RheoWoodDB

A unified collection of scientific data on wood rheology

9e Journées Scientifiques

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Wood rheology … in brief : the bending example

Piece of wood — size, specie, tree position…

+

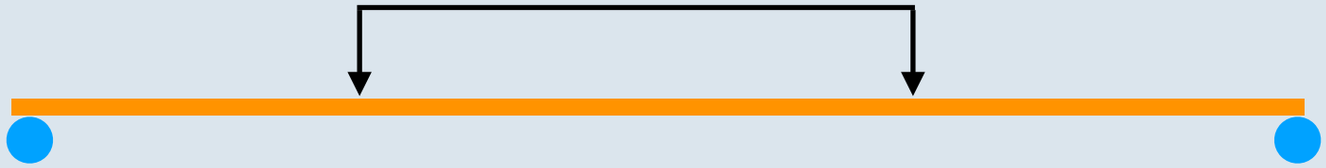
Boundary conditions — type, distance, …

+

Loading — position, intensity, …

=

Mechanical test



Environment

Parameters : Temperature, RH, air-flow, wind, rain, snow, UV, …

Un-Controlled vs controlled

Time

+ material orthotropy

+ other sollicitations (tensile, shear, …)

… have a nice experimental plan !

Context up to the situation :

Long, un-easy and sensitive to experiment, expensive ….

… but a partially describe phenomenon in the wood science community.

Material axis	Sollicitation mode						
	Bending			Tensile	Compression	Shear	Torsion
	3pts	4pts	others				
Longi.	Lopes & Matos, 2019	Kingston & Clarke, 1961	Hunt 1986	Schniewind & Barrett, 1972	Mohammedet al., 2019	…	Bhatnagar, 1969
	Dwianto et al., 2000	Hering & Niemz, 2012	Hunt 1987	Taniguchi et al., 2010	Dwianto et al., 2000		…
	Hogan & Niklas, 2004	Gnanaharan & Haygreen, 1979	Foudjet & Bremond, 1989	Peng et al., 2017	Keith, 1974		
	Nakai & Grossman, 1983	Moliński & Raczkowski, 1988	…	Kojima & Yamamoto, 2005	Bazant, 1985		
	Grossman & Kingston, 1954	Hoyle et al., 1984		Kojima & Yamamoto, 2004	Gnclnuhtrrun & Hcrygr-ren, 1978		
	Arima & Grossman, 1978	Armstrong & Grossman, 1972		Scheniewind 1966	…		
	Hearmon & Paton, 1964	Mukuday 1987		Scheniewind, 1972			
	Schniewind 1967	Bengtsson & Kliger, 2003		Hunt, 1979			
	Raczkowski, 1969	Montero, 2012		Hunt 1984			
	Scheniewind, 1972	…		Hunt 1987			
	Ranta-Maunus, 1975			Engelund & Salmén, 2012			
	Gressel_1984			…			
	Clauser 1959						
	Ma et al., 2014						
	Leichti , 1988						
	…						
Radial	…		Hermawan & Fujimoto, 2019			Scheniewind, 1972	
			…				
Tangential			Hermawan & Fujimoto, 2019		Perkitny, 1965	Scheniewind, 1972	

**** incomplete list of references***

Context facing a problematic :

… however un-comparable results occurs !

even if we compare according to compliance level on similar moisture content and temperature.

Find a solution for a collaborative work…

MS Excel file is not suitable
(how to store and sort data sets, collaborate, etc)

MS Access file is not suitable
(how to collaborate, display etc)

Proposition :

A shared python-based software to collect, compare and model the rheological of wood

- the more we work with the better we will fit our needs
- macro-langage (can read/write with other softwares), common (in science, lab…)
- get data from articles, reports, or unpublished experiments (records, or digitalization of graphs)
- by different criterions
- 1D rheological models, …
- objective

First attempt :

Publications

PDF

PDF

PDF

Dataset collection

Open format

Light

Easy to handle

|

JSON

input & output functions

Processing

I/O

Manipulation

Fitting

|

Python

Visualization

See, zoom and move

Compare

|

Python

Deeper look into a data

- Metadata informations :
  - reference (author, year, institute, doi, …)
  - material (specie, size, tