

## ES1406 COST Action Meeting (WG and MC meeting) Prague (Charles University) – Prof. Jan Frouz hosting

**April 4, 2016**

### 12.00 – Overview of the Action, steps taken to date, outputs to achieve (Juan J. Jiménez)

Key points addressed (others than those included in the MC meeting minutes)

- Do we want to share all our data? Key to achieve the objectives of the Action.
- Budget reduced. Mainly due to absence of otherwise interested participants. How to correct this deviation from the whole budget in the next Grant Periods without leading to mismanagement?
- Joint meeting with BIOLINK Action?
- Prepare posters and leaflets for dissemination; better leaflets, as posters are not easily transported.
- Session alongside Ecosummit? We could take advantage of the attendance of key persons related to soil fauna, SOM studies, international agencies, etc. to see ways of interaction and collaboration. Sebastien Barot, coorganiser of this congress will explore the availability of one meeting room.
- Next meeting after Coimbra summer school?
- Go for global synthesis paper
- Olaf Schmidt suggested providing more contacts for Sweden (J. Bengtsson?) and Finland (Visa Nuutinen). The chair will contact them. *As per August 2016, Visa Nuutinen will be joining the Action shortly (to be accepted in the next MC meeting at Tartu, Estonia).*

### Invited speakers talks

14:15-15:00 – “Food sources and trophic links of soil animals: What can we learn from stable isotope analysis?” by Dr. Alexei Tiunov (Institute of Ecology and Evolution, Moscow, Russia).

15:00-15:45 – “Modelling the impact of pore space distribution on carbon turnover – The CIPS model” by Dr. Katrin Kuka (Institut für Pflanzenbau und Bodenkunde, Germany)

**April 5, 2016**

### Overview of the Working Groups (9.00 – 12.00)

#### WG 1 (Prof. Juliane Filser) – State of the art and gap analysis

- Development of conceptual framework (this is key).
- Scattered data – to collect and merge in a structured table (data management, WG3)
- A common large-scale field experiment (SOM and soil fauna experimentation).
- A clear cut to-do list is a must (who does what, and when; important to achieve the objectives of the Action).

- Improve communication; all messages to the whole list, including MC members, and the rest of participants); The Chair here stresses out how messages were sent from the beginning to all participants with different reactions; more specifically, all agreed participants to attend a meeting were duly informed. After the meeting the Chair will inform all other participants about decisions and activities to be undertaken within the Grant Period.
- Discuss how the Chair can better supported by the Group.
- When and how the webpage is updated (this links also to WG4).
- Plan and fulfil our tasks.

(See Juliane's ppt attached).

## WG 2 (Prof. Sébastien Barot) – Modelling the impact of soil fauna on SOM dynamics

- Regarding models, not many for soil animals and, specifically for earthworms the SWORM model (Blanchart et al. 2009, Eur J Soil Biol) – sensible? For termites, ants?
- BUT, many models for SOM. Perveen et al. (2014) in Global Change Biology; again!! Soil micro-organisms and SOM, but not soil fauna. This emphasizes our need to deliver a KEYSOM model.
- Other examples: de Ruiter et al. (1998), a foodweb model; soil structure is not included.

? Which model(s) should be the base of our activities? (Gaby's model almost identical to CENTURY) → connection to BIOLINK. But let us not limit ourselves to global models (example NO) (?)

- Simple, general earthworm model is feasible (Seb)
- Simple opinion paper on why fauna should be included in SOM models:
  - Follow the dynamics of casts and C;
  - Model follow the dynamics of micro-organisms;
  - Take into account earthworm (engineers) biomass;
  - In order to assess the relative influence of all processes / parameter.
- This will allow us to identify which type of data we do need / we do miss.
- Possibility to have multiple states in the model / theoretical situation.
- The development of the model is not such difficult but requires a bit of time -> give a glimpse of the model in the opinion paper?
- Maybe one model for natural, one for managed systems?
- **Not only earthworms in the model to see how soil functions, but an optimization of the parameters (G. Deckym).**
- **To choose mechanisms depending on the objectives (S. Barot)**
- **[why only EW? Should be engineers! Also feed on other casts etc. Why not "high-medium – low quality food, which can be connected to submodels of e.g. litter, MO, other casts... Output should be accumulation – stable – decline of OM] (J. Filser)**

