



TOPIC GROUP 1 SAPWOOD AT WORK (Frank Sterck & Kathy Steppe)

Topic description - Functional balances in branches amongst species along climate gradients in Europe

- Review relationships between leaf area, sapwood area and phloem area and their ratios.
- Conduct a pilot study on 10 species differing in shade tolerance on twigs in shade and sun.
- Standardize the protocol for large European study.
- Set up an across-European study on widely dispersed species, for example *Pinus sylvestris*.
- Set up an across-European study on multiple species.

Agenda TG meeting Friday, March 7, 9-12 hours

- 9:00-10:00 Results of pilot studies, challenges at European scale
Mainly presentations, start for discussion in follow up sessions.
(Frank, Paul, Gai, Tommaso, Lies).
- 10:00–10:30 Paper 1: Acclimation in functional balances to climate variation: a single species approach. Mainly discussion!
- 11:00–11:30 Paper 2: Functional balance responses to climate variation: a multiple species approach Mainly discussion!
- 11.30 – 12.00 Protocol standardization (Paul, Frank)
- 12.00 – 12.30 Possible application in models (Kathy, Frank)



TOPIC 2 Relation phenology and wood production (Cyrille Rathgeber)

Topic description - Xylogenesis in Perspective— Exploring the relationships between leaf phenology, tree growth and forest productivity

Topic group 2 explores the relationships that underpin forest ecosystem functioning from leaf phenology, primary and secondary tree growth and stand productivity. We organized our work in five activities. Activity 1: “collecting data, evidences, and ideas” include wood formation monitoring data catalogue development, publications collection development and prospective ideas development for data analysis. Activity 2: “data analysis” is focused on the analysis of wood formation monitoring large common dataset via collaborative work. Activity 3: “case studies” will bring together data and knowledge from different fields, from NDVI to forest productivity (via xylogenesis) but for a limited area, basically a couple of sites and a couple of species. Activity 4: “process-based modeling”, will use the data gathered by the other activities to feed process based models of forest growth. Activity 5 “review, opinions & perspectives” will loop with activity 1 and other activities with the ambition of publishing new insights that may arise from our work of bringing together different knowledge.

Agenda TG 2 meeting Friday, March 7, 9-12 hours

- Activity 1: collecting data, evidences, and ideas
 - Data Catalogue [Cyrille]
 - Bibliographic database [Cyrille]
 - Re-analysis of data [Harri]
- Activity 2: data analysis
 - GloboXyloCo Pilot summary
- Activity 3: Case studies (From NDVI to tree-ring and forest productivity)
 - Case studies Proposals [Mathieu & James]
 - STSM Proposal [Mathieu]
- Activity 4: Process-based modelling
 - Integrated model of tree growth with leaf phenology, primary growth and secondary growth [Annikki?]
- Activity 5: Review, Opinions & Perspectives
 - Patrick Key Note [Patrick]
 - Review paper outline [Cyrille]
 - Opinion paper outline [Cyrille]
 - Link with other communities [Patrick]

Contact: cyrille.rathgeber@nancy.inra.fr



TOPIC 3: Lethal dose of drought (Andreas Bolte)

Topic description - Lethal dose of drought (at population scale) – the LD₅₀SWD approach

Lethal drought indicator L50SWD

- Novel approach (in particular link to SWD)
- has to be applied/validated in studies and experiments (e.g. drought experiment)
- clear definition of SWD (acc. to plant-available soil water)
- joined seedling experiment in 2014

Agenda TG meeting Thursday, March 6, 14.30-17.30 hours

- (1) Introduction round (old and new TG members)
- (2) General information about the concept/aims of the TG
- (3) State of the current work
 - Preparation of the drought experiments 2014
 - Preparation/conduction of the P50 measurements
 - STSM application activities
- (4) Planned experiments and studies
 - Discussion of methodology (experiments, measures)
 - Follow-up and outreach
 - Timelines
 - Responsibilities
- (5) Publication of the pre-study (method paper)
 - Short presentation of the results
 - Procedure (circulate the draft, additions)
 - Authorship
 - Timeline
- (6) Workshop in November 2014 (Portugal)
 - Duration and focus
 - Expected outcome
- (7) Collaboration with other TG and contribution to WGs
- (8) What else?

Contact: andreas.bolte@vti.bund.de



TOPIC 4: WOOD ANATOMICAL FUNCTIONAL TRAITS (Hans Beeckman & Katarina Čufar)

Short description -

Wood has been studied microscopically since the 17^e century. This produced a vast body of knowledge with a particularly rich terminology covering numerous wood anatomical traits which are all potentially functional and relevant for discussions on stress effects on trees. Clear definitions of traits are crucial to design research (including data collection and modeling) on growth responses of trees to extreme events, or more generally, to continue exploring the functionality of the secondary xylem. Many of the traits are exceptionally well defined in the IAWA feature lists for softwood and hardwood identification.

The topic group explores the possibility of using the IAWA lists as starting points for a categorization of wood anatomical functional traits.

