



Screening of recent scientific research results on soil related C pools – support for KP reporting

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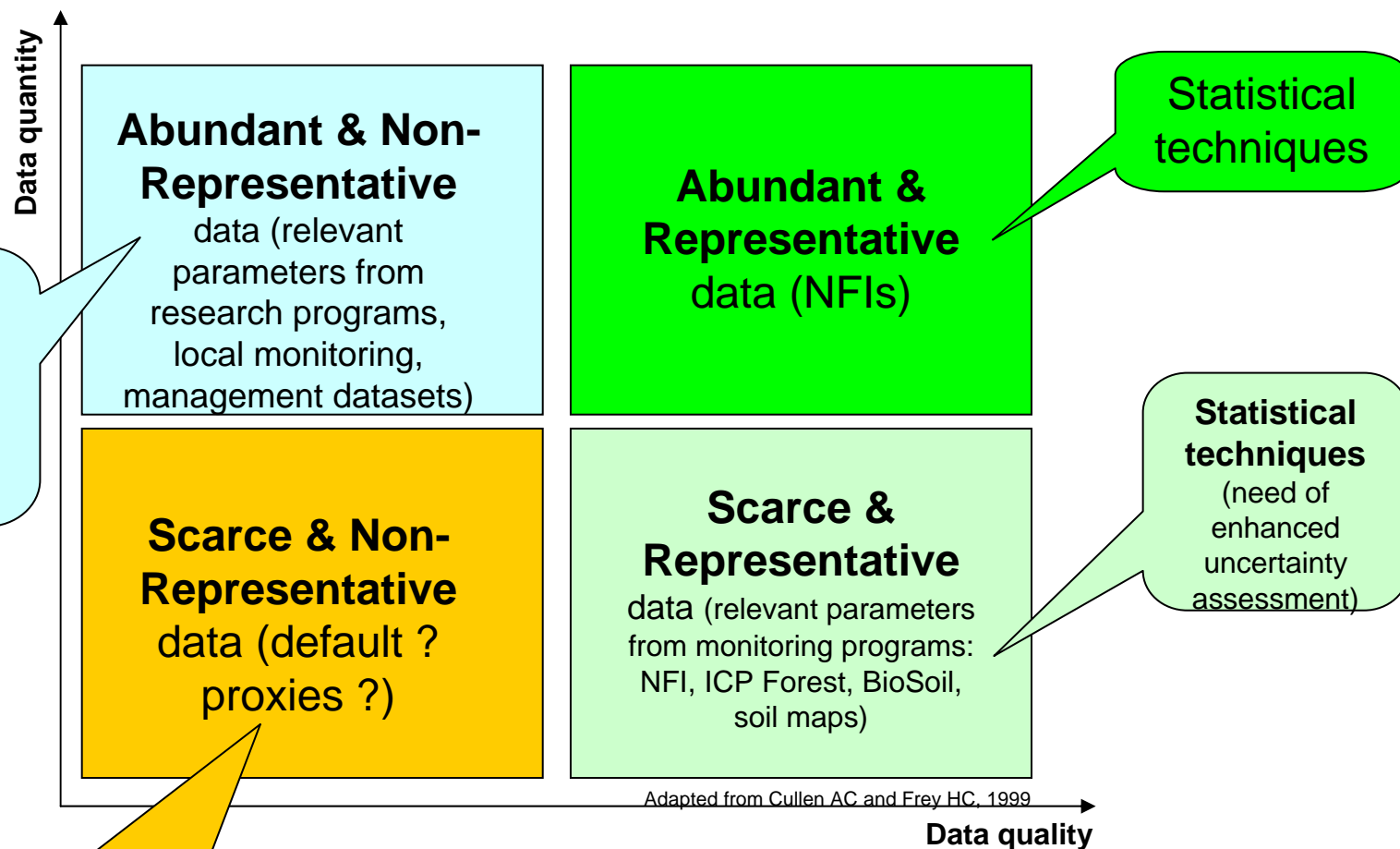


Purpose of screening: address the two major questions related to changes in the C stocks in soil related pools (LT, SOM). DW is not a major issue as NFIs apparently provide appropriate data.

