

Selected issues of the first KP report and their fix in Hungary

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MgSzH

„LULUCF issues under the Kyoto Protocol”
EU DG JRC, Brussels, 10 November 2010

TOPICS

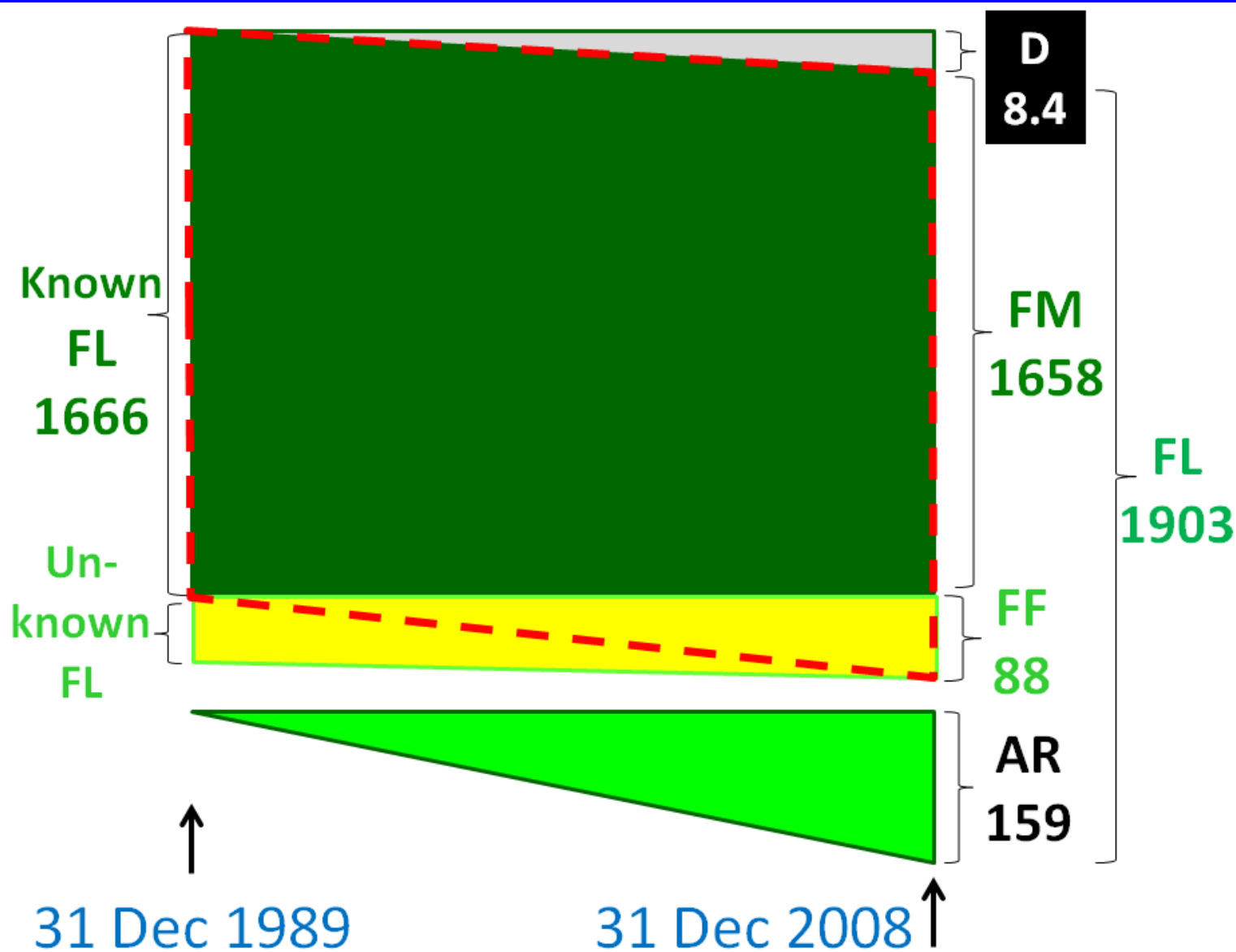
We found forests...

