Supplement of Biogeosciences Discuss., 12, 16913–16951, 2015
http://www.biogeosciences-discuss.net/12/16913/2015/
doi:10.5194/bgd-12-16913-2015-supplement

Supplement of

The fate of ^{15}N-nitrate in mesocosms from five European peatlands differing in long-term nitrogen deposition rate

K. Zając and C. Blodau

Correspondence to: C. Blodau (christian.blodau@uni-muenster.de)

Soil moisture (SM) sensors calibration procedure

Calibration was performed on the studied peat monoliths ('mesocosms') after termination of the experiment. Each peat core, which had been equipped with SM sensors during the experiment, was divided into two parts – the top and the bottom. From each part smaller peat cores (0.12 m in diameter, 0.1 m high) were removed and placed in thin-walled, rigid PVC tubes. Peat cores were saturated and dried successively – first at air temperature for 40 days and subsequently at 70°C in the oven until no further decrease in mass was observed. The peat mass and the soil moisture content were recorded every 1 to 5 days, starting at the saturation state and finishing after oven drying. The calibration curves were established for the top and the bottom part of the mesocosms, for each site specifically. Due to the big variability between the absolute sensor readings we used relative delta values for the calculations (a difference between the highest reading recorded by the sensor, i.e. at 100% saturation and the current reading). Later, the delta values were transferred back to the absolute volumetric water content (VWC) values.

Obtained calibration curves were mainly polynomial and had a regression coefficient of $R^2 > 0.82$:

Degerö Stormyr top	$y = -8E\text{-}07x^2 + 0.0019x + 0.0367$	$R^2 = 0.99$
Degerö Stormyr bottom	$y = 6E\text{-}06x^2 + 0.0003x + 0.0185$	$R^2 = 0.83$
Cors Fochno top	$y = 2E\text{-}06x^2 + 0.0007x – 0.0118$	$R^2 = 0.90$
Cors Fochno bottom	$y = 0.002x + 0.0974$	$R^2 = 0.89$
Whixall Moss top	$y = -2E\text{-}06x^2 – 0.002x + 0.0871$	$R^2 = 0.91$
Whixall Moss bottom	$y = 2E\text{-}06x^2 + 0.0008x – 0.0347$	$R^2 = 0.93$

Lille Vildmose top	$y = 0.002x + 0.0109$	$R^2 = 0.94$
Lille Vildmose bottom	$y = 4E\text{-}06x^2 + 0.001x + 0.0099$	$R^2 = 0.93$
Frölichshaier Sattelmoor top/bottom	$y = -2E\text{-}06x^2 + 0.0024x + 0.0789$	$R^2 = 0.99$

The sensor readings were highest not at the expected 100% saturation (first reading) but during second or third measurement (2-4 days later). This effect may have been caused by the differences in the dielectric constant values (ε) of air and peat.

Variable peat structure and porosity within one peat core might have led to deviations in sensor readings Such effect was also suggested by Nagare et al. (2011), where it was argued that an increased volumetric fraction of air at greater porosities is the main cause for the deviation from ε-VWC relationships of soils at similar water contents.

Nagare R.M., Schincariol R.A., Quinton W.L., Hayashi M., 2011: Laboratory calibration of time domain reflectometry to determine moisture content in undisturbed peat samples. European Journal of Soil Science 62:505-515

Table S1. Total aboveground biomass, *Sphagnum* growth rate, bulk density (0-20 cm depth) and volumetric water content (0-15 cm depth) of the investigated sites. *Sphagnum* biomass calculated for the 5 cm thick layer. Standard deviations are given.

Site	Total aboveground biomass (g m^{-2})			*Sphagnum* growth	Peat Density	VWC
	Sphagnum	Shrubs	Graminoids	(mm month^{-1})	(g cm^{-3})	(cm^{-3} cm^{-3})
DS	1117 ± 245	55 ± 14	110 ± 62	1.0 ± 0.2	0.044 ± 0.008	0.897
CF	1196 ± 220	260 ± 96	97 ± 38	0.4 ± 0.5	0.049 ± 0.008	0.804
WM	682 ± 54	273 ± 81	39 ± 18	0.3 ± 0.1	0.045 ± 0.016	0.642
LV	1089 ± 339	124 ± 48	41 ± 7	0.6 ± 0.05	0.041 ± 0.021	0.924
FS	754 ± 48	359 ± 85	92 ± 119	2.3 ± 1.3	0.042 ± 0.006	0.748

