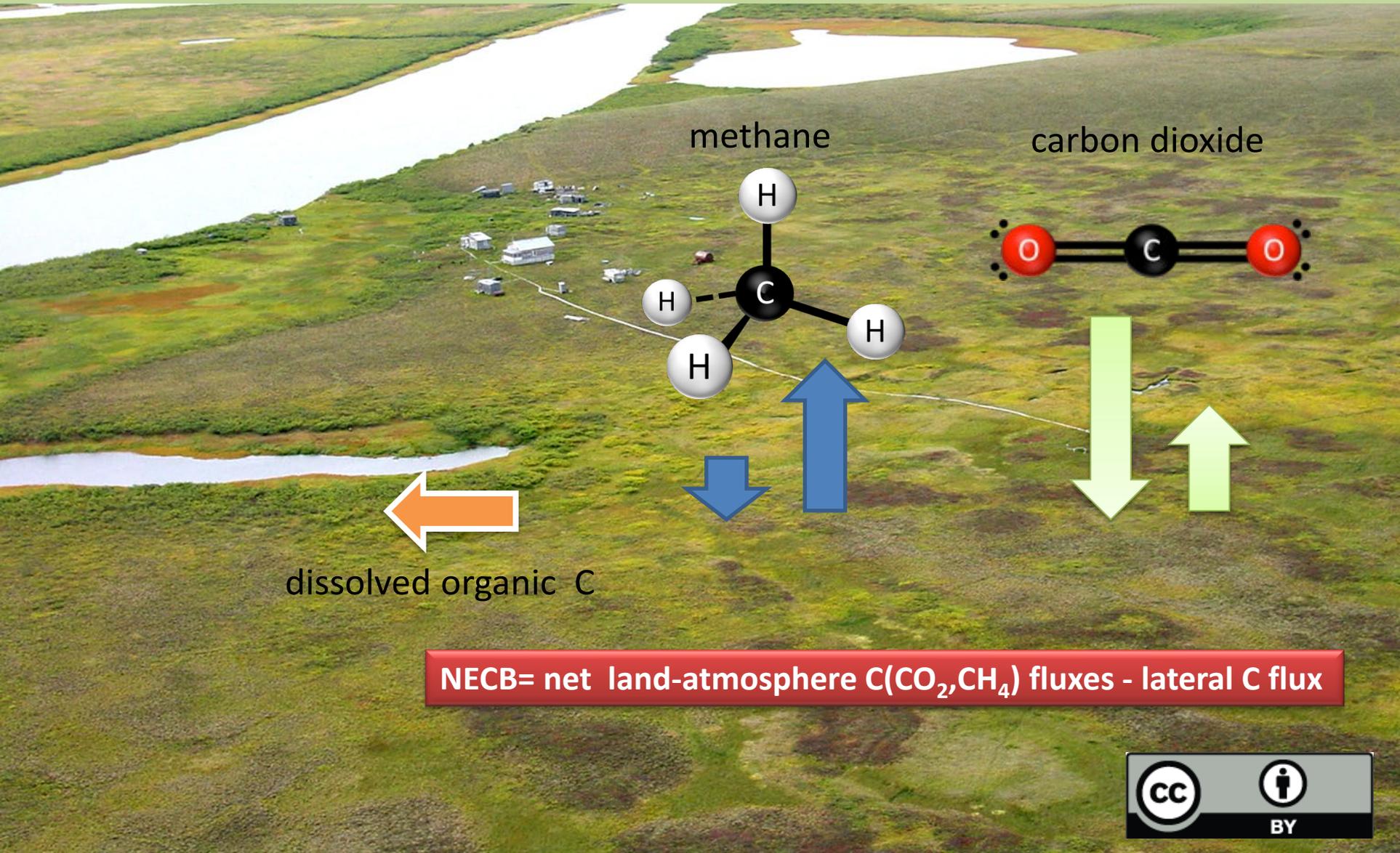


The carbon budget of a tundra in the north-eastern Russian Arctic during the snow free season and its stability in the 2003-2016 period

