

Gas-Vegetation-Litter group discussion Tempere Meeting

Urgently :

Please do your spring surface sampling for micro-organismes (Besançon) and Rennes (rotifers), same protocol as in November 2003.

Points discussed :

1. Vegetation relevés in WP I
2. Methane in WP I
3. Parametrisation for modelling, equation
4. WP III and litter experiment
5. Gaz measurements in WP II
6. Consistency in units

1. Vegetation relevés and diversity in WP I

- Within collar of 30 cm diameter + 1 m² including the collar
- For Finland, where the vegetation around the large sized collar is disturbed, there will be some additional randomly taken surfaces to some up to 1 m² surface, including the collar
- Take the full list of species and give an estimated percentage cover (1 – 100 %)
- Use a grid of dm² cells to facilitate the cover estimation
- Do the relevés at maximum biomass and full development of species
- Consider also mosses and lichens

2. Methane in WP I

- Use dark chambers. We assume that *Eriophorum vaginatum* does not close its stomata and acts only as a pipe, which will therefore not be affected by the photosynthesis evolution. This aspect could possibly be studied in an additional protocole (not attributed).
- With TCD-GC, the sampling time could be of several hours. It would be better to use a FID-GC, which could reduce the sampling time to 30-60 minutes. Nevertheless, the perfect linear relationship showed by Estelle indicates that a TCD can also be used with shorter time span such as 30-60 minutes.
- Do mesures once a month, on all the collars (combine with photosynthesis measurement campaign)
- The samples should be analysed the next day, but there are example where the samples have been stored several days.
- Some use Teruno container (Finland), others LMD (France)

Reminder from the Charquemont meeting:

How to do CH₄ measurements, technics ?

- CH₄ measurements in the same 30 cm diam. collar as CO₂, and at the same time (more reliable).

- Build a dark chamber with a fen and an insulating coat with a reflecting surface.
- Start measures after 10', about 5-10 samples with syringe, every 5' (do tests).
- Size/height of chamber is not so important.
- Practically, best start CO₂ measurements on one collar and alternatively take gas samples in some other installed CH₄ chambers.
- Use Teruno container for sampling CH₄.

3. Parametrisation for modelling, equation

- Estelle and Mika will present a comparative study in Baup

4. WP III litter experiment

- Litter available so far is Sphagnum (500 g FW) and E. vaginatum (50 g FW). These are the litter to use now. More (in particular E. angustifolium) will be produced for spring 2005.
- We do a short term experiment in Rennes, starting in october, with harvest after 15 days and 2 months, which will be concieved so as to need only a small amount of litter
- The long term experiment is done in Le Russey, starting end of June, with final harvest after 12 months. Andy installs the litter containers/bags. For Sphagnum we use the 9 pots with 20 g FW in all the 3 trenches, for Eriophorum only 6 pots with 8 g FW in 2 trenches (is that right ???).
- CO₂ fluxes (IRGA, in the dark) have to be measured once a month (needs one day work) to get an idea of the amount of carbon mineralised. The day-time course will be adjusted with gas measurements done in WP II.
- ¹³C will be measured less frequently, intensively at the begining (days), more spaced later on (on the whole 3-6 points). The analyses will be done in Nancy, or else in Rennes (depending on the possibilities). D. Epron provides the sampling device and the containers.
- Surface samples will be used by Estelle, deep samples of final harvest by Andy.
- Final harvest will consider depths no 3, 4 and 5 (to be confirmed ?). The analytical protocols will be discussed in Baup : ¹³C and ¹⁵N for bulk peat, nitrate and ammonium, microbial pool (fumigation), DOC, TON, extraction with H₂SO₄ for recalcitrant compounds.
- Andy may concieve some additional treatments on the 3 spare pots (control shared), such as labelled living Eriophorum and Sphagnum, adding not labelled living Eriophorum with labelled Eriophorum litter.