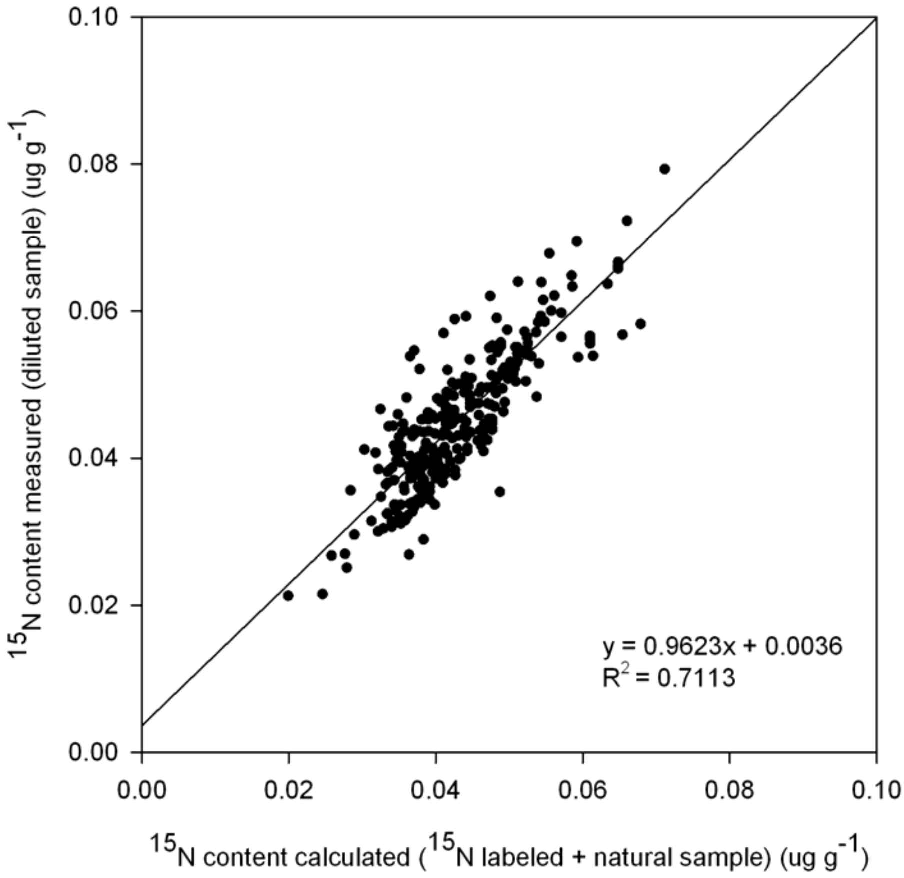

Figure S1. Correlation between recalculated ^{15}N content measured in a labeled and not-labeled sample (^{15}N labeled + natural sample) and ^{15}N content in a measured diluted sample. Pearson's correlation coefficient $r = 0.845$, coefficient of determination $R^2 = 0.71$.