Han Dolman, Ko van Huissteden, Joshua Dean, Trofim Maximov, Roman Petrov, Luca Belelli Marchesini



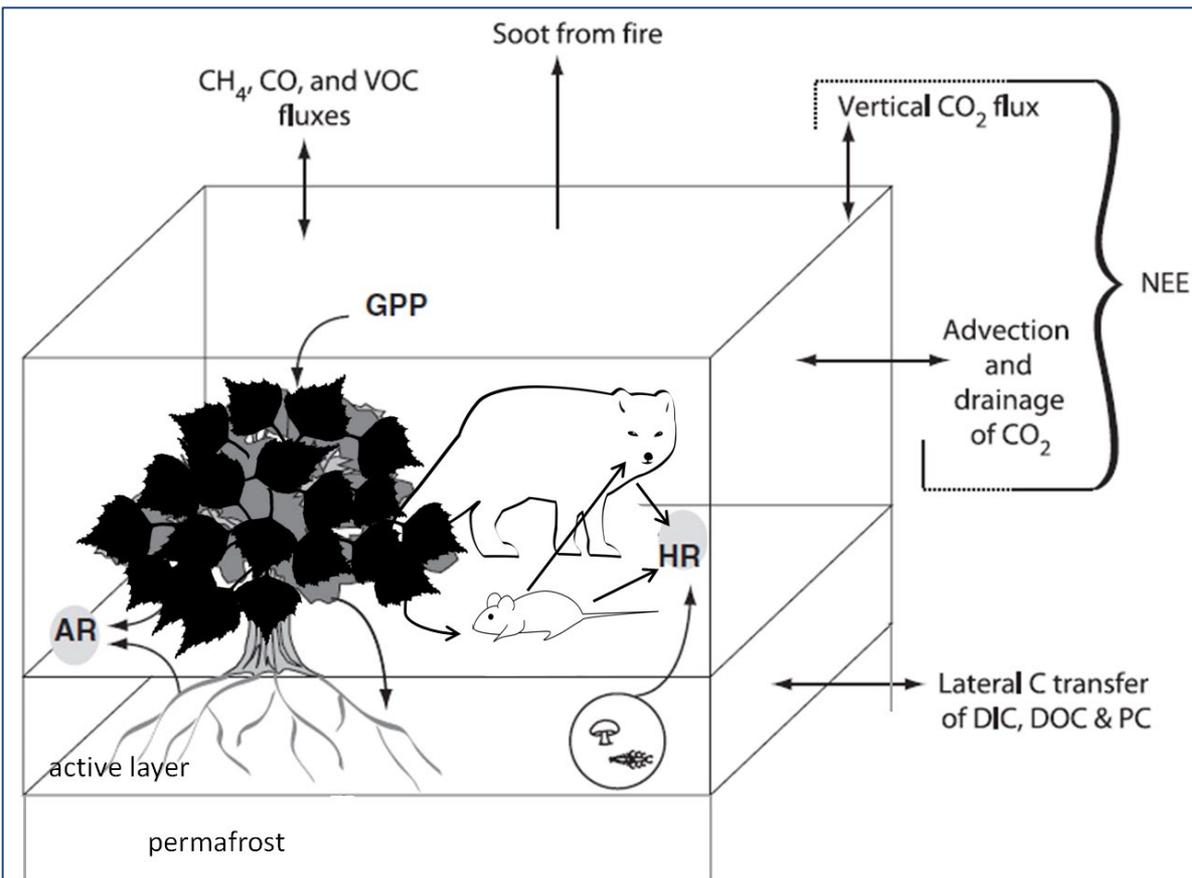
NECB= net land-atmosphere C(CO_2 , CH_4) fluxes - lateral C flux

$$\text{NECB} = dC/dt$$

Eddy covariance technique

Mass flow

$$\text{NECB} = -\text{NEE} + \text{FCO} + \text{FCH}_4 + \text{FVOC} + \text{FDIC} + \text{FDOC} + \text{FPC}$$



