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(GROUP STUDYING THE SOIL RESPIRATION)

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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 idea, information or data and set up common experiments with materiel 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 EGM-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.

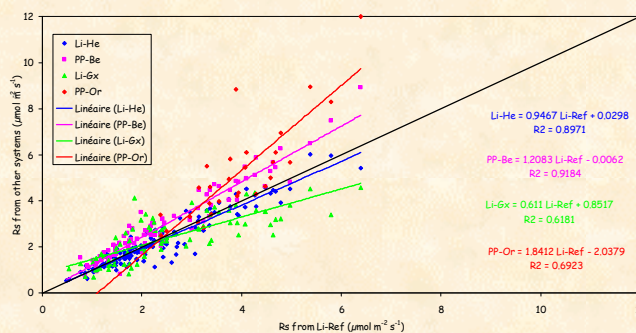


Fig. 1

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 frequencies probably linked to the wind turbulence intensity. The Fig. 3 shows the importance of the precipitation (by the way of the soil water content) on the deeper concentration.

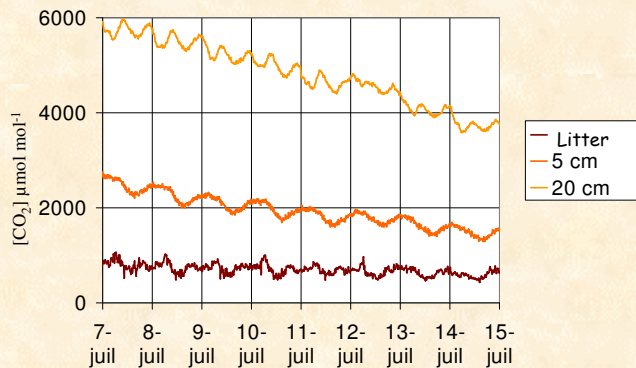


Fig. 2

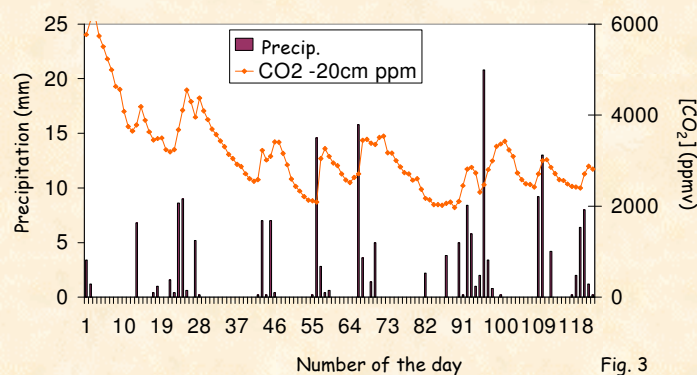


Fig. 3

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. A 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 analyser (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

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