Soil demo v.2

Estimating uncertainty by MCA

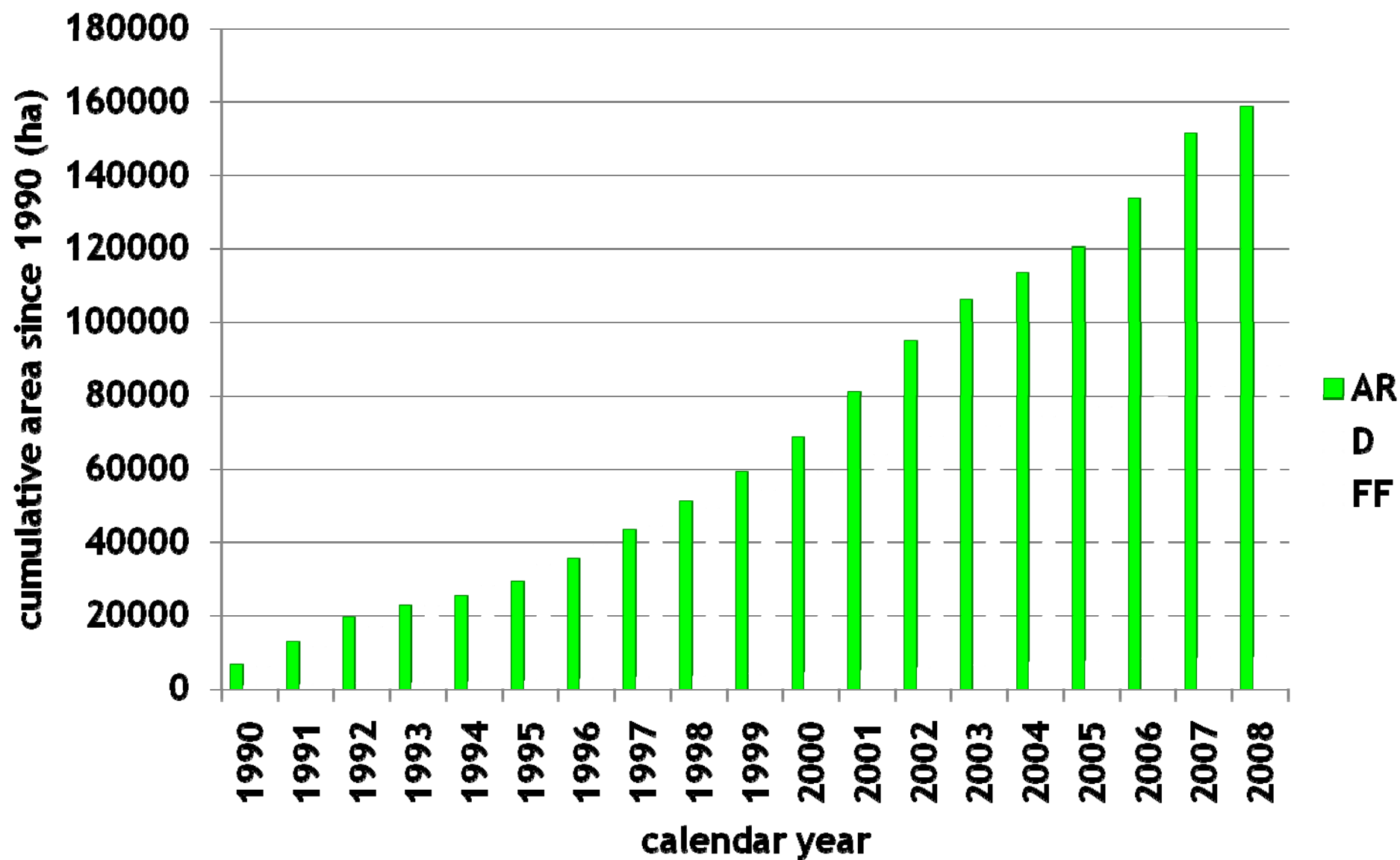


Evolution of **known** forest area



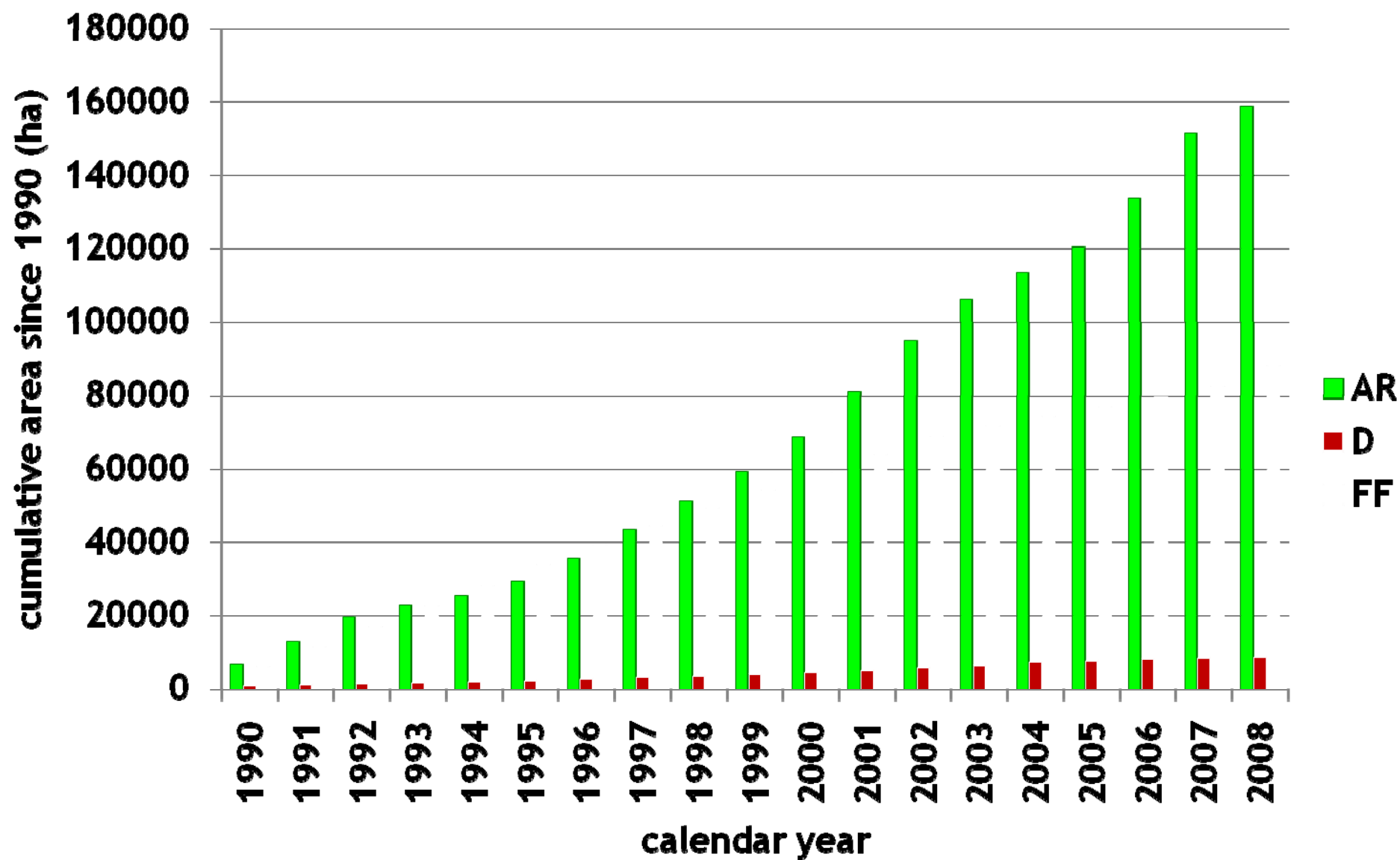


Evolution of forest area



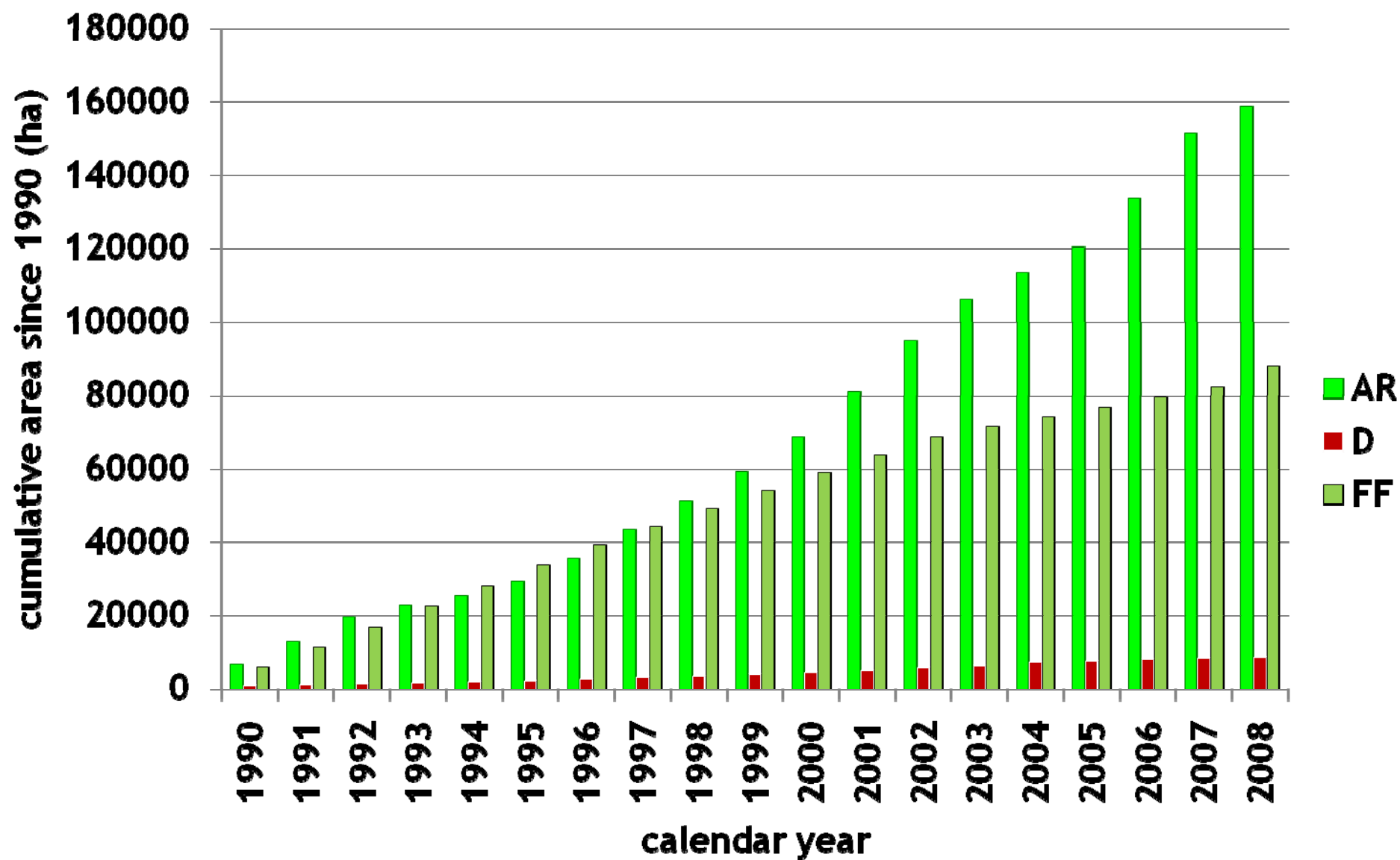


Evolution of forest area





Evolution of forest area





Guidance by IPCC 2006 GL

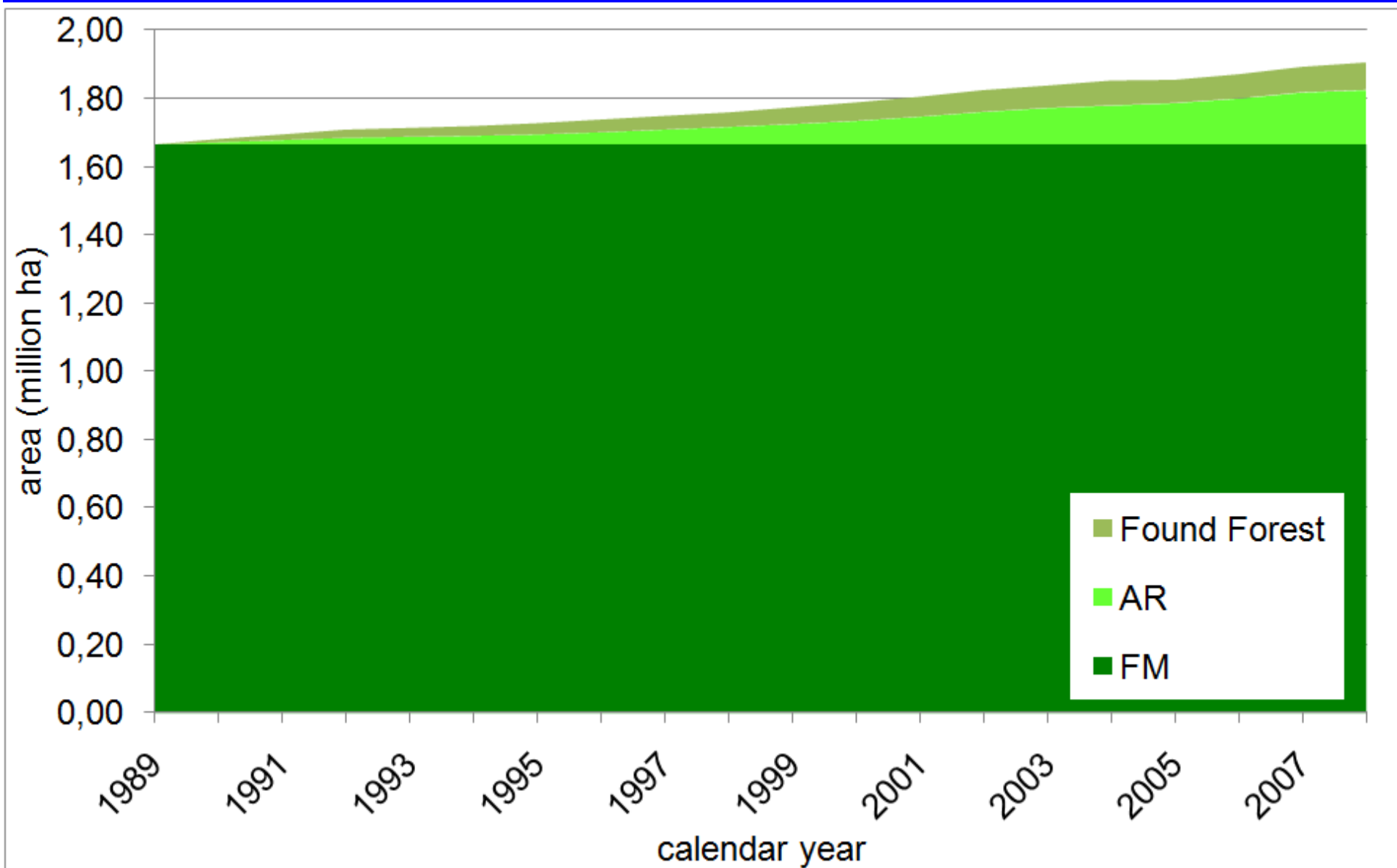


$\Delta_{FM} = f(FL_2, FL_1)$ but:

„When using the Stock-Difference Method..., it is important to ensure that the area of land in that category at times t_1 and t_2 is identical...”