Some of the traits are common for a taxon and may bear information on long term evolutionary adaptation to a certain habitat (ecophyletic wood anatomy). Other traits reflect responses of an organism, a population or a community to short term, including extreme, events (phenotypic modifications). Tree ring variables can be considered as an example of this type of traits characterizing single trees or cross dated series of the same or even different species.

Other classifications deal with the type of response (linear, unimodal, multimodal,...), type of variable (quantitative, semi-quantitative, qualitative), shape of probability distribution function.

Agenda TG meeting March 7, 9-12 hours

1. Wood anatomical functional traits: what to measure and how to analyze. Summary of the statements of the Sarajevo presentations and draft of review (Hans Beeckman – 9:00).
2. How to quantify conduits in wood? (Lenka Plavcova – 9:30)
3. Issues of image acquisition (Georg Von Arx – 10:00)
4. Conduit size in plants: predictable variations and adaptive meaning (Tommaso Anfodillo – 10:30)
5. Task division for review, ideas for case studies (11:00)
6. Planning of activities of the topic group. (11:30)

Contact: hans.beeckman@africamuseum.be; Katarina.Cufar@bf.uni-lj.si



TOPIC GROUP 5 IADF Network (Giovanna Battipaglia & Martin De Luis)

Topic description - AIM: Getting a better understanding in the occurrence, the distribution, functioning, and the ecological role of IADFs in tree rings.

APPROACH & PLANNED ACTIVITIES:

(i) How the frequency and type of IADFs (whether present in earlywood or latewood) changes with species, geographical distribution and climate?

Activity 1: The Topic Group 5 is building an IADF catalogue and database, collecting data related to the occurrence and characteristics of IADFs across a large geographical range and different species.

(ii) What are the current structural and functional insights and research gaps regarding IADFs formation in relation to long term and short term drought stress?

Activity 2: We are analysing the current literature to understand where we need to fill knowledge gap (for example compare the several methods that have been used to evaluate the presence or absence of IADFs, or understand the role of the position, the anatomical and isotopic properties of the IADF). Further we are planning to write several paper based on the IADF database (review paper, meta-analysis paper, methodological paper).

Agenda TG meeting Thursday, March 6, 14.30-17.30 hours

State of the current work

- Catalogue, database and preliminary results
- Methodological approach: what we have, where we want to go

Planned steps

- Discussion on if/how to include further IADF data and site characteristics
- Discussion on the data analyses
- Follow-up and outreach
- Timelines
- Responsibilities

Workshop in November 2014 (Portugal)

- Duration and focus
- Expected outcome

Collaboration with other TG and contribution to WGs

What else?

Contact: mdla@unizar.es; giovanna.battipaglia@univ-montp2.fr



TOPIC GROUP 6 - Phloem and parenchyma tissues (Elisabeth Robert & Jozica Gricar)

Topic description

AIM: Getting a better understanding in the functioning, the plasticity and the ecological patterns of phloem and parenchyma tissues.

APPROACH & PLANNED ACTIVITIES:

(i) What is the variation in the characteristics of the phloem and parenchyma tissues in trees growing in contrasting environmental conditions regarding drought stress?

Activity 1: From the across Europe sampling that TG1 will organise to study the functional balances between the amount of phloem area, the amount of sapwood area and the amount of

leaf area, we will select a subsample from which we will study the characteristics of the phloem,

the axial parenchyma, the radial parenchyma and the pith tissue in order to address the potential

patterns in the characteristics of these tissues in relation to drought.

(ii) What are the current structural and functional insights and research gaps regarding phloem and parenchyma tissues in relation to long term and short term drought stress?

Activity 2: We are writing a review paper in which we will define the current research gaps and perspectives.

Agenda TG meeting Friday, March 6, 14.30-17.30 hours

(i) Activity 1:

a) Present the defined protocol for the sampling of branches.

b) Define the phloem and parenchyma analysis.

- Will we complete the branch sampling set with stem samples: pros and cons?

- How do we want the branch samples to be labeled and preserved?

- How do we select the phloem and parenchyma subset?

- How will we do the measurements on the branch samples? How will we section? What will we measure?

- How will we bring the data together? How will we do the analysis?

- Task division. Who can sample? Who can do the sectioning? Will we organize a sectioning workshop? Who can prepare/do the analysis?

(ii) Activity 2: Present the results of the workshop, *i.e.* the outline of the review paper.

(iii) Short discussion: What are the links between our topic group activities and the working group activities?

Contact: erobert@vub.ac.be; jozica.gricar@gozdis.si



TOPIC GROUP 7 Tree Mortality (Jordi Martínez-Vilalta)

Topic description

Activities in our Topic Group focus on a **synthesis on growth patterns as predictors of tree mortality** (early warning signals). After discussion on general data requirements a detailed protocol was developed in order to decide which studies to include in a meta study on this topic.

The proposed work is related to other TG, particularly TG3 (similar topic but from different perspectives), TG8 (both focused on growth patterns, but at different scales) and TG10.

Agenda TG meeting Friday, March 7, 9-12 hours

9:00 – 9:30h. Report on activities since Sarajevo, by J Martínez-Vilalta.

9:30 – 10:00h. Using growth to predict tree mortality, by M Cailleret.

