Activities of the GERS (Group Studying the Soil Respiration)


To cite this version:

Bernard Longdoz, Jérôme Ngao, D. Perrin, G. Vincent, K. Soudani, et al.. Activities of the GERS (Group Studying the Soil Respiration). International symposium: Forests soils under global and local changes: from research to practice, Sep 2004, Bordeaux, France. 1 p., 2004. hal-02832330

HAL Id: hal-02832330
https://hal.inrae.fr/hal-02832330
Submitted on 7 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
1. Introduction

The GERS is a group of researchers, students and technicians from France and Belgium working on the soil respiration (Rs). The aim of this group is to provide a place where the members of different teams can exchange ideas, information or data and set up common experiments with material sharing or measurement systems comparison. This group is open to all new teams or persons interested by the topics related to soil respiration and by the exchange and sharing procedure adopted by the GERS. This poster presents some examples of research activities carried out by the GERS.

2. Comparison of systems measuring soil respiration

Previous publications have shown large differences between Rs measurements performed by different methods. Consequently, the GERS teams have compared their five closed dynamic chamber systems and their protocols (chamber insertion or use of collar…) before analysing the Rs data from their studying plots. These closed systems are composed of chambers put on collars inserted in the soil and linked to an infrared gas analyser. The CO₂ respired by the soil is accumulated in the chamber and Rs is deduced from the concentration increase measured by the analyser. The systems involve in the comparison are Li-He, Li-Ref, Li-Gx, PP-Be and PP-Or. Li-He and Li-Ref are two Li-6252 IRGA connected with a Li 6000-9 chamber (Licor, Lincoln, USA). Li-Gx consists of Li-6252 IRGA connected to a homemade chamber respiration (185 mm H x 80 mm D).

PP-Be and PP-Or are two CIRAS-1 EG 4 IRGA connected with the SRC-1 chamber (PP System, UK) but PP-Be has the upgraded modified version of this chamber (grid added at the bottom of the chamber). These systems have been compared on a large range of Rs values in three forest sites usually investigated by the GERS teams (Vielsalm in Belgium and Hesse and Chaux in France) excepting for PP-Or which was present only at Chaux. In the results presentation (Fig. 1) all the systems are compared to Li-Ref to achieve a better visibility. The Fig. 1 shows that the systematic difference is lower than 25% for high flux (6 mol m⁻² s⁻¹) except for the PP-Or (more than 50%) but modifications on this system are presently in progress. For the other systems the systematic difference will be removed (following the equations presented on the Fig. 1) before to compare the data recorded on different plots.

3. Soil CO₂ concentration

Soil CO₂ concentration sensors GMT 220 and GM20 (Vaisala, Finland) of two teams of the GERS have been installed on the same place (forest of Hesse, France) to measure the time evolution of a vertical profile (sensors in the litter, at 5cm and -20cm depth). In the Fig. 2 concentration at -20 and -5 cm have a regular diurnal evolution with a general decrease following the temperature behaviour. In the litter variations have higher content (on the deeper concentration).

4. Wood debris respiration

The UMR Écologie et Écophysiologie Forestière (see section 5) has recorded the weight decrease of wood debris resulting from thinning and left on forest soil. Annual debris carbon lost has been deduced from these data. One of the goal of this experiment is to estimate the percentage of this lost that goes back in the atmosphere. For achieve it, the respiration rate of the debris at different temperature and humidity will be measured by a special closed chamber adapted for wood branches linked to a gas analysers (Unité de Physique des Biosystèmes, see section 5). Then these rates will be extrapolate on one year according to the temperature and humidity evolution recorded in the forest.

5. List of the teams involved in the GERS

- Unité de Biologie végétale, Faculté universitaire des Sciences agronomiques de Gembloux (Belgium)
- Laboratoire de Biologie et Écophysiologie, Université de Franche-Comté, Besançon (France)
- Laboratoire d’Écologie Systématic et Évolution, Université Paris XI (France)
- Unité de Physique des Biosystèmes, Faculté universitaire des Sciences agronomiques de Gembloux (Belgium)
- UMR Écologie et Écophysiologie Forestière, Université Henri Poincaré Nancy 1 (France)
- Centre d’Études Spatiales de la Biosphère, Toulouse (France)