



Effect of management intensity and the 2003 summer heat wave on the carbon budget of a managed grassland site in central Europe

C. Ammann, C. Flechard, A. Neftel, J. Fuhrer

Agroscope FAL, Air Pollution/Climate Group, Zürich (christof.ammann@fal.admin.ch)

Managed agricultural ecosystems form a significant part of the European land cover. Mitigation options like the conversion from arable land to permanent grassland and an optimized management could help to sequester carbon in agricultural soils. However, the annual carbon budget is also influenced by the regional climate conditions, which might change considerably in the future. In order to study these effects, the carbon cycle of a managed grassland site on the Swiss Central Plateau is monitored since 2002 within the framework of the EU projects GREENGRASS and CarboEurope-IP. The grassland was established in 2001 by conversion from arable land and is used for producing hay and silage. The experimental field is divided in two plots, the one undergoing intensive management (high nitrogen input), the other extensive management (no fertilization). Continuous eddy covariance measurements of the CO₂ flux and the quantification of carbon export and import by harvest and manure application allow for the assessment of the complete carbon budget of both plots. Since the net carbon exchange for a managed grassland is calculated as a relatively small difference of two large opposite terms (net CO₂ uptake and harvest export), it is affected by a considerable uncertainty. Yet, in general the intensively managed field shows a tendency to sequester carbon, whereas the extensive field exhibits a net carbon loss. In 2003 the pronounced summer heat wave in central Europe led to a significant drought and a reduction in the productivity as well as in the respiratory loss of the ecosystems. As a result, the carbon budget of the intensive field was shifted to a near-zero value.