Contrasting carbon storage with timber production in managed and unmanaged Oak forests in Austria based on simulations and observations

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BG3.5 „Enhancing science-based knowledge on forests' capacities to mitigate climate change"

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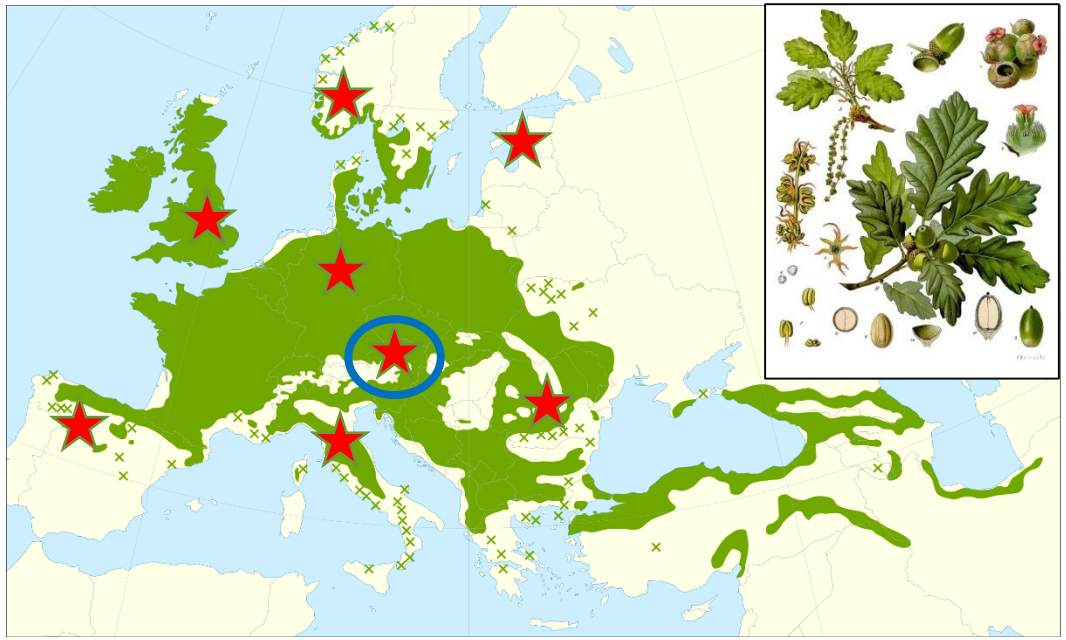
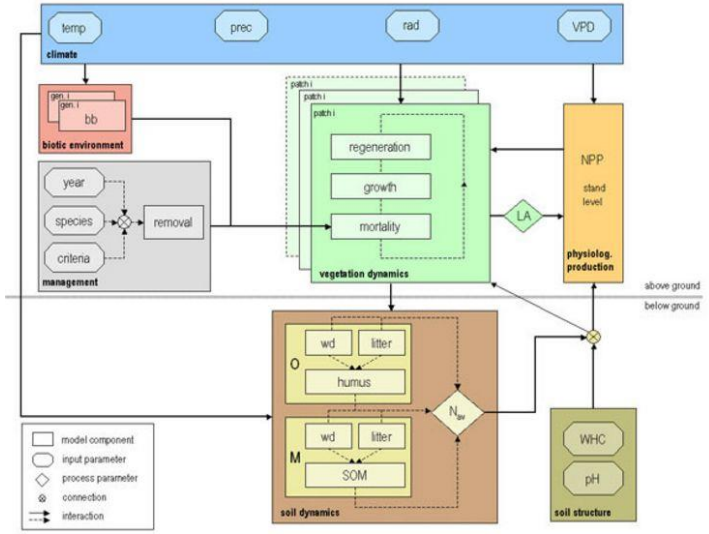
Methods and context - *Quercus petraea* (sessile oak) as target species

- ✓ Sessile oak (and pedunculate oak) occur naturally in 7 out of the 8 case study areas in Opt-ForEU, expected to increase northwards due to climate change and management decisions (e.g. Hanewinkel et al. 2012 Nature CC)
- ✓ High ecological and economic importance of oak forests, but unclear which management is best suited to reach multiple goals