IF $FL = FM + AR + FF$, $\Delta C_{FM} = ?$





$FL_1 \longrightarrow FL_2$ balance

$$FL_1 = D + FM_1$$

$$FL_2 = FL_1 - D$$

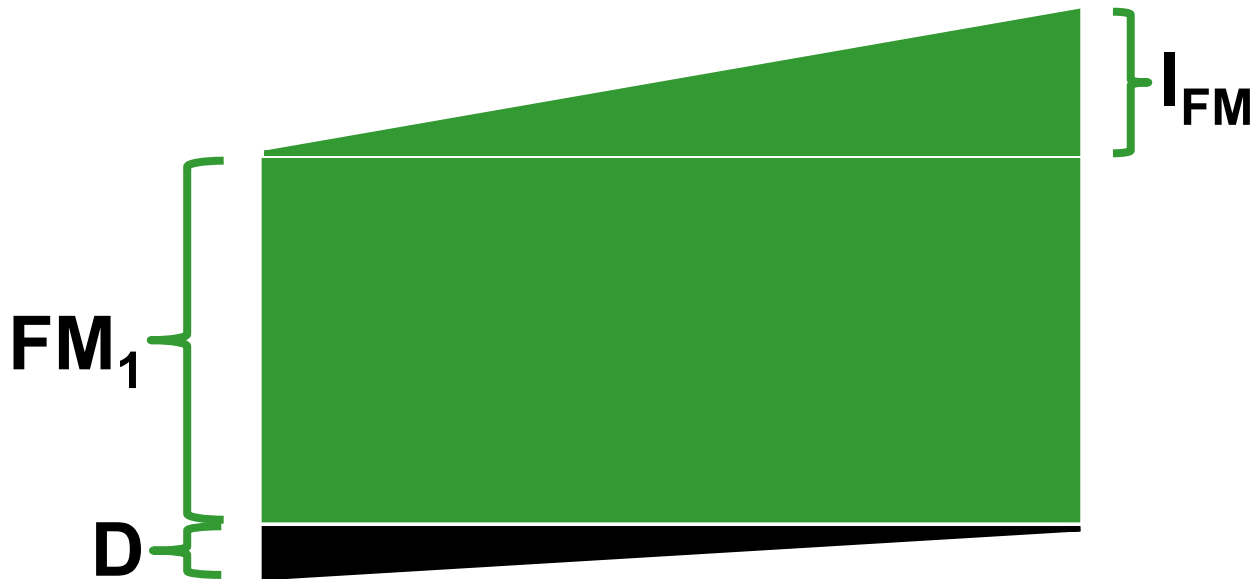




$FL_1 \longrightarrow FL_2$ balance

$$FL_1 = D + FM_1$$

$$FL_2 = FL_1 - D + I_{FM}$$

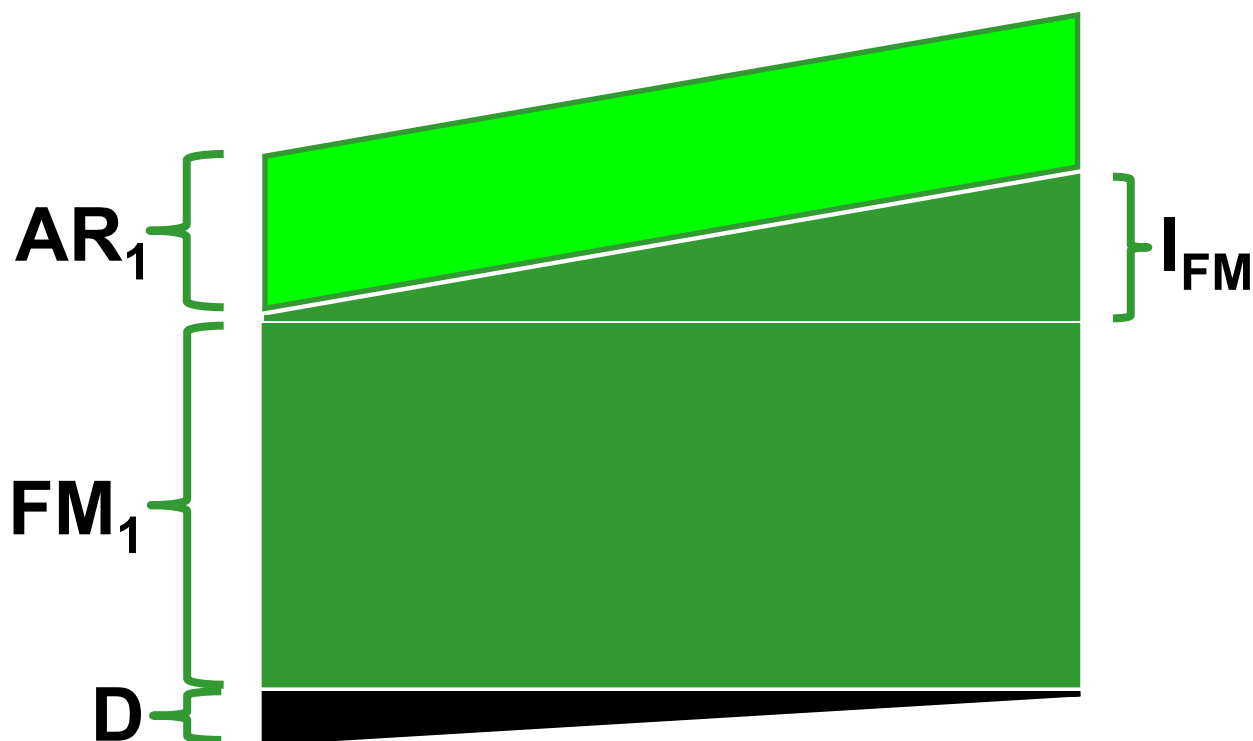




$FL_1 \longrightarrow FL_2$ balance

$$FL_1 = D + FM_1 + AR_1$$

$$FL_2 = FL_1 - D + I_{FM}$$

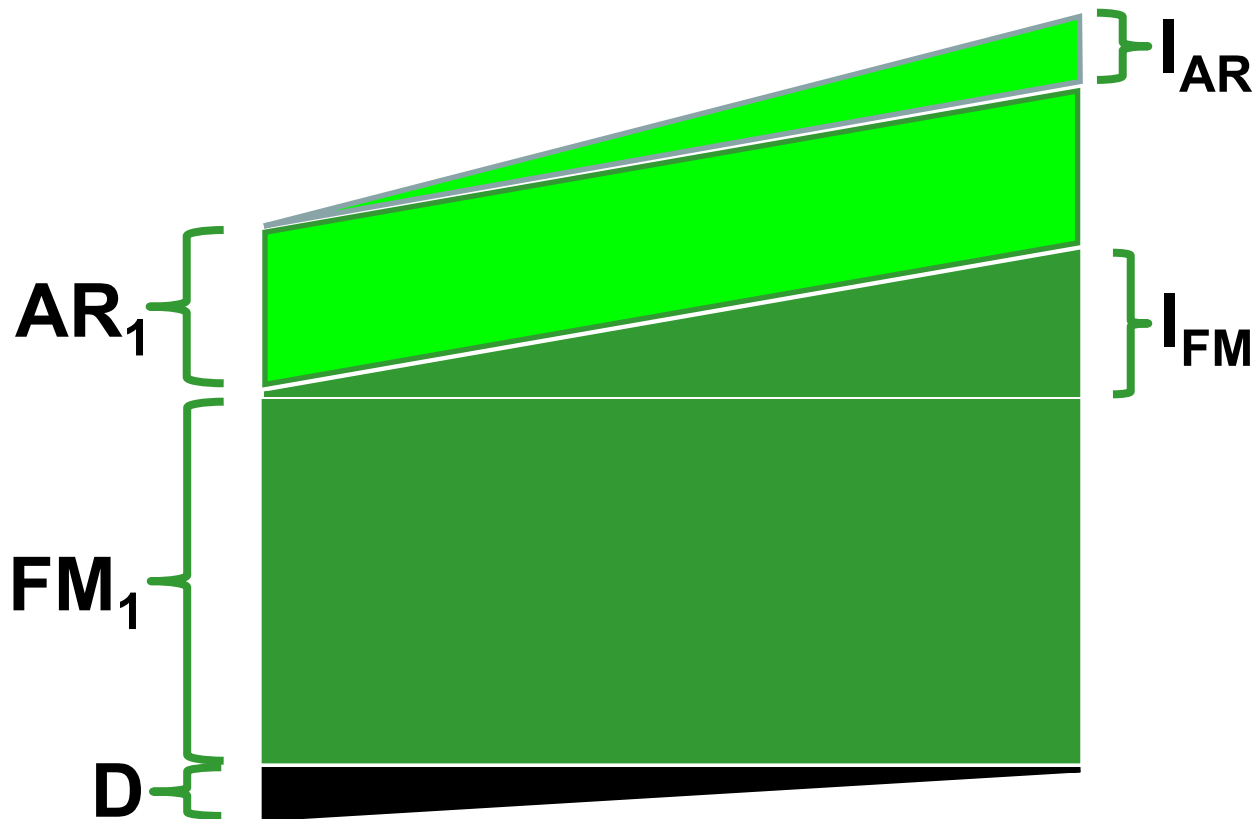




$FL_1 \longrightarrow FL_2$ balance

$$FL_1 = D + FM_1 + AR_1$$

$$FL_2 = FL_1 - D + I_{FM} + I_{AR}$$

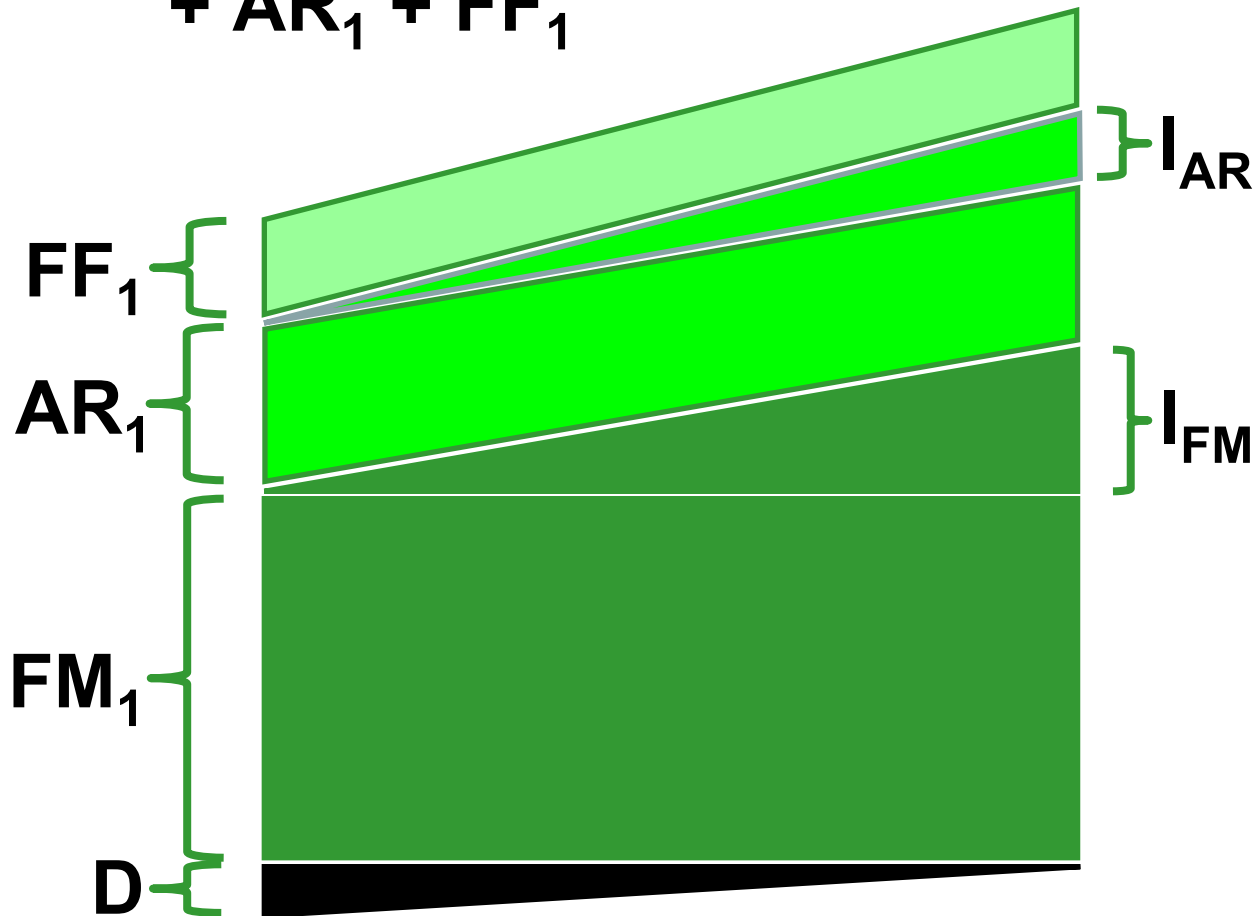




$FL_1 \rightarrow FL_2$ balance



$$FL_1 = D + FM_1 + AR_1 + FF_1$$

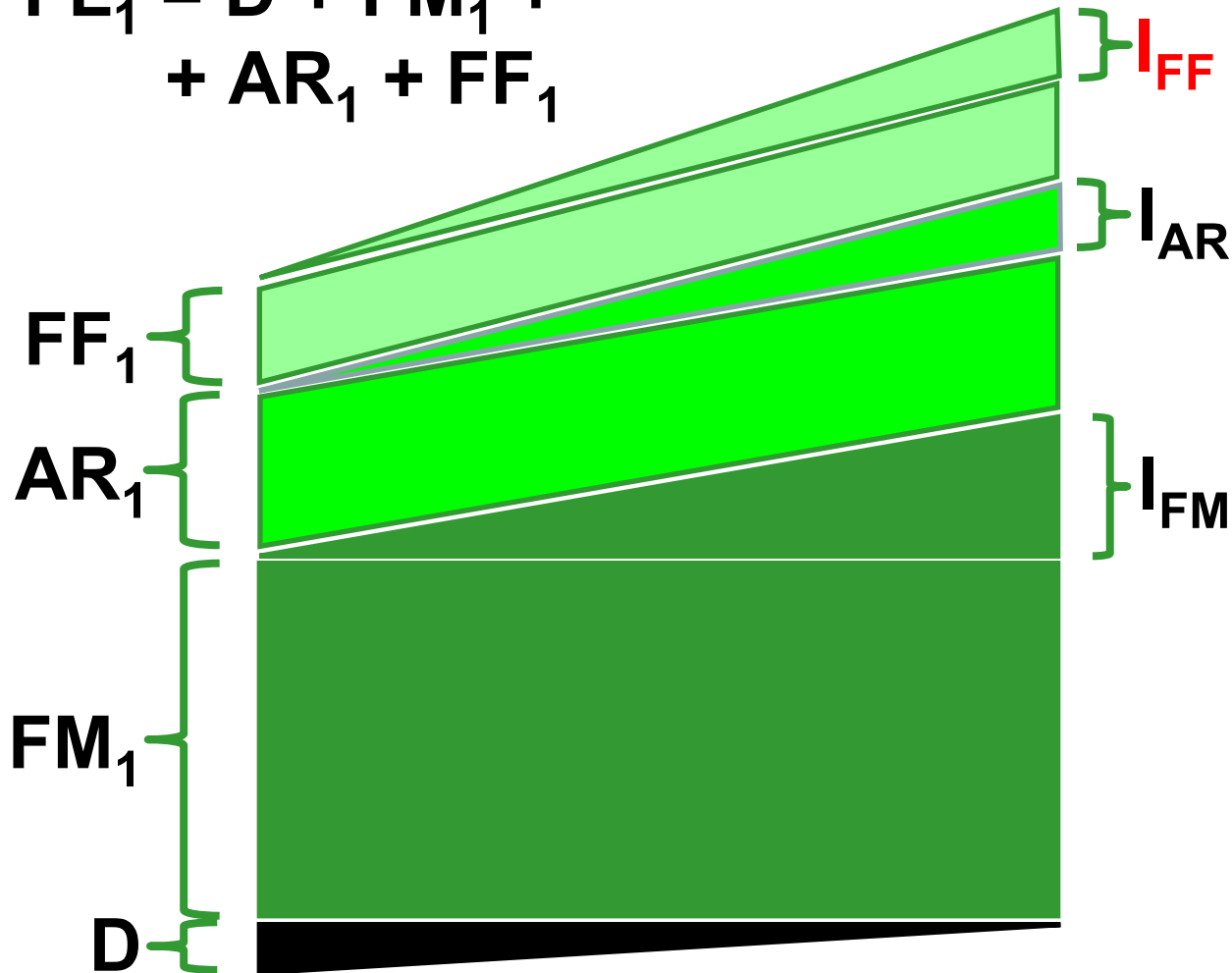


$$FL_2 = FL_1 - D + I_{FM} + I_{AR} + I_{FF}$$



