

PHD program: Biology and biodiversity

RESPONSE OF CARBON CYCLING OF GRASSLANDS TO ALTERED PRECIPITATION IN SOUTH-EASTERN CRIMEA

Oleksandra Khalaim

Research interests: nonlinear response of carbon cycling processes to altered precipitation in grasslands, climate change impacts to steppe ecosystems

Email: alexandra.khalaim@gmail.com

Although the reactions of grasslands to altered precipitation have been being investigated worldwide for the last 20 years, complexity in precipitation effects on ecosystem carbon processes remains largely unclear, especially in the changing climate (Zhou X., 2009). This research is devoted to analysis of interactions between altered precipitation and carbon cycling in grassland. I hypothesize that ecosystem carbon processes have nonlinear response to precipitation in grasslands. To check this, a manipulative change of precipitation levels has been organized on 21 land plots (20/40/60% increasing and decreasing of precipitation levels) in Karadag Nature Reserve. Soil, root, microbial, and ecosystem respiration; ecosystem CO₂ exchange; and soil carbon content have been measured since October, 2011. In May-September 2012 the average gross ecosystem productivity positively correlated with precipitation ($r^2=0.48$, $p < 0.002$) with the peak in May, varying across the treatments from 1.84 ± 0.3 to 6.89 ± 1.1 $\mu\text{mol CO}_2\text{m}^{-2}\text{s}^{-1}$. Averaged soil respiration in April-October growing season had a significant positive correlation with soil moisture at 15 cm depth ($r^2=0.51$, $p < 0.0001$). Although it was positively correlated with precipitation ($r^2=0.34$, $p < 0.001$), this relationship appeared to be non-linear in this study. After obtaining data for 2013 growing season, it will be possible to describe more adequately carbon processes on the experimental site.

Key words: climate change, grasslands, carbon cycling, altered precipitation