Caudullo et al. 2017

- ➢ Study location: eastern Austria, ~600 mm annual rainfall, 9 °C annual temperature, Oak-hornbeam mixed forests (European forest type EFT5)
- ➢ Modelling using forest growth simulator PICUS v1.5
- ➢ Management scenarios (stand establishment, treatment)



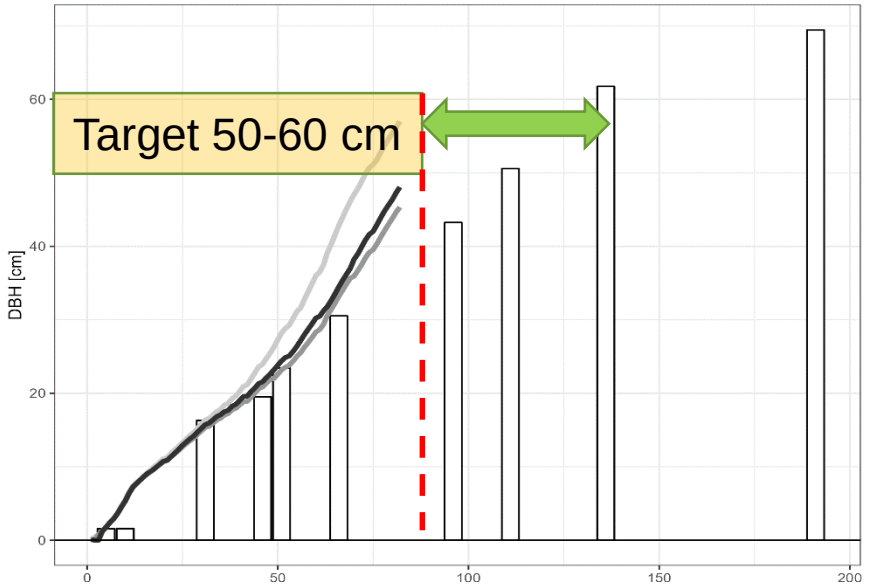
Lexer and Hönninger 2001; Irauschek et al 2017

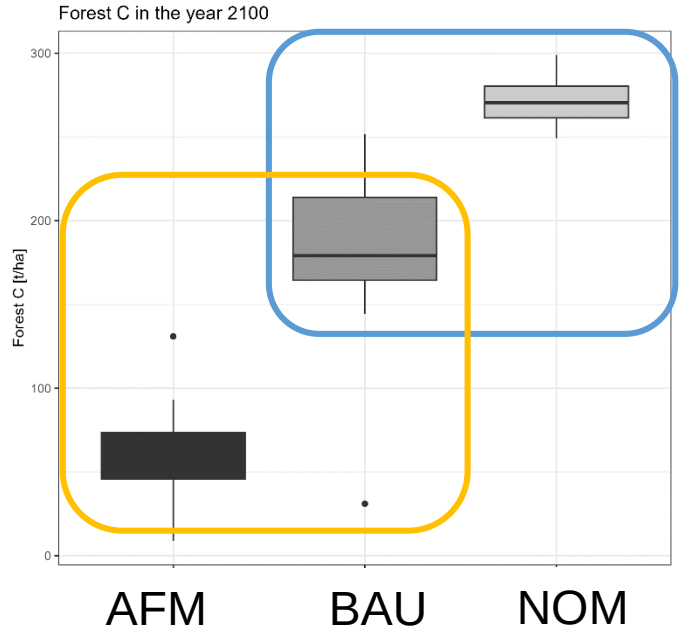
Results and interpretation – tradeoff between carbon, harvested wood and biodiversity

- ✓ Combining adaptive forest management (AFM) and stand establishment allow reaching target stem diameter of Oak trees within ~80 years
- ✓ Compared to current managament (BAU), about 30-40 years earlier tree harvesting is possible under AFM

- ✓ No management (NOM), compared to BAU, increases by year 2100 carbon stocks by ~90 tC/ha or ~+50% (carbon sink ~1 tC/ha/year)
- ✓ Under AFM -60% carbon stocks, but +100% harvested wood volume, and similar deadwood pool, compared to BAU

- ➢ Clear tradeoffs evident and decision support tools needed to identify and evaluate undesirable effects of forest management





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Thank you!