NEE= net CO₂ ecosystem-atmosphere flux

FCO= net carbon monoxide (CO) flux

FCH₄= net methane (CH₄) flux

FVOC= net volatile organic C (VOC) flux

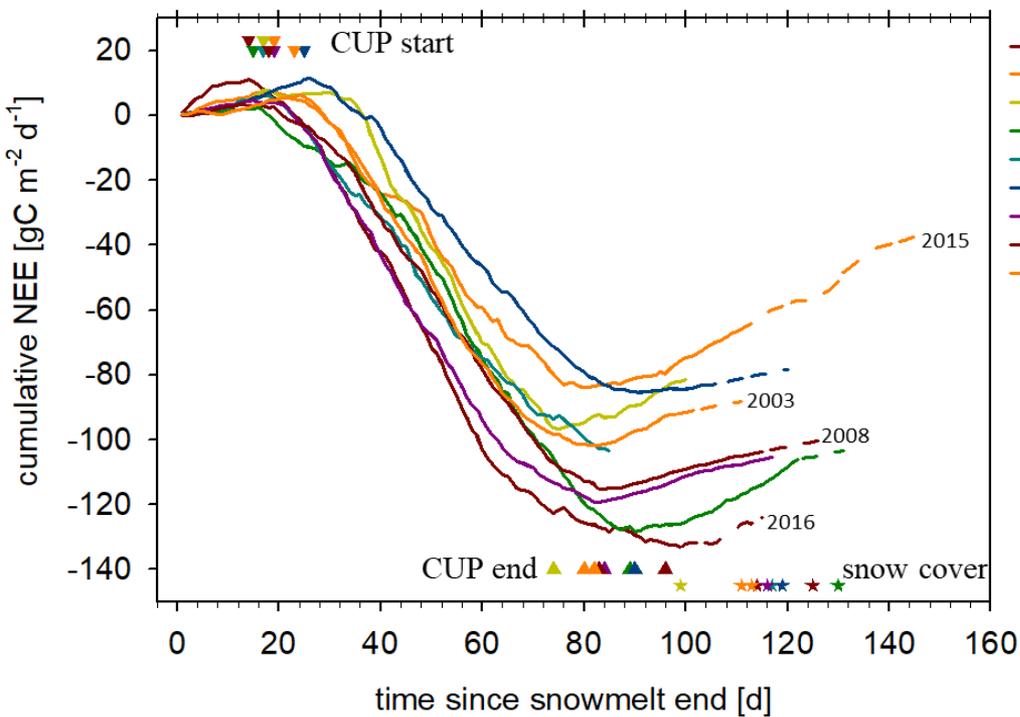
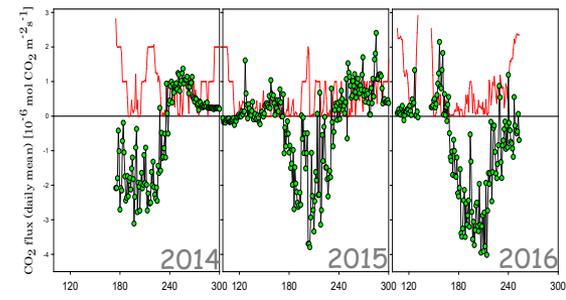
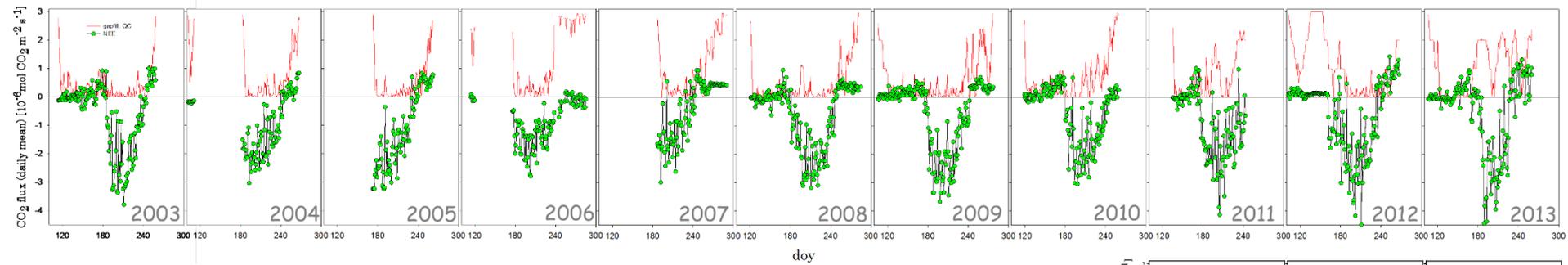
FDIC= net dissolved inorganic C (DIC) input/output

