



Challenges to implementing a model-based FMRL in Switzerland

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Model-based FMRL - Overview

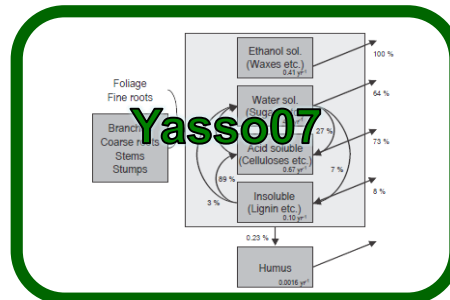
- Constructing: Forest growth model and a litter decomposition model
 - JRC-IIASA-EFI: EFISCEN (5-year time step) and Yasso (annual; Liski et al. 2005)
 - Switzerland: MASSIMO (5-year time step) and Yasso07 (annual; Tuomi et al. 2009, 2011))
- Accounting during CP2
 - Model against model
 - Data against model
 - Annual or over CP

Model-based FMRL - Switzerland

FMRL

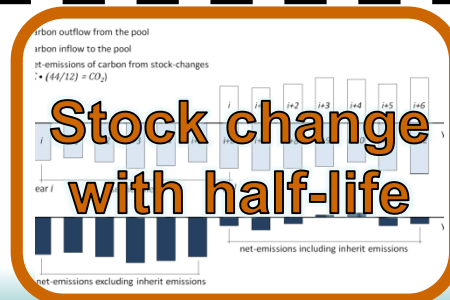
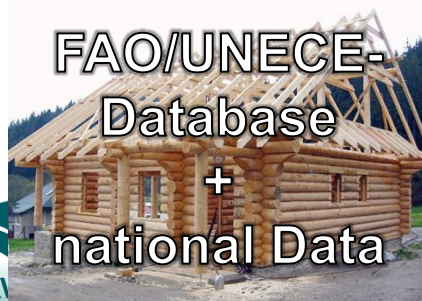


above- &
belowground
living biomass



dead wood,
litter and soil

Management
scenario
BAU



HWP

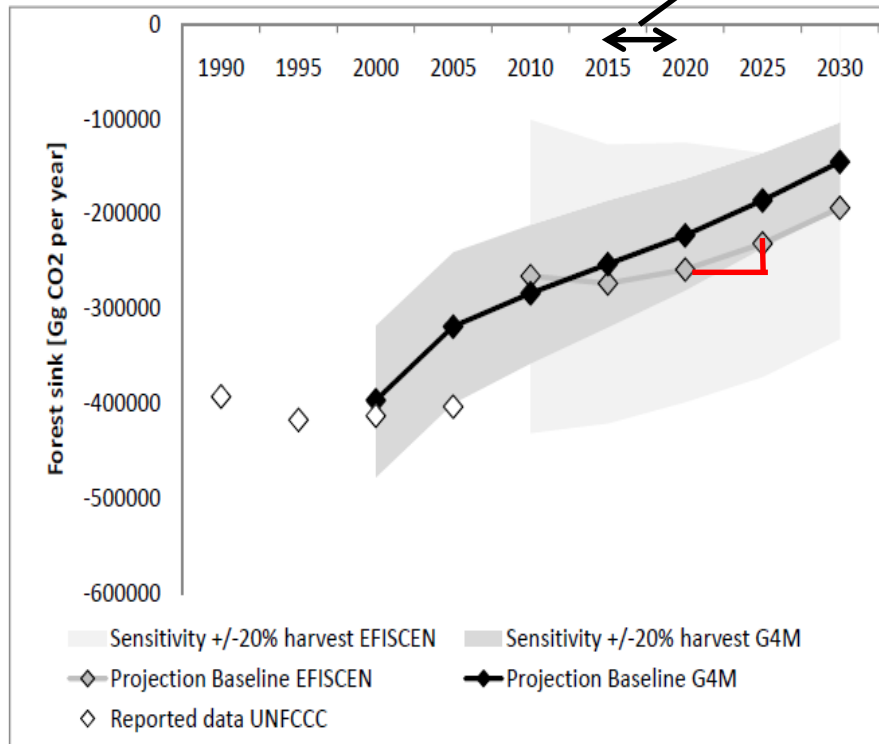
Challenges – accounting in CP2

- Annual reporting: Model limitations
 - Multi-annual time step
- Accounting: „measurements-model“ or „model-model“
 - methodological consistency
 - „model-model“: FMRL based on most current data before 2009; deriving time series since 1990
- Excluding extraordinary natural disturbances
 - „background level“ including uncertainty
 - function of historical management