Questions are very welcome

Please interact with my presentation and read the supplementary slides

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Active on researchgate

Distribution of *Quercus rob*ur versus *Quercus petraea*

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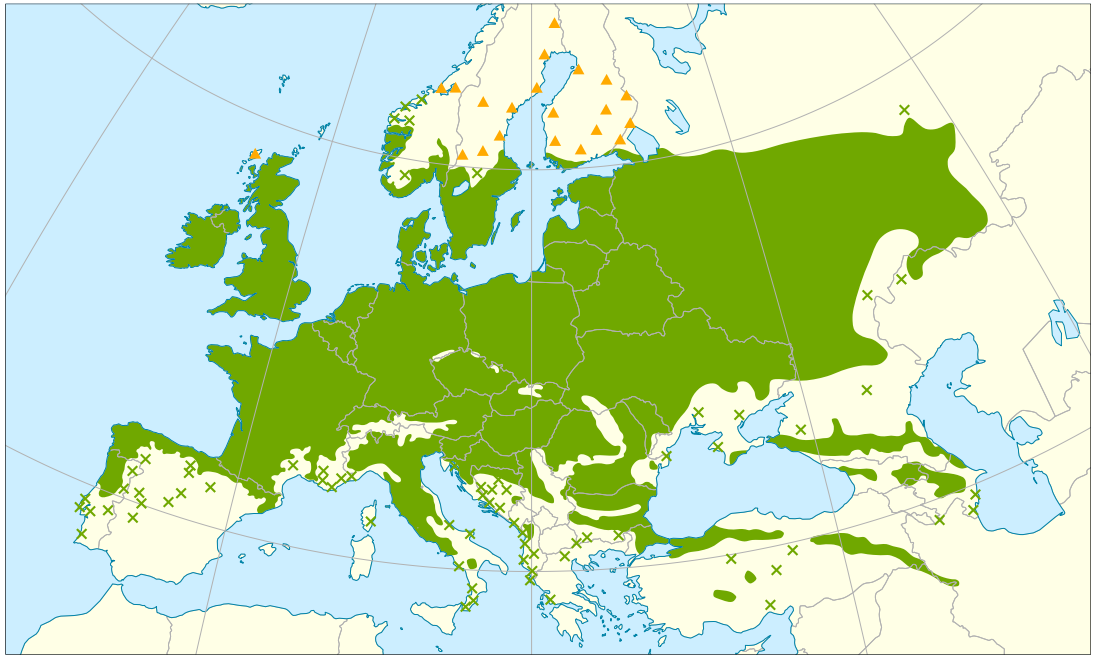

