

Scientific Project

“Multidisciplinary study of the adaptation of natural and planted forests to environmental variations, ***biotic*** and abiotic, in the context of climate change”

Definition of adaptive traits from the study of the dieback and mortality of trees produced by extreme climatic events

Tree mortality after extreme events of **drought and heat**

Obvious manifestations of **mal-adaptation**

Comparison of morphological characters of **dead and alive** trees (after an extreme event)



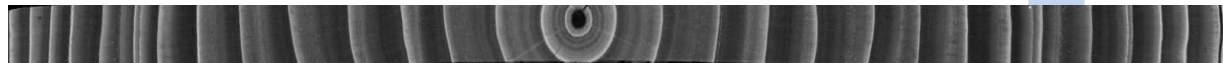
Pino ponderosa, Patagonia, Argentina, 2011

Wood structure can be used to study dead trees
... it can be well described by microdensity

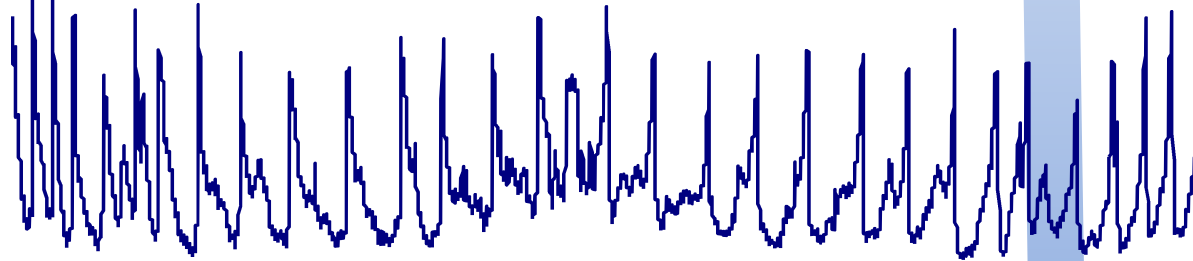
Wood Sample



X-ray Image



Microdensity Profile



Wood structure can be used to study *adaptive genetic variation*

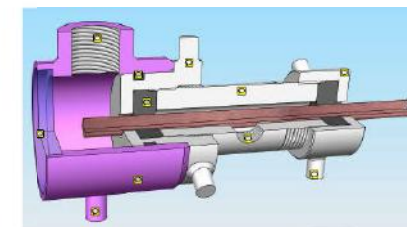
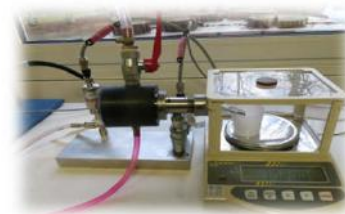
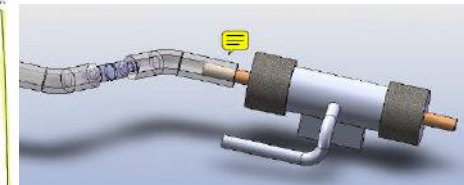
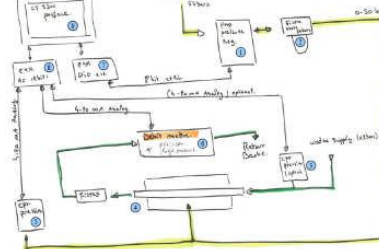
Determination of the functional role of the adaptive characters to understand the individual response of trees

- Use non-destructive tools with the aim of **indirectly** characterizing **functional characters** of **adaptive relevance** (vulnerability to cavitation, conductivity and **fitness**)

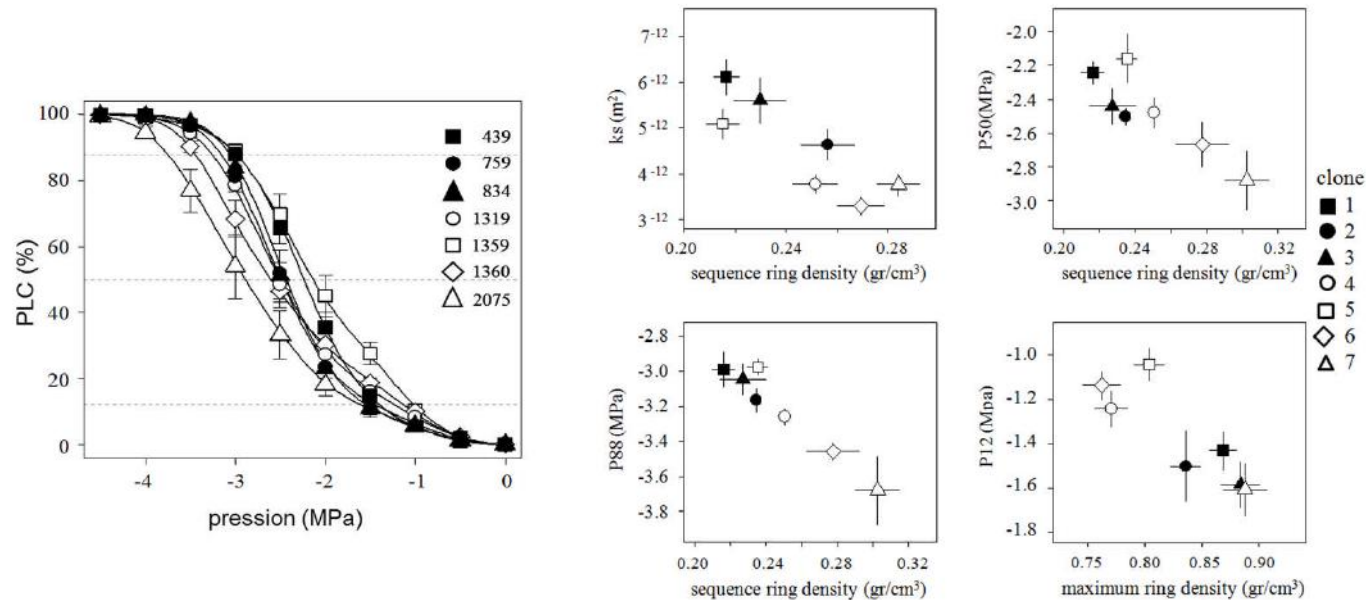
Destructive, expensive, tedious and time-consuming methods