Variation of C and stability (D. Rasse); ! Distribution on SOM in a profile for validation? Perhaps also SOM amount related to undisturbed system? (Note, however, hen-egg problem: high C

because of high fauna or vice versa, i.e. it is the consequence or cause of the movement and activity of soil fauna).

- C entering the soil and soil C stocks (J. Curiel)
- Some models might not work well without soil fauna (G. Deckym)
- Mind transport of deep-soil C (A. Tiunov)
- An earthworm-driven priming effect (Fontaine et al. 2007, Nature): earthworms take pieces of litter into deep soil.
- Mind time perspective (P.H. Krogh) – humus formation vs. duration of experiments (short-time perspectives) – Humus accumulation during millennia, but see Jan's reclamation site! (it only takes some decades); site-specific differences.
- The need to use C-models like Century model and others (J. Filsler; also P. Lavelle presentation in attached ppt; presented by the Chair to the modellers group). How well SOM models like CENTURY can address the contribution of soil fauna when modifying different parameters like bulk density, tillage, crop rotation, etc.
- SOM age,  $^{14}\text{C}$ ? (J. Curiel)

Set up a common manipulation experiment [would require extra money]? It could be done through STSMs.

Review literature with respect to climate change effects on earthworms & C dynamics

What about checking the good old metal sites such as Gusum etc., using them for calibration (with...without animals) and comparing this data with other sites with higher/lower abundance of animals? Mind Jan's site!

! Define interfaces to global C models! Policy-relevant!!! Remember that management activities differentially affect fauna (reducing many, fostering some groups).

Seb is involved in a French group for increasing soil C content, the 4‰ (political issue! -> this links to WG4)

### **WG 3 (Dr. Davorka Hackenberger)**

Short- and long-term contribution of fauna to SOM dynamics; existing databases from SOM manipulation experiments and soil fauna are difficult to access. What should be included?

Include information from previous EU projects in database such as

- EUROSOMNet (Franko et al. 2002, Computers and electronics in agriculture); data from long-term experiments (only SOM)
- Ecofinders
- ISMC Action: develop one world-wide soil model, including fauna (Katrin Kuka is involved). DOI is assigned to contributors once data has been used by modellers. National long-term projects can be included – but mind focus of KEYSOM!
- Also to be used after the end of the COST Action.
- Use an already standardized data format, like the GBIF? – What about a database within the KEYSOM site. Check with website developer the capacity to host a database (password access). Which entries for the database?
- STSM possible for collecting data – but objectives have to be specified! Dito requirements for data and metadata.

Discussing Xavier's template for collecting data (or articles?!) for meta-analysis.

General problem of compiling data with different degrees of resolution: perhaps restricting ours to only those studies where everything has been measured directly in the site under study?

Which data to be modelled; data available from JRC (Ispra) (E. Velizarova)

Search in the review papers for database information (data collection) – (J. Frouz); for instance, X. Domene using the keywords predators and SOM found 12 references.

Not all cells in the matrix would be filled (M.J.Briones)

Global info on soil fauna, and global info on SOM ?

### **WG 4 [Prof. Paulo Sousa; unattended due to illness] – Dissemination and knowledge management**

The Chair suggested here to prepare later an Electronic handbook of methods in Soil fauna and SOM experimentation (KEYSOM Handbook of Methods). Methods for measuring fauna to be uploaded in the website? Including modelling protocols and the minimum data set needed in modelling SOM dynamics and soil fauna activity; A. Tiunov agreed this could be easily done and new versions could be later added to the website.

Facebook could not be linked; also, not all participants use facebook.

