Adaptive management in mountain forests

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Tackling climate change – Tours 21. Mai 2012

Challenges for adaptive management in mountain forests

① CC affects productivity / ↑ or ↓

② maintaining protection against natural hazards

③ maintaining other ecosystem services (carbon sequestration, water provision, . . . (biodiversity))

❶ storm

❷ fire

❸ insects & pathogens

❹ societal change / demands by society

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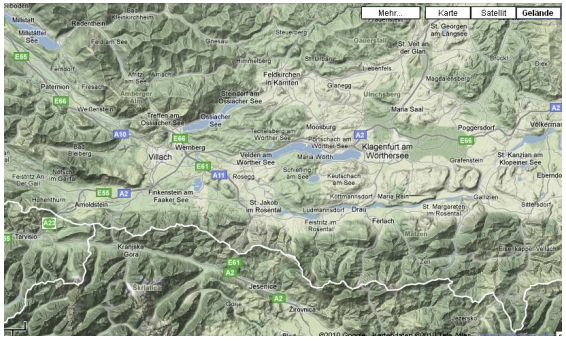
Methods

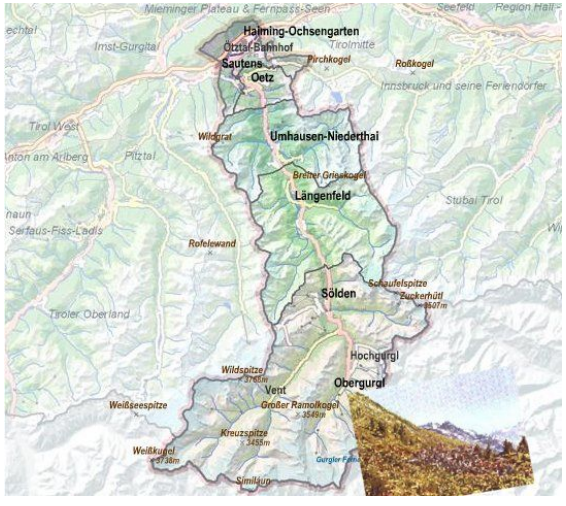
Modeling exercise

- Caldis (based on PrognAUS) for forest productivity
- Yasso07 for soil carbon

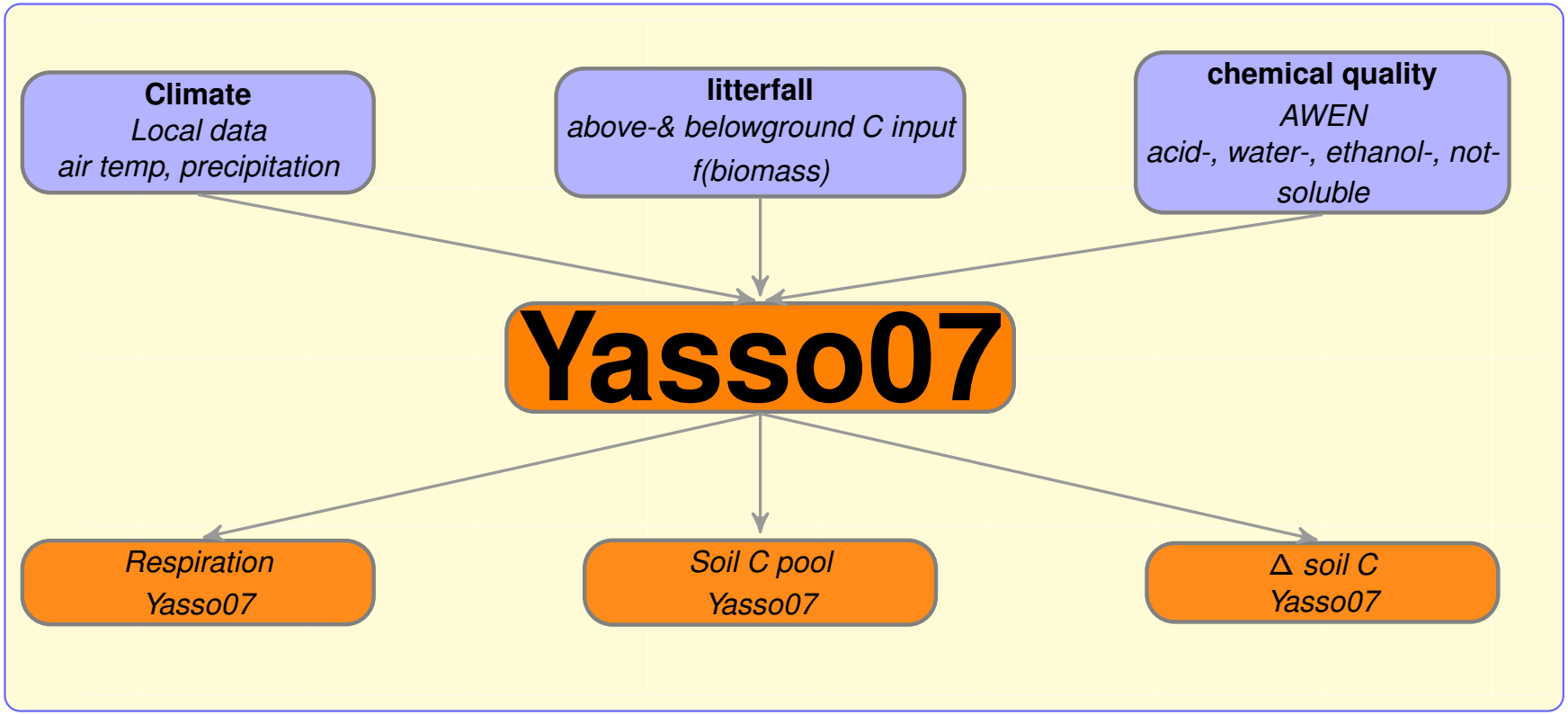
Ossiacher Tauern
”spruce optimum”