- >1200 VC in branches and seedlings (Choat et al. 2012)
- >150 VC in trunks of Douglas-fir (Dalla-Salda et al. 2009, 2011)
- >500 VC in seedlings of pinus pinaster (Lamy et al. 2013)
- 800 VC in branches of Douglas-fir (PhD thesis in progress Thibaud Chauvin)

EMBOLITRON: development and construction of a prototype for the evaluation of VC



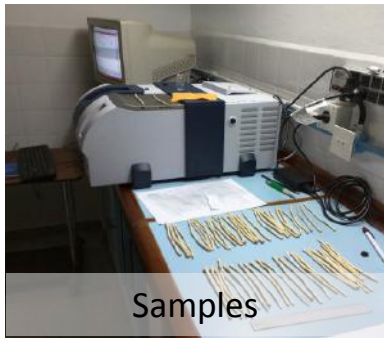
Study the genetic variation of adaptive traits
Identify genetic improvement strategies allowing to achieve
genotypes better adapted to stressful conditions



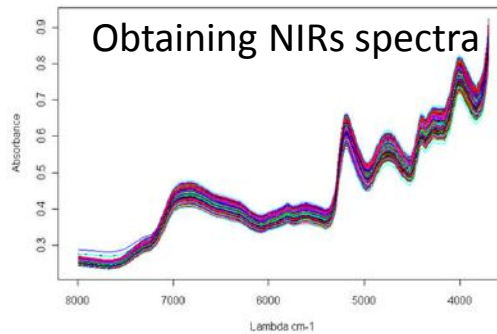
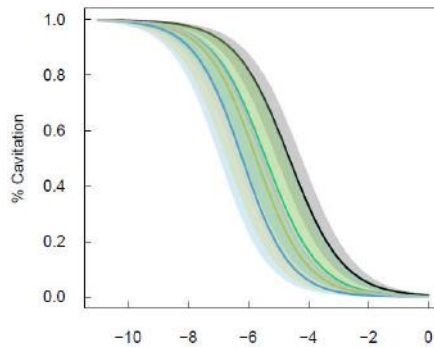
Significant relationships on the individual and genetic levels between hydraulic and microdensity variables

VC Proxys: microdensity profiles

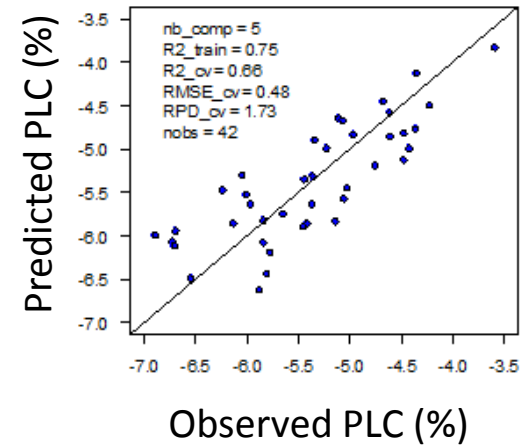
NIRs prediction of vulnerability to cavitation in Cypress (*Austrocedrus chilensis*)



Obtaining references values



Calibration model



VC Proxys: NIRs

Define silvicultural practices to improve productivity and adaptability of forest systems to environmental stress in the context of CC

- *multidisciplinary approach by using tools of genetic improvement, ecophysiology, genetic quantitative, genomic, forest management, anatomy and wood technology*



Enviadas a laboratorio para la obtención de los valores de referencia.



Technological innovation of management, processes and products to increase the participation of wood in different uses allowing C fixation in the long term

- Contributing to solve problems associated with the housing deficit
- To study intra and inter species variation of wood properties for structural use



FORESTIA: main topics