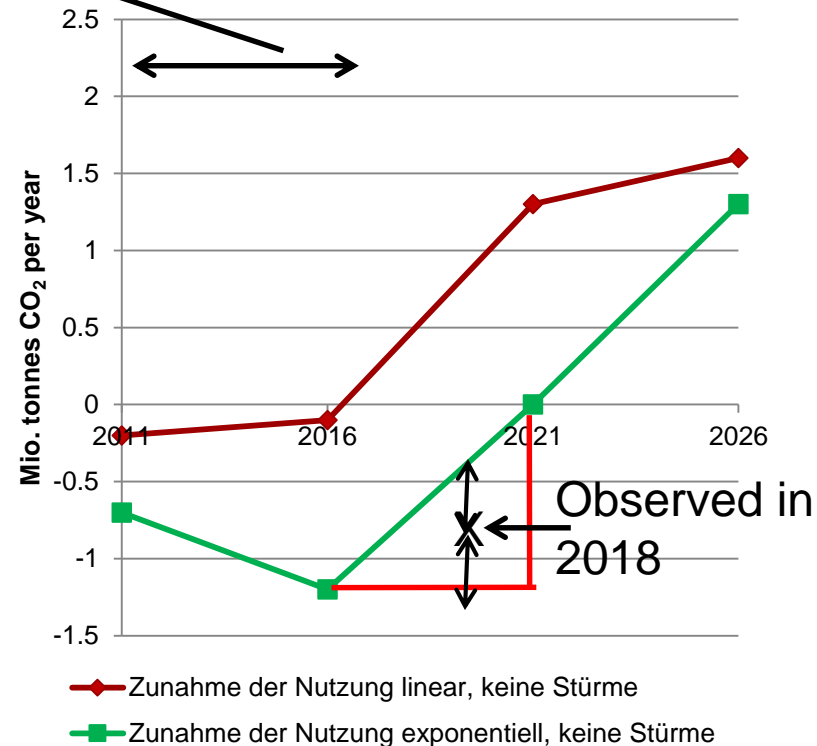
Implications – annual accounting

EU-27 (Boettcher et al. 2011)

Projection based on 5-year model time step against which to account
 - Linear or step-wise interpolation

