



Improvement of the assessment of soil carbon stock changes of remaining CL in Austria

Elisabeth Schwaiger

Assessment of C stock changes of remaining cropland

- For calculation of emissions/removals of soil C stock changes in „cropland remaining cropland“ **country specific methodology (Tier 2)** was used.

IPCC methodology includes a management factor (F_{MG}), a land-use factor (F_{LU}) and an input factor for input of organic matter (F_I).

In a study the IPCC default factors have been assessed against results from national long-term field trials.

Consistency between default and national factors for cropland was found for management factor (reduced tillage, no-till), removal of crop residues and green manuring.

A weaker correlation was found for the application of organic fertilisers (e.g. manure) and land use.

The new approach calculates the soil CSC in five different cropland management types in annual and perennial cropland by applying the specific management factors for each of these types and the related areas in an annual resolution:

Related management has been defined by selected measures of the Austrian agri-environment programme (ÖPUL), which is in place since joining the EU in 1995 :

- **Cropland with organic farming (“Biolandbau”)**: For organic cropland a rapid development can be seen as part of the ÖPUL 2000 programme, where the area expanded from 77.930 ha (2001) to 152.900 ha (2007).
- **Cropland without mineral fertilizer use (“Verzicht”)**: rather stable areas (about 40.000 ha).
- **Cropland with reduced fertilizer use (“Reduktion” resp. “UBAG”)**: This measure to reduce fertilizer amounts was part of the ÖPUL programme since joining the EU in 1995 until 2006. From 2007 to 2014 this measure was part of the ÖPUL measure “UBAG” which almost doubled the related cropland areas (1.2 Mio ha).
- **Cropland with mulch tillage and no-tillage (“Mulch- und Direktsaat”)**: It got a boost of arable area with the ÖPUL 2000 programme starting from 7.944 ha in 2014 this measure was implemented at approximately 140.000 ha
- Areas with **greening measures**, which can be combined with those 4 Agro-Env. measures, were assigned to the 4 measures and their contribution to C-sequestration has been taken into account.

Implementation

In previous submissions an **average soil C stock change factor** due to the management changes was estimated for 1990 and 2011 and the resulting average soil C stock change was applied for the total remaining cropland area.

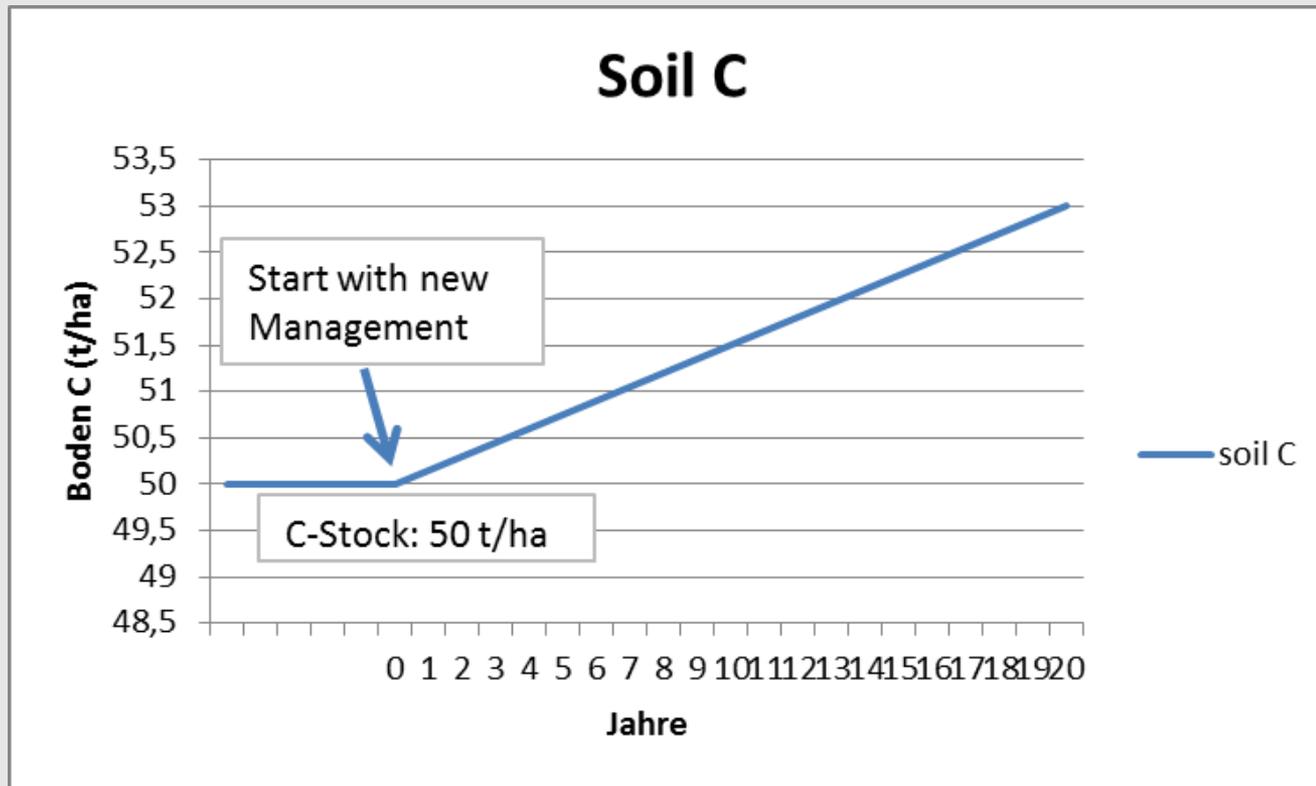
- With submission 2016 the areas of related management in Austria have been taken into account for each year since 1990 and the typical soil C stock change rates were applied for these trends in areas with the single management types.
- This gives a more accurate picture of the cropland management changes and the related soil C stock changes in Austria over time. Each such cropland area with specific measures is supposed to accumulate soil carbon for the 20 years transition period, after this period the net CSC is assumed to be zero.
- For the sub-category „perennial cropland remaining perennial cropland“ the soil carbon stock changes have been calculated analogous to “annual cropland remaining annual cropland”.

