

# Does climate change contradict efforts to increase soil organic matter stocks?

Authors: Hlavinka P., Kersebaum K.Ch., Dubrovský M., Žalud Z., Trnka M.



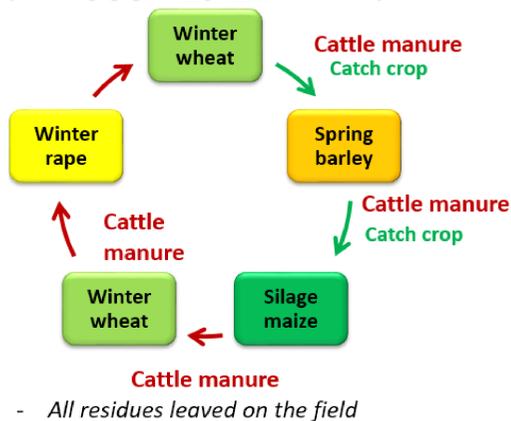
## Introduction

Agro-ecosystem models could be used as suitable tool for climate change impact assessment. By this way not only expected levels of field crops yields but also change within plant-soil-atmosphere system and processes could be analysed. Models are ultimate tools to assess trends under changing climatic conditions for different management options. This is especially true when assessing changes that are only noticeable after longer times such as soil organic carbon changes. This soil compound can be strongly influenced by changing climate conditions and it is problematic both from soil fertility lost and additional release of carbon dioxide as greenhouse gas. The question that needs to be answered is whether measures to enrich soil organic carbon are stable even under changing climatic conditions.

## • Methods

### • Crop rotation modelling

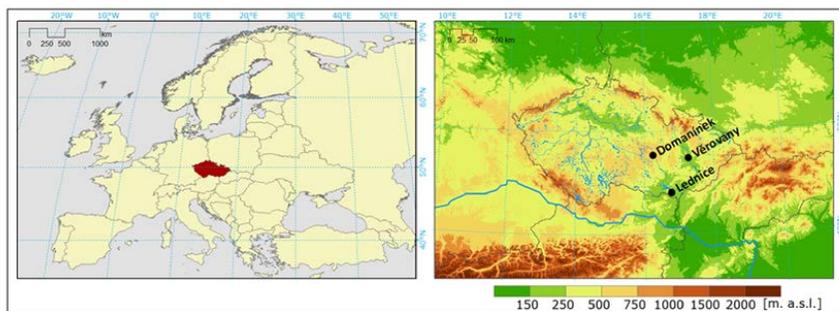
The HERMES agro-ecosystem model was used for assessment of 5 years crop rotation (see below) management focused on soil organic carbon increase and stabilisation (due to the projects NAZV QJ1310123, QJ1610072 and MACSUR 2812ERA147).



Crop rotation scheme with regular using of catch crops and cattle manure.

### • Study area

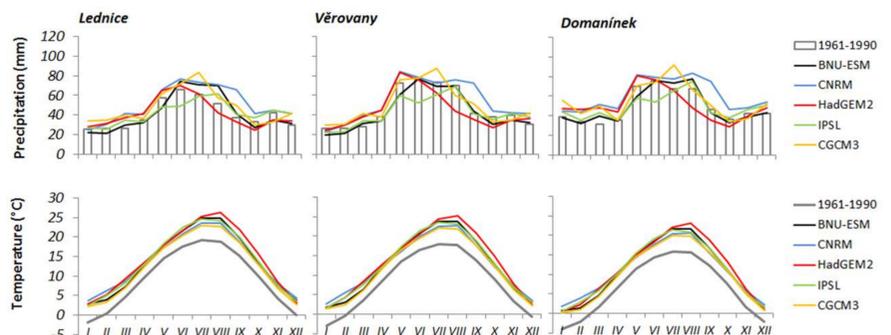
The study was realized within 3 stations (with significant climatic gradient) in the Czech Republic. The identical soil profile (representing high quality chernozem) was used through the stations.



The position and the altitude of included 3 stations.

### • Climate change scenarios

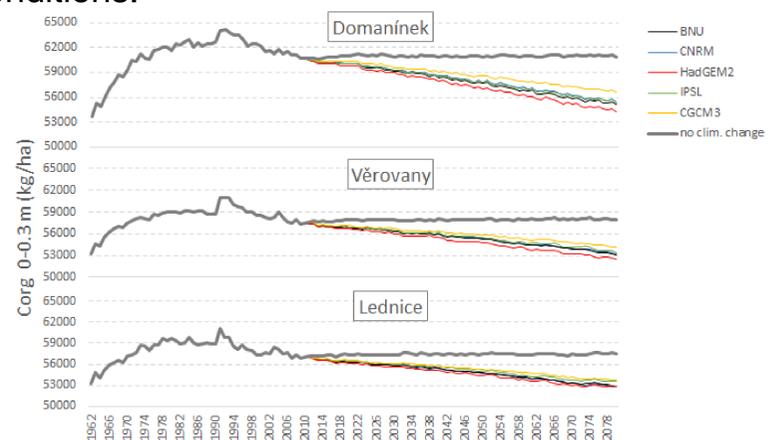
The HERMES was applied for the period from 1961 to 2080 with measured weather data until 2010 and then 6 projected climate conditions (1 scenario with no climate change and 5 Global Circulation Models in connection with RCP 8.5).



Conditions for study sites from warm and dry to colder and wetter (left to right).

## • Results

Even in case of significant organic material input, soil Corg (for 0-0.3 m depth) is estimated to decrease after initial enrichment under projected climate conditions.



Simulated soil organic carbon content (Corg) within three selected stations.

## Contact

Global Change Research Institute CAS  
 Bělidla 986/4a, 603 00 Brno, Czech Republic  
[www.czechglobe.cz](http://www.czechglobe.cz), [phlavinka@centrum.cz](mailto:phlavinka@centrum.cz)  
 and  
 Leibniz Centre for Agricultural Landscape Research (ZALF),  
 Institute of Landscape Systems Analysis, Eberswalder Straße 84,  
 15374 Müncheberg, Germany