- **Data processing methods**
- **Is soil C pool stable on short term on Forest Management lands?**
- **Is soil C pool a source/sink under afforestation/reforestation lands?**



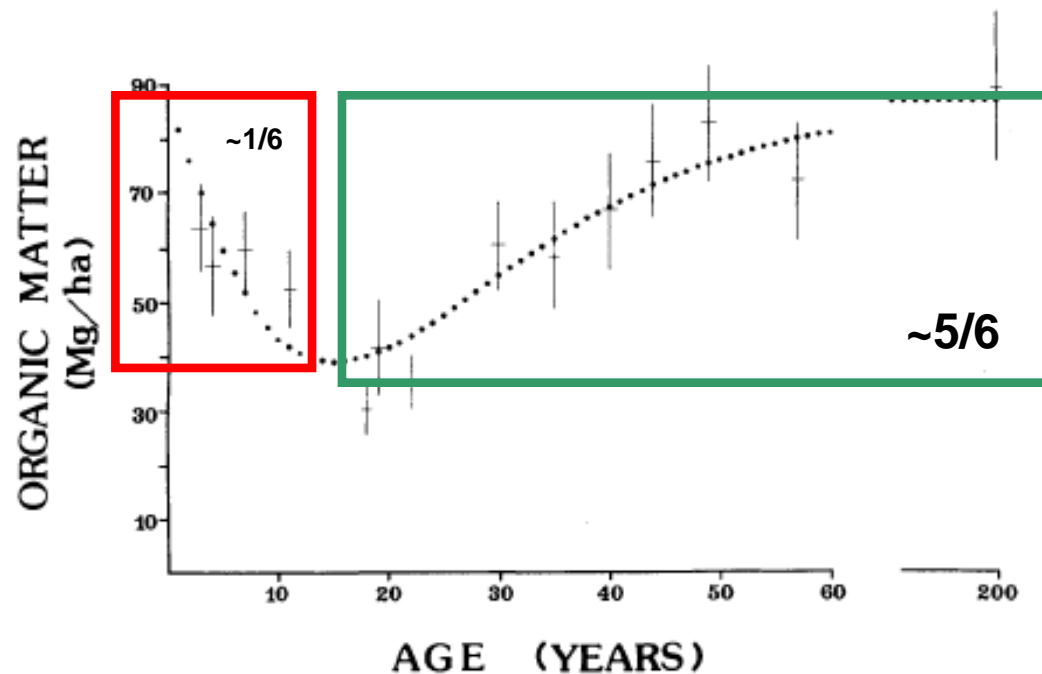
Data availability and methods for processing it





Reporting on *Forestland/Forest management activity*

Post harvesting forest floor drop in organic matter - *Covington curve* (1981)

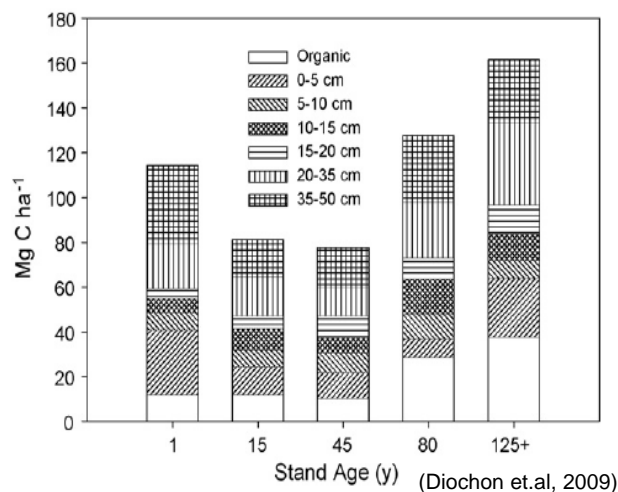
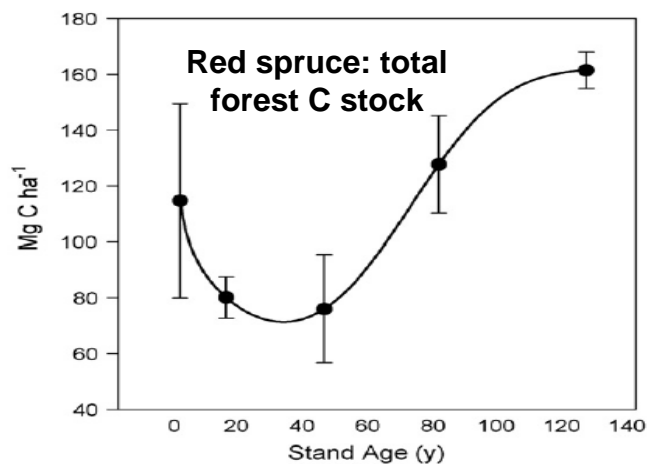