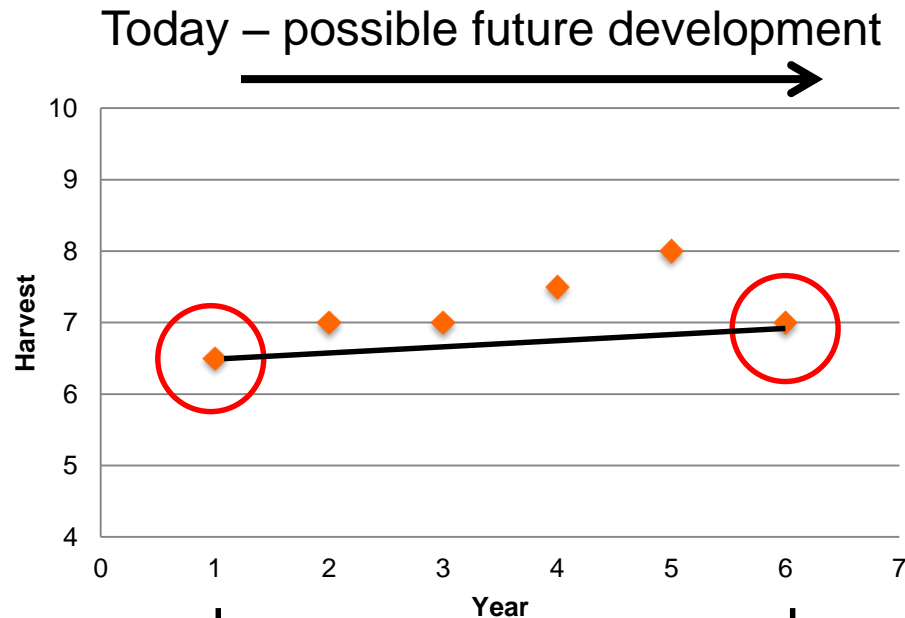


Switzerland



Implications – annual accounting

- Limitation of multi-annual model

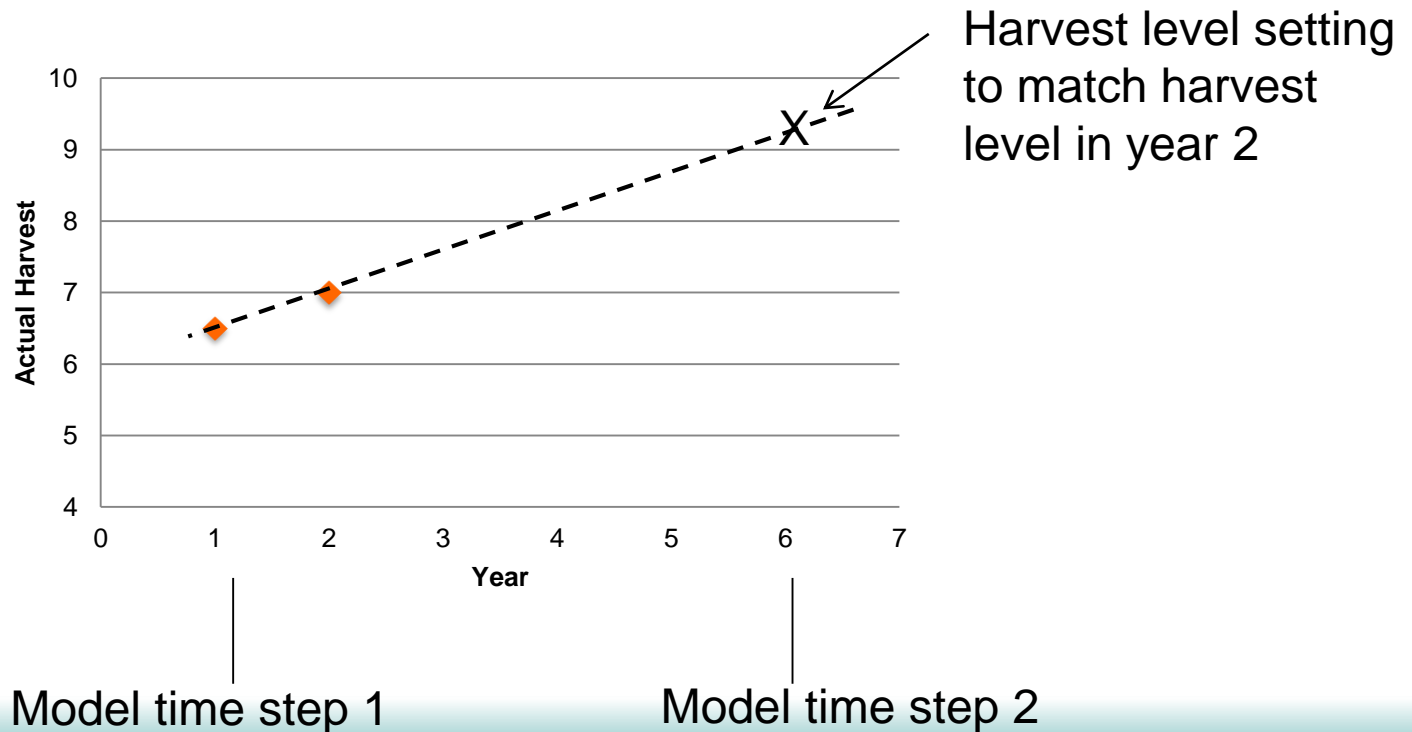


Model time step 1

Model time step 2

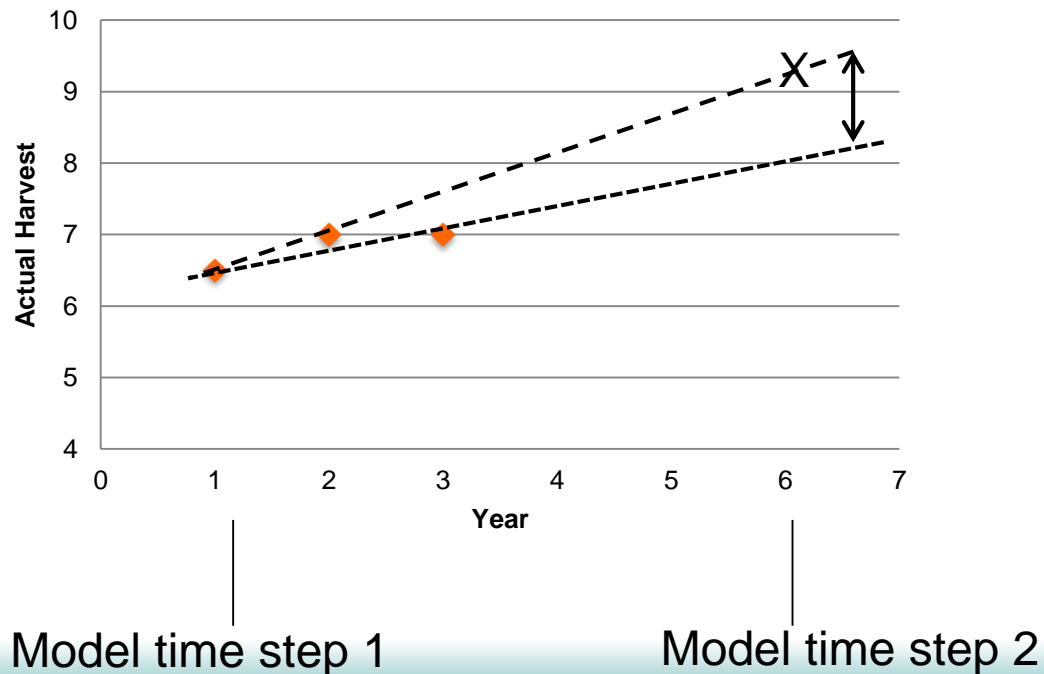
Implications – annual accounting

- Accounting Year 2



Implications – annual accounting

- Accounting Year 3



Implications – time series, pools

- Time series since 1990 requires running a model backwards in model-model accounting
- Transfer of litter between growth and decomposition models
 - Ensure consistency and maintain mass balance
- „background“ level of natural mortality
 - Data and model limitations

Further considerations and challenges

- Verification / Validation
- Forest structure and FM
 - Uneven-aged and mixed species forests
 - eg protection forests based on individual trees
- Forest regeneration – new species mix
- Empirical models rely on yield table information – still applicable?
- After switch to 2006 guidelines no averaging over several years to account for limitations of multi-year models





Thank you!