

Effects of rewetting on greenhouse gas emissions of cultivated fens

Reinhard Wolf¹ and Jutta Zeitz¹

Questions

- Which greenhouse gas mitigation potentials can be achieved for extensively cultivated fens with different duration of rewetting (6 and 18 years)?
- Which control factors affect the fluxes of the greenhouse gases?

Study Sites



Fig. 1: Sedge fen nearby Körzin, 50 km south of Berlin.

Fig. 2: Flood lawn with bentgrass and spike-rush nearby Krielow, 50 km west of Berlin.

First Results

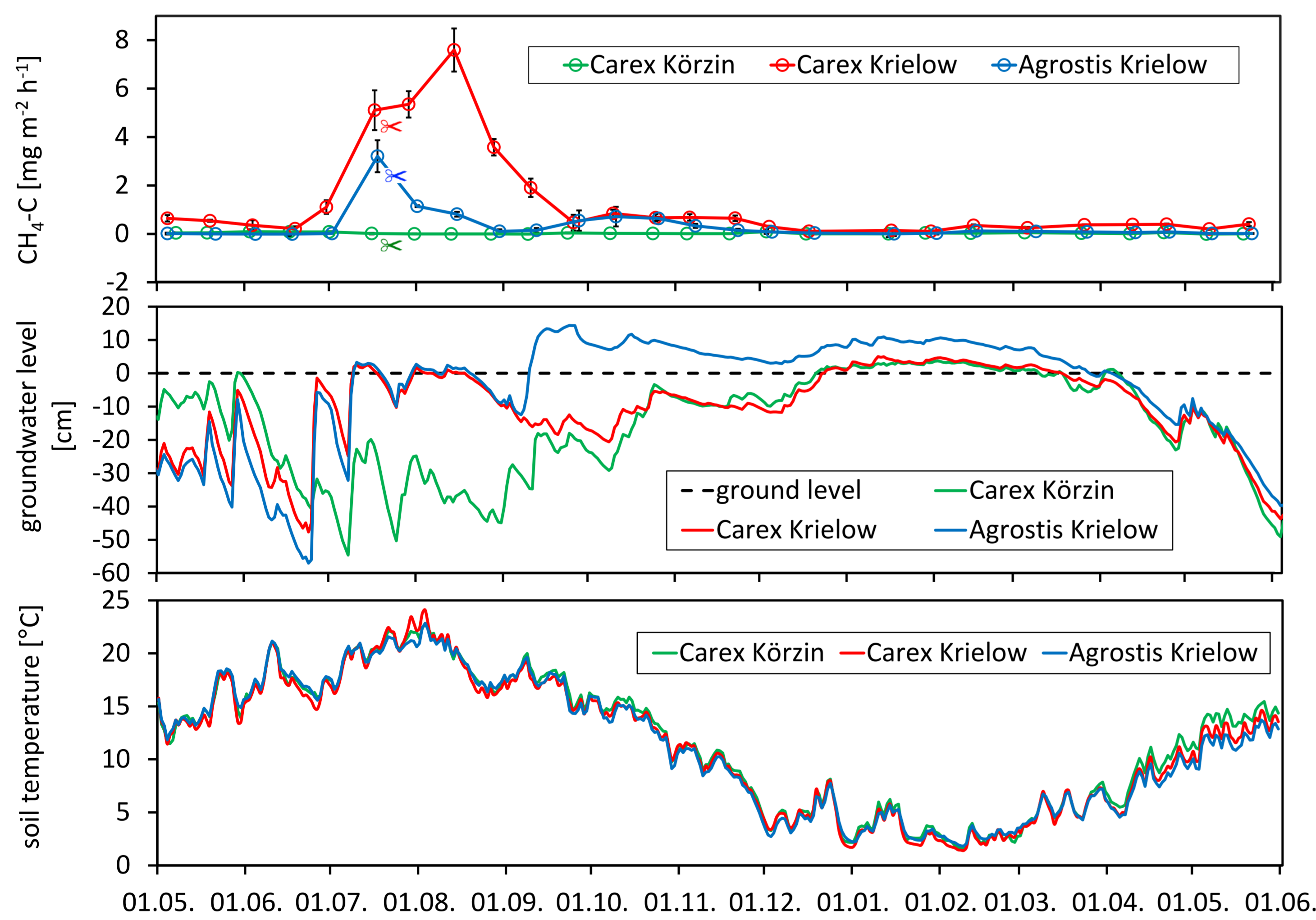


Fig. 5: CH₄-fluxes (means and standard deviation, n = 3) according to the groundwater level and soil temperature (-5 cm) from 01.05.14 to 01.06.15.