**Organic mass loss
(lower dry/high humid
warm)**

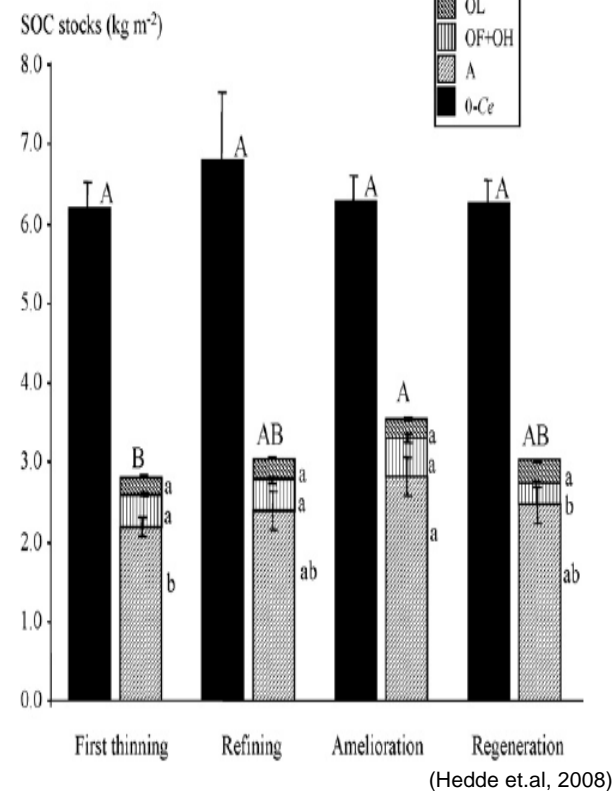
**Ideally assumed that
clear cut is 1 % of total
forestland**