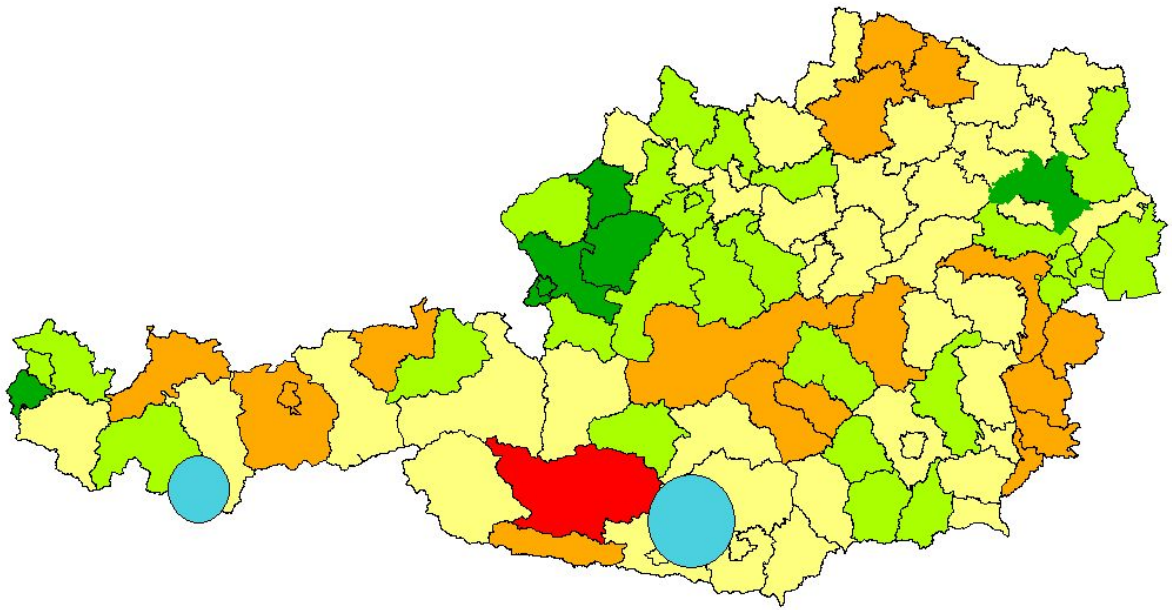
Obergurgl / upper timberline



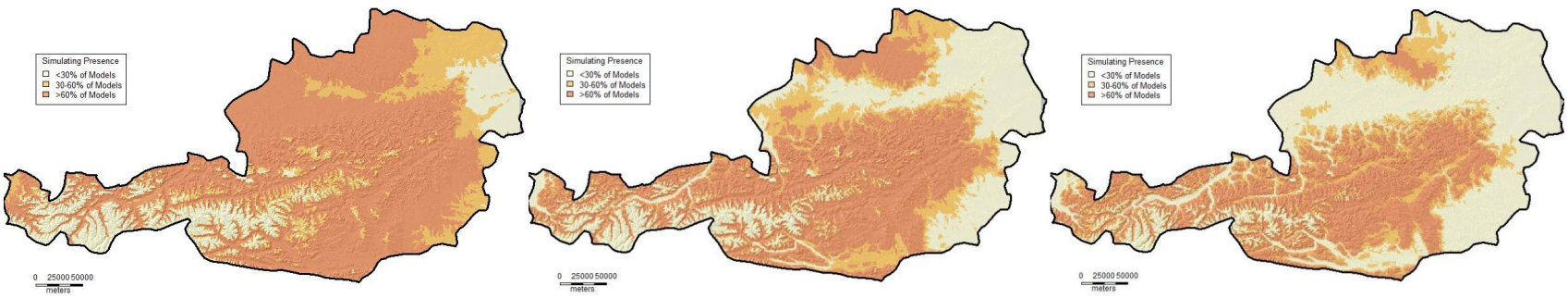
Yasso07


Climate
Local data
air temp, precipitation
litterfall
above-& belowground C input
f(biomass)
chemical quality
AWEN
acid-, water-, ethanol-, not-soluble
Yasso07
Respiration
Yasso07
Soil C pool
Yasso07
Δ soil C
Yasso07