Cropland: Methodology

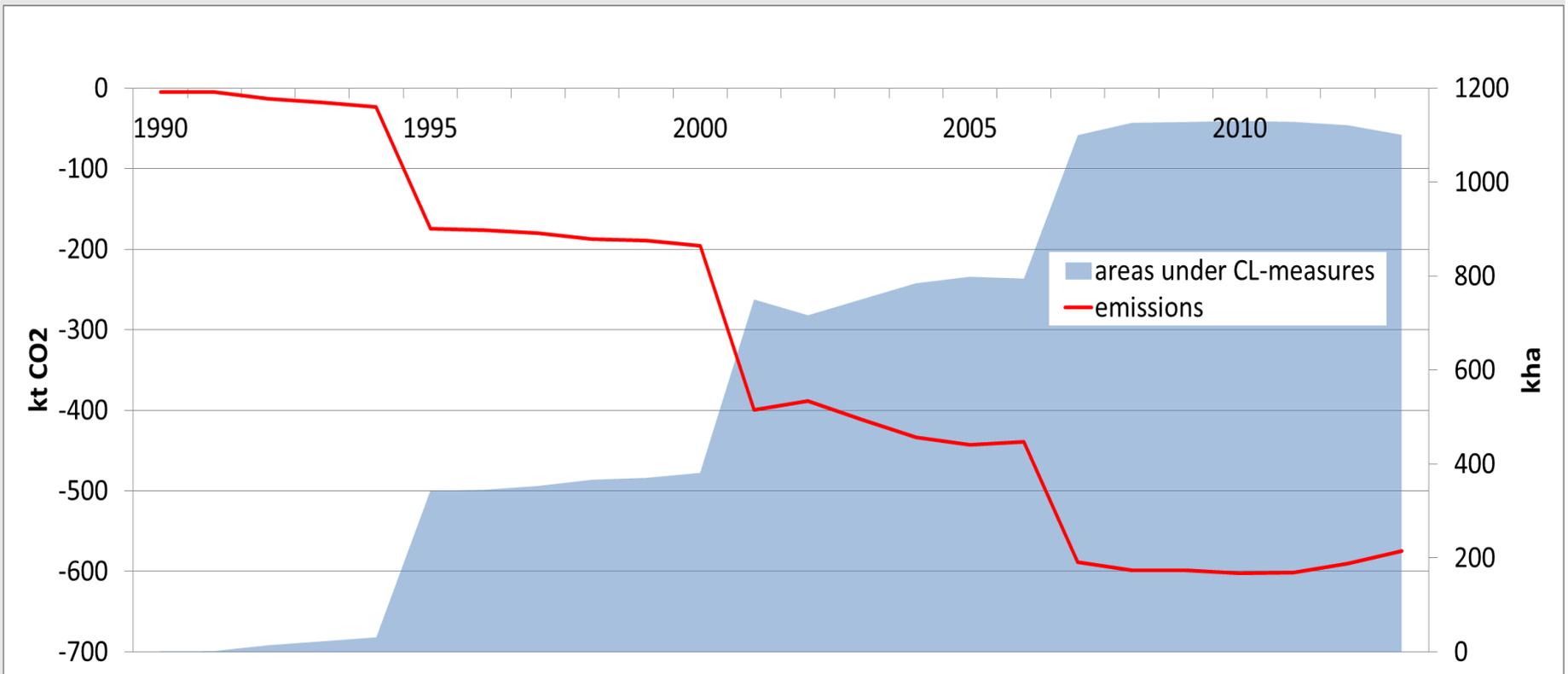
Management factors based on long term field trial:

| | Managementfaktoren: | | | Annual C stock change t C/ha |
|---|-------------------------------|------------------------------|---------------------------|------------------------------|
| | F _{LU} „Land use“ | F _{MG} „Tillage“ | F _i „Input“ | |
| cropland with organic farming | 0,93 | 1,03 | 1,11 | 0,17 |
| cropland without mineral fertilizer use | 0,93 | 1,03 | 1,11 | 0,17 |
| cropland with reduced fertilizer use and this measure was part of the ÖPUL measure UBAG | 0,93 | 1,03 | 1,09 | 0,12 |
| cropland with mulch tillage and no-tillage | 0,93 | 1,1 | 1,07 | 0,25 |
| Cropland area without these measures | 0,93 | 1 | 1 | 0 |

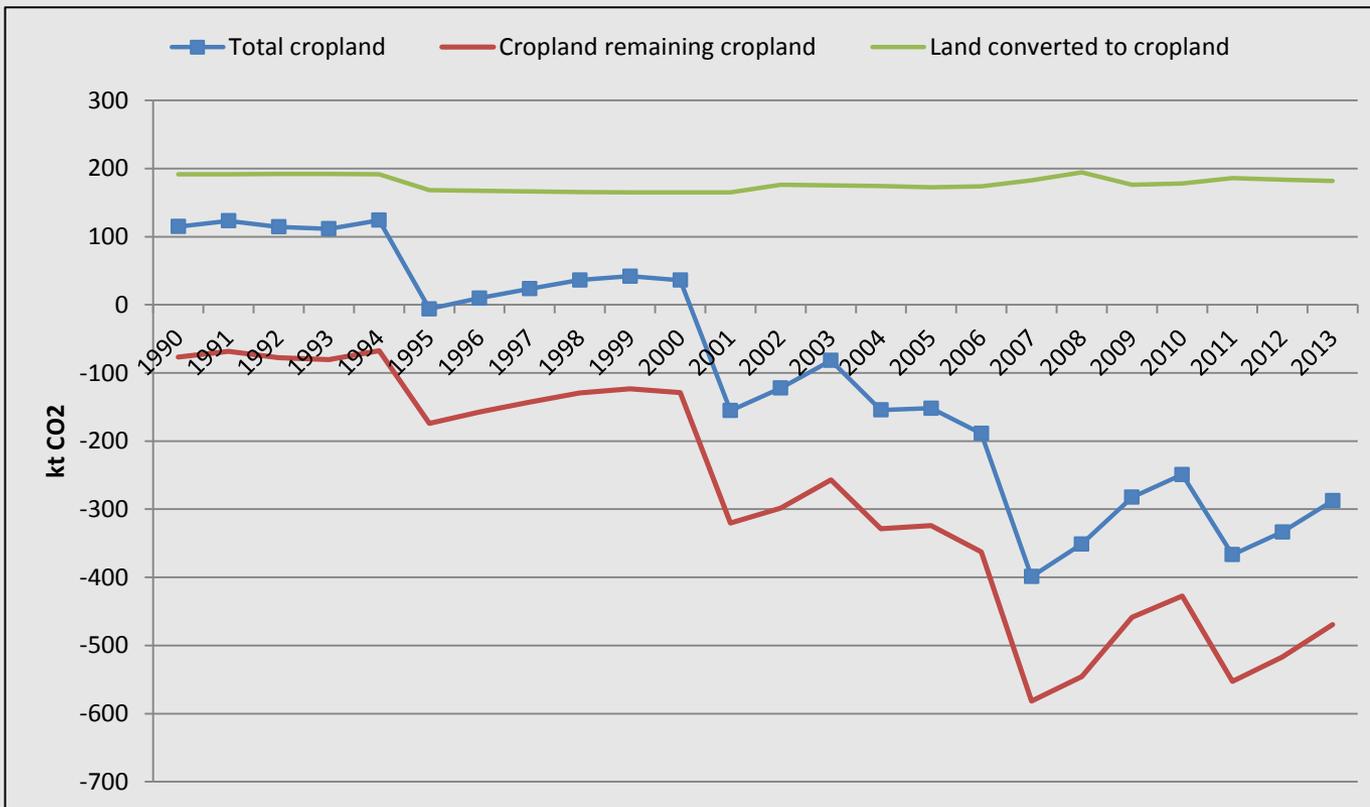
→ application IPCC–default transition period - 20 years
 After 20 year a equilibrium state under the same management



Impacts on Soil-C stock changes



Cropland-results: emissions/removals



- Smooth trend of emissions from land converted to Cropland
- unsteady trend, correlated with Agro-Env. programme