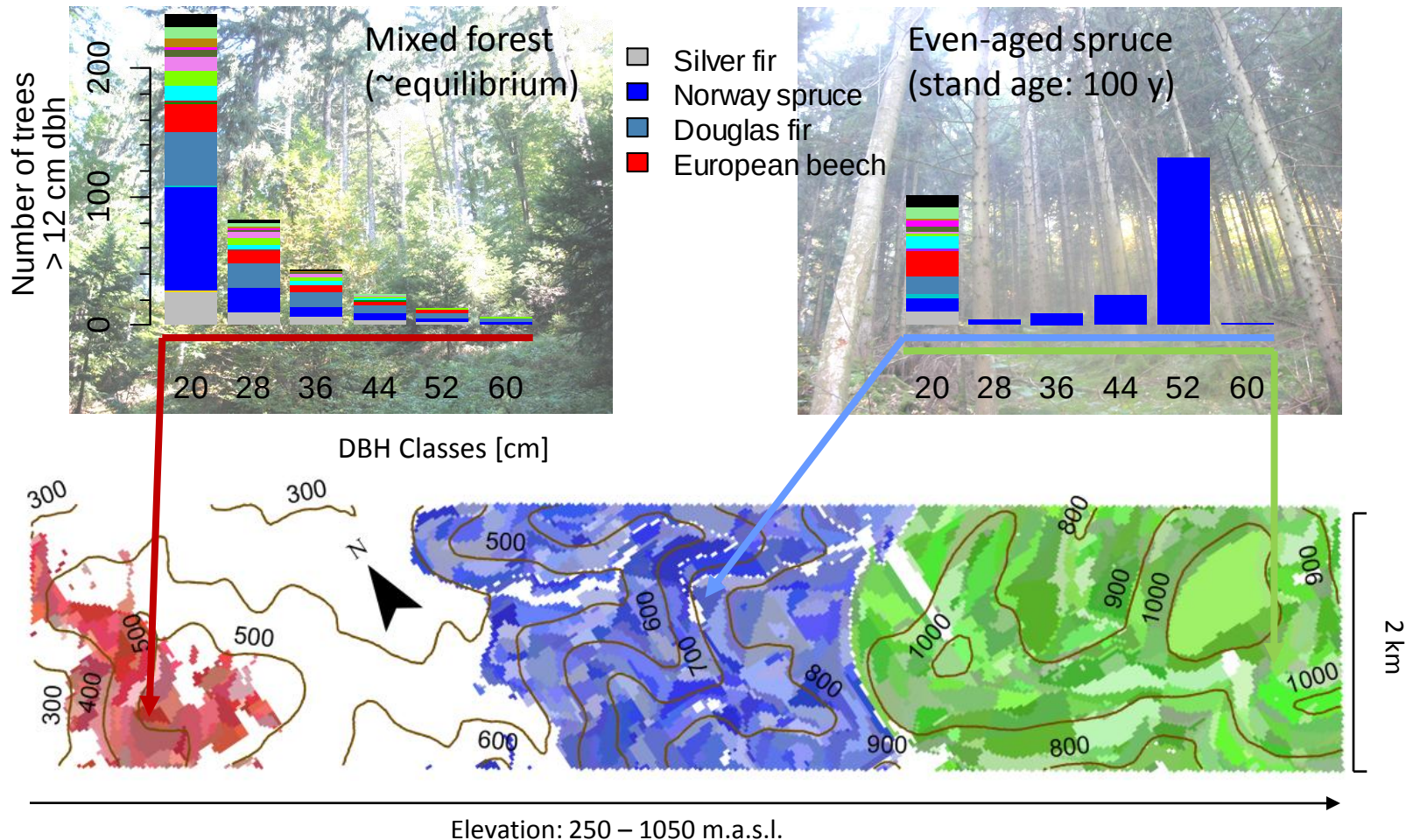
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methods