$FL_1 \rightarrow FL_2$ balance

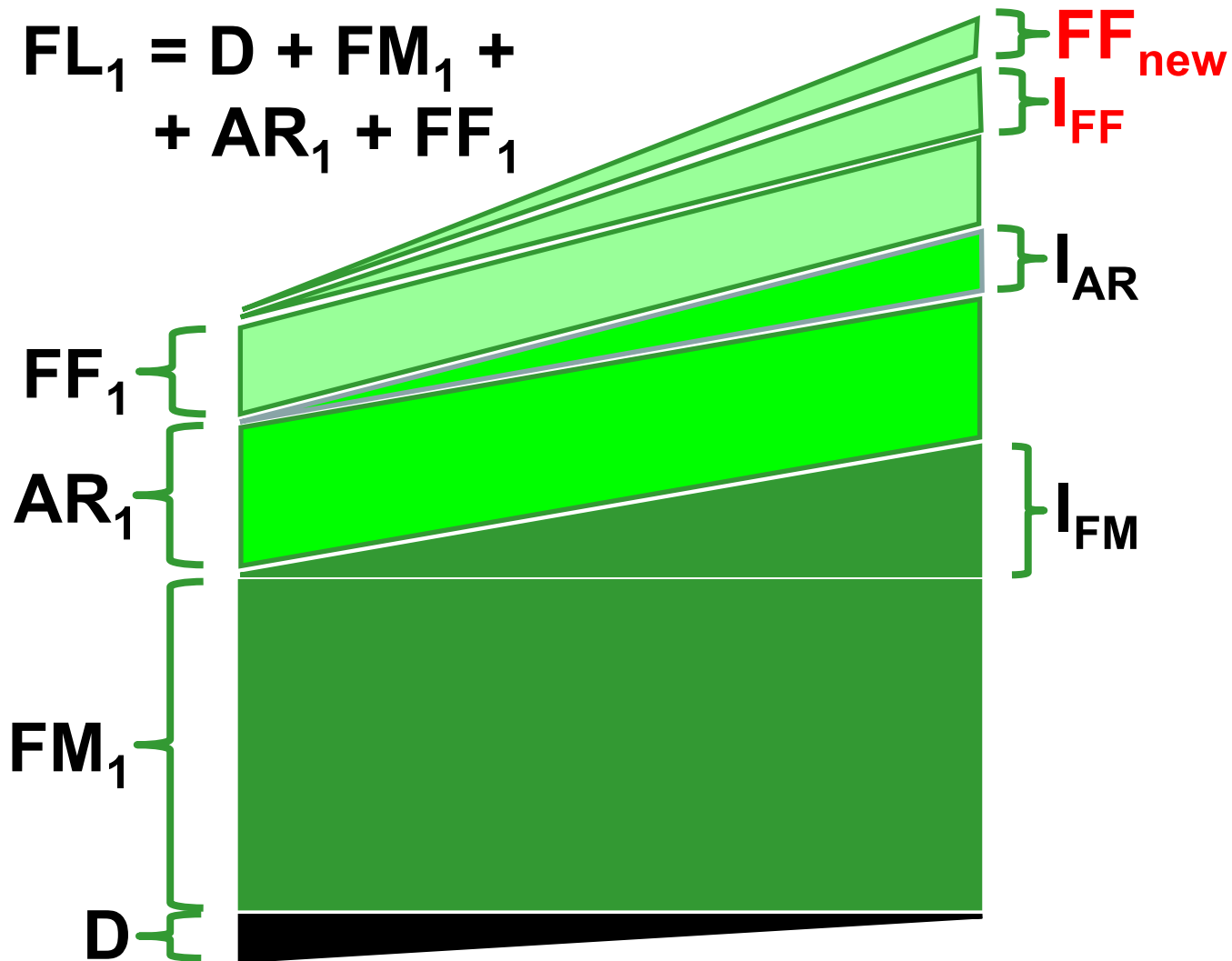
$$FL_1 = D + FM_1 + AR_1 + FF_1$$



$$FL_2 = FL_1 - D + I_{FM} + I_{AR} + I_{FF}$$



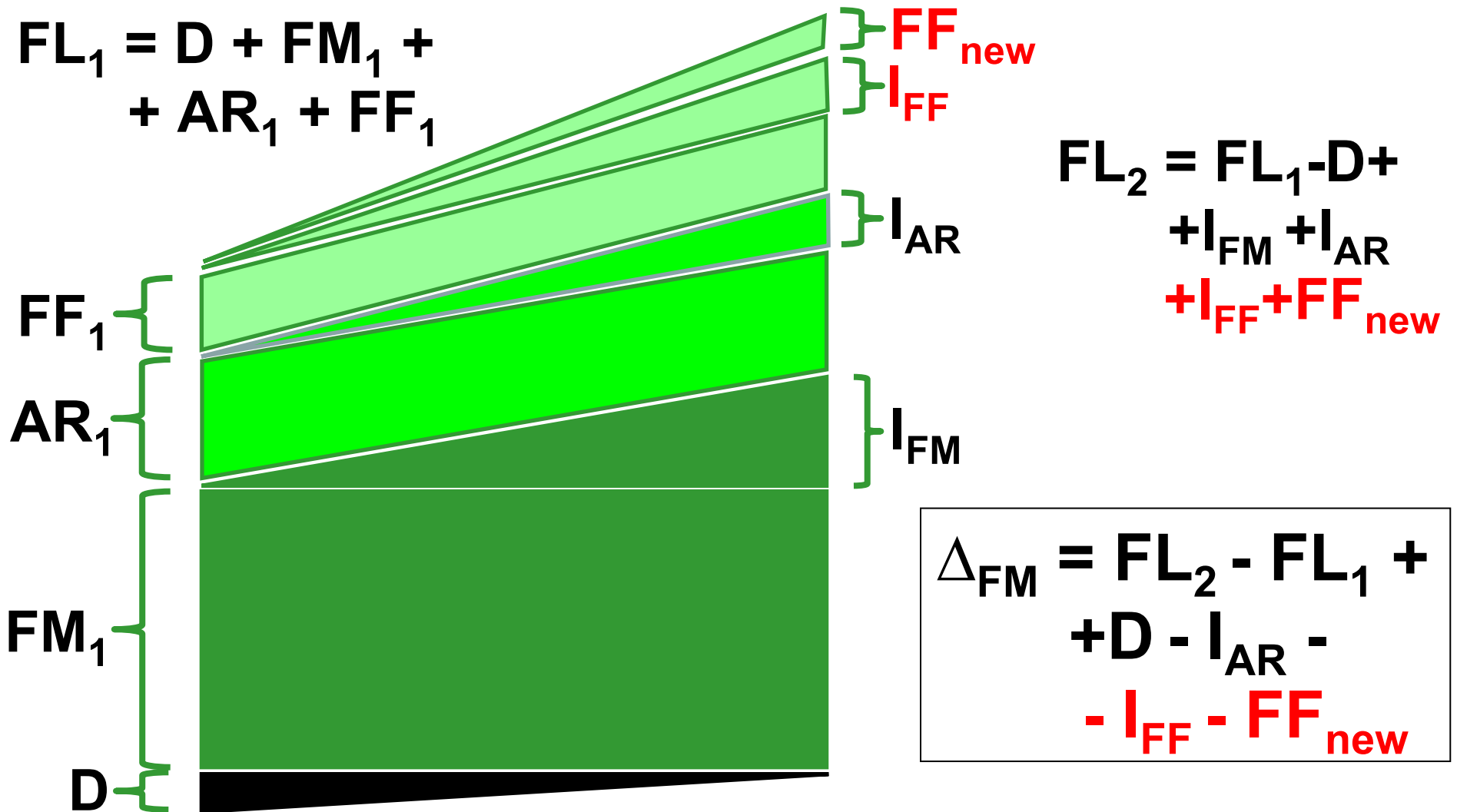
$FL_1 \rightarrow FL_2$ balance



$$FL_2 = FL_1 - D + I_{FM} + I_{AR} + I_{FF} + FF_{new}$$



$FL_1 \rightarrow FL_2$ balance



**Our soils
(except for D)
are not a source...**



Demonstration principles

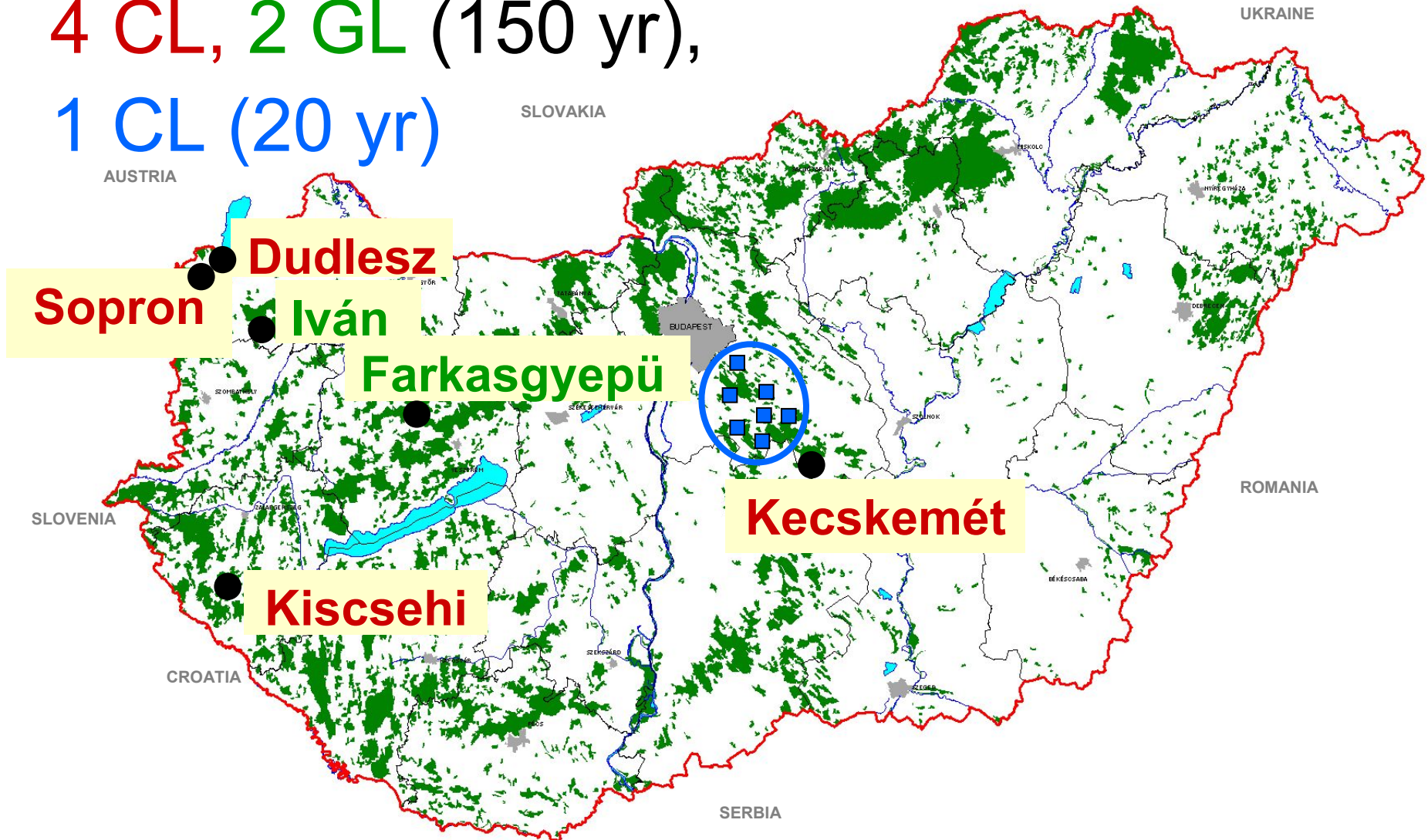


- Using very limited country-specific information
- Applying all methods suggested by GPG
- Relying also on data from other countries
- Applying a (highly) conservative approach



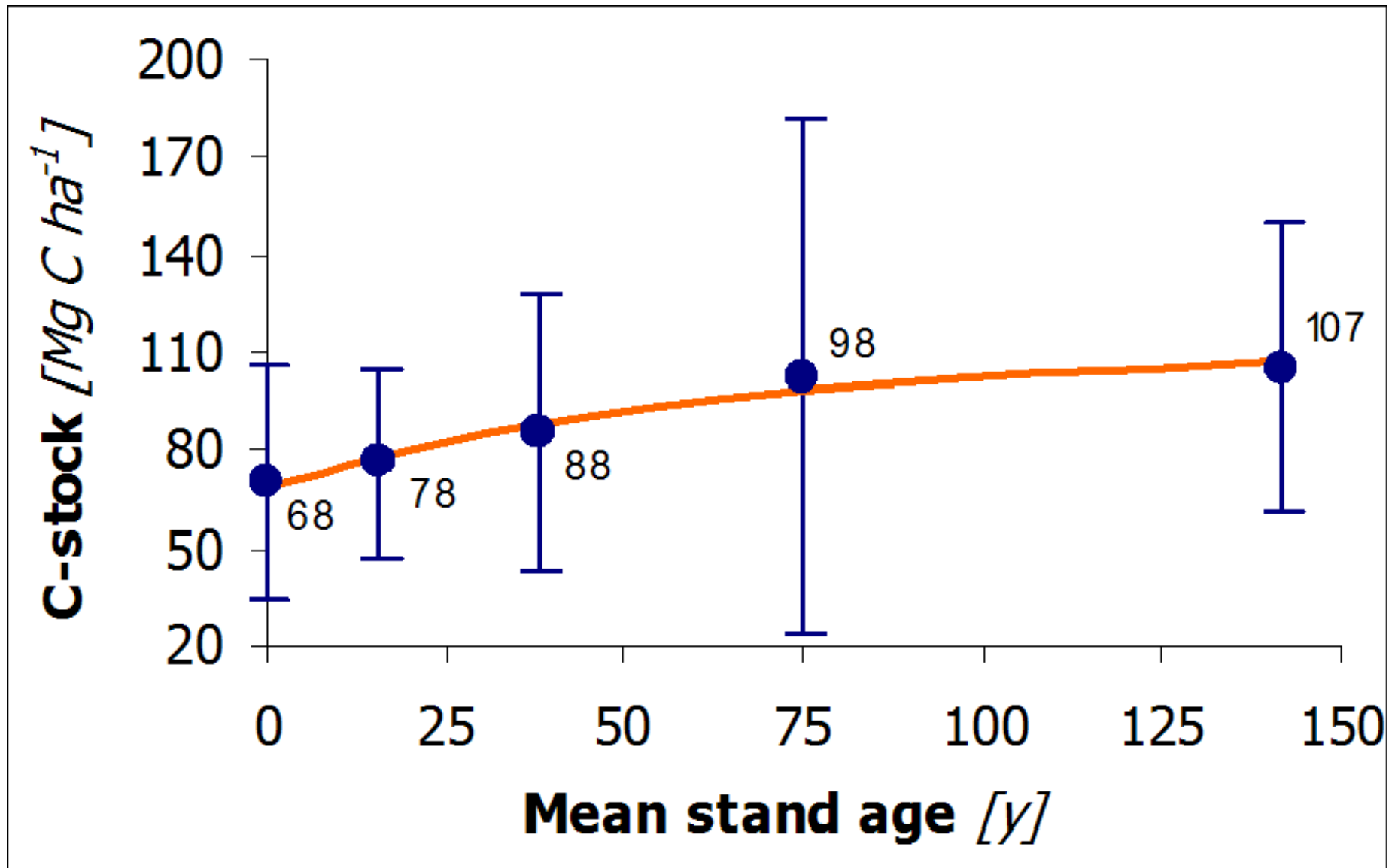
Local information base: chronosequences / case studies

