

**Workshop on “Tree stability: models standardisation and integration”<sup>1</sup>**  
UMR AMAP, Montpellier, 21-23 October 2009

**Workshop objective**

This workshop aims in: (i) presenting the actual models, methods and computing tools that are available for tree stability investigations and prediction at the tree and stand scales; (ii) discussing about standardisation and integration of these methods and tools in decision support systems; (iii) deciding how to strengthen and make permanent the animation of this tree stability research network, and how to enhance and support international collaborations on this topic.

Presentations will take the form of short talks and software demonstrations. A large place will be devoted to open discussions. The proposed program is split into three main sections devoted to (i) mechanical models of tree/stand stability; (ii) making the connexion between tree/stand growth and tree stability models; (iii) computer platforms that can host these models.

In addition, an introduction to the concepts and models of tree architecture will be presented at the beginning of the workshop. How to describing and model tree architecture, i.e. the dynamical evolution of tree topology and geometry, have been widely investigated in AMAP (the research unit which host this workshop), and we think that these concepts will help in improving approaches and models to study tree mechanical stability. An example of collaborative software development and sources sharing will be also presented. At the end of these three days, a round table will be organized in order to conclude this workshop and to decide about the future of this tree stability group.

**This program is not static, and can be adapted** regarding to the needs, i.e. possibilities will be given to participants to contribute in the limit of the available time.

---

<sup>1</sup> This workshop is supported by Agropolis Fondation and the Université Montpellier 2

## Workshop program (to be updated)

### *Wednesday – October 21*

11:30-12:30 Reception of participants at UMR AMAP

12:30-14:00 *Lunch at CIRAD*

14:00-14:45 Introduction to the workshop  
(Barry Gardiner, Steve Mitchell & Thierry Fourcaud)

14:00-14:45 Concepts of tree architecture  
▪ “Concepts and models of tree architecture in AMAP” ( Yves Caraglio & Jean-François Barczi)

14:45-15:45 Existing models of tree stability (Tree scale/Stand scale)  
Static models  
▪ *GALES : theory, strengths and weaknesses and plans for the future of the model* (Barry Gardiner et al.)  
▪ *HWIND : (Veli-Pekka Ikonen et al.)*

15:45-16:15 *Coffee break*

16:15-17:30 Existing models of tree stability (Tree scale/Stand scale)  
Static models  
▪ *Relating mechanical strength at the stem level to values obtained for clear wood small samples* (Jean-Claude Ruel)  
▪ *“Cyclic foundation concepts for modelling soil-root interaction”*: (Tim Newson)  
▪ *“Numerical modeling of root-soil interactions at the tree scale and application to tree stability”* : (Thierry Fourcaud, Adrien Bonneu, Lionel Dupuy, Jinna Ji, Michel kokutse)

### *End of Day 1*

### *Thursday – October 22*

09:00-10:15 Existing models of tree stability (Tree scale/Stand scale)  
Dynamic models  
▪ *“Tree response to high winds: evaluating architectural effects with numerical experiments”* (Damien Sellier)  
▪ *“tree architecture and tree multi-modal response to wind”* (Emmanuel de Langre, Bruno Moulia & Mathieu Rodriguez),  
▪ *“Dynamic behaviour of individual trees - measurement and modelling”* (John Moore)

10:15-10:45 *Coffee break*

*Thursday – October 22*

- 10:45-11:45 Existing models of tree stability (Tree scale/Stand scale)  
Dynamic models
- *"How do Scots pine trees respond to turbulent airflow?" (Dirk Schindler)*
  - *"Modelling wind and plant interactions at various scales" (D. Pivato, S. Dupont, Y. Brunet)*

- 11:45-12:30 Coupling tree growth and tree stability models (Tree scale/Stand scale)
- *WINDFIRM-ForestGALES\_BC-TASS (Steve Mitchell)*
  - *"Concepts of tree growth and tree biomechanics that could be considered in future models of tree stability" (Tancrède Almeras & Thierry Fourcaud )*

12:30-14:00 *Lunch at CIRAD*

- 14:00-15:45 Computer Platforms:  
Tree and Stand growth models
- *CAPSIS : a simulation platform to implement models of forestry growth & dynamics (François de Coligny)*
  - *Xplo : A tool for plant architecture exploration (Sébastien Griffon)*
  - *The PlantBioM project : (Thierry Fourcaud & Tancrède Almeras)*
- Risk assessment
- *"Development of a wind risk model for irregular forest stands" : (Barry Gardiner & Sophie Hale)*
  - *"Effect on early thinning to reduce wind damage risk" : an example of ForestGales application coupling Gales model and an Airflow model; (Kana Kamimura & Barry Gardiner)*

15:45-16:15 *Coffee break*

- 16:15-17:30 Software demonstration:
- *ForestGales (2.3)*
  - *HWIND*
  - *CAPSIS/FOREOLE*
  - *AMAPsim, ...*

*End of Day 2*

*Friday – October 23*

- 09:00-09:45 Co-development and sources/models sharing
- *Overview of software platform and tools for model integration, collaborative development and resources sharing (Samuel Dufour-Kowalski)*

*Friday – October 23*

09:45-10:15 Round table

*Summary about existing tree stability models*

10:15-10:45

*Coffee break*

10:45-12:30 Round table

- *Summary about tree stability models : Major knowledge gaps in models, Improving spatial representation, Improving tree-tree interactions*
- *Mechanisms for joint model improvement and integration (code sharing, model integration and pooled datasets for model validation)*
- *Planned actions: what has been done (see last report) what still need to be done? (projects, COST action, web site, etc.)*

12:30-14:00

*Lunch at CIRAD*

*End of Day 3*