

# Higher quantity and lower frequency of N addition and mowing improved gross N turnover in a temperate steppe of Northern China

C Wang<sup>1</sup>, Jianping Sun<sup>2</sup>, and Kuan-Hu Dong<sup>2</sup>

<sup>1</sup>Prof. Dr.

<sup>2</sup>Shanxi Agricultural University

July 9, 2020

## Abstract

Anthropogenic effects, such as nitrogen (N) enrichment and mowing, are constantly changing the function and structure of grassland ecosystems. In order to test whether the magnitude and frequency of N addition, as well as occurrence of mowing, affects gross N turnover. We designed a long-term field experiment which included 5 levels of N addition (0, 2, 10, 20, and 50 g N m<sup>-2</sup> yr<sup>-1</sup>) and mowing in a typical grassland of northern China. To test the effects of N addition frequency, the amount of N applied was separated evenly by two times (twice a year, low frequency) or twelve times (monthly, high frequency) that results were compared against a control site where none of the treatments were applied. Mowing effects were also considered at each N treatment levels. Our results showed that the N level, the frequency of N addition, and mowing significantly influenced gross ammonification (GA) and nitrification (GN) rates. Specifically, the effect of N addition frequency was significantly different under the highest N addition level (50 g N m<sup>-2</sup> yr<sup>-1</sup>), lower frequency (twice a year) significantly increased N turnover rates. Mowing significantly increased the GA rate, while decreased GN rate both under the highest N addition level (50 g N m<sup>-2</sup> yr<sup>-1</sup>) and lower N addition frequency. Further long-term study of the effects of the interactions between N addition and mowing on N turnover will be needed for understanding the mechanisms by which nutrient cycling in typical grassland ecosystems may change in the future.

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