4 CL, 2 GL (150 yr),
1 CL (20 yr)



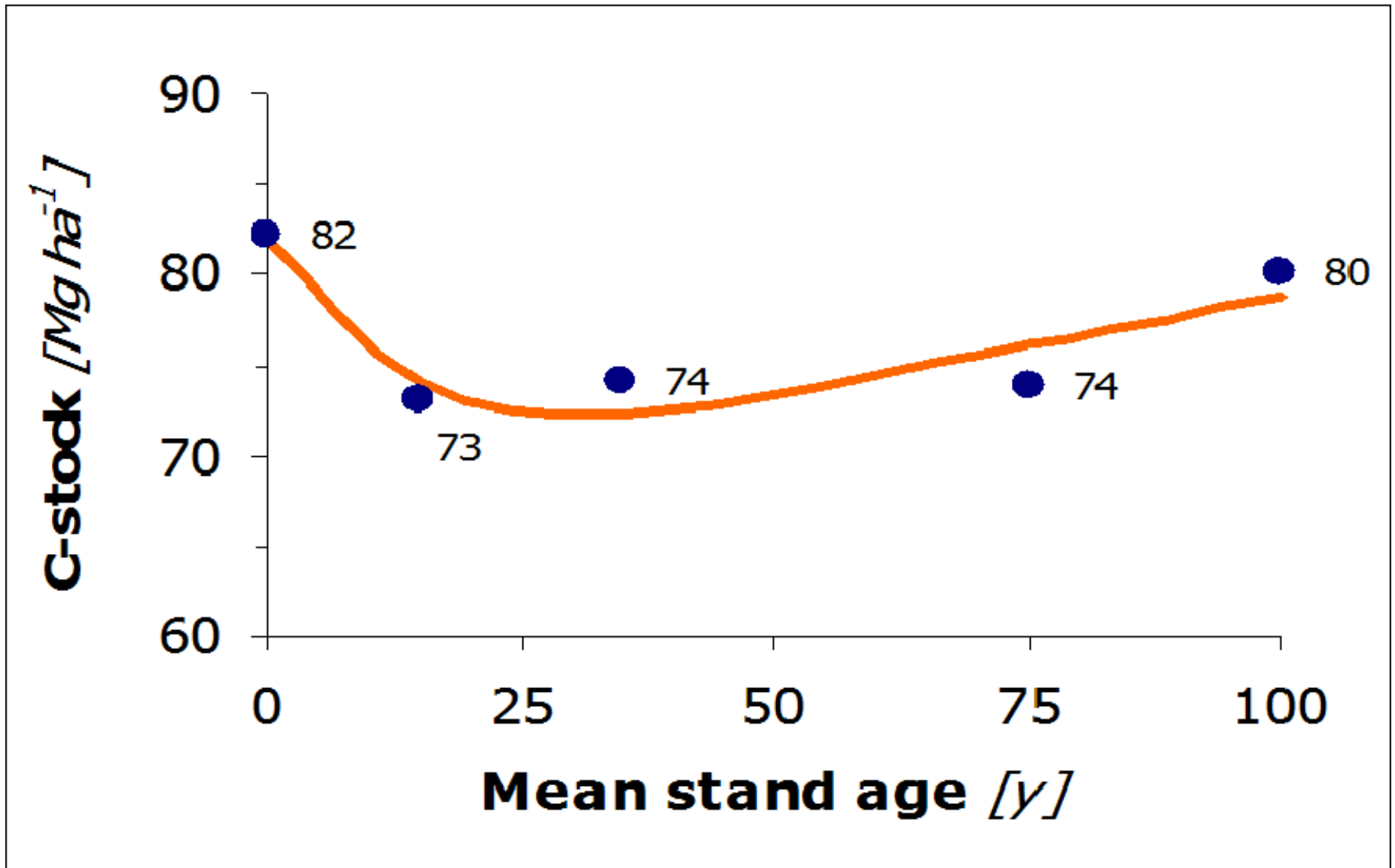


CL: $C = 68.5 + 43.5 \cdot (1 - e^{-0.016 \cdot t})$



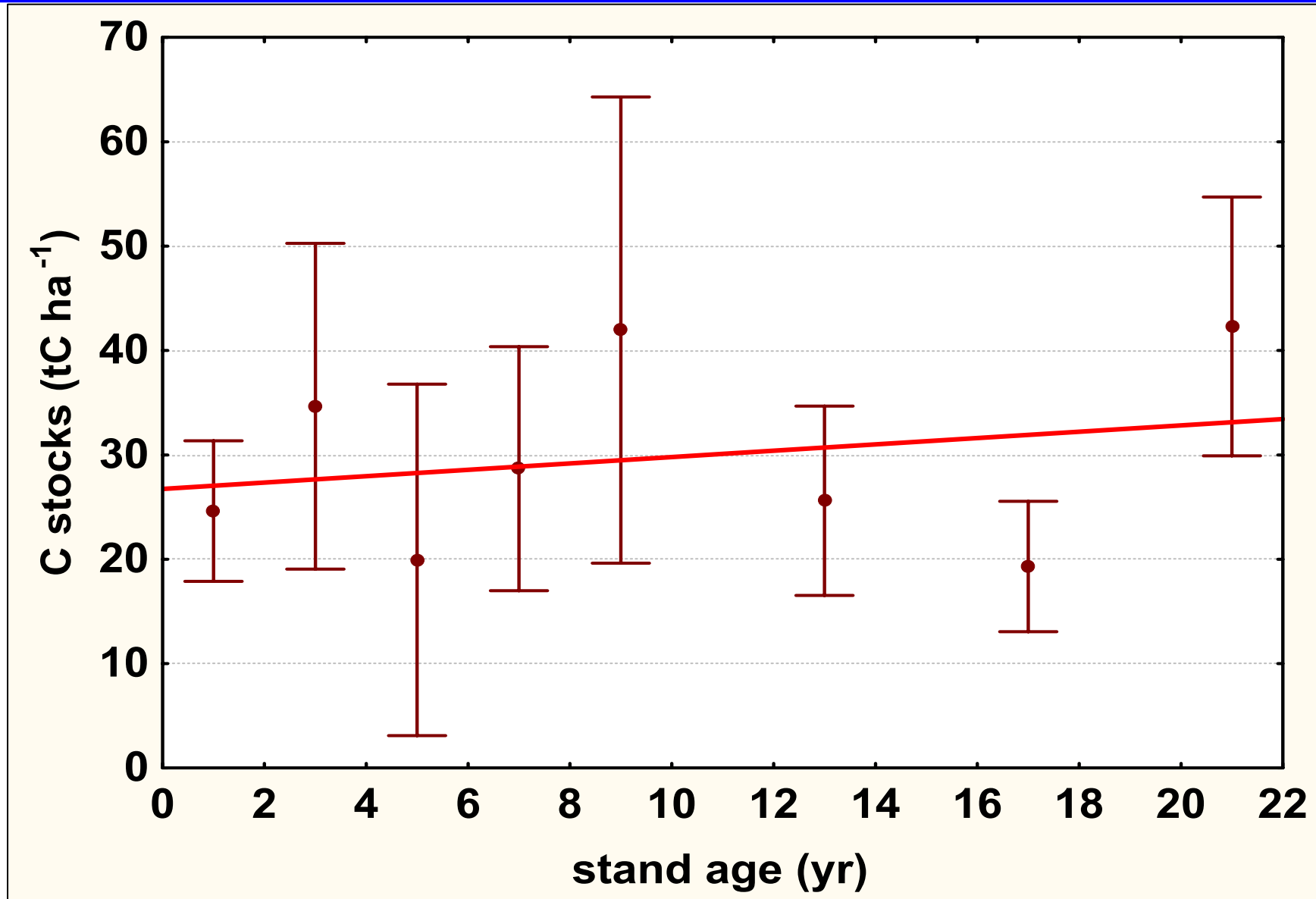


GL:
$$C = 82.0 + 32.9 \cdot (1 - e^{-0.015 \cdot t}) - 29.0 \cdot (1 - e^{-0.046 \cdot t})$$





$$\text{CL: } C = 26,8 + 0,304 * t$$





Strata and estimates

Forest Land Stratum under the KP	Estimated area in 2008 (kha)	Emission (+) and removal (-) factor (tC ha ⁻¹)	Total emissions (+) or removals (-) (ktC)
AR since 1990 from CL	127	(indirectly)	-48
AR since 1990 from GL	31		



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All other FM	1637	-0,05	-82



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All other FM	1637	-0,05	-82
Total			-33 < 0

**How certain are we
on our uncertainties?**



Uncertainty estimation

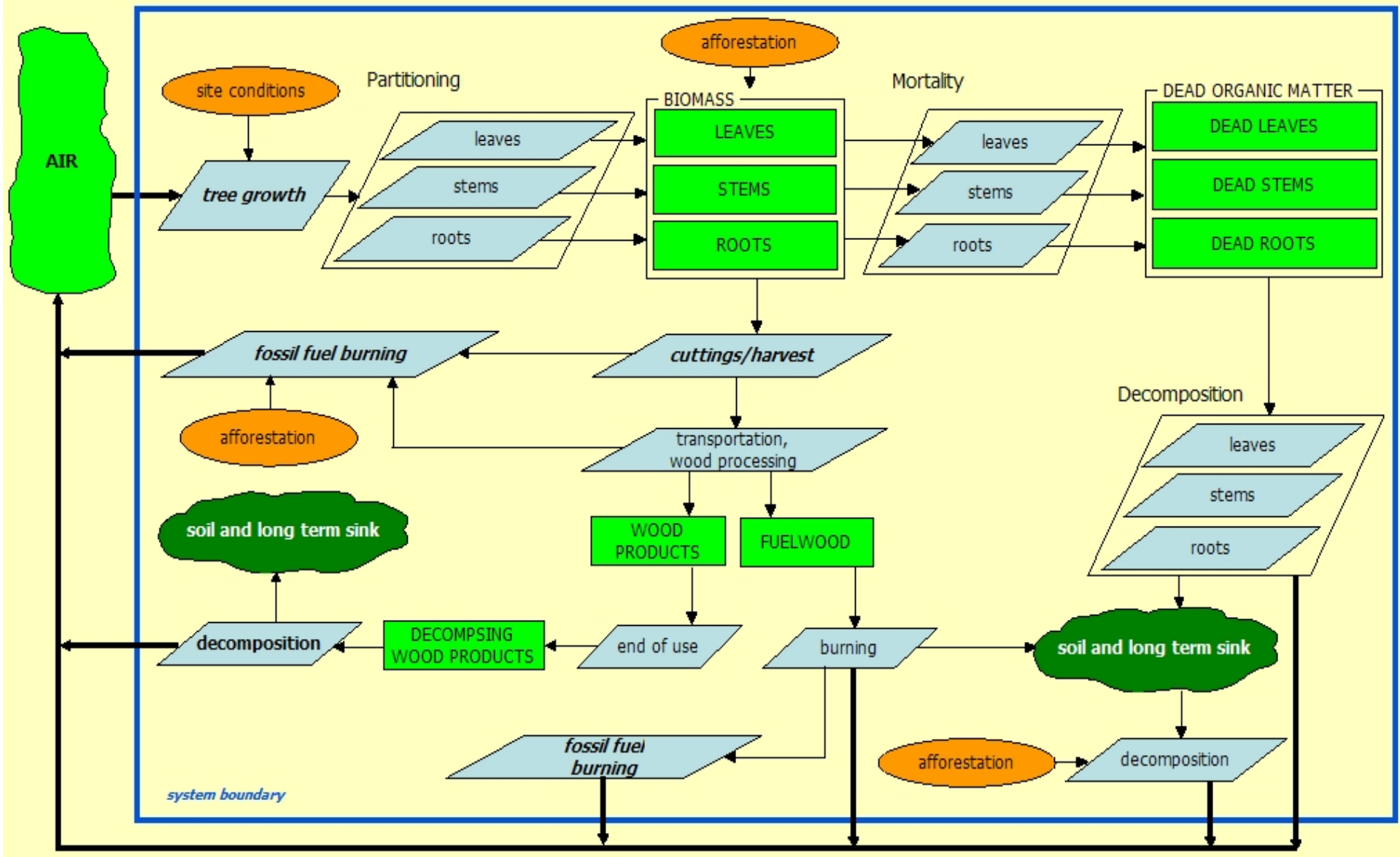


- Non-quantifiable elements
- Estimates for specific variables
- Expert judgments
- *Estimates of combined effects of several variables on the „system“ using a model*