Warnings



Warnings



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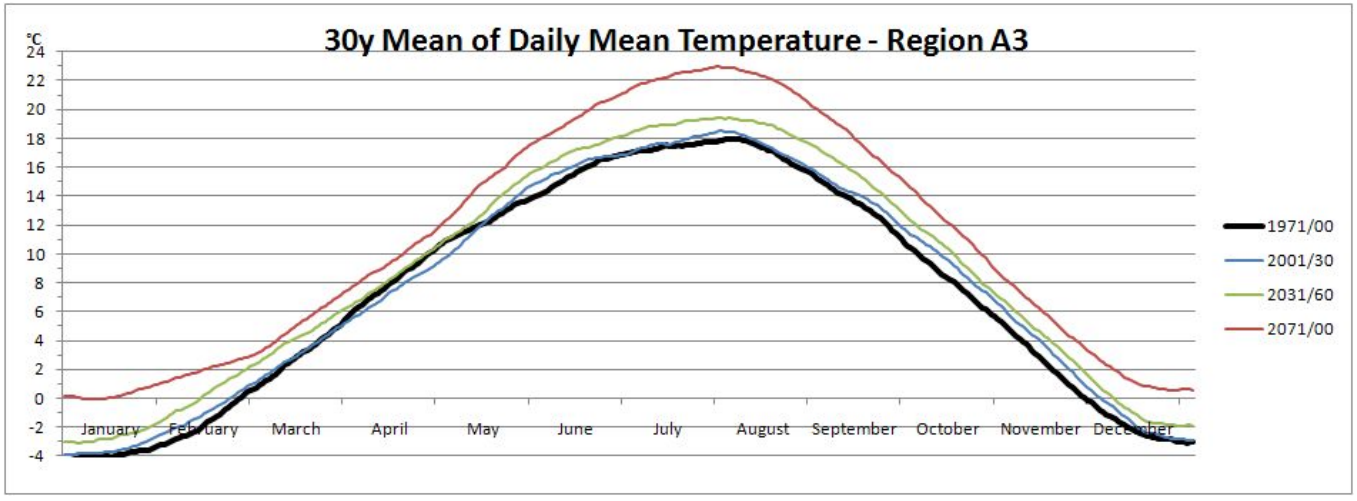
Warnings


30y Mean of Daily Mean Temperature - Region A3
°C
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
January
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September
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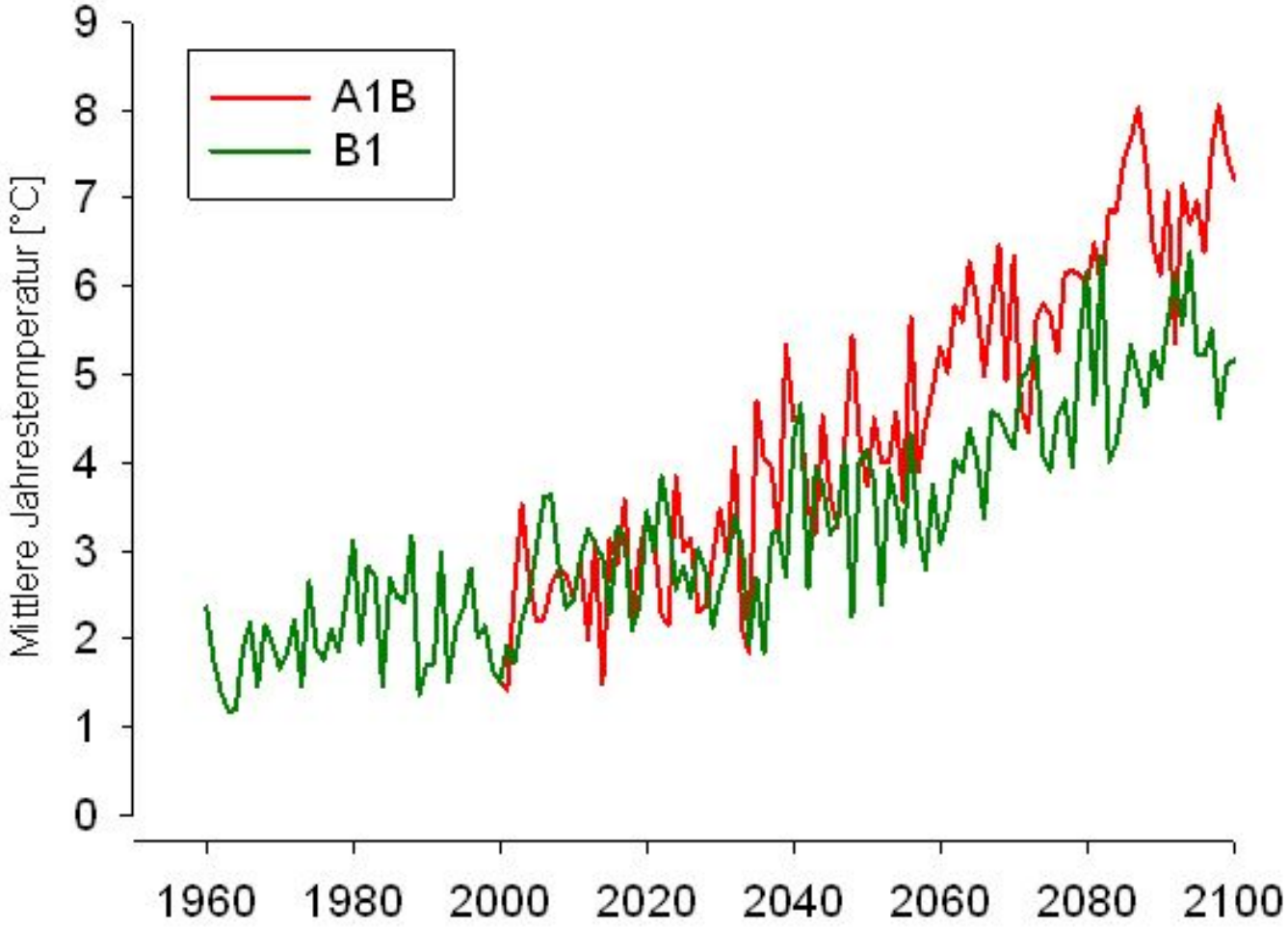
November
December
1971/00
2001/30
2031/60
2071/00