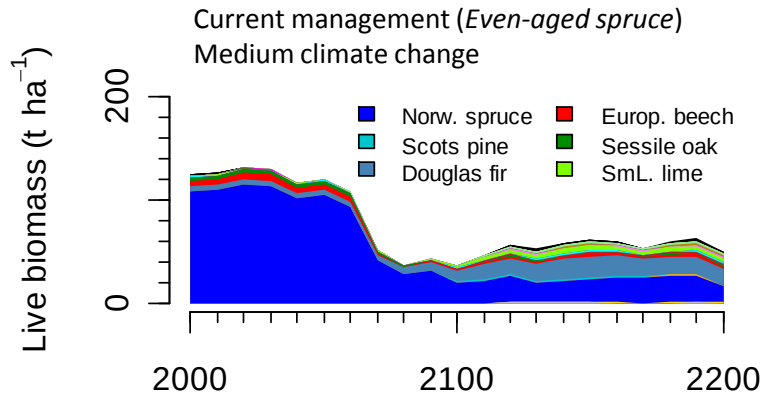
Case study Black Forest



Local stand data by courtesy of FVA

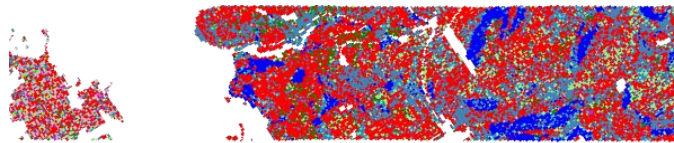
German national forest inventory in Yousefpour et al. 2010, Env. Management

Results: Climate and forest dynamics

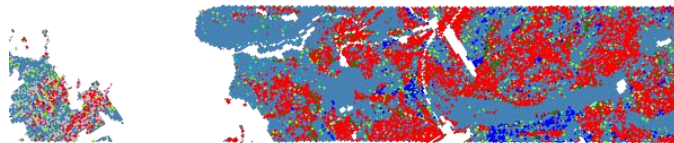


- drought-induced Norway spruce mortality under climate change

Dominant tree species 100 years after conversion to *Natural vegetation*

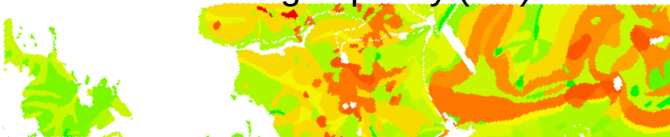


Current climate (1950-2000)



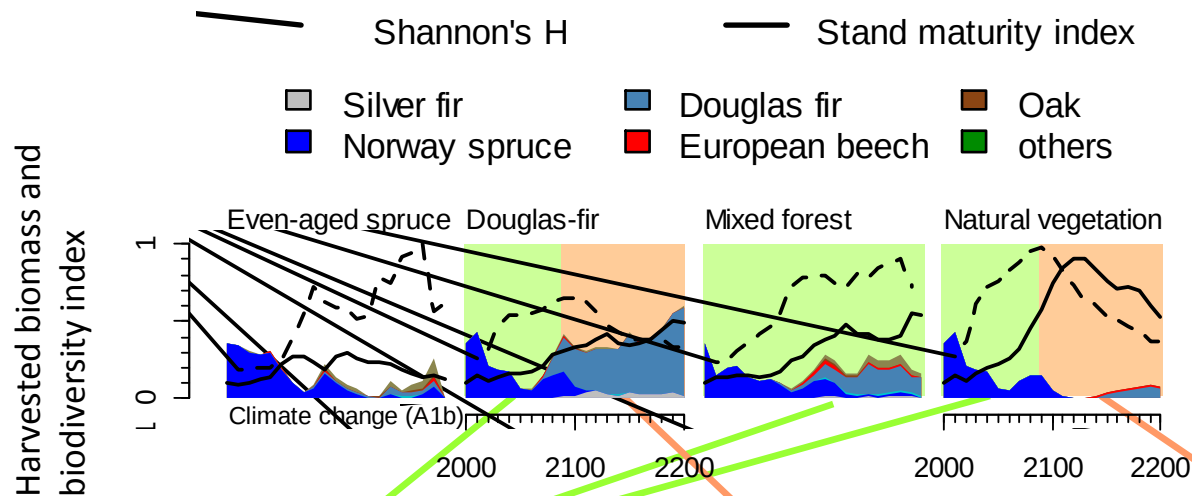
Medium climate change¹

Soil water holding capacity (cm): 2  27



- Climate change favours drought-tolerant tree species.
(Douglas-fir > Lime > Beech, Oak > Spruce).
- The spatial distribution depends on elevation and soil water holding capacity.
- Tree species composition needs to be adapted to dryer climatic conditions.