Modeling forest C dynamics:

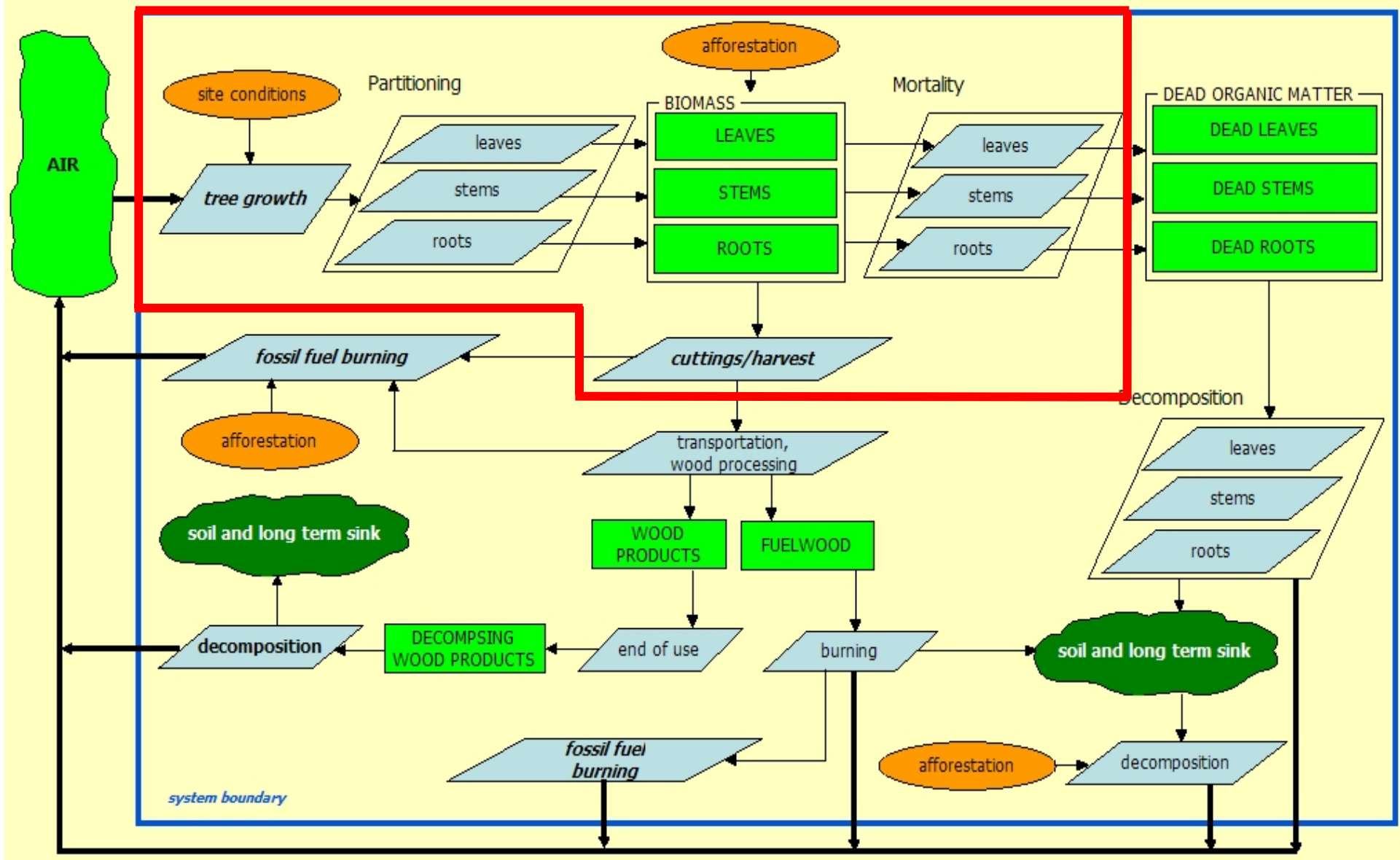
www.scientia.hu/Casmofor (4.0)





Modeling forest C dynamics:

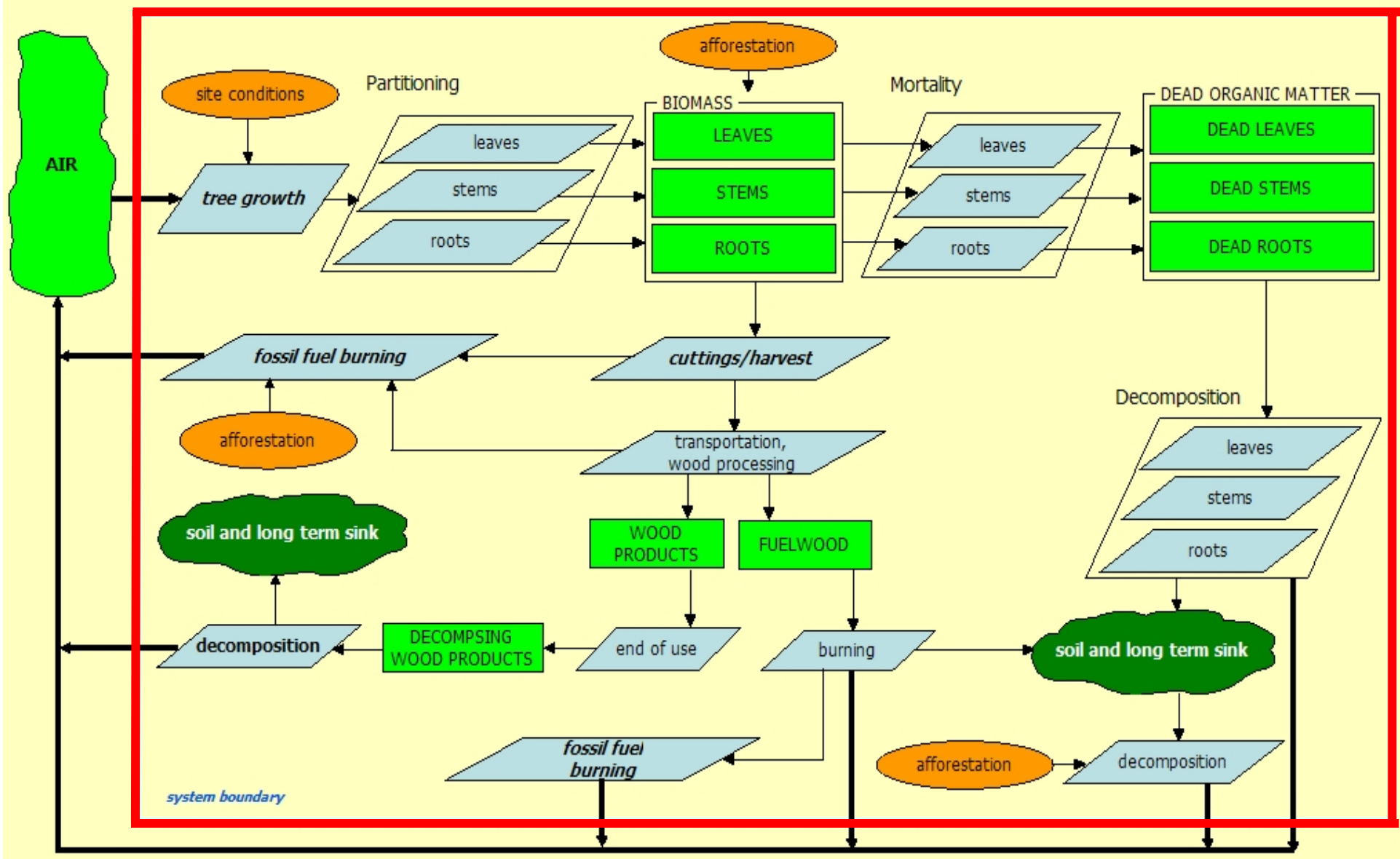
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CASMOFOR 4.0: a framework



- *following IPCC methodology*
- 40 equations of C dynamics/economics
- standwise approach with annual steps
- forestry data warehouse for Hungary



Full Monte-Carlo module

CASMOFOR v.4.0

-- Setting Conditions for the Sensitivity Analysis, analysis of the effects of assumed bias, or of interannual variability --
Please set the data field(s) below as appropriate
-- For more details on the various analyses, click here to go to the help system. --

Number of simulations (i.e., the number of times the scenarios are to be run):

In the table below, set the relative standard deviations (SD, in percent) by species (1, 2, 3) for any variable for which you want to conduct an analysis. (You will name the species later.) The analysis will be done for that variable(s) for which the SD is different from 0. The SD must be maximum 33%. The error distribution for each variable is assumed to be normal, site-independent, and its mean is equal to the value of the variable in the database of the model. Insert 0 in the green cells (0/1/2) to conduct a sensitivity analysis; 1 if you want the error to be a bias; and 2 if you want the SDs to be the rate of the interannual variability.

	1	2	3	0/1		1	2	3	0/1
current annual increment (tC/yr)	<input type="text" value="20"/>	<input type="text" value="20"/>	<input type="text" value="20"/>	<input type="text" value="1"/>	number of years required for the dead wood to decompose (yr)	<input type="text" value="30"/>	<input type="text" value="30"/>	<input type="text" value="30"/>	<input type="text" value="0"/>
carbon content of wood (tC / t dry wood)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of utilized (non-dead) wood in clearcuts	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
biomass expansion factor (age-independent)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of fuelwood in used part of clearcuts	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
basic wood density (t dry wood/m ³ fresh wood)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of fuelwood in timber when processing for wood products	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
leaf biomass increment over aboveground woody biomass (excluding leaves) increment ratio	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	average age of wood products (yr)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
time needed for leaves to decompose (yr)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of wood that becomes fuelwood from unused product	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
fraction of roots of living trees (relative to root increment) that dies at the end of year	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	number of years that is required for the decomposing product to decompose	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
time needed for roots to decompose (yr)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of dead organic matter that does not decompose, but increases soil organic matter content	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
leaf biomass over aboveground woody biomass (excluding leaves) ratio (age-independent)	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	ratio of fuelwood that does not burn, but increases soil organic matter content	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
belowground (root) biomass over aboveground woody biomass (excluding leaves) ratio	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	amount of carbon (tC/ha/yr) emitted during soil preparation	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

[Click here to continue](#)



What if:



Variable	Assumed relative STD (%)
CAI	20 %
Basic wood density	10 %
Root-to-shoot ratio	30 %

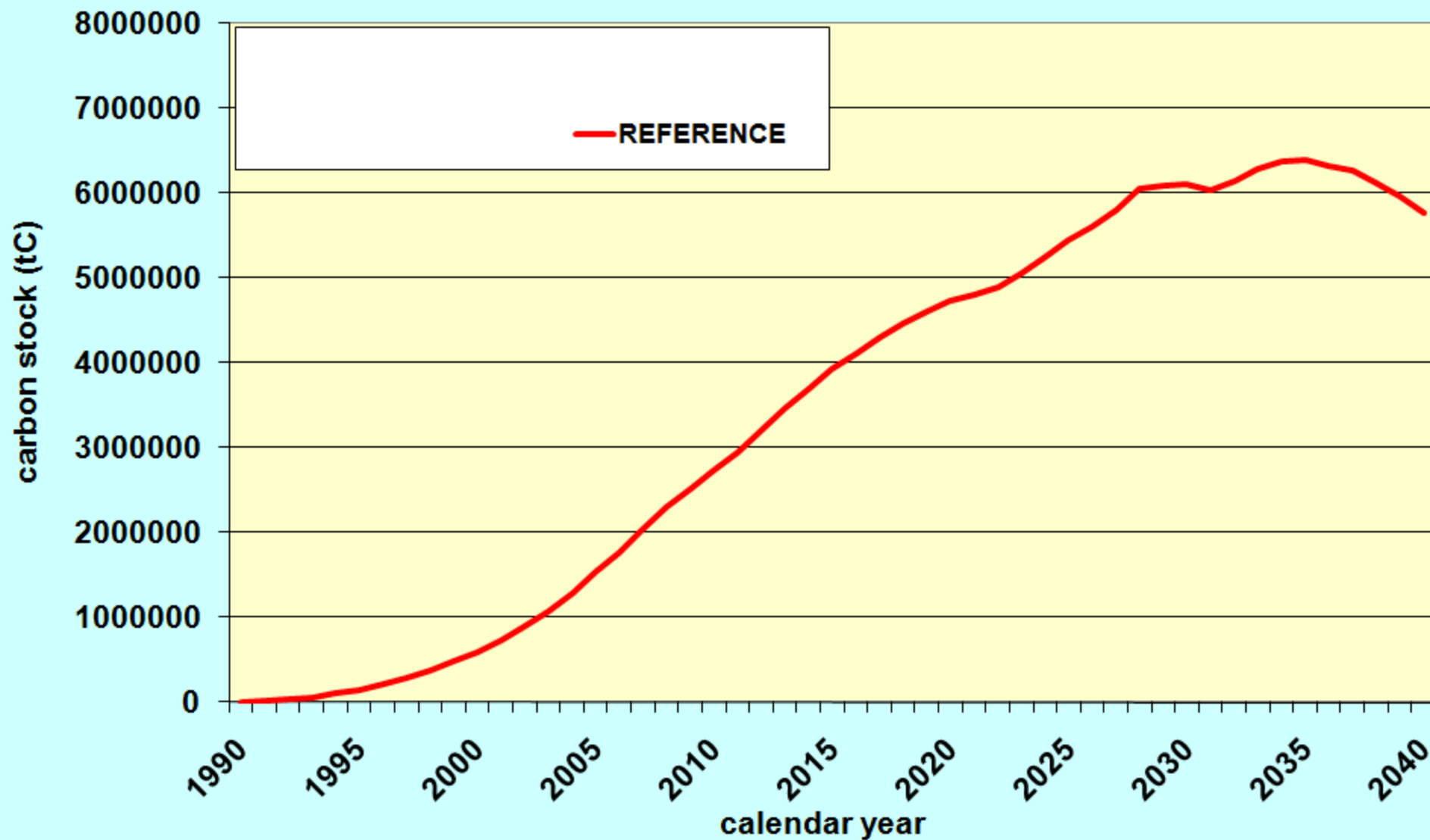


Simulated AR



above ground biomass (tC)