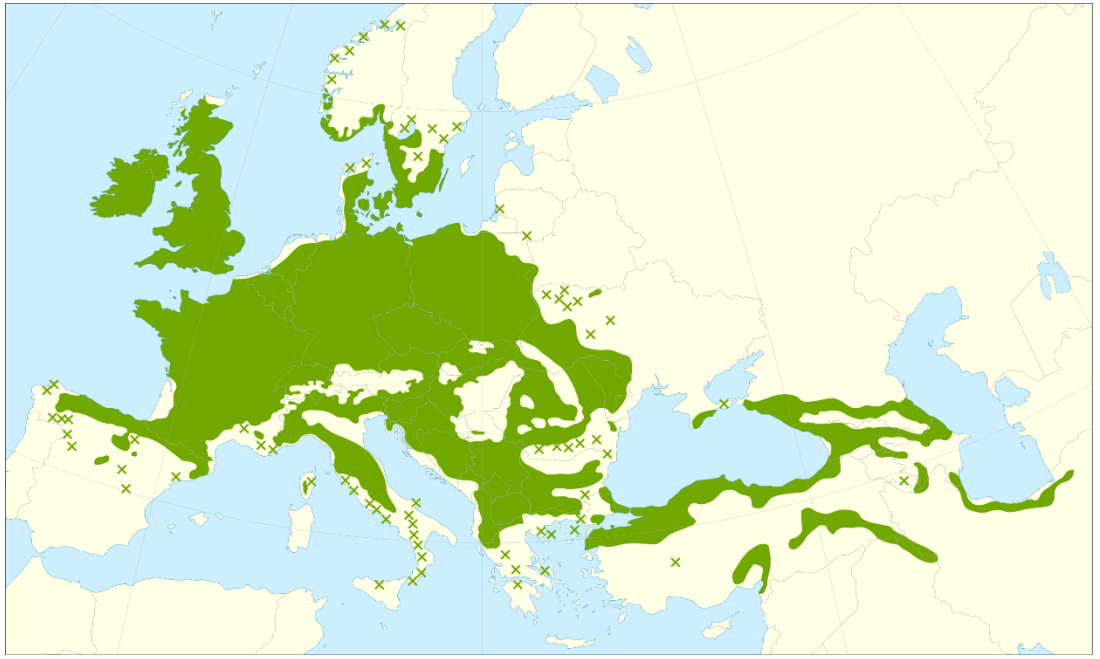

Management and stand establishment scenarios

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- Management
  - NOM – No management, no harvesting
  - BAU – Business as usual: 100 target trees per hectare, start of thinnings at tree height of 15 m, remove 30% at first thinning and 20% at following thinnings
  - AFM – Adaptive forest management: 60 target trees per hectare, start of thinnings at tree height of 9 m, remove 33% of trees each thinning
- Stand establishment
  - 5000 oak per hectare
  - 3000 oak per hectare, 1000 hornbeam per hectare
  - 1500 oak per hectare, 750 hornbeam per hectare

No management (NOM) and current management (BAU) lead to lower stem diamater compared to adaptive forest management (AFM)

