

Swiss-french RECIPE meeting in Besançon 1-3 October 2003

Attending: André-Jean Francez, Nathalie Josselin, Andy Siegenthaler, Alexandre Buttler, Daniel Gilbert, Estelle Bortoluzzi, Marie Pandolfo, Francky Sabot (last two, only 2nd October)

Retained elsewhere: Daniel Epron, Fatima Laggoun, Anne Comont, Walter Rosselli

Objective of the meeting: discuss some methodological points for WP I and WP II (1 oct.), visit the field sites and in particular the trenches in Russey for WP II and III (2 Oct.) and work out the final sampling scheme for WP I (3 Oct., morning). These discussions shall prepare the general meeting in Charquemont (23-23 oct. 3002).

Wednesday 1st October

The meeting started with two presentations by Estelle and Andy, which brought interactive discussions during which following points were discussed:

- Gas measurements with IRGA
 - 12-14 rings per day can be measured with the new open top chamber IRGA purchased in Besançon by Daniel Epron on RECIPE fundings. This means that we can afford for 12-14 rings in Russey, and 12-14 in Chaux-d'Abel. Andy will try to manufacture the needed 18 additional rings at the EPFL (metal or PVC?).
 - In Russey we will develop and calibrate the model with 4 sessions per months (each of 1 day duration), in Chaux-d'Abel we will make a survey with one session per month, like in Baup and Aberdeen (?), the aim being to be able to compare restored sites at some fixed periods and not having for each site a calibrated model. Most probably the model will also be worked out in Helsinki, since this group has the most experience (their contribution is appealed for).
 - The question is, who will do the measurements in Baup? Should be done by the hired technician, under the supervision of Estelle.
 - In Rennes there is a normal IRGA (closed chamber), like the one Estelle has used last year. It is probably the same as in Aberdeen and Helsinki (where they have larger collars also). A major question is how are we going to compare the data acquired with different devices? Can we express the results with some relative values rather than absolute values? This has to be discussed at the Charquemont meeting.
 - For the WP II there will be 3 trenches x12 pots on which gas measurement should be made (with an adaptator ring to fix the 30 cm chamber on the tubes, which are smaller than the rings of WP I; André-Jean works out a design). This appears to be too much with the open top chamber (20 minutes per pot), but we know that with the closed chamber 5-10 minutes were needed by Estelle, which means that it could be feasible. To be discussed at the Charquemont meeting.
 - In WP I, the strategy for choosing the precise spots for the rings were discussed. Two possibilities if the vegetation has two components (patches) : put the ring with 3 replicates in each patch (for example Sphagnum growing with Eriophorum and Sphagnum growing with Polytrichum) or else, put the 4-

6 rings along a virtual gradient where the three species are mixed in various proportions. In any case, make an inventory of potential spots and then take randomly some of them for putting the rings. In Russey: pioneer site: 4 rings along a gradient of Sphagnum fall.+Eriophorum angust. cover and 3 rings on bare peat; advanced stage: 5 rings along a gradient of Sphagnum fall.+Eriophorum vag+Polytrichum stric.; in Chaux- d'Abel, decision has to be made: either 2 sites (Sphagnum fall.+Erioph. vag and Sphagnum fall.+Polytrichum, each 3 rings) or 3 sites for better assessment of the minerotrophy gradient (each 4 rings along gradient of mix cover of the 3 species). Clearly, the choice depends also on the target species in WP II and III.