Results of a case: Synergies and trade-offs



Biodiv.-timber synergy:

High light availability
through harvest



High tree diversity

Biodiv.-timber trade-off:

Promotion of productive
species



Low tree diversity

Biodiv.-timber trade-off:

Harvest restrictions



Large trees, dead wood

- Trade-offs between EGS need to be considered and synergies need to be exploited.
- Over the long term, forest biodiversity and timber production can be jointly promoted by medium intensive *Mixed forest* management

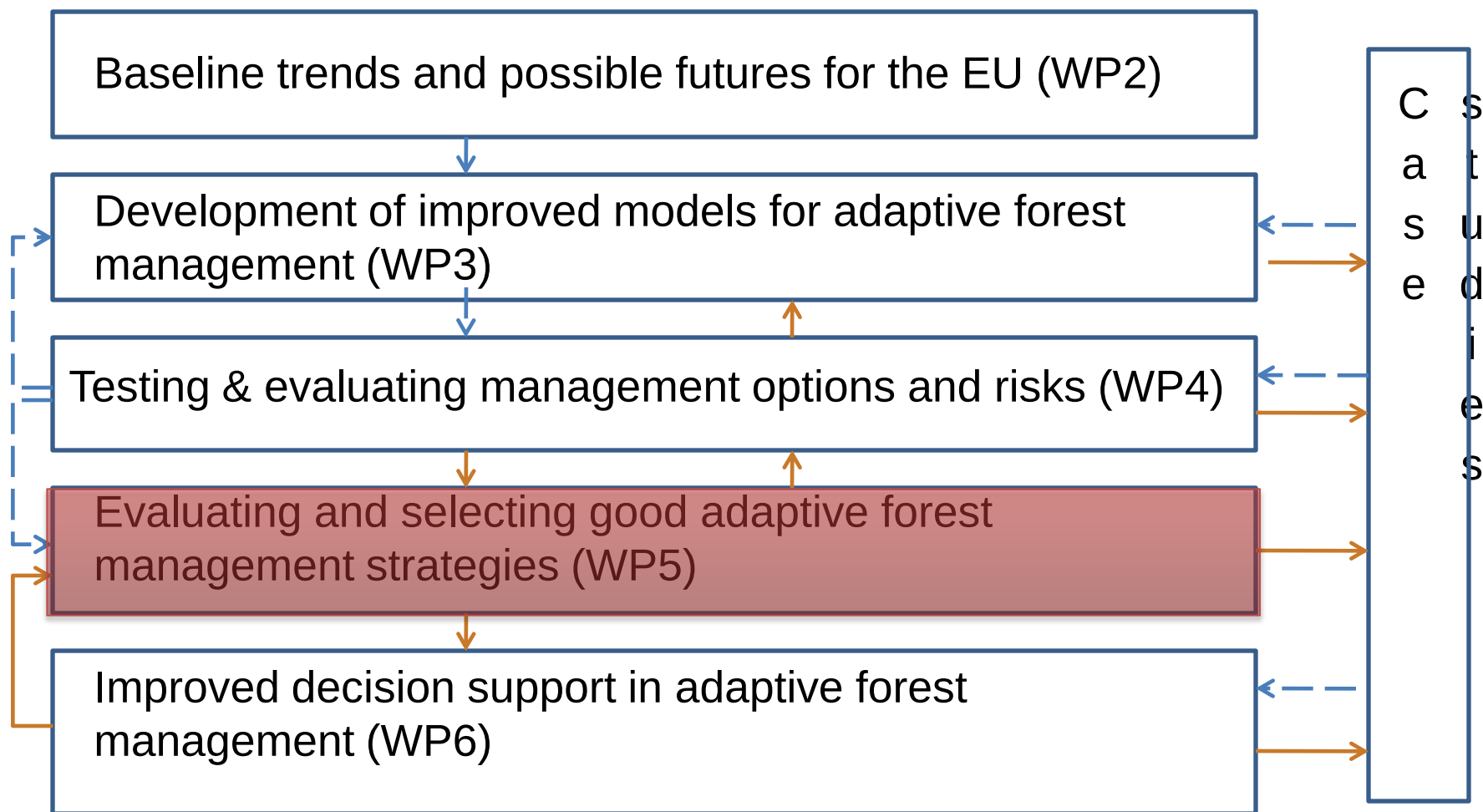
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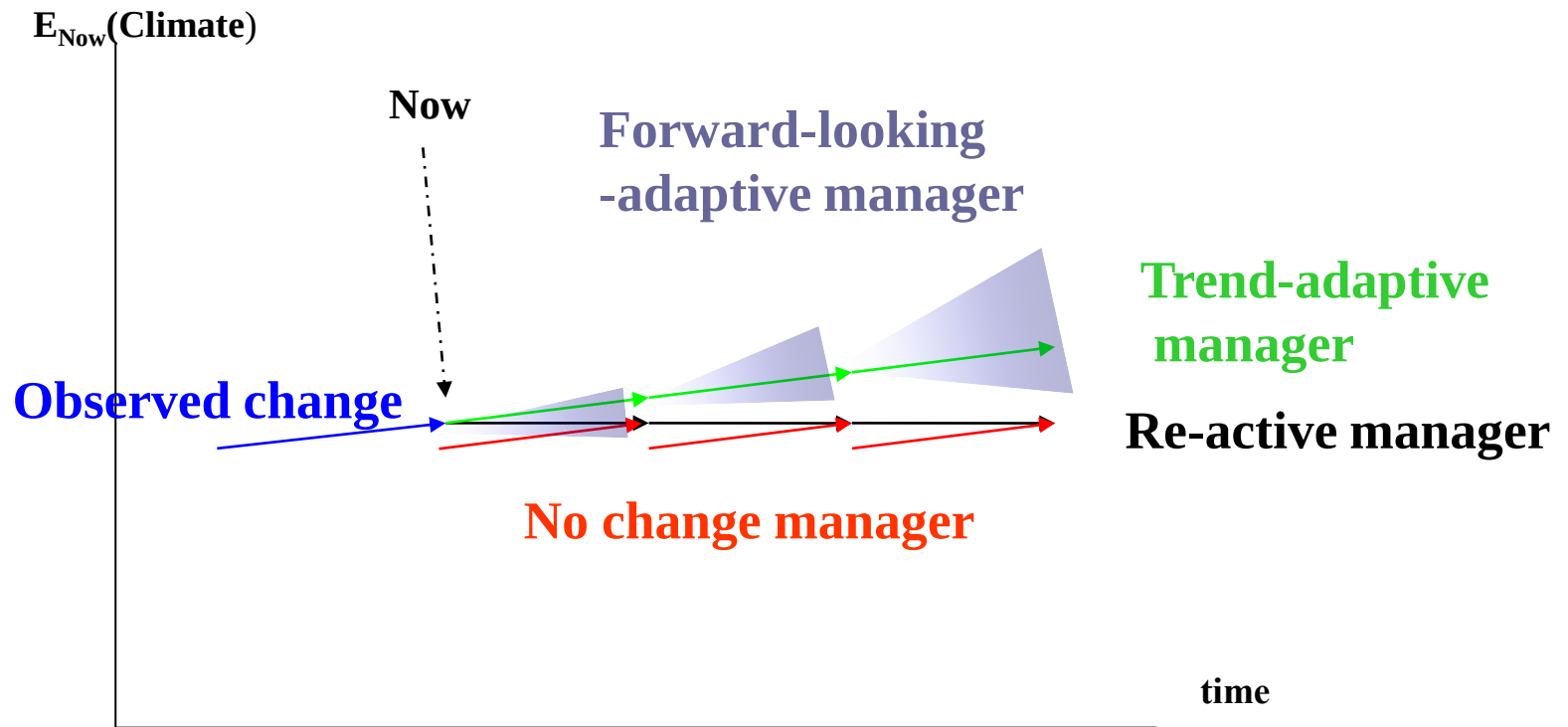