Warnings


A1B
B1
Mittlere Jahrestemperatur [°C]
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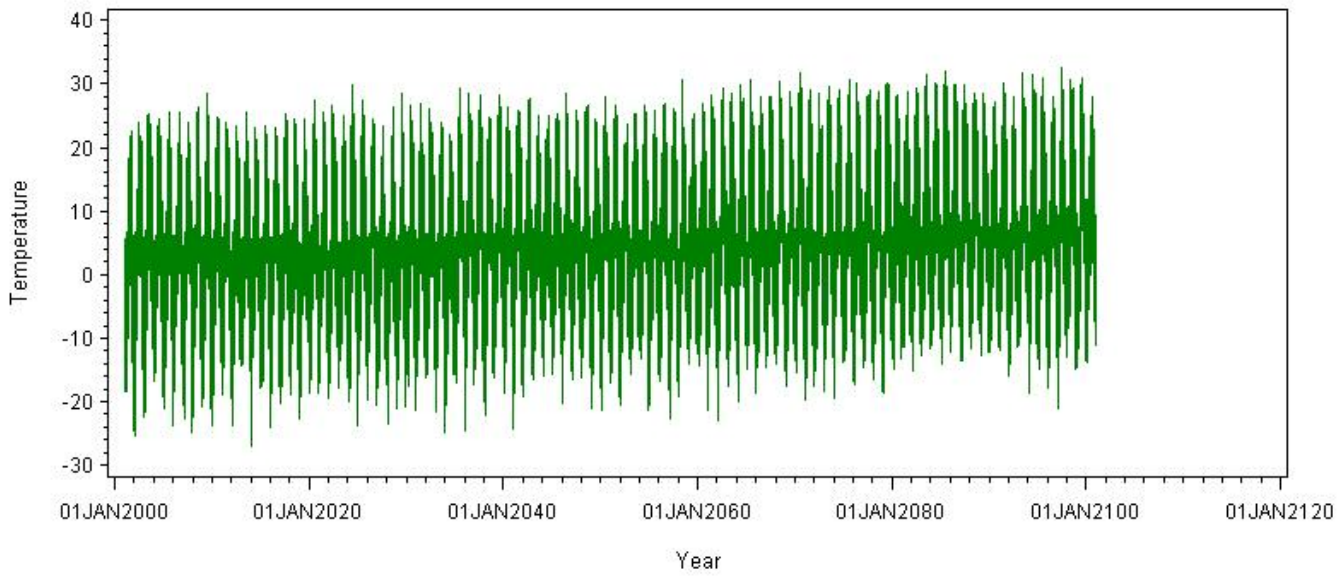
2100

Climate sceptics



The Cembran pine forest at timberline does not move

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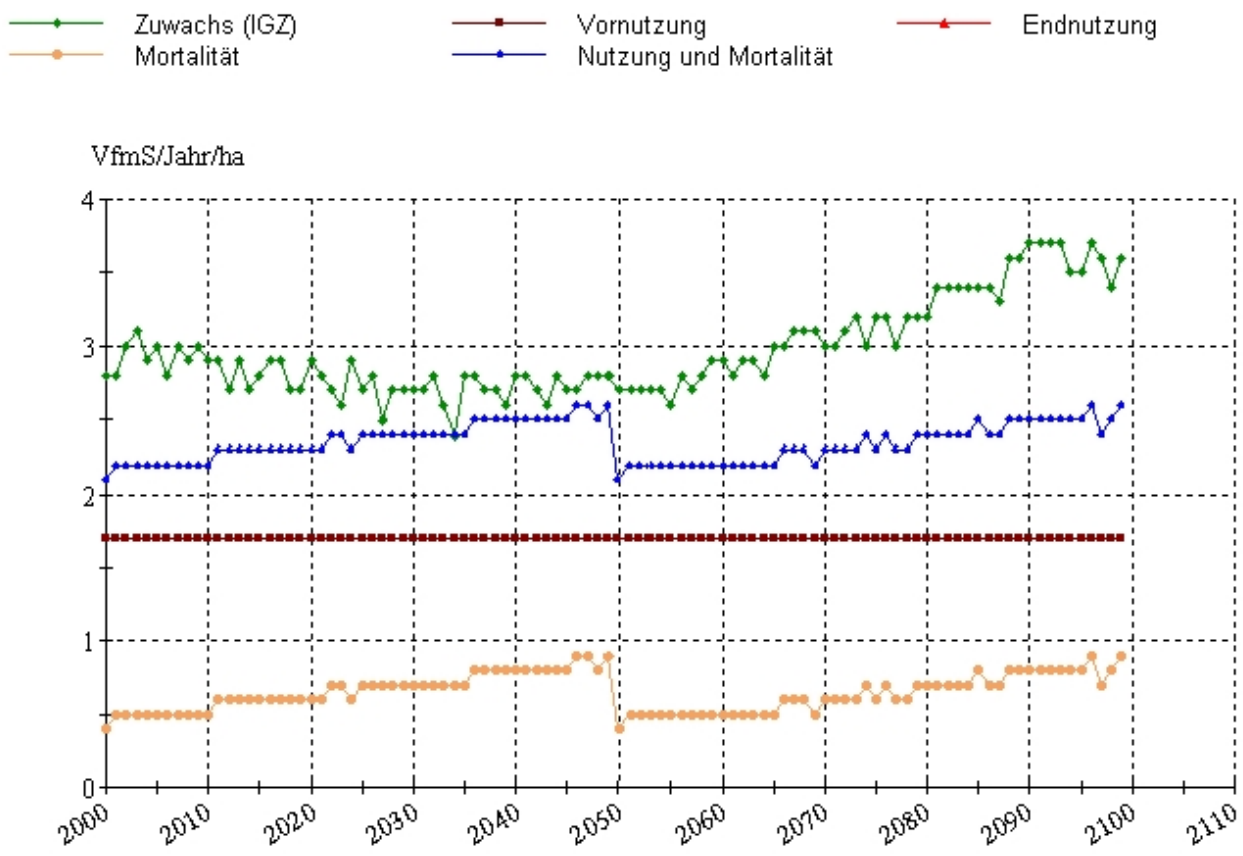

