

grant report

With the support of my ERC_mobil grant, I spent 3 months at the Max Planck Institut for Biogeochemistry in Jena, Germany. There are currently two ERC projects at the Max Planck Institute in Jena on the topic I have been researching, but there have also been some previous successful applications. One of my most important goals is to get acquainted with the experience of colleagues in the Institution on their winning ERC projects. Prof. Susan Trumbore who the project leader of ERC advanced grant on terrestrial carbon cycling, imported my soil samples (from Hungary and USA) into the studies of her ERC project, so it was possible to carry out extremely expensive radio-carbon studies, and I could see directly into the work of an ERC application.

Following the preparation of the sample, we measured the residual moisture content and the organic and inorganic carbon and the nitrogen contents of our soil samples. At present, the radiocarbon (^{14}C) testing of the samples is stuning out as well as the radiocarbon content of carbon dioxide by the soil respiration.

What soil samples are studied and why?

I studied at the soil samples of two research projects. One is the DIRT project. Six treatments were established in the experimental site and every treatment was set up in three replications. I took soil samples from the Síkfőkút Project DIRT site from 3 soil layers and from the Andrews DIRT project (Oregon USA) from the upper layer. Síkfőkút much drier (about 550 -. 600 mm precipitation), while the site is much wetter Andrews (about 2200-2300 mm.). However, the applied treatments are the same. Previous studies have shown a great difference in the priming effect between the 2 sites. The radiocarbon studies may indicate the importance of priming effect in the areas. Up until now, studies have shown that the priming effect on the drier Síkfőkút site is not important while the US site is significant. The ^{14}C measurements can help us decide this question. Which also reveals the extent to which the priming is affected by the climate.

We measured the quantitative changes of the SOM of our litter manipulation experiment for 18 years (Varga et al. 2008, Fekete et al. 2011, Fekete et al. 2014) but the turnover and age of the SOM was not possible to study yet.

In my other research project I study the soil of dry, meso and wet Central European oak forests. These forests have a different intensity of decomposition and leaching so carbon cycle.

The SOM have different composition which effect the resistance to leaching and these phenomena are also related to the age of SOM. Theoretically in more humid areas, the amount of lighter organic matter that can be easier decomposed and leached so it may be present in smaller quantities.

With these tests, we would like to model the anthropogenic effects and the effects of climate change.

The applications of C isotopes can help to explain the variation of the vertical profile of organic carbon and radiocarbon in soils, thereby identifying factors affecting the stability of organic carbon in soil layers help understanding the origin, fate and stability of organic matter in soils and the plant litter material.

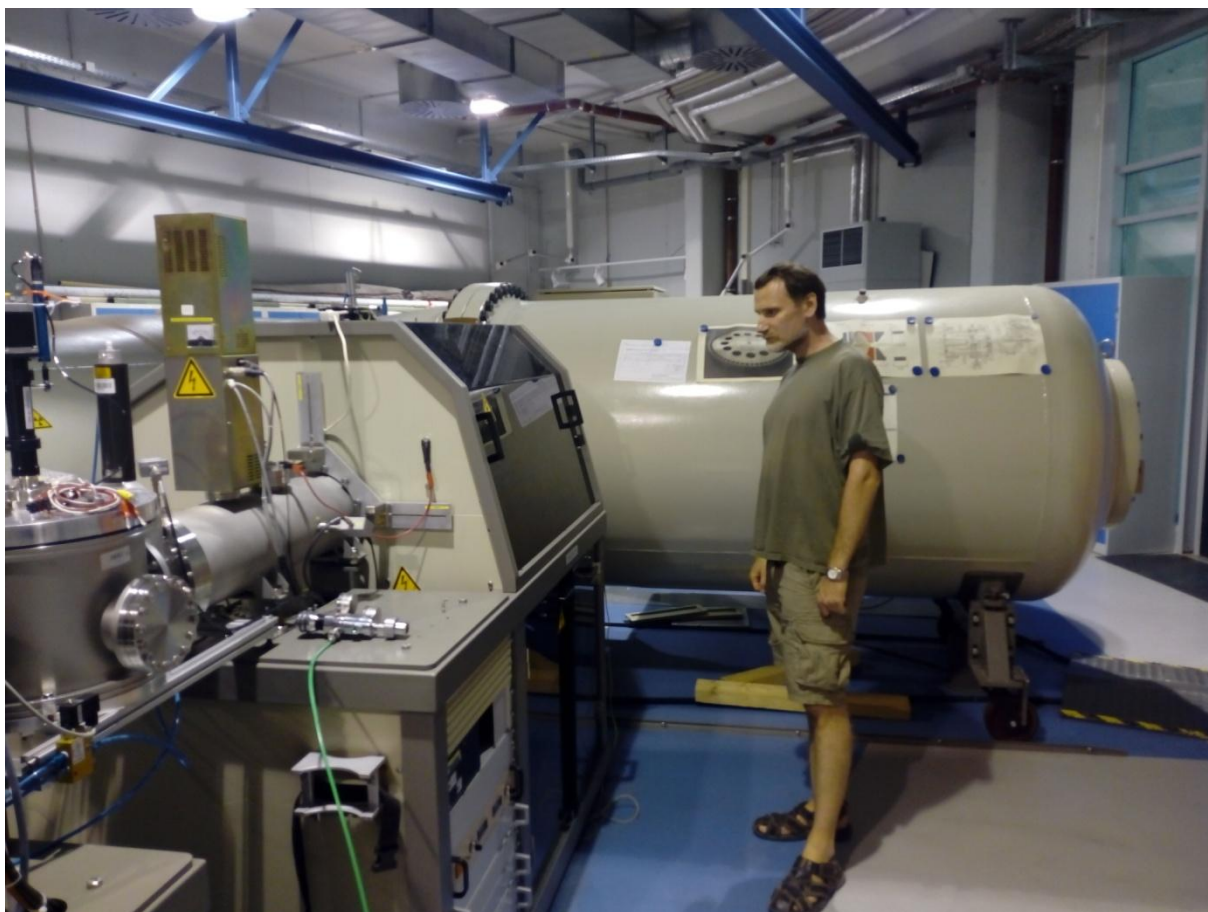
My knowledge that I got at the Max Planck Institute was well complemented by my one day visit to Department of Ecology and Ecosystem Management and Institute of Advanced Study (TUM-IAS) Technische Universität München. Prof. Ingrid Kögel-Knabner who the leader in this department studies the formation, composition and properties of the organic substances in soil and their central role in the global carbon cycle. This is done primarily through the use of spectroscopic methods, such as ^{13}C -NMR spectroscopy and nano-SIMS. These methods would well complement my research so far, which can help build my later ERC application. It was therefore very useful to get acquainted with the Institute's researchers and the techniques they employ.

Maybe we can get new knowledge about the plant litter input how effect on soil biological activity and soil carbon storage and cycling focusing on soil organic carbon, soil respiration and soil carbon turnover and their interactions with the soil - plant system.

These studies will be an important part of my planned ERC application.



The scholar is in front of Max Planck Institut for Biogeochemistry



Dr. István Fekete is at the Institute's radio-carbon laboratory