- In Russey, the idea was to investigate also within WP I the area beside our trenches where the Nature Conservation Body did a restoration trial. On one hand, this would provide an applied case for looking at the gas exchanges, on the other hand, there is a risk of having a badly controlled site and we may end up with unpublishable data. One could also argue that the trench experiment has precisely been designed for having a controlled experiment and there is no need to waste effort with other experiments, which have not been designed for scientific purposes.
- Abiotic factors for gas exchange models:
 - Variables such as precipitation, light, air temperature, soil temperature at 5 and 30 cm depth, will be recorded with HOBO mini recorder (<http://www.littoclimate.com/>), every 30 minutes, including min. and max. Estelle will give references and calculates the needed investment for a single site. Andy can possibly get a full equipment from colleagues in Davos.
 - The measure of the peat humidity with a data logger (Thetaprob) seems not precise enough to be related to the moss microclimate. Instead, Estelle has worked out a desiccation indices, which can be observed on the Sphagnum (independent variable) and has produced calibration curve for the humidity content within the mosses. The calibration curves may have to be produced for the different Sphagnum species. Thus, the Sphagnum is supposed to be the microclimate indicator for the whole surface vegetation.
 - The question remains whether the light reflexion (which increases when mosses dry out) has some importance for the higher growing plants.
- Leaf area index: for photosynthesis modelling, we need a measure of plant growth, in particular a variable related to the leaf area, which is assumed to be proportional to the photosynthesis. We want to have an indirect easy measure to be carried out repeatedly over the growing season in all the rings. Estelle has worked out some calibration between the dependant variable "leaf area", both for Eriophorum vag. and angust. (measured on scanned leaves) and the leaf length (independent variable). For Oxycoccus she did the same, using 3 size classes, which can be easily estimated, instead of leaf length. The methods will have to be extended to Potentilla erecta and some others next spring, depending on the species occurring in the rings. For Sphagnum and other mosses, the direct target variable will be the density of individuals, but the depth of photosynthetic parts may change over time, and this need some thoughts. One could test this in a preliminary growth experiment checking for the length of green part or, else, measuring carefully the light extension rate with depth, which would give a clue on whether the density is enough as a direct variable,

or if the length of green parts has to be checked also. Estelle will search for literature references.

- The fluorimetric photosynthesis pulse method could be used in addition to IRGA, specially for the WP II pots. Some of us have facilities for getting this device. To be discussed at the Charquemont meeting. Andy and Daniel Epron could give a short presentation about their experience.
- The sampling drawing for WP I (also usable for WP II and III) made by Andy and Alexander will be slightly modified (to avoid to mix at the surface a possible shallow moss layer with peat) and the definitive version 3 will be dispatched by Alexander to everybody. Remember, for WP I we will look for sites with up to 40 cm new formed peat, for WP II and III, the pots will have 45 cm length (new, before 35 !) and thus the peat core 40 cm. The zero level is either the moss capitulum or the bare peat.
- Methane:
 - Cannot be sampled in the open top IRGA chambers ; thus, we will set separate tubes for methane, following the methods developed by André-Jean who will provide the tubes for all people (tubes of approx. 10 cm diam. with a perforated lid ; sampling with a syringe after a few hours. The portable GC is not really adapted for carrying in the field and therefore the samples will have to be analysed in the lab.
- 13C/12C
 - The methane sampling device (see above) will also provide the 13C/12C soil respiration samples. Nevertheless, it seems that the ratio could easily change along the upward migration because of successive microbial processes along which the produced gases are used by other groups, thus mixing up the ratios. This has to be discussed at the Charquemont meeting.
- Trench preparation and sampling in WP II and III
 - A drawing for the trench preparation was sent to all partners by Alexander and Andy, with guidelines, based on the experience gained in Russey.
 - For peat sampling at the end of the experiment, see above (file with drawing for WP I, II and III, version 3)
 - After intense discussion, a pot size of 45 cm (instead of 35cm) is suggested, filled with a 40 cm peat core. Arguments were: better for capillarity continuity within the peat at the dryer end of the gradient, where the pot upper border has to be 30 cm above the max. water level; makes the comparison more straightforward with the WP I where we use sites with up to 40 cm new peat (therefore sampling down to 47.5 cm), still keeping the sample number low.
 - Pots will have holes of 0.8 mm diameter: bore across both walls, shift down 2.5 cm and turn the pot 45 degrees, and bore across again, and so on.
 - The pot is closed (glued PVC circular lid) at its lower part, with holes of same density as on the side.
 - The whole experiments needs 135 pots (make a few spare pots, since they are easily breakable). In Besançon we will prepare the pots for Russey and Baupt.
 - The inner diameter of the pots will be 135 (Swiss/France), 140 (Finland) and 151 (UK). The 3 peat corers are constructed according to these requirements. They will be ready at the beginning of October, shipped by Andy to Harry, whereas Steve will take it back from the Charquemont meeting. Arrangement will be made between Rennes, Besançon and Lausanne for setting the experiment in Russey and Baupt.

