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Emission factor drained peatlands Switzerland

A brief analysis of recent studies and comparison to EF used in the Swiss GHG Inventory

The current CO_2 emission factor for drained peatlands in the Swiss Greenhouse Gas Inventory is 9.52 ± 2.2 t C ha^{-1} a^{-1}. No distinction is made between cropland and grassland. It is based on earlier studies which made use of existing publications from various European countries (see Leifeld et al. 2003; 2005 and references cited therein). Most of the drained peatlands in Switzerland that are now under agricultural use are former fens, i.e., minerotrophic mires with emission factors that are typically higher than that of drained ombrothrophic bogs (Rihm, 2009). The majority of those soils are cropped.

According to IPCC (2003), Switzerland is located in the cold temperate zone. The climatic limit between cold and warm is at a mean annual temperature of + 10 °C. MAT of the Swiss Central Plateau where most of peatland drainage occurred is at around + 7.9 to + 10.0 °C but typically below + 10.0 °C, thus close to the warm temperate zone.

The corresponding default emission factors for carbon stock changes in cropland from peatland drainage [t C ha^{-1} a^{-1}] are 5.0 (± 90%) and 10.0 (± 90%) for the cool temperate and warm temperate zone, respectively (IPCC 2006). The EF for cool temperate soils has been raised from previously 1.0 (± 90%) t C ha^{-1} a^{-1} in the IPCC 2003 GPG.

A review on CO_2 emission from drained fens in Europe report median EF of 4.09 (range 1.09 – 10.6; n = 3) for cropland and 4.12 (range 0.82 – 6.58; n = 5) for grassland [t C ha^{-1} a^{-1}] (Byrne et al. 2004). More recently, Höper (2007) summarized EF from drained fens in Central Europe and South Sweden, regions which are climatically very similar to the Swiss Central Plateau. Mean EF of fens in Höper (2007) is 11.2 (range 9.9 to 13.2) when drained for cropland and 4.6 (range 3.7 to 6.6) t C ha^{-1} a^{-1} when drained for grassland, respectively. The EF for CL on organic soils given by Byrne et al. (2004) is much smaller than that in Höper (2007); most probably because two of the three references were from Finland where EF refer to the boreal zone. A recent Norwegian study reports EF for fens drained for agriculture of between 6.0 and 8.6 t C ha^{-1} a^{-1}, depending on the method used (Gronlund et al. 2008). The sites have a climate that is a bit colder (average MAT of eight sites: + 6.2 °C) but of similar rainfall (average precipitation of 1365 mm) as in Switzerland and represent Swiss pre-Alpine conditions.

From the data above it can be seen that the country-specific EF for organic soils under agricultural use in Switzerland is within the uncertainty range reported currently in the literature. A revision of that EF is therefore at the moment not justified. Two ongoing studies on country-specific EF of drained organic soils are presently assessed at the Agroscope Research Station ART and will enter a possible future revision of EF.

References

Byrne, KA., Chojnicki, B., Christensen, TR., Drösler, M., Freibauer, A., Frolking, S., Lindroth, A., Mailhammer, J., Malmer, N., Selin, P., Turunen, J., Valentini, R., Zetterberg, L., 2004: EU Peatlands: Current carbon stocks and trace gas fluxes. Carboeurope-GHG, concerted action synthesis of the European greenhouse gas budget. Department of Forest Science and Environment, Viterbo, Italy, 1-58.

Grønlund, A., Hauge, A., Hovde, A. and Rasse, D.P., 2008. Carbon loss estimates from cultivated peat soils in Norway: a comparison of three methods. Nutrient Cycling in Agroecosystems 81: 157-167.

Höper, H., 2007. Freisetzung von Treibhausgasen aus deutschen Mooren. Telma 37: 85-116.

Leifeld, J., Bassin, S., Fuhrer, J. 2003: Carbon stocks and carbon sequestration potentials in agricultural soils in Switzerland. Schriftenreihe der FAL 44. Zürich-Reckenholz

Leifeld, J., Bassin, S., Fuhrer, J. 2005: Carbon stocks in Swiss agricultural soils predicted by land-use, soil characteristics, and altitude. Agriculture, Ecosystems & Environment 105: 255-266

Rihm, B., 2009. LULUCF – Abgrenzung der organischen Böden. Tests mit den Hoch- und Flachmoorinventaren. Meteotest, 2009.