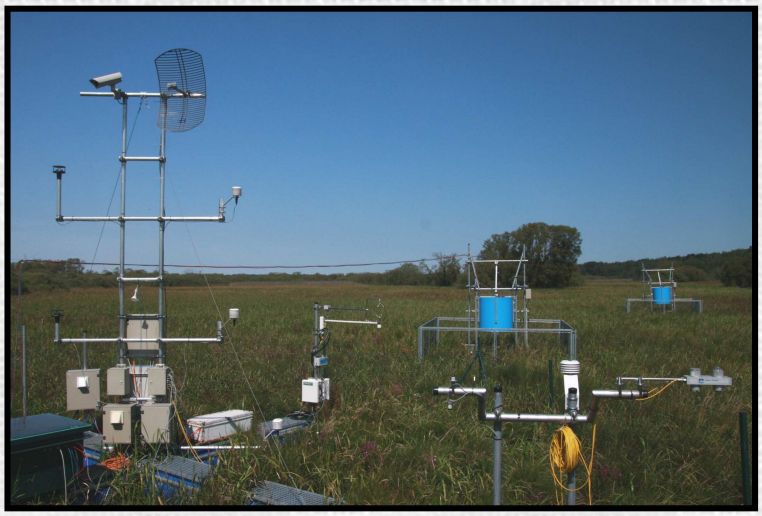
Carbon dioxide exchange of a sedge-grass marsh under different meteorological conditions

Dušek, J., Čížková, H., Květ, J.
Global Change Research Centre AS CR, v.v.i.
Czech Republic



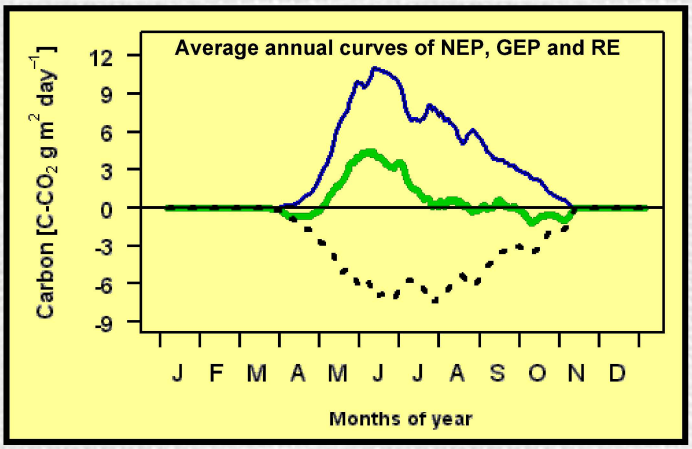
The sedge grass-marsh in the Czech Republic (426 m a.s.l.) is located near the town of Třeboň, South Bohemia is 1 ha part of a herbaceous wetland with an area of 450 ha. The surrounding vegetation is formed by sedge-grass marsh communities dominated by Carex acuta L. and Phalaris arundinacea L. This area is covered by up to several meters thick layer of peat, which is superimposed on quaternary alluvial sands and clays. The ecosystem station is situated in the inundation area of a large human-made lake (Rožmberk fishpond, 5 km2).