- Some recommendations for the coring are given in the paper (see Butler, A., Grosvernier, P. & Matthey, Y., 1998 A new sampler for extracting undisturbed surface peat cores for growth pot experiment. *The New Phytologist*, 140: 355-360). More recommendations by phone with Alexander for Finland, at the Charquemont meeting for others.
 - The peat cores will have to be of same nature in all pots. In Russey, we will sample on a bare surface down to 60 cm and discard the upper 20 cm, which is dark and more porous (mineralised). Aim is to have peat quality as it would be in the newly exposed deep catotelm, after mining.
 - An approx. 10 cm height outer PCV rings will be used and uplifted as the mosses grow tall (avoiding that they collapse).
 - The target species should be: 2 common species (*Sphagnum fallax* and *Eriophorum vaginatum*) and 1 other species, depending on the sites. In Russey this could be either *E. angustifolium* or *Polytrichum strictum*, in Baupt it will be *E. angustifolium*.
 - Plant density: for mosses, a 5 cm thick carpet at natural density (cut as such in the field, using 5 cm height rings); for vascular plants, 4 individuals at regular intervals between them and to the pot border. The same 5 cm height rings can be filled with a porous peat and then the plants planted. This can be done a few weeks before and the plants spared. The rings with mosses or peat/vascular plants can then be placed on the pots filled with the peat.
- Labelling: the plants brought to Andreas Gattinger by Andy seem to grow well. More about this at the Charquemont meeting. Andreas would like to know what the enrichment rate should be. André-Jean goes back to Andreas to discuss this (probably 50% for 13C; 30% for 15N).
 - Water chemistry: peepers.
 - A new design has been worked out by Andy and Alexander, which would allow to sample directly in the holes where the peat in WPI has been extracted. Independent flasks of larger size could be used. More about this at the Charquemont meeting.
 - Preliminary measurements with the classical peepers have been made by Philippe and Andy. The portable Varian GC is ready, after many trials and tests. Results were shown and seem to be promising.
 - The problem is that at the surface air is in contact with the peeper's membranes. Should we use another device (i.e. Ejelkamp) for sampling the water in the unsaturated layer?
 - Microorganisms and microscope purchase in Besançon.
 - Daniel Gilbert has organised the whole process of selection and purchase of the microscope and imagery on RECIPE fun dings. The equipment has arrived. Daniel will organise further the setting by Olympus (3-4 days are included). In particular, the macro commands for the imagery has to be worked out.
 - Hired technician on RECIPE, with suggested specialisation in microscopic counts: Hung Nguyen (50% contract UFC-LBE, oct. 03 to sept. 05) for bacteria, Emilie Gauthier (60% contract UFC-CE, oct. 03 to august 04) for fungi, Peggy Birringer (permanent staff, 1 day/week over 3 years) for protists. Andy will be involved also, but will concentrate on his own data of the Jura site.

- Alexander has got a credit of the Region Franche-Comté, which will be used for funding the remaining 2/5 of the microscope purchase (almost 3/5, since the purchase was delayed because of the slow internal administrative process of public markets).
- Other information's:
 - With the above mentioned credit, 2 PC lab-top will be purchased, one for Estelle for using with the HOB0 and GC, the other one for Alexander.
 - Alexander was contacted by people from the University of Ural, who would be interested in setting collaboration within RECIPE. The question of extending the contract to eastern countries (i.e. program INTAS) will be addressed to Steve.
- Not discussed:
 - Measurement of primary productivity in WP I and III (input expected from Finland)
 - In vitro incubation of peat (according to André-Jean's experience)

Thursday 2 October

We visited the Russey and Chaux-d'Abel sites. Marie and Franky showed their preparation work and raised some questions.

A major issue was the refinement of the trench geometry (slope) in order to get the correct water levels (see drawing) and the role of the lateral drain, which is aimed at evacuating the excess of water. This will of course influence the max/median/min water levels.

It was decided to follow some empirical and practical rules:

- close the lateral drain (which was dug at the lowest level) in each trench and let the water fill to equilibrium
- this will provide a reliable comparison between the 3 trenches for further changes in geometry
- as was said in the guidelines (drawing), when the water level is at its summer minimum (measures?), there should still be some water visible in the lower part of the trench. This is a good starting point.
- If the water rises too much, in particular in winter time, the drain will allow to keep down the max. level. It also will be used to keep the max level 30 cm below the pots in the upper part of the slope (see drawing).

Friday 3 October

- A suggestion of sampling organisation scheme, based on the excel table earlier produced by Andy and in which he gathered all the information's from partners, is given in a separate Power point file (follows next).

Attached Power-point files:

Subsample dispatching (not yet finished, follows next)

Core slicing

Trenches

Written by Alexander, 12th october 2003