5. Gaz measurements in WP II

- Theses measurements will provide the gas exchange of pure stands of the keystone species, which is not possible in WP I where we deal with communities.
- We keep the year 1 and year 2 pots, on the whole 2x36 pots
- Measure the gas fluxes on pots of year 2, which will be kept over the two years
- In autumn 2004 we collect the pots of year 1, hoping to see some changes (preliminary tests to be done)

- The IRGA chamber has to be adapted to fit the pot diameter. Measures over 10 minutes (about the same time is needed for closed and open to chambers).
- In 2004 do seasonal measures in Russey, UK and Baup (spring, beginning of summer, end of summer), bi-weekly in Finland, where the carbon balance is sought. In 2005 we will carry on and possibly intensify the measures.
- For specific questions, additional measurements will be done on some pots only.
- Sphagnum tends to dry out and it may thus be necessary to make some shading. It is important that we are creating a growth gradient, with a rather good growth near the water, and a bad one at the highest level.

6. Consistency in units

- Estelle makes an agreement by e-mail

Other reminders from the Charquemont meeting concerning WP I, with some additional informations :

Natural 13C :

- 13C will be measured. The analyses will be done in Nancy, or else in Rennes (depending on the possibilities). D. Epron provides the sampling device and the containers.

Plant biometry for measuring monthly (at least at same frequency as gas measurements) change of aerial biomass (for modelling carbon fluxes):

- Estimates of LAI for vascular graminoids: make calibration curve length vs area and length vs weight (scan leaves and count pixels, calibrate with known surfaces, and weight the dry mass). In the collar, count number of leaves (exhaustive sampling, or else, 3 replicated small samples) and measure their length. In Finland the length is measured for 3 shoots, always the same, bi-weekly, the number of leaves is measured monthly.
- Estimates of LAI for vascular plants with low statured leaves: make calibration curve estimated size class vs area and size vs weight (scan leaves and count pixels, calibrate with known surface, and weight dry mass). In the collar, count number of leaves in each size class.
- Sphagnum and other mosses: measure of percent coverage (estimation) within collar and density measurement (3 replicates of small surfaces of 5 cm diameter). Put 3 cranked wire to measure the growth in length. At the end of the experiment, 3 small 5 cm diameter cores will be extracted and 10 randomly taken moss shoots will be cut in fragments of 0-1 and 1-3 cm and dry weighted. Calculation of biomass change will be made by multiplying the growth in length by the mean weight per cm of the 1-3 fragments and the mean density of shoots.

Primary production measured with the harvest method :

- Useful for comparisons with modelled carbon fluxes
- Conversion from mass weight to carbon weight can be done based on figures in literature

- Some measures concerning biometry (see above) can be used again, but they will concern only aerial production.
- No destructive final harvest, we stick to the chamber method (too difficult to control for underground primary production)

What about the two types of IRGA chambers (open top and closed chamber) :

- A paper on chamber comparisons was issued (see Mika).
- Collar of 30 cm diameter for every body. In Finland, larger collar are already used, but new sites will get the 30 cm collar.
- Calibration could be made with a special device in Finland, but the idea of bringing the various chambers to the Tampere meeting is abandoned. Instead, Estelle will do some measurements with both devices in Baup.

Frequency of gas measurements :

- For doing the carbon balance (modelling with explanatory variables), weakly measurements are necessary, as well as full day measures from sun rise to sun set. This precise calibration will be done in Russey and Finland.
- In Scotland, Baup and Chaux-d'Abel, we will apply/validate the models and thus do only monthly measurements. If necessary, the models could be adapted towards a simplification, in order to fulfil the required comparisons between sites.
- It is mentioned that having a model based on precise and intensive variable measurements such as temperature, light and humidity doesn't compensate for the missing of other relevant variables (i.e. carbon losses in runoffs and CO fluxes).
- It is also mentioned that models have often to be worked out for each collar. Nevertheless, in our project we have to chose strategic models that can be applied in all situations

Abiotic parameters :

- T air at 1.5 m.
- Solar radiation at 1.5 m. in open place.
- P from nearest weather station or else at 1.5 m.
- T sol at -1, -5 and -30 cm depth.
- The depth -5 cm will constitute the common depth for modelling.
- The depth -1 cm is risky (fluctuation).
- The depth - 30 cm is important for incubation.
- Measures every 30'.
- Dipwell ("piezometer") measures for each collar, possibly weakly, otherwise bi-weakly.
- Humidity from Sphagnum fallax dessication index (provided by Estelle).

A. Buttler, 15th June, written in the airplane, while flying over Greenland and later over the canadian tundra.