First KEYSOM Training school in Coimbra (final dates 4-7 October 2016) – see the programme at the end of this document for the list of lecturers.

## General discussion

Decide on what priorities are (Literature review, experimentation, ...)

For common experiment we need a common protocol (process-oriented, including soil respiration); selection of parameters for soil functioning (J. Frouz); functional parameters to be taken into account.

Aggregate stability, C content (per mass), bulk density and distribution (30 cm in 10 cm intervals for international reasons). C content problematic because of roots; bulk density as a proxy for C content (?). Basal respiration? No. C/N ratio could be measured by Jan

Look for best-studied sites (European information)

Keystone faunal groups, depending on sites and land use.

Have the table completed first.

## STSM and other tasks

STSM (translocated to 2<sup>nd</sup> Grant Period)

Announcement can be really open, applicants can do anything related to the MoU;

Other: e.g. start sampling in common experiment – typical for MSc or PhD students!

“To-Do-List” from Osijek (6 tasks / 3 groups) (file: Osijek suggestions)

subGroup 1 (Lydia, Davorka, Aline, Seb, Juanjo, Jan: lead) had been working on a table and decided to postpone everything on STSM (Jan has the file); initial candidates were defined (Davorka, Aline, Zangerlé, Marsden).

subGroup 2: Katrin Kuka wants to contribute to paper; Gaby takes the lead

subGroup 3: Agisilaos – Soil fauna management in East and SE Europe

Suggestion: Make an extra group of those people really interested in a common field exp. → make concrete suggestions and plans to be discussed in plenary → subGroup 4.

## April 6, 2016

### Group reports

*subGroup 1 (Jan)*

(see Juanjo); Paper 2: contribution of fauna to soil profile formation in different biomes

- Paper writing: authorship sequence according to quantity and quality of contribution, seniorship according to the usual standards;
- Display ongoing manuscripts somewhere so that any others who might wish to contribute can do so;
- Send ms to all members for review comments before submission;

### *subGroup 2 (Gaby)*

Paper structure and definition of some groups (short ones needed to be more efficient).

Discuss it within BioLink:

- ➔ Gaby (paper 1) has sent around the outputs of both meetings and ask for participation (see attached file, modelling). Modelling concept, structured along functions or functional groups.

Parameterization of the model by including all scales → remember STSMs on a) engineers, b) modelling; Sebastian's paper in Oikos! (Sanders et al. 2014)

Discussion with Jan on a common experimentation;

Towards a general journal of soil science and modelling?

Coauthors for the groups?

Short ppt prepared by P. Lavelle (see pdf attached) and presented by Juanjo to the group of modellers.

A very simplified model; engineers changing parameters and fluxes. (Sébastien Barot)

Can be useful the separation of soil depths from the group of common experimentation? 0-5, 5-15, 15-30 cm of the mineral layer. Measuring the depth of the litter layer.

A STSM for soil fauna and SOM (M.J. Briones)

### *subGroup 3 (Agisilaos) Two likely papers:*

- ➔ Soil fauna management in East and Southeast Europe (subgroup 3).
- ➔ Soil fauna protection status at European level.

Soil fauna management in each practice (erosion, climate...), e.g. cover crops, shelter beds etc. Mind that ant soils are more erodible.

1. Policies of the EU that have a significant influence on soil fauna protection.
2. Case studies (Soil fauna management in each country and an example or a good practice).
  - Soil fauna management in Estonia, Groups of soil biota, and activity of soil microorganisms.
  - Soil fauna management in Romania, Agricultural strategy and approaches in order to mitigate the impact of soil erosion.
  - Soil fauna management in Bulgaria, Forest management and soil fauna protection.
  - Soil fauna management in Greece, Effects of fires and soil erosion as well as measures for the protection of soil fauna.
3. Developing economic models to assess the impact on soil fauna.
4. Irrigation impact on SOM and soil fauna in Mediterranean Environment.

Structure of the paper with case studies. Deadlines for the preparation.