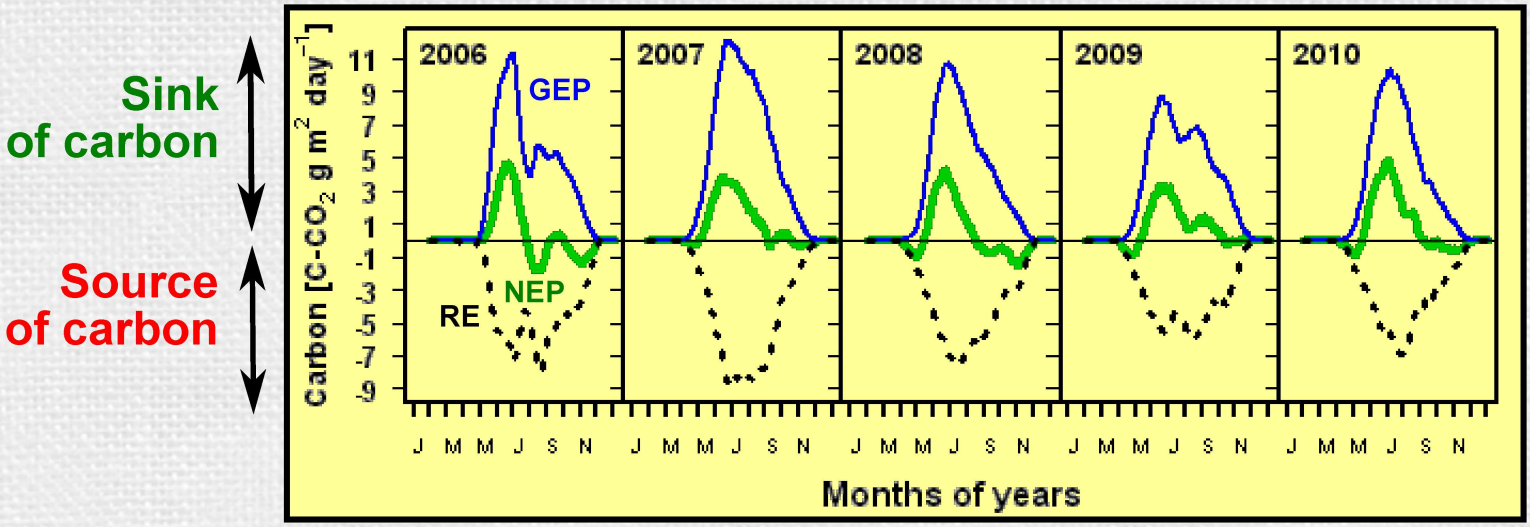
Overall meteorological characteristic for 2006 to 2010.

Meteorological parameters	2006	2007	2008	2009	2010
Annual average air temperature [°C]	7.9	9.1	8.8	8.6	7.5
Maximum air temperature [°C]	33.5	37.5	33.1	36.0	34.8
Minimum air temperature [°C]	-23.4	-17.2	-15.2	-18.8	-22.1
Annual sum of precipitation [mm]	737	580	539	711	662
Annual average water level [m]	0.02	-0.06	-0.11	-0.05	-0.02
Maximum water level [m]	2.36	0.17	0.07	0.74	1.12
Minimum water level [m]	-0.33	-0.29	-0.29	-0.39	-0.29

The annual patterns of 5 consecutive years of net ecosystem production (NEP), gross ecosystem production (GEP) and ecosystem respiration (RE) estimated from the eddy covariance data are presented. These data on carbon exchange were positive means of carbon retention in the wetland ecosystem while negative means represent carbon looses due to high RE in our case. At first sight it is obvious that the curves are different, but their bell shape is the same. The growing season started between the 78th and 103rd days of each year (DOY), depending on the current year´s conditions. The either positive or negative bell-like shape of the curves was disrupted by floods mainly in 2006, 2009 and partly in 2010. On the curves of NEP and GEP, a decrease is evident during and after floods. Similarly, RE decrease is usually soon followed by RE increase, which reflects fast decomposition of plant parts damaged by a flood. After floods, plant regrowth occurred in 2006 and 2009. Yet, after the flood of 2009, the NEP did not reach negative values.

Average annual NEP = 182 g C-CO_2 m^{-2} $year^{-1}$





Flooded site August 2010

Annual carbon balance (C-CO_2) in the sedge-grass marsh based on eddy covariance measurements.

[g C-CO_2 $m^{-2}year^{-1}$]	2006	2007	2008	2009	2010
Net ecosystem production (NEP)	105	261	110	211	225
Ecosystem respiration (RE)	990	1108	980	845	795
Gross ecosystem respiration (GEP)	1095	1369	1090	1056	1020

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