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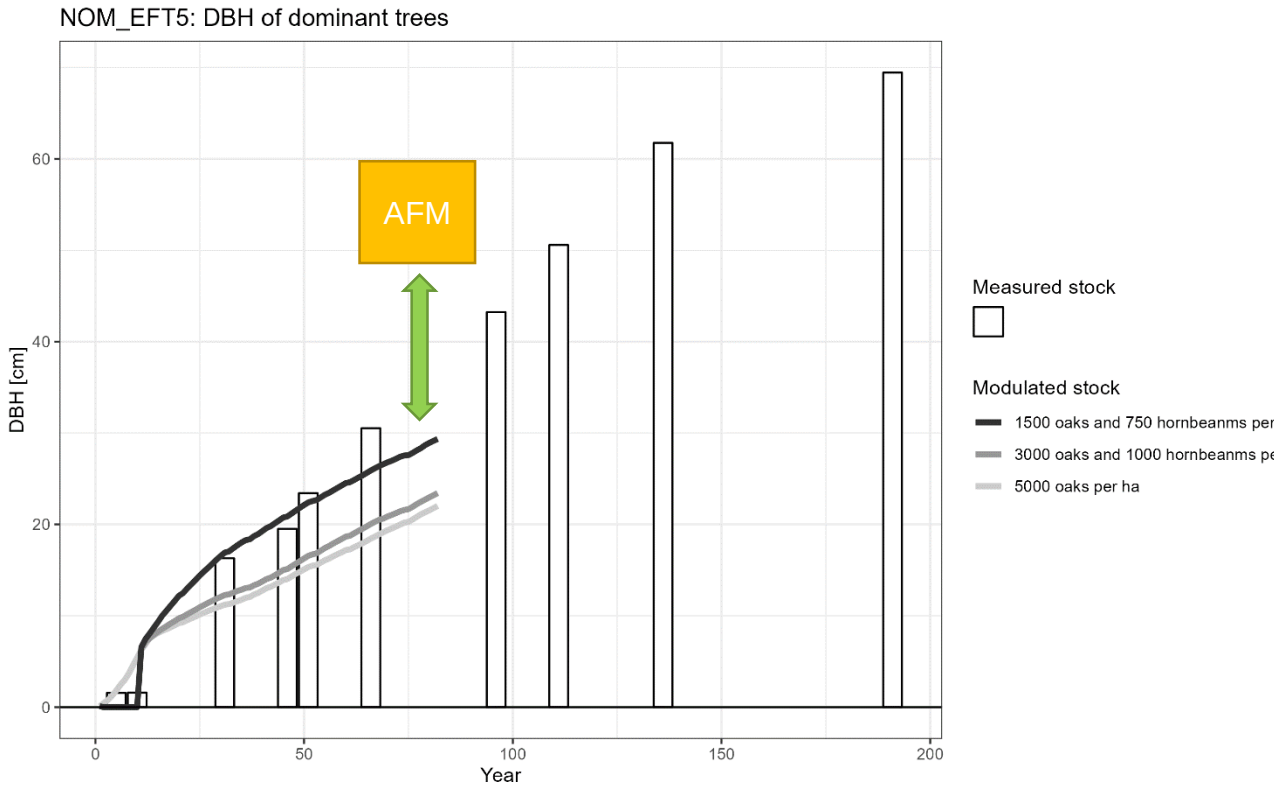
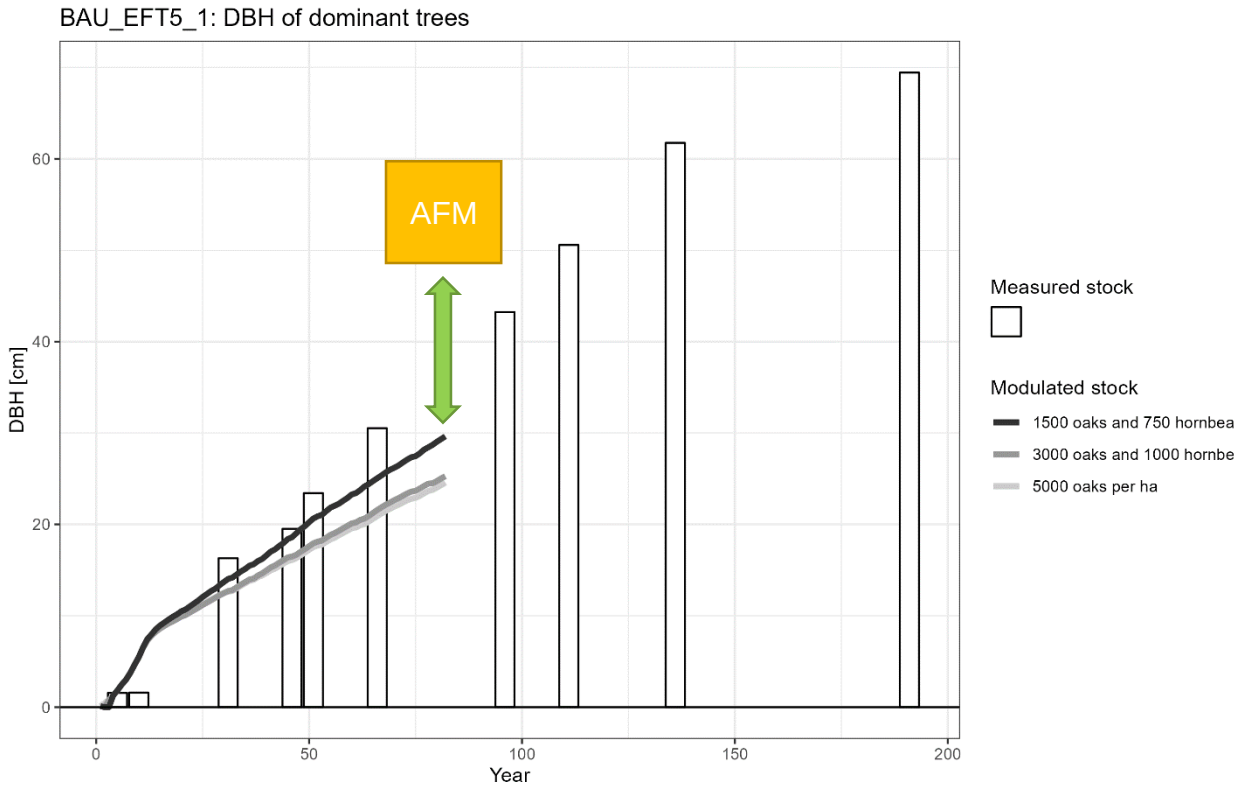
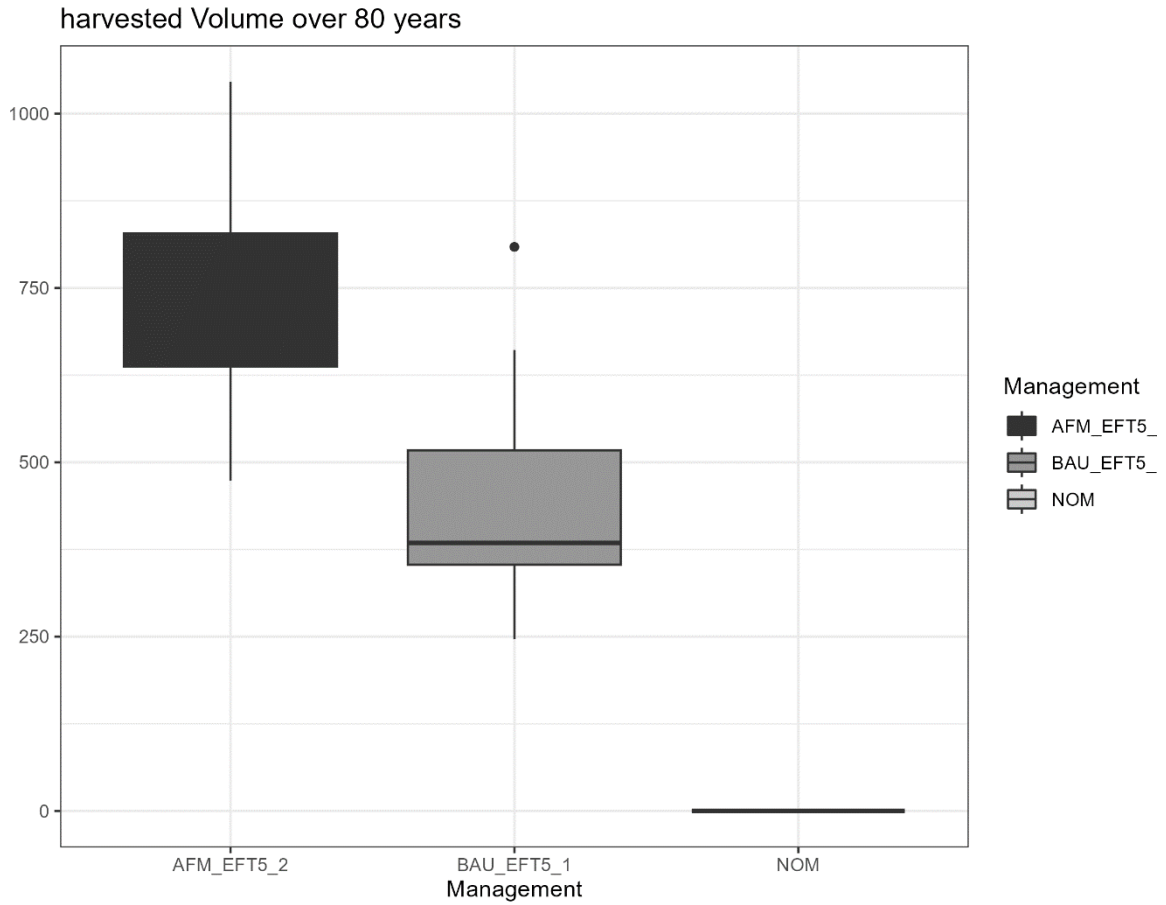




Harvested wood volume

- AFM 750 m3/ha over 80 years, 9.4 m3/ha/year harvested
- BAU 370 m3/ha or 4.6 m3/ha/year harvested
- NOM 0 m3/ha/year



Deadwood stocks are little changed by management alternatives

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