**Juliane:** send erosion/earthworm paper (done)

*Group 4 (Pascal)*

Hyp.: C stability related to aggregate structure; fauna effect differing with respect to regions; sample sites across regional and climatic gradients.

- Preferably use sites with existing information; preferably grassland and forest (arable fields too complex). Details still to be specified (sample size, methods). Don't use sand for cores but rather B horizon! Monoliths can be freely provided by Jan Frouz.
- Site history information needed – try to keep soil and habitat types comparable (if possible), perhaps also typical land uses for every region. Provide hypotheses and table with basic information on this (to be circulated). Not too extensive; use this rather as a scoping study in different climatic zones (O. Schmidt). "A brief study on soil fauna engineering effects across Europe". Measure CO<sub>2</sub> emission as well?
- Sites across regional and climatic gradients; Site selection: 2-4 for country; a total of 40-60 natural and agricultural sites. At least four large regions in Europe.
- Number of replicates: 5; time for field work: 3-4 days (one year time)
- Institutions providing special analyses and services (isotopes, exclosures, extraction, micro-organisms, meta-barcoding).
- Remember: NO FUNDS for this, must be covered by your respective Nationally funded projects; material costs are not covered, but STSMs might be allocated.
- Sending samples: individuals participating. Pascal will send the table to the group to be filled. (name of participant, method provided by the institution, max. number of samples that can be processed. Potential sites)
- Or maybe one type of system and analysis across the climatic gradient (D. Rasse);
- Collect the info first and then decide (J. Filser).
- Climax vegetation as criterion to select the sites, i.e., close to the Arctic, where no forests are present.
- Just a bit of extra work (A. Tiunov).
- STSMs associated to this, how many?
- A to-do list (organization of the next steps) – field protocols; a table with sites and protocols of analysis in their institutions. All these protocols to be included in the "KEYSOM Handbook of methods for soil fauna and SOM experimentation".
- Tiunov – (specialists for identification of groups); metabarcoding analyses (Paul) ;

**Juliane:** check LCC's new microscope!

## General considerations

### *Communication*

- Use complete mailing list (COST website is NOT complete) for mailings (unless only for core group or MC); during the first GP, new participants have arrived to the Action, and there might have been some caveats in having the full list of participants to whom information should have been sent. Moreover, some participants were initially invited to participate in the Action and declined; this may limit the performance of the Action. Just let me recall that the role of the Chair, besides participating in the activities of the Action, is to facilitate this process and foster the interaction among participants. Also, the Action has an important scientific and technical component, but, as the Chair indicated in the full proposal, there is also one important aspect to be covered, which is the dissemination of the results at policy level to influence decision-making process.
- Name labels in next meeting, as it was done in the Osijek meeting! Badges were not provided; remember that Local Organiser Support includes the cost of these (see Vademecum).

### **Management Committee Meeting – April 6 – Juanjo (see pdf file attached)**

- More than 2/3 out of 21 countries present
- (etc., see Juanjo's presentation)

~ 18,000 € underspent (due to the non-attendance of participants to this meeting and the previous one in Osijek)

Next meeting: Tartu, Estonia; January 2017 – Marja and Mari (option for meeting after that: Bucarest, Romania – Maria I)

Also option to have WG meetings (to be explored).

Preparation of a KEYSOM flyer by April 30<sup>th</sup>, at the end of GP1. 500 copies were printed and distributed to the Core group (WG leaders, STSM coordinator and Forum of Young Researchers responsible). During the second GP another leaflet will be prepared with updated information to be sent to all participants.

STSM: Field studies – purpose is to support those performing multiple analyses / measurements for everybody; e.g. meta-barcoding. Further – see Juanjo's presentation

Dissemination: Pascal's workshop (Forum for young researchers) in Montpellier received little interest – It is not going to be finally held and Pascal Querner is not finally attending.

Suggestions for Training School: Try to come up also with some practical instructions, especially for planned field experiment – to be checked with Paulo.

Juan J. Jiménez

Juliane Filser