Local studies on harvesting



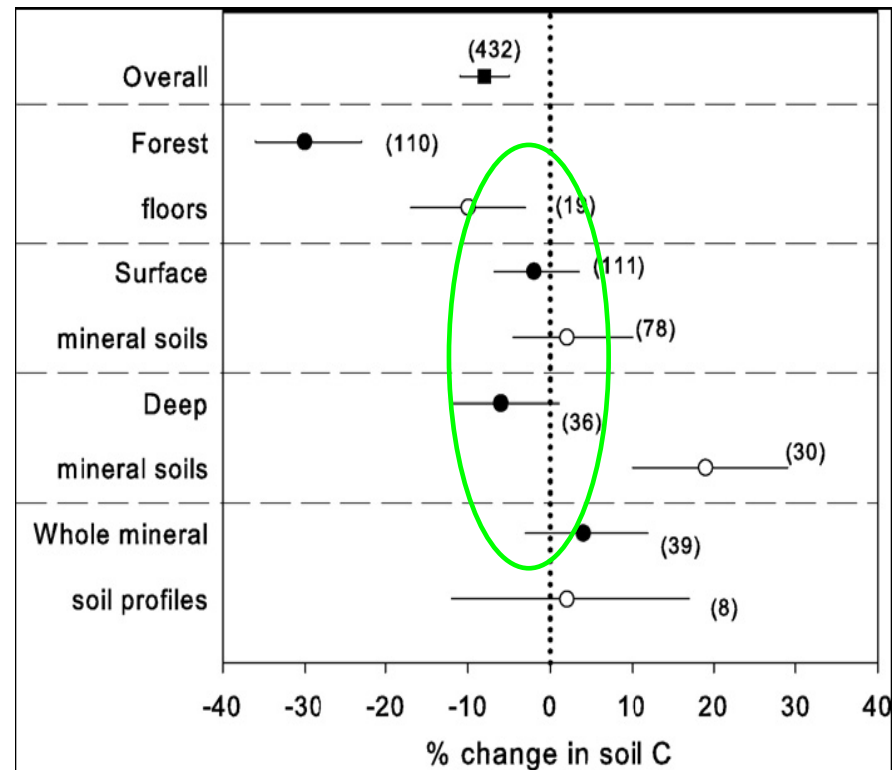
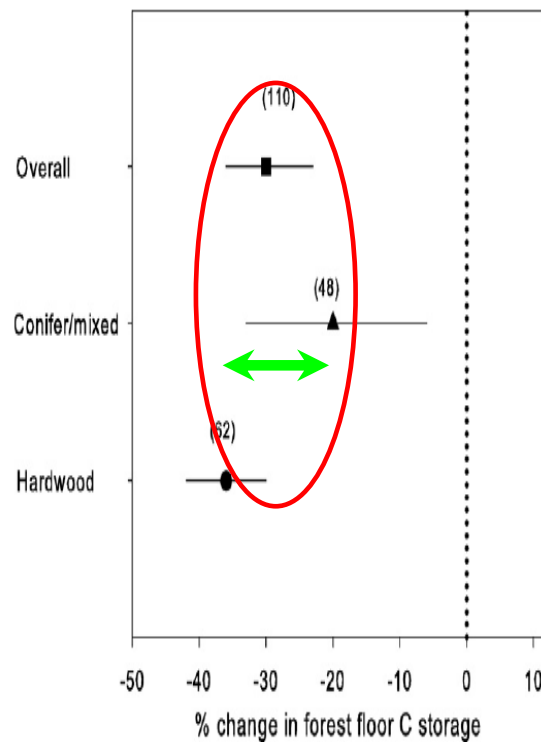
Beech: soil C stocks dynamics



C stock below 20 cm may be driving the temporal trends in whole soil storage !
Do we really estimate the entire sink/source?



Meta-analysis (i.e. harvested vs. undisturbed)



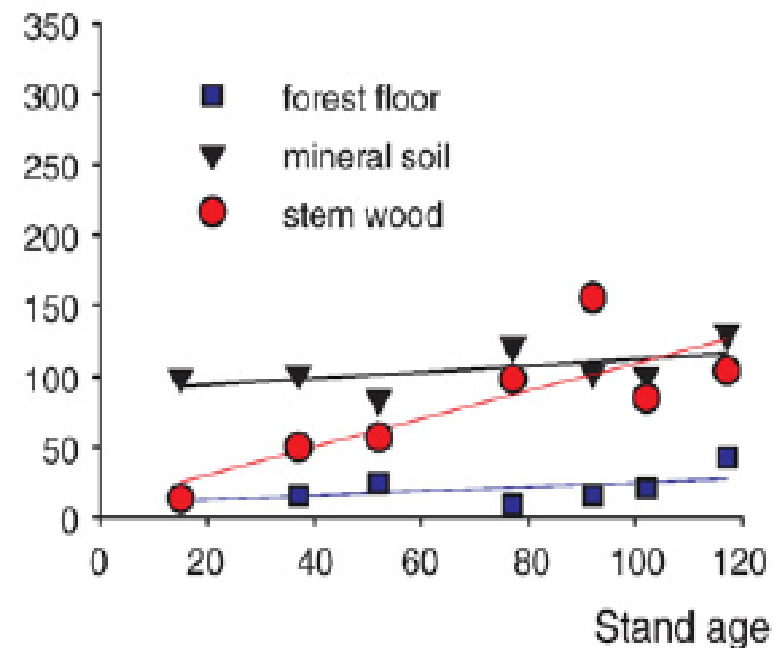
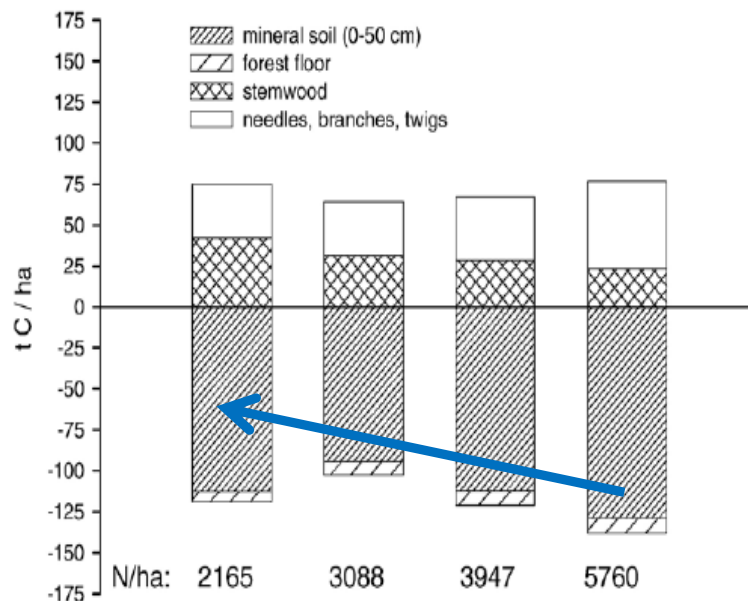
C pool sizes (C storage; filled circles) and C concentrations (open circles). Nave *et al.*, 2010.