FDOC= net dissolved organic C (DOC) input/output

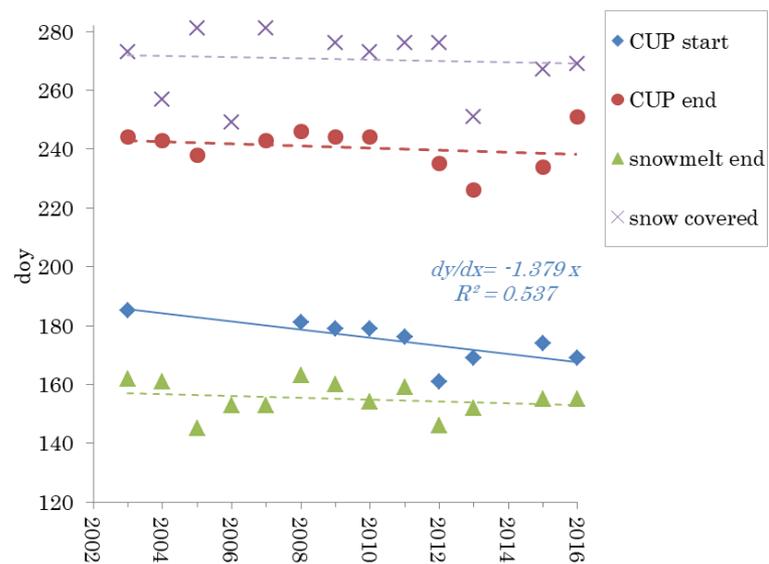
FPC=net lateral transfer of particulate C (non-dissolved, nongaseous) C
via soot emission (fires), water and wind deposition/erosion.

(mod. after Chapin III et al, 2006)