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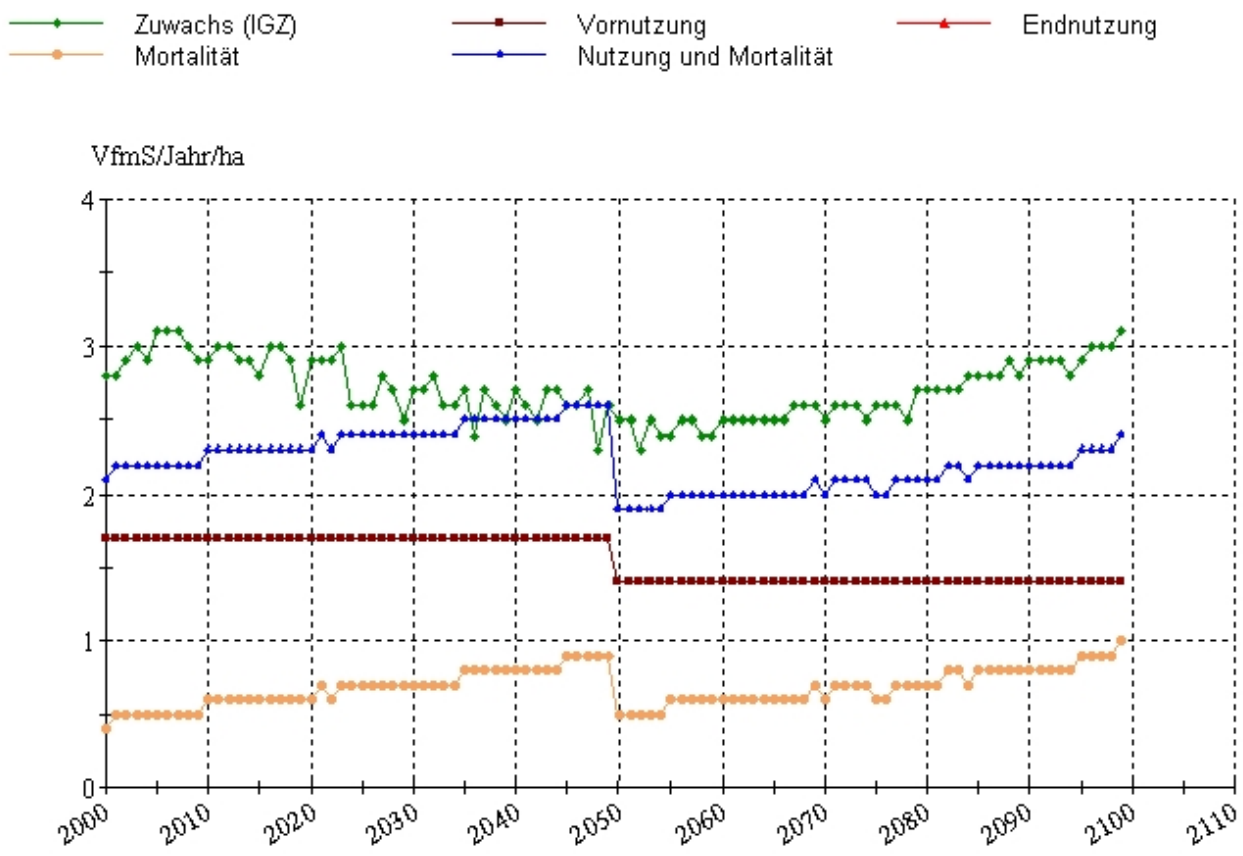
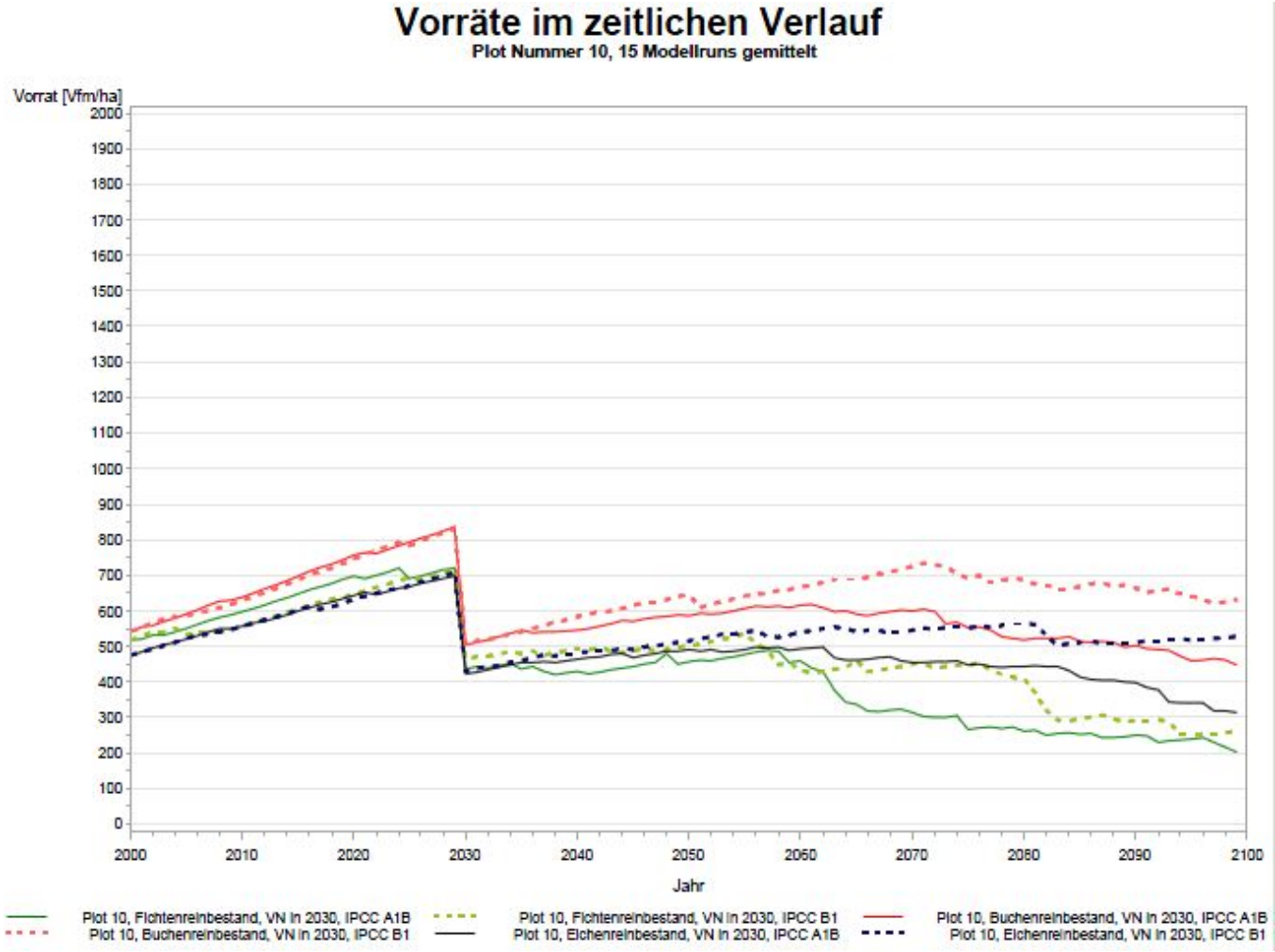


