Geophysical Research Abstracts, Vol. 7, 08318, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08318


# Determining the carbon balance of croplands: winter wheat at the Swiss super-site

W. Eugster (1), F. Böckli (1), C. Ammann (2), C. Flechard (2), A. Neftel (2), J. Fuhrer (2), and **N. Buchmann** (1)

(1) Institute of Plant Sciences, Swiss Federal Institute of Technology ETHZ, Zürich, Switzerland, (2) Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, Zürich, Switzerland (werner.eugster@ipw.agrl.ethz.ch, fax +41 44 632 1153)

The first year of flux measurements at the Swiss cropland site (winter wheat in 2004) allow a first assessment of the methodology to determine the seasonal carbon budget at our site. We employed the eddy covariance method for continuous flux measurements, performed additional field campaigns to assess soil respiration using a portable chamber system (LiCOR 6400), determined crop yield using small harvest plots and compared this yield to the one reported by the farmer for grain and straw. The integrated eddy covariance fluxes from the beginning of the year until the harvest date (03 August 2004) yielded 600 gC $m^{-2}$ NEE which is in excellent agreement with our best estimate of 576 gC $m^{-2}$ for the harvest biomass export.
While the grain yield reported by the farmer (704 g dry weight $m^{-2}$, corresponding to 352 gC $m^{-2}$) was measured accurately, the corresponding straw yield (358 g dry weight $m^{-2}$ or 129 gC $m^{-2}$) was unrealistically low in comparison with our own small harvest plot samples (dry weight yields for grain, straw, and stubbles were 1065, 851, and 147 g/m2, which corresponds to 532, 425, and 74 gC $m^{-2}$, respectively). Using the harvest ratio obtained from our small harvest plots (55.6%) we corrected the reported straw yield to obtain a more realistic best estimate of 224 gC $m^{-2}$ for straw harvest. Since straw has no relevant commercial value the farmer did not immediately remove it from the field due to approaching bad weather conditions. The low value reported is thus interpreted as a combined effect of losses during the three weeks that the straw was on the field and exposed to rain, and the unsupervised process of collecting and weighing the straw long after the harvest.
There were no signs of a relevant problem with low turbulence during the night at our site (the so-called $u_*$ dependency). To confirm our respiration estimates from the eddy covariance system we carried out a few chamber measurement campaigns during the growing season. The agreement between respiration fluxes measured during the day by chamber and the eddy covariance fluxes measured at night at a comparable temperature agreed quite well.