methods



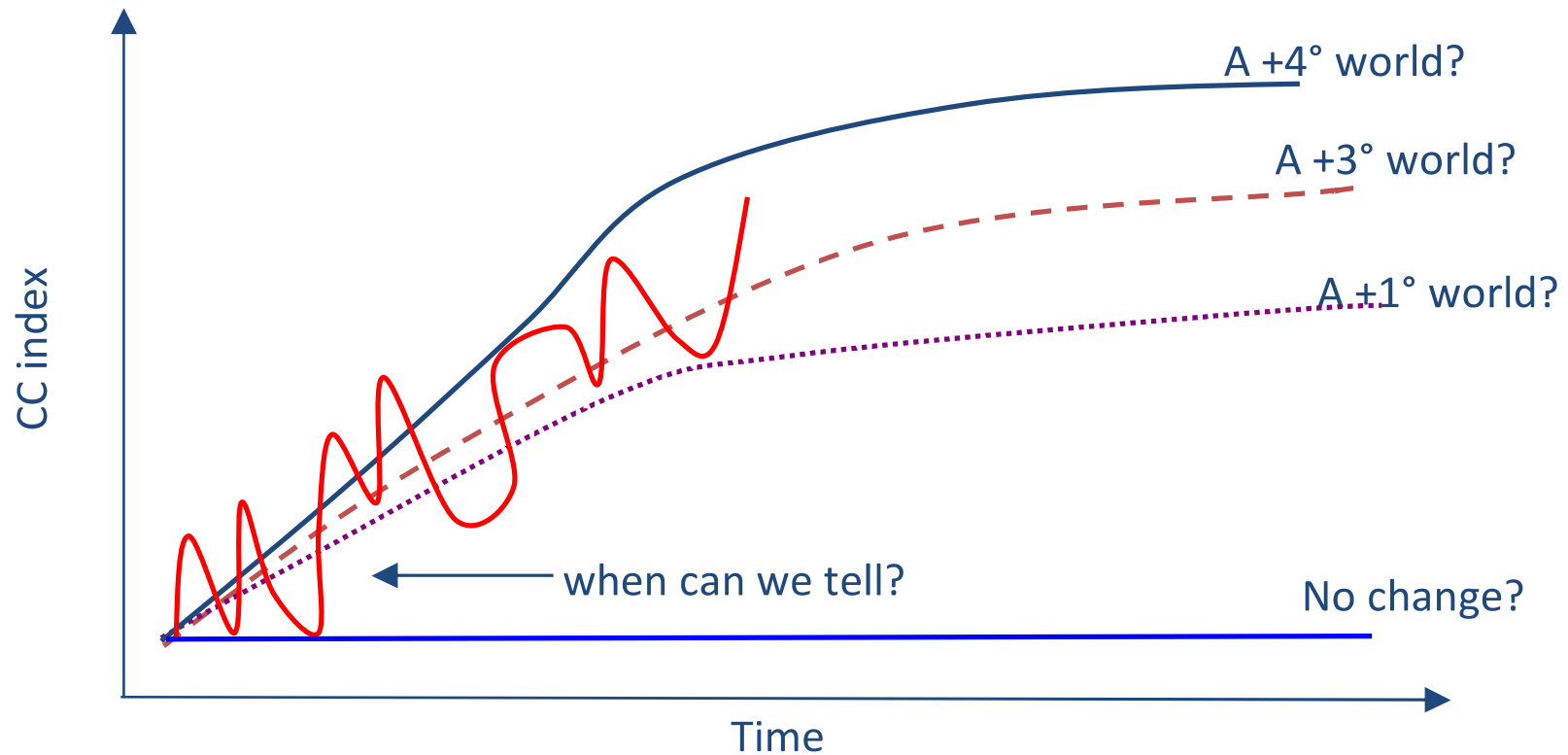
Approach in adaptive management: Look ahead in uncertain and dynamic times

Bredahl-Jacobsen et al. 2010



Implementation: Bayesian Modeling and Simulation Concept (Yousefpour et al.)

Adaption strategies depends on expectations...



Draft Conclusions

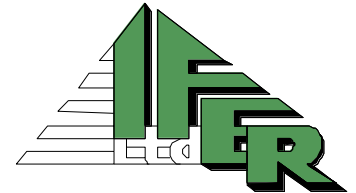
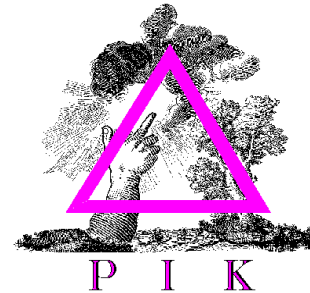
1. Severe but highly varying impacts of climate change on European forests are foreseen
2. MOTIVE - assessed major trends and improved models (including risks)
3. Different scenarios and models necessary to depict range of potential changes
4. Increase of productivity (NPP) in the Boreal – highly variable in Central Europe, problems in the Mediterranean
5. Strong biome shifts (Conifers – broadleaves) – improved models necessary
6. MOTIVE - common understanding on adaptive management strategies
7. Ideally: Forward looking adaptive management including uncertainties adapted in all case studies
8. MOTIVE - considerable knowledge transfer between “old” and “new” member states of the EU (models, strategies)

Outreach in member states is required !

The awareness of forest owners and practitioners is critical for implementation of adaptation to climate change



Thank you



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<http://www.motive-project.net/>