The Cembran pine forest at timberline does not move

The Cembran pine forest is not particularly threatened

- deep alpine valleys are hardly exposed to storm / except for bad luck
- insects & pathogens are still way below the timberline
- fire ??? / evidence of charcoal in soils

The spruce site in Ossiach changes dramatically



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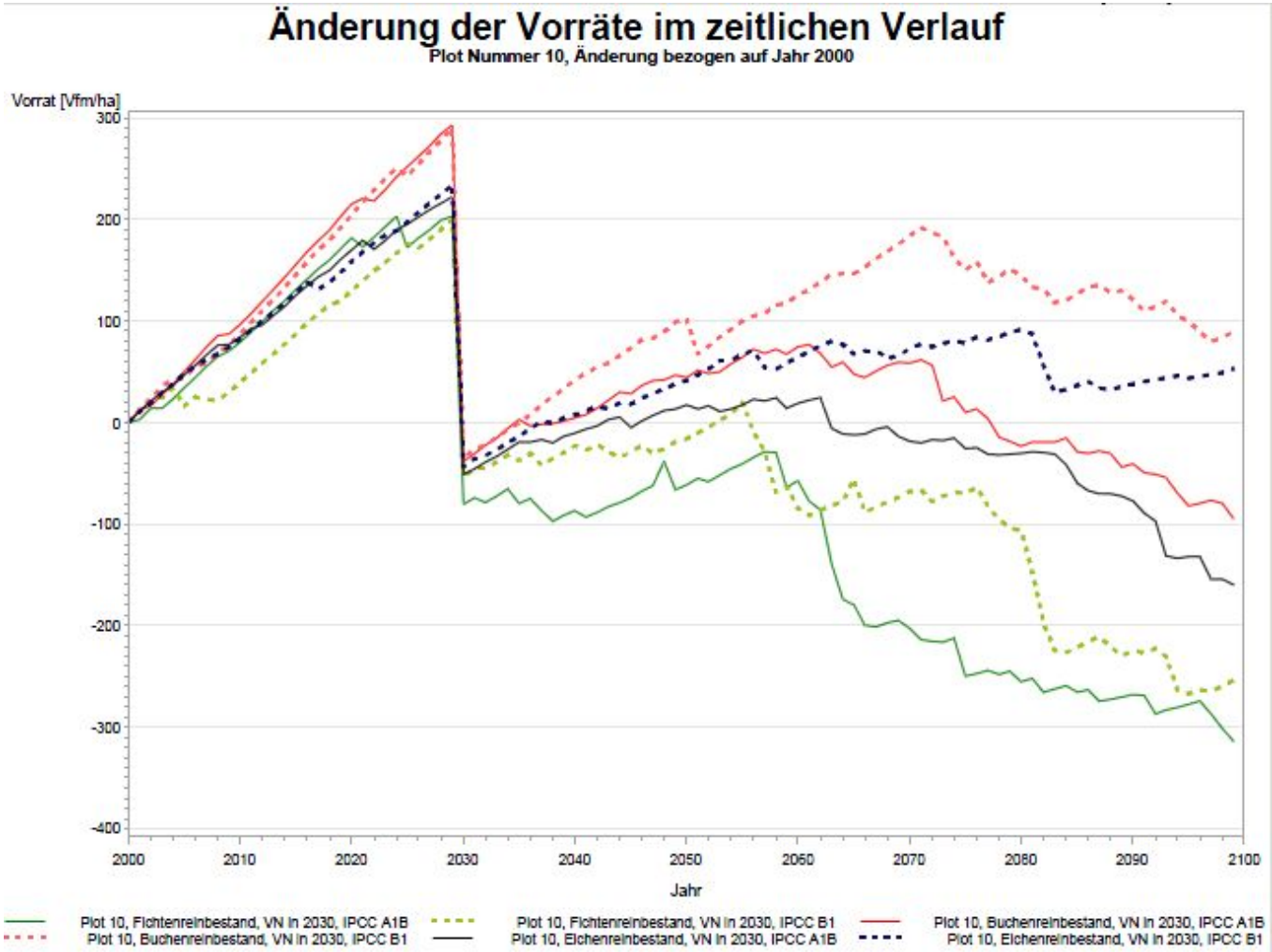

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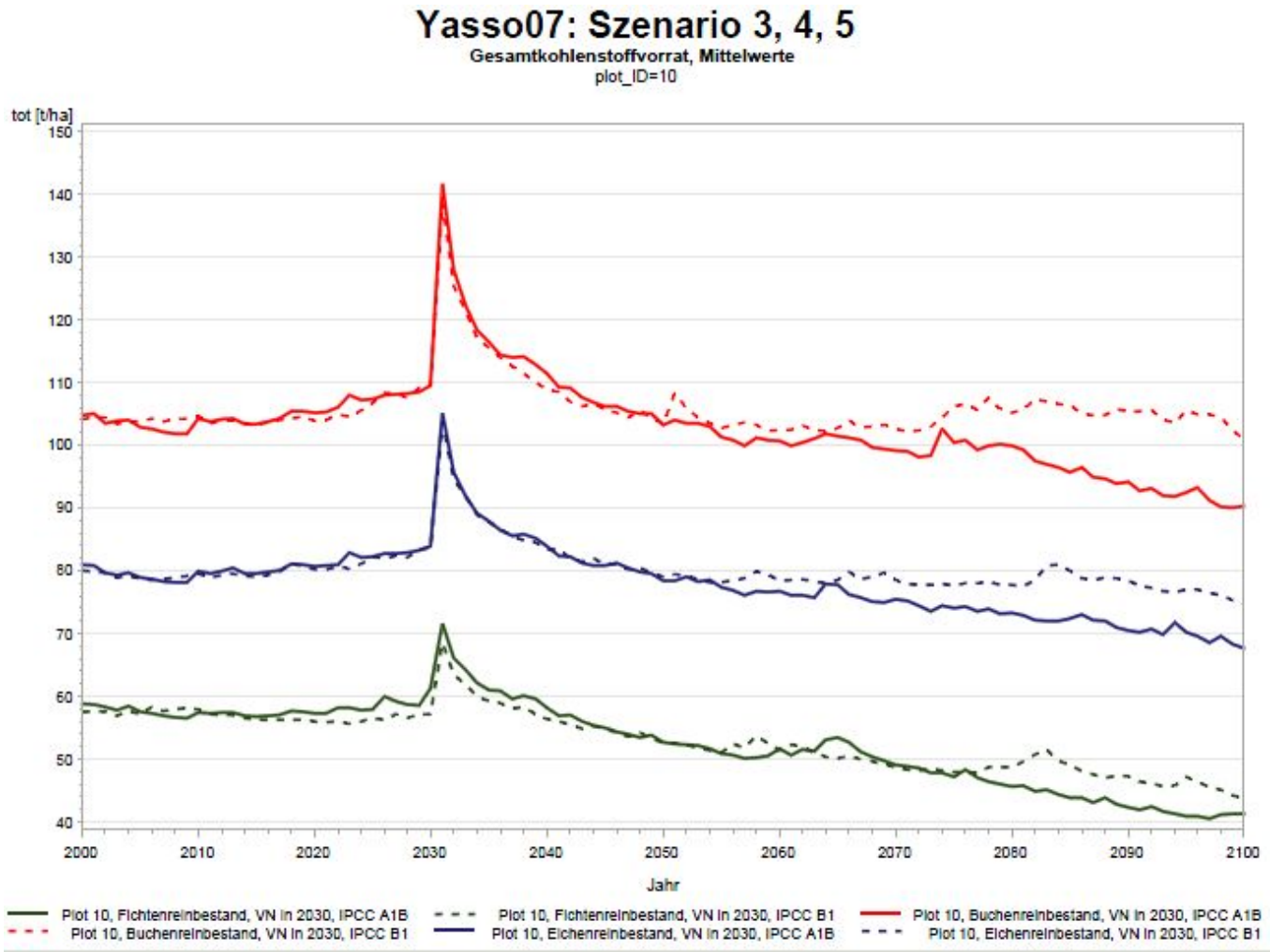
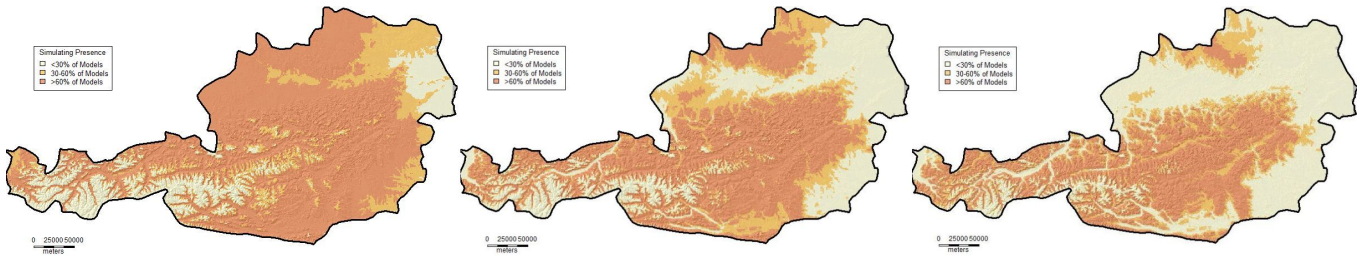