First Conclusions

- CH₄-fluxes seasonal controlled by groundwater level: increasing CH₄-emissions with increasing groundwater level and reverse
- CH₄-fluxes year-round dependent on soil temperature
- DOC-concentration of the soil pore water affects the CH₄-emissions: high DOC-concentrations (> 200 mg l⁻¹) after 6 years of rewetting with high CH₄-emissions, lower DOC-concentrations (<100 mg l⁻¹) after 18 years of rewetting with lower CH₄-emissions

Material and Methods

- Biennial measurement (05.14 - 04.16) of CO₂, CH₄ and N₂O in 2 to 3 week intervals with the chamber method (n = 3) after DRÖSLER (2005):
 - CO₂: dynamic mode, transparent chamber for NEE, opaque chamber for respiration, Licor 820
 - CH₄ und N₂O: static mode, 1 h duration, opaque chambers, intervals of 10 min.
- Recording of the control factors:
 - precipitation, air temperature, PAR → weather station
 - water level (n = 3) → piezometer, diver in groundwater pipe
 - DOC, NH₄-N, NO₃-N (n = 3) → sampling of soil pore water and groundwater with suction cups and piezometers
 - soil temperature, soil moisture → FDR-sensor in -5, -10 und -20 cm depth
- Once-only soil sampling (n = 4) and analysing of C_t, C_{org}, N_t, N_{org}, C_{mic}, N_{mic}, pH, bulk density and plant biomass after mowing

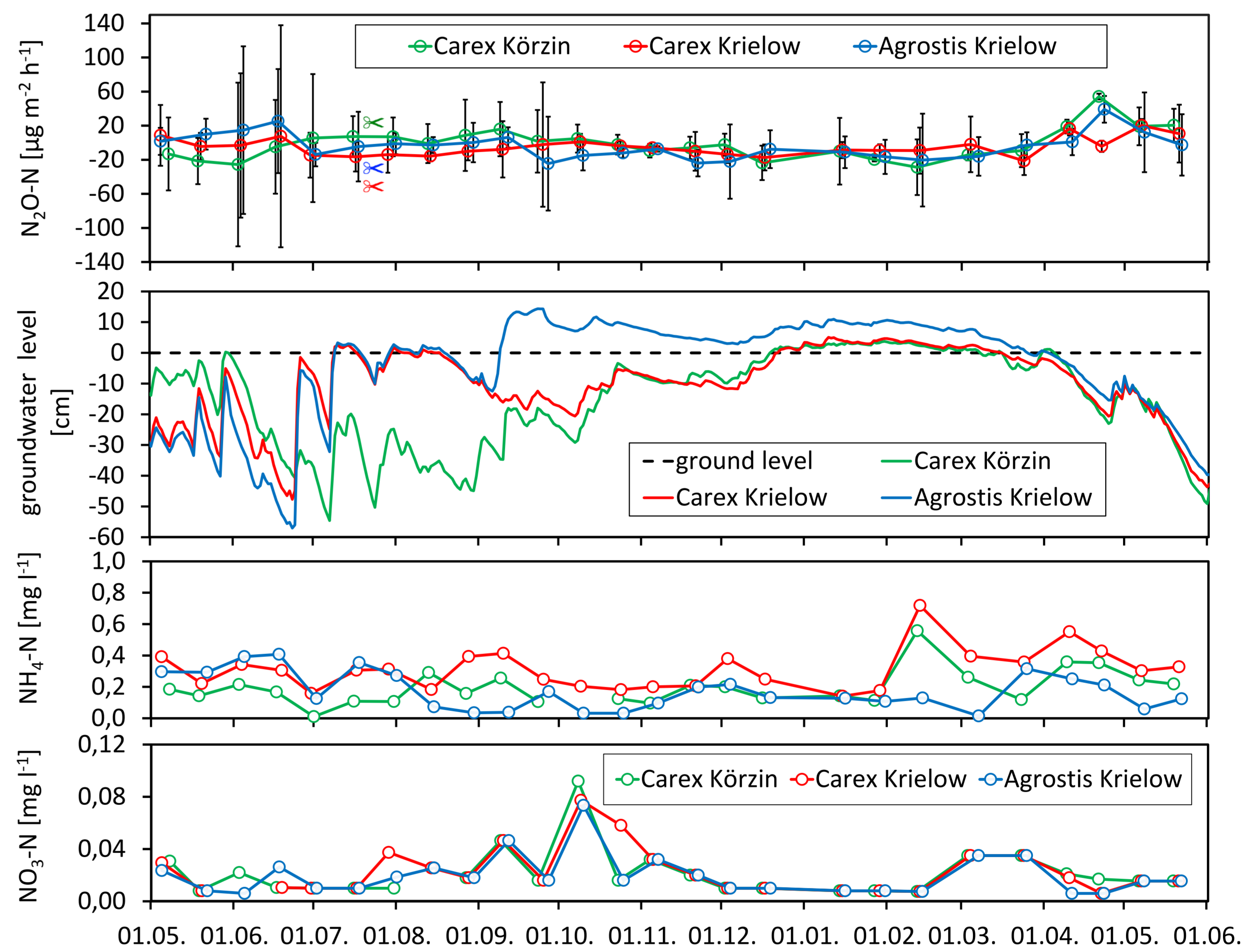


Fig. 6: N₂O-fluxes (means and standard deviation, n = 3) according to the groundwater level, ammonium- and nitrate-concentration in the soil pore water (-15 cm) from 01.05.14 to 01.06.15.