Yes/No clear impact of forest harvesting on SOC, but it generates reduction of LT C stock!



Thinning effects on C stocks dynamics

Effects on SOC and organic layers depends on the type of technology involved or, at least, difference is difficult to prove by measurements under errors. The most intensive technology seems to have only slight effect (Tamminen et al., 2012)



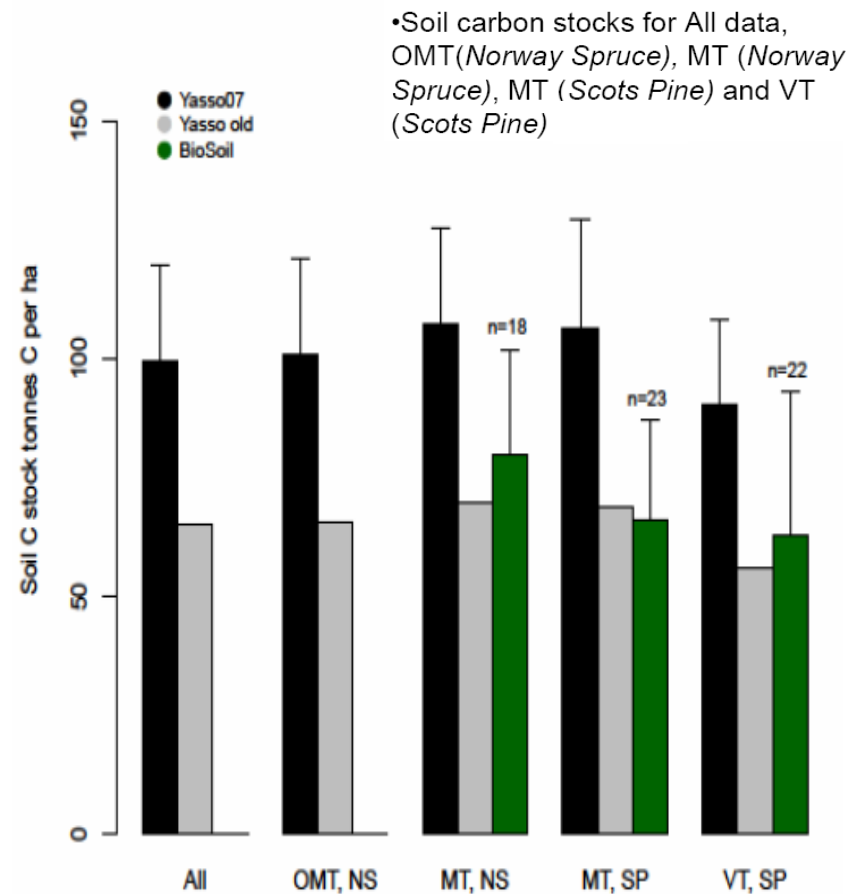


Reporting on *Forestland/Forest management activity*

Tier 3 reporting potential of annual C stock changes based on simulations, with models “*reasonably estimating long-term dynamics of organic matter pools on forest floor and in forest soil*”. Mod. based on:

- (i) temperature dependent decay & physical transfers
- (ii) weather & chemical composition based decay

Yasso07, Yasso old and BioSoil soil C stock



Rantakari et al., 2011



Reporting on Forestland/Forest management activity

Literature on SOC and LT on managed forests lands

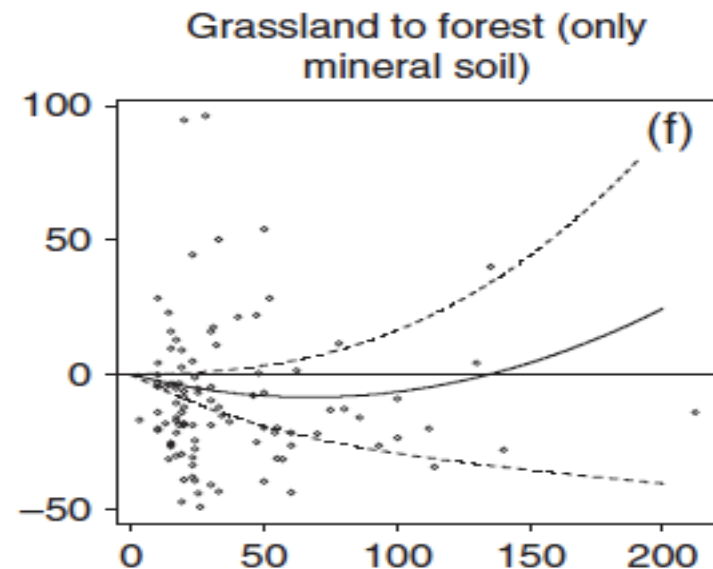
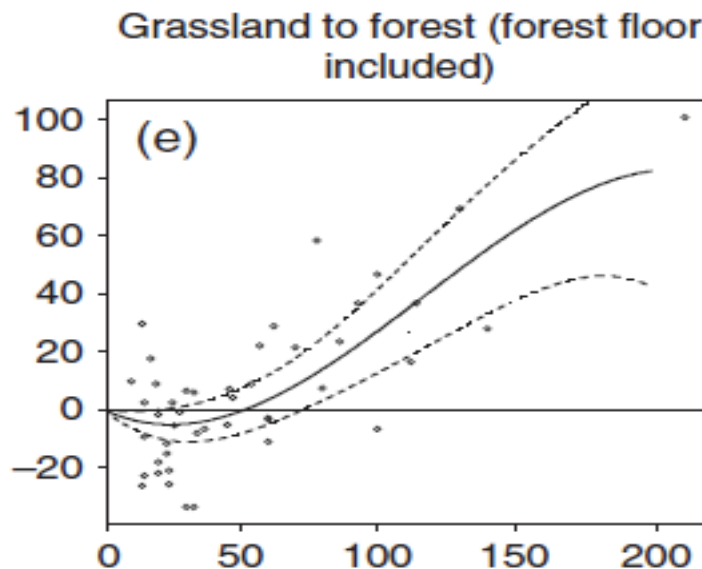
- European continent-wide *baseline soil C concentrations and stocks* data for early 1990 (Baritz et. al, 2010)
- difficult to conclude whether the differences are the result of differing “initial condition” or due to management action (Hoover, 2003; IPCC 2003)
- high correlation of tree species and C stocks in SOC and LT (Schulp et. al, 2008; Díaz-Pinés et al. 2010)
- subtle effect of tree species (beech – spruce) & subtle effect of rotation length (Jandl, 2011)
- at the landscape scale, potential C sink of soils was estimated 27–>70% of the tree sink, depending on forest management and disturbances, with the increasing growing stock associated with higher soil sink (Karjalainen, 1996; Perruchoud et al., 1999; Lisky, 2002)