10:00 – 11:00h. General discussion on how to move forward. Planning and distribution of tasks. All TG participants.

11:00 – 12:00h. Smaller meetings of working groups focusing on specific tasks. All TG participants.



TOPIC GROUP 8 Dendrometers

(P. Fonti, K. Steppe, T. Sanders)

Short description - Automatic dendrometers (point or band) are simple and cheap instruments that allow the collection of high-resolution data on stem size variation, including stem growth and stem hydration/dehydration. Dendrometers have already proven to supply valuable indications on plant-water relation. Many foresters and research groups have installed dendrometers on different tree species and in many different bio-zones (from tropics to Boreal, passing through the Mediterranean environments). A huge amount of data has already been collected and now it is time to centralize them to perform an inter-species and global analysis of tree tolerance to drought stress.

The key objectives of the Topic Group 8 are the establishment of a worldwide catalogue summarizing available dendrometer data and to distinguish appropriate parameters which can be used to assess global patterns.

Agenda TG meeting Thursday, March 6, 14.30-17.30 hours

Progress with the Inventory of sites

- State of the art and data catalogue [Patrick]
- TreeNet & Database Proposal [Roman+ Patrick]

Presentations of preliminary analysis

- Preliminary data analysis [Tanja]
- A preliminary study of dendrometer signals as climate indicators [STMS Maurits]

Case studies (Testing several dendrometers)

- Testing several dendrometers during 2014 [Stefan Mayr + Kathy]
- ... other ideas

Discussion on metadata and data format for database

- Discussion from example of participants dataset ?

Definition of tasks for next meeting in Portugal

- What? Who? When? ..

Contact: patrick.fonti@wsl.ch; Kathy.Steppe@UGent.be; tanja.sanders@vti.bund.de



TOPIC 9 Environmental stress and wood quality (Manuela Romagnoli, Bilgin Guller, Jorge Paiva)

Short description – The focus of this Topic Group is the effect of environmental stress on wood quality and wood production. The aim is to provide information to an important stakeholder – the wood industry. While obviously linked to other TGs (e.g. TG 5 and TG 6) TG 9 concentrates on those wood traits/properties which are important for the end user. Wood quality is a general concept which relates to wood characteristics at the morphological/anatomical level, but also on physical, chemical and mechanical wood properties.

Yet, it is difficult to generate a clear picture from the variety of publications on effects of environmental factors, including stress, on wood quality. This is because the definition of **wood quality** is often vague, indicators for wood quality vary and time scales used to quantify effects largely vary. TG 9 will systematically screen available information and come up with two review articles on (1) The effect of environmental stress on wood quality and (2) on the effect of wood anatomical characters - with special focus on density- on the characteristics of wood product and its physical and mechanical properties.

In parallel TG9 is seeking for interaction with stakeholders from wood industry (wood quality) and forestry (forest management) to finally the experts involved in different areas. The challenge is to understand how our research can be used by the stakeholders and how some techniques like biotechnology may help to improve wood characteristics.

TG meeting in Finland

Meeting is cancelled due to absence of TG leaders in the Finland meeting, but group members continue working on the review articles. During the next meeting in Portugal, TG9 will organise a 1.5-day workshop entitled *Environmental stress and wood quality: possible implications on wood end-use*.



TOPIC GROUP 10 Forest genetics speeding up adaptation: the case of resistance to drought (Philippe Rozenberg & Sven de Vries)

Topic description - Human-mediated management approaches can help to speed up adaptation as there is a potential for **evolutionary adaptation to climate change** in tree populations. The evolutionary mechanism that may enable trees to adapt relies on the magnitude of genetic variation and heritability of **adaptive traits**. Precise estimation of genetic determinism requires measurement of a large number of genotypes and individuals. Hence it is important to define adaptive traits among easy to measure traits. Basic wood properties, like density, could be involved in survival to **drought**. Within TG10, adaptive responses of trees to drought will not only address wood properties but will consider a whole-tree approach, from aquapores to stomata. However most emphasis will be put on basic wood properties and especially on annual-ring density variables.

TG10 activities include:

- 1 - review studies of relationships between annual ring density variables and xylem hydraulic properties involved in resistance to drought;
- 2 - review studies of relationship between annual-ring density variables and survival after a drought episode;
- 3 - inventory of forest declines: natural stands and trials mixing healthy and dying (or dead) trees after a drought event, plus biotic factors;
- 4 - review studies of relationship between bioclimatic characteristics of response to drought and annual ring density variables;
- 5- review molecular studies of adaptation to drought;
- 6- review of published studies of genetic variation and heritability of traits involved in resistance to drought,
- 7- Study of adaptation to drought: reliability of transfer from laboratory studies in controlled conditions to field studies in natural conditions

Agenda TG meeting Friday, March 7, 9-12 hours

9.00 – 9.30: Introduction of (Workshop) results to new participants

9.30 – 10.30: continuation of discussion on the 7 topics within TG10

10.30 – 11.00: coffee break

11.00 – 12.00: separate discussion groups for each of the 7 topics within TG10

Contact: philippe.rozenberg@orleans.inra.fr; sven.devries@wur.nl