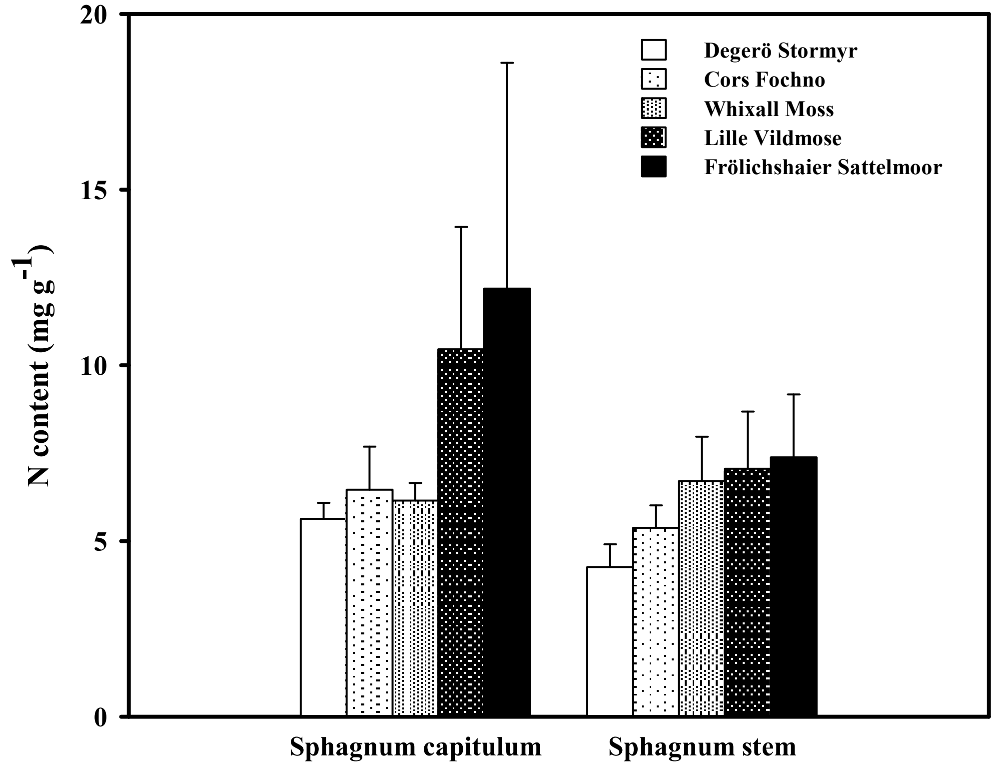

Figure S2. Nitrogen content (mean ± SD, n = 3) of *Sphagnum* capitulum and stem.

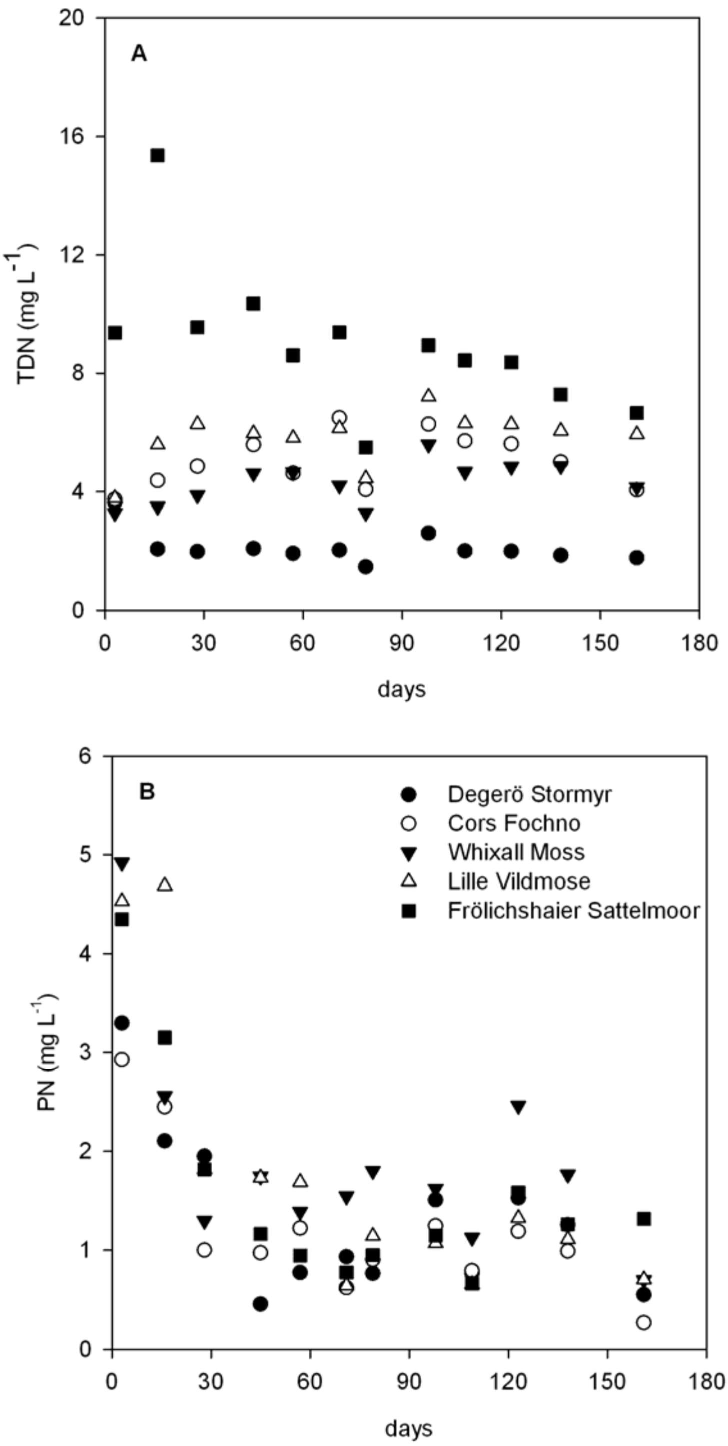

Figure S3. (A) Total dissolved nitrogen (TDN) concentration (mg L^{-1}) for the sites (4 measuring depths pulled together) and (B) particulate nitrogen (PN) content (mg L^{-1}) measured at the bottom outlet of the cores.