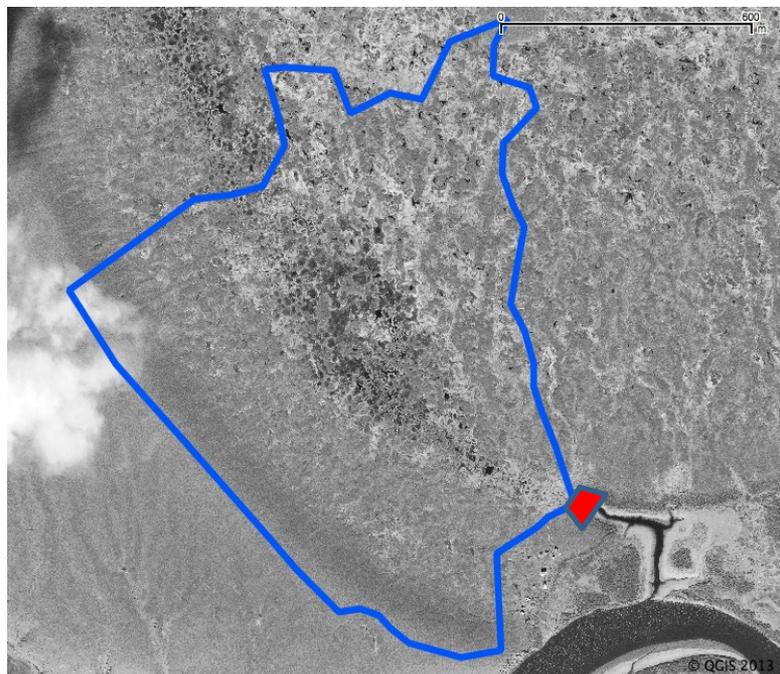
Net Ecosystem Exchange



- 2016
- 2015
- 2013
- 2012
- 2011
- 2010
- 2009
- 2008
- 2003



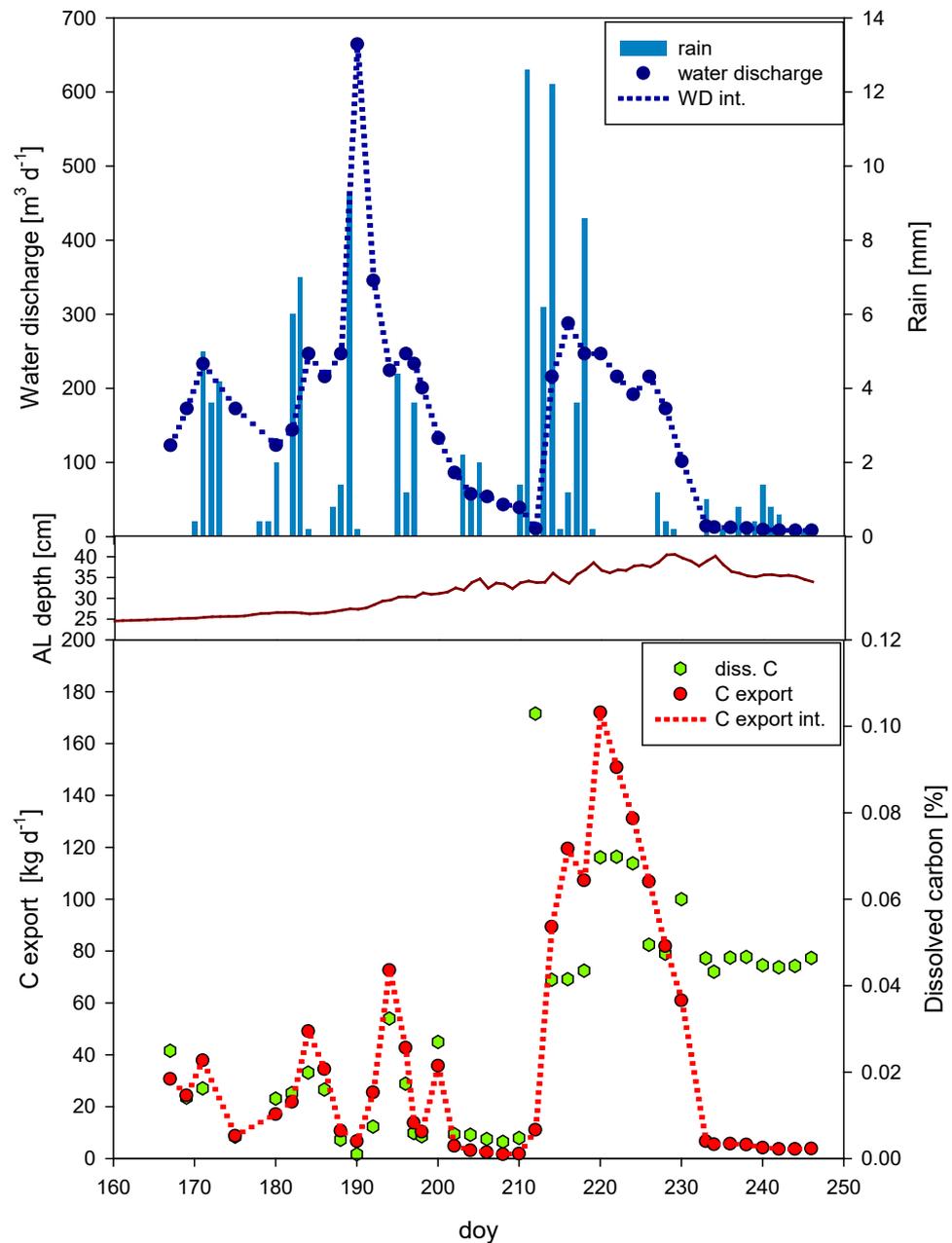
Lateral C fluxes (FDOC)