Reporting on *conversion to forest*

Literature on SOC and LT on afforestation/reforestation lands

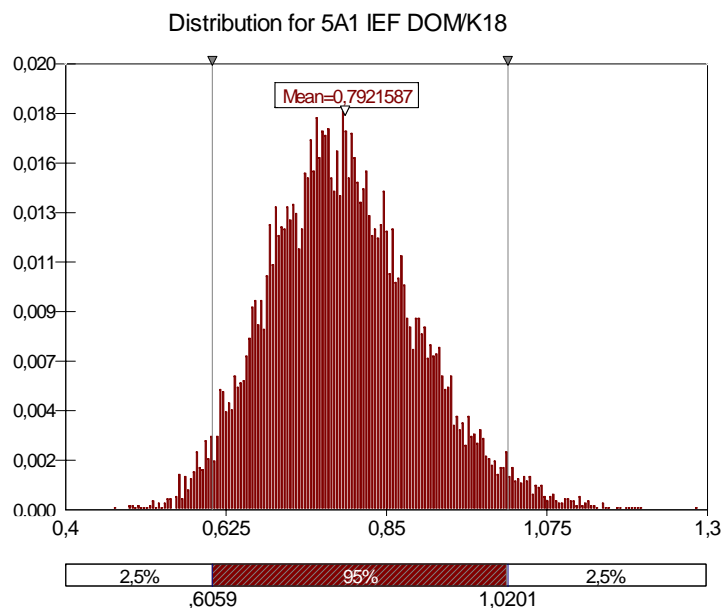
- apparently no saturation of C stock in organic layers in growing stands, while there is a re-distribution of SOC toward deeper soil layers (Lal, 2005; Schulp et. al, 2008, Vaesterdal,)
- short term trends in soil C stocks corresponded with temporal trends in litter stocks (Toriyama, 2011)
- methodological issue related to soil compaction (by technology) and expansion (by enreaching C) (Toriyama, 2011)



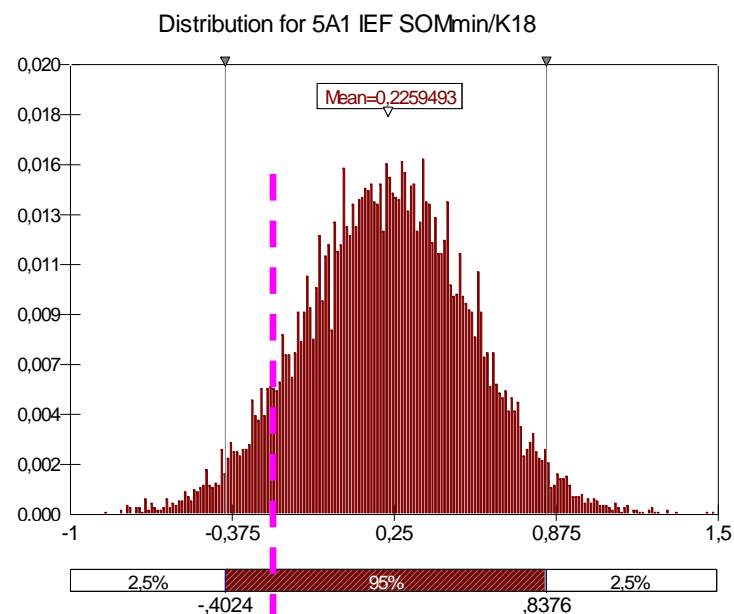
Poeplau et al., 2011

National EU MS GHG inventories

IEF for DOM and SOM for 5A1 (fit to lognormal, re-simulated)



Chance of being
source: < 0.01%



Source: $p < 24\%$ Sink: $p < 76\%$



Conclusions

- Lot of local data in time C stocks, less on stock changes!
- Science recognizes the inherent complexity of estimating change in these soil related C pools
- Mathematical-statistical procedures are available but data mining need
- Natural disturbances complicate the picture