Ossiach: spruce needs help



- increasing drought stress
- increasing pressure from insects not even considered
- call for more intense management

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Future of mountain forestry

- societal changes predictable?
- efforts to establish energy autarky / high demand for wood
- high management costs and low productivity / low demand for wood
- increasing timber prices in Austria in last 10 years
- paradigm shift from ”protection of protection forests” to more intense utilization
- regulation of ungulates (deer) density

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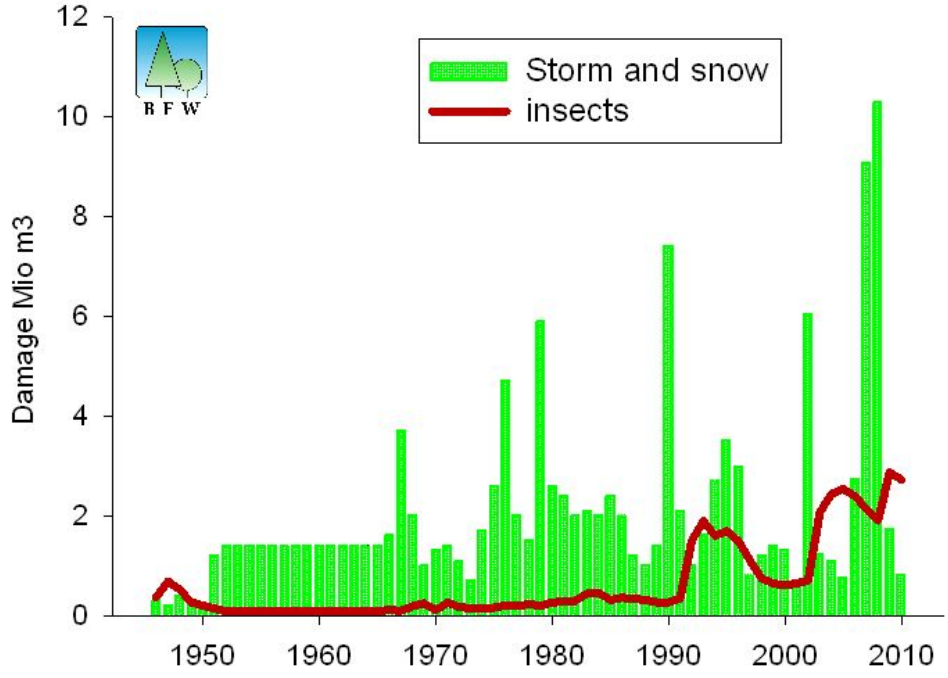
Recommendations

- stable mixed forests
- quick salvage after storm
- preservation of humus layer (water, productivity)
- establish case studies ”adpative management *sensu* Buzz Holling



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Summary

- high elevation forests less affected than montane forests
- highly productive spruce forests in mountains require attention
- soil carbon pool not necessarily stable; implications for ecosystem services
- common slogans apply for climate change issues in mountain forestry
- unpredictability of societal moves

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Acknowledgements