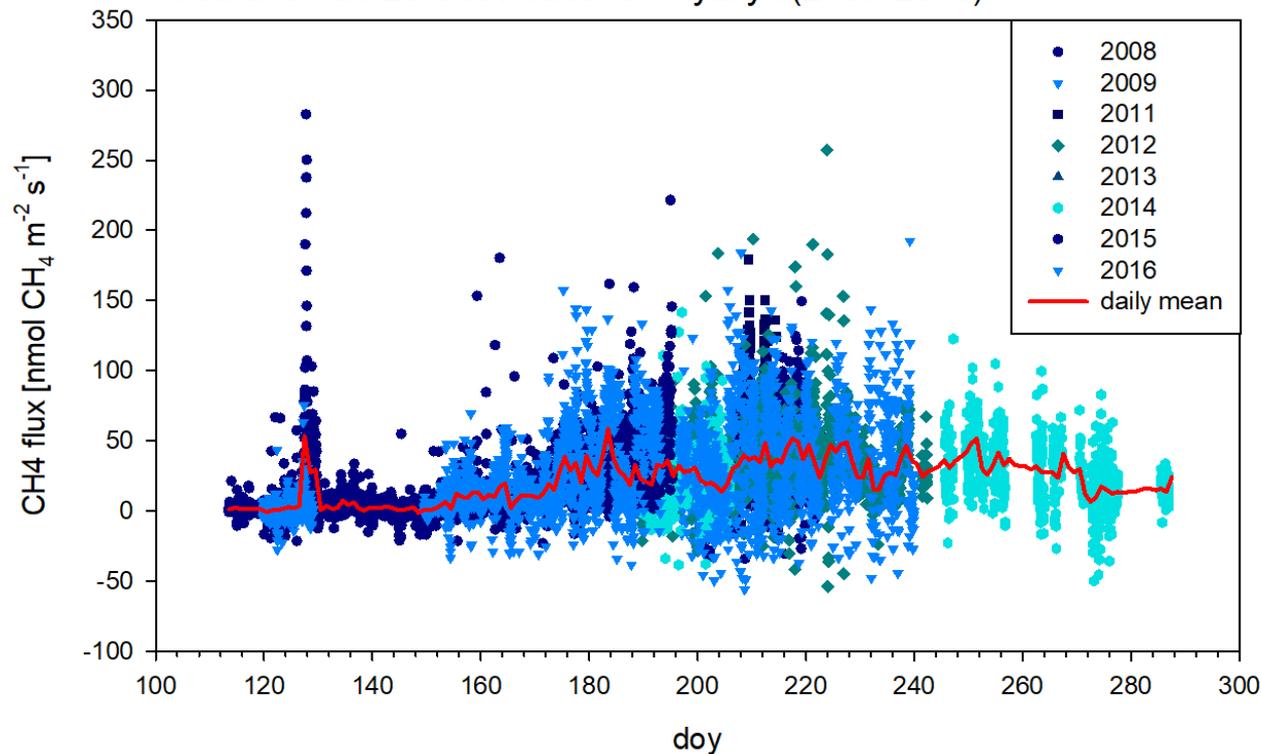
Catchment area assessment:
995132 m² ~ 1Km²
Uncertainty: ±20%

Water discharge measurements
Total DOC export over 89 days: 3108.9 Kg

Cumulative FDOC= 3.12 gC m⁻²



Methane flux EC observations - Kytalyk (2008-2016)



Carbon quantity emitted/exported as CH₄/DOC similar and small fraction of NECB (0.3%)

Kytalyk tundra consistent carbon sink during the snow free season with moderate inter-annual variability
(CV:0.2 and 0.35 for NECB and GHG budget)

	NECB	GHG balance
Component	(gC m ⁻²)	(gC CO ₂ e m ⁻²)
NEE	93.11 ± 18.80	-93.11 ± 18.80
FCH ₄	-3.49	+40.61
FDOC	-3.12	
Σ	86.5 ± 18.8	-52.5 ± 18.8