CASMOFOR

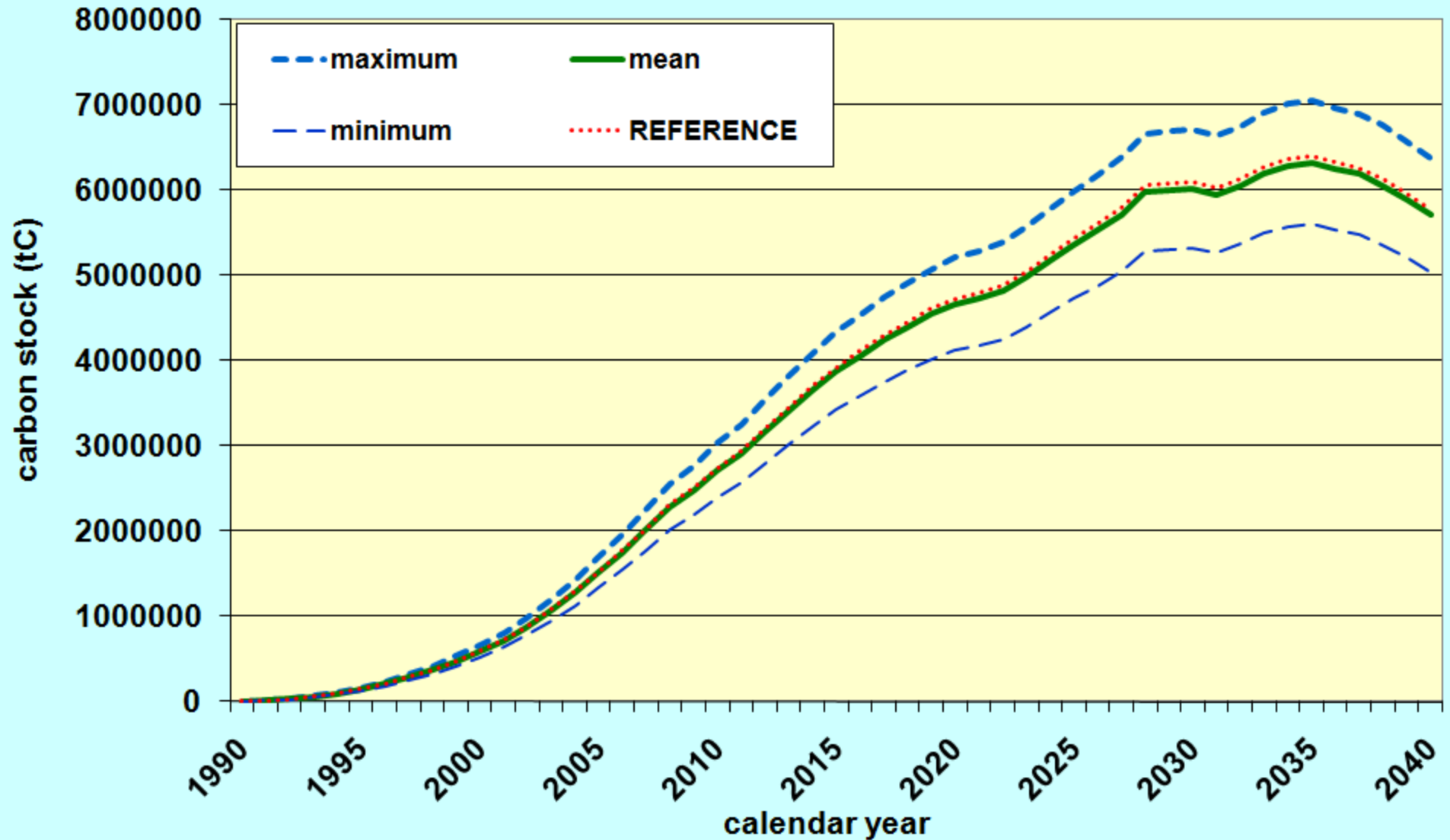




Simulated AR + absolute STD

above ground biomass (tC)

CASMOFOR



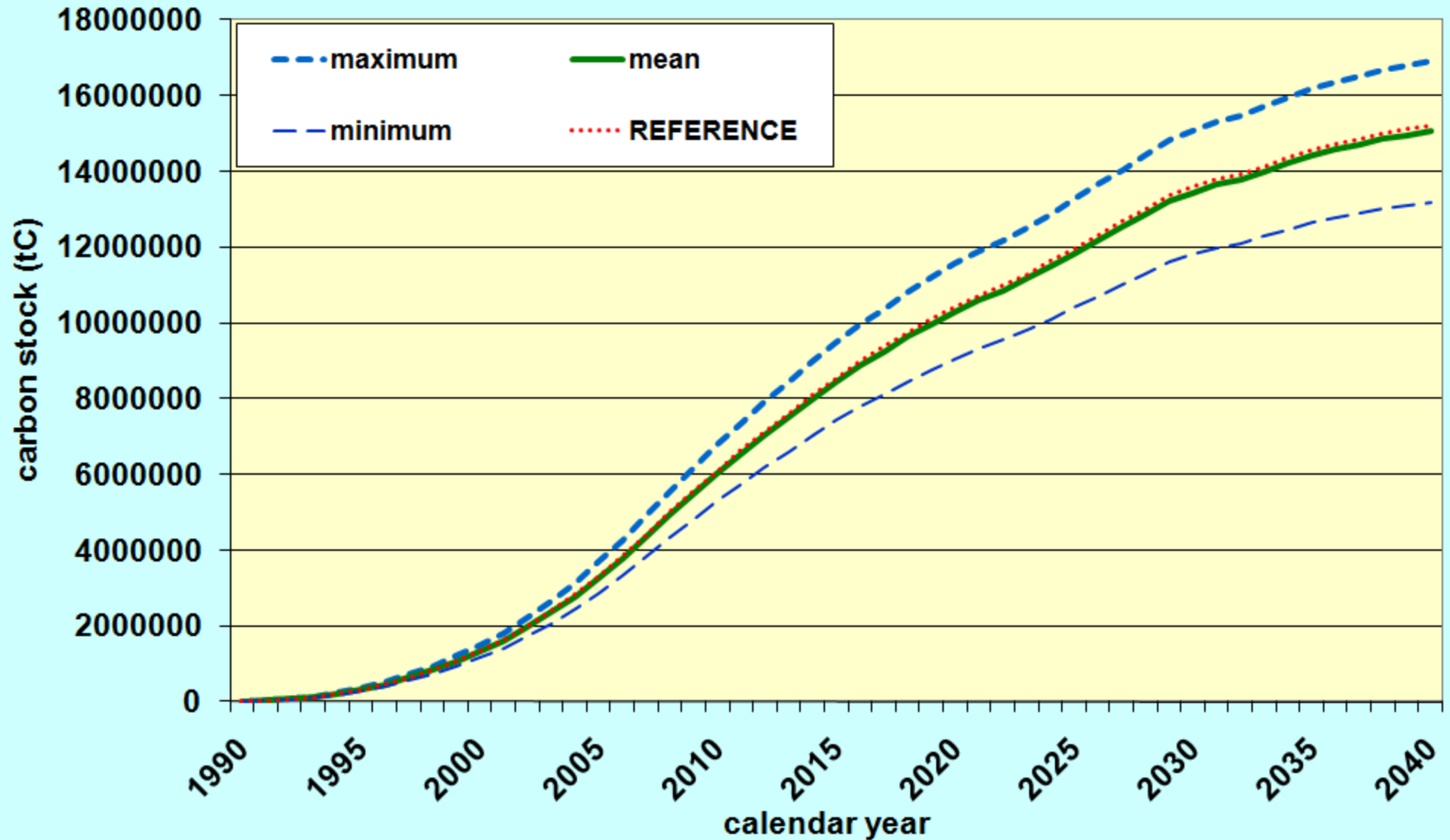


Simulated AR + absolute STD



TOTAL

CASMOFOR



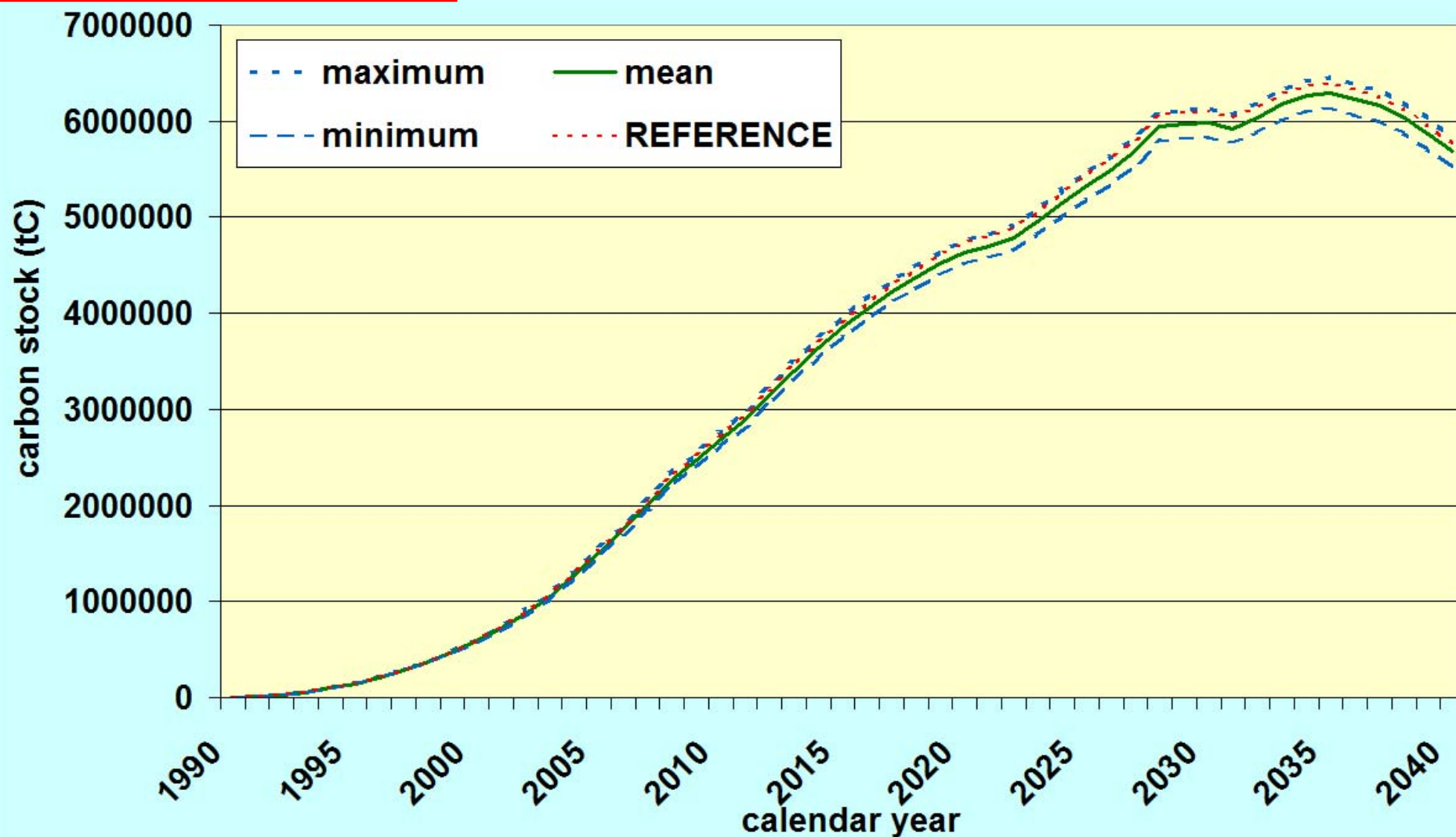


Simulated AR + absolute CI



above ground biomass (tC)

CASMOFOR



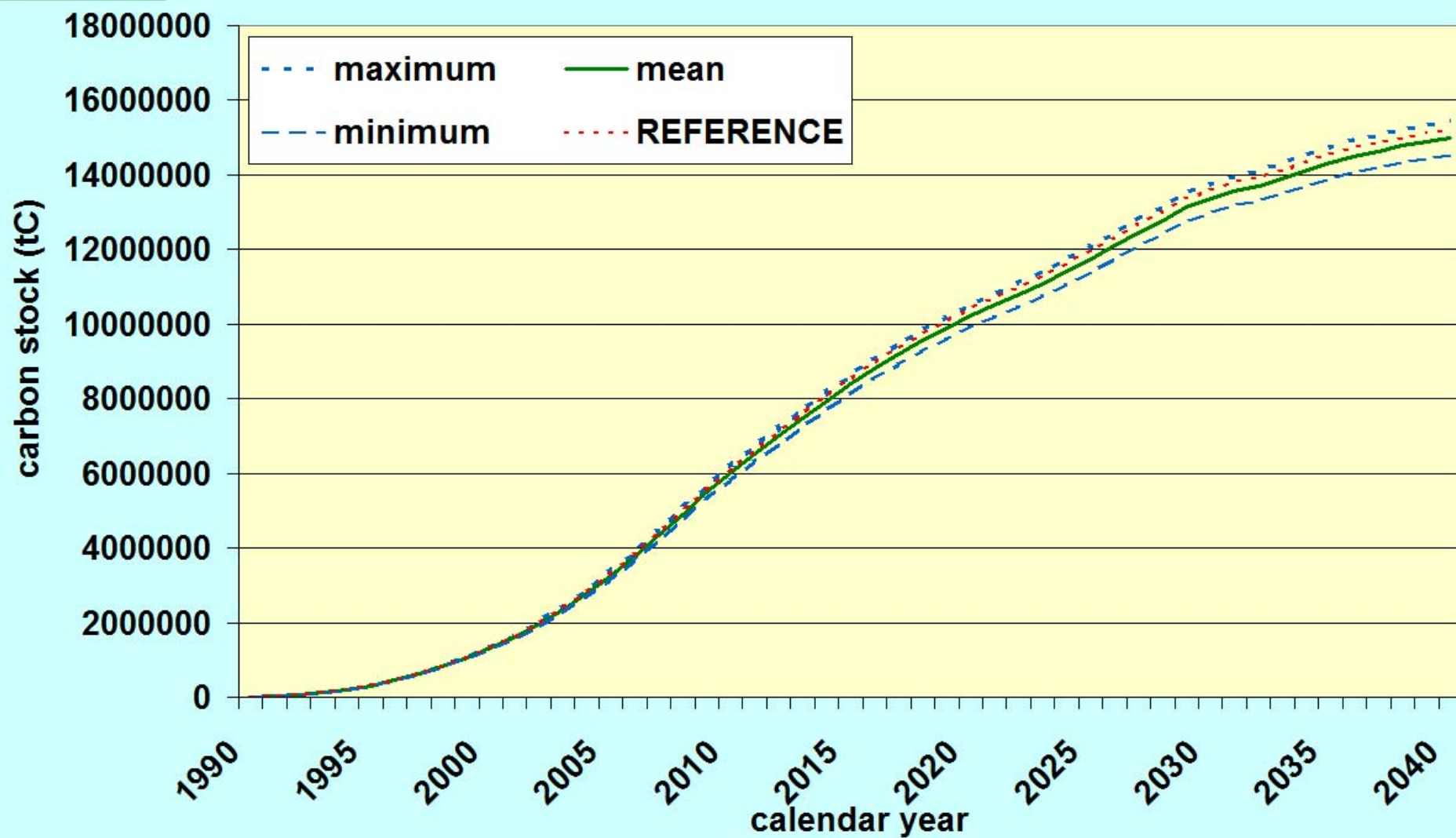


Simulated AR + absolute CI



TOTAL

CASMOFOR



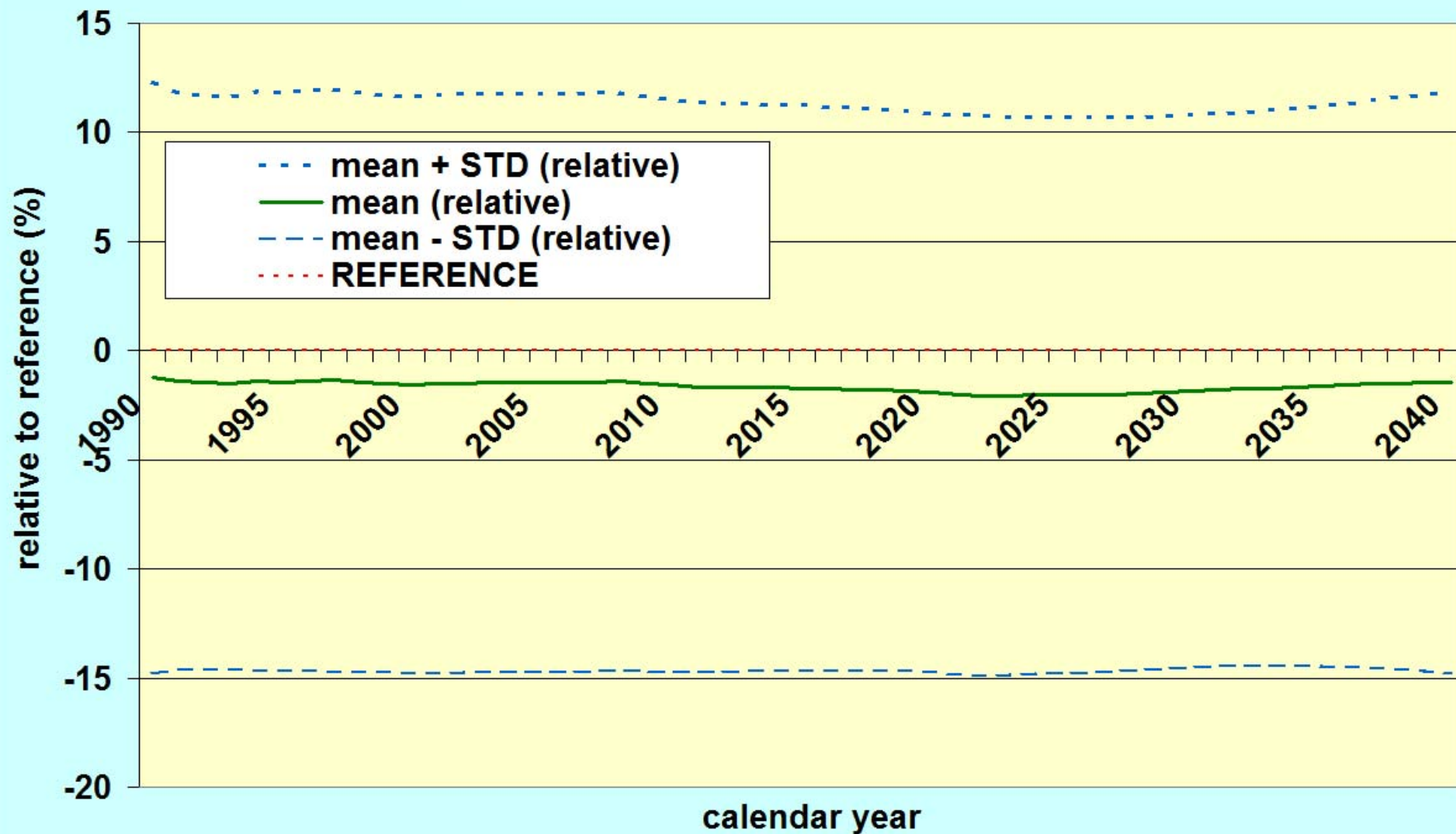


Simulated AR + relative STD



above ground biomass (tC)

CASMOFOR



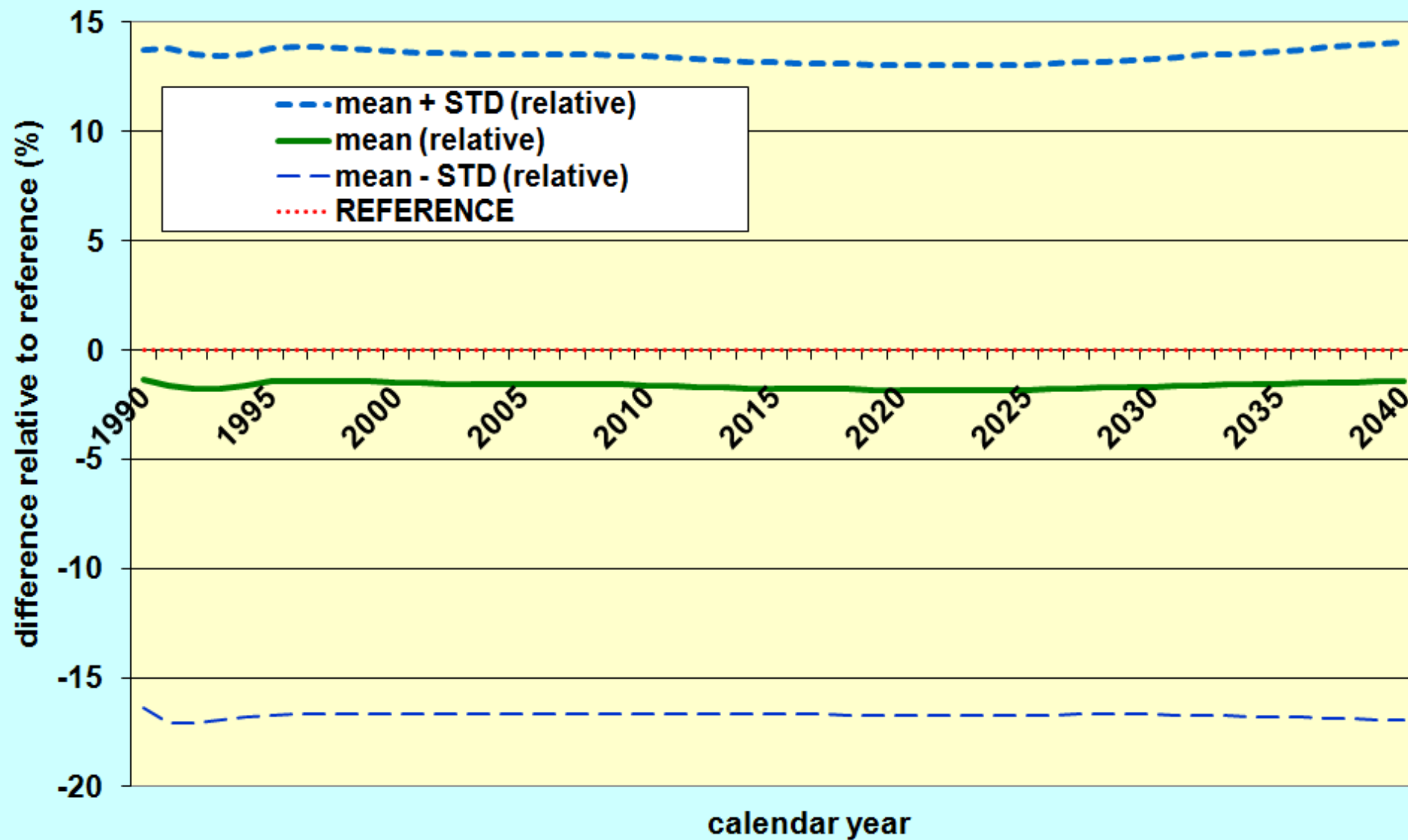


Simulated AR + relative STD



TOTAL

CASMOFOR





Concerned with accuracy? Try the Monte-Carlo module

Variable	STD relative to the reference C stock change (%) in 2008		
	AB	BB	All carbon pools
CAI	11,8%	11,8%	12,3
Basic wood density	6,1%	6,1%	6,4
Root-to-shoot ratio	-	18,1%	3,6
Combined effect:	13,5 %	25,1%	15,3%

$$U_{AB} = 2 * STD * t(95\%; DF=99) / \text{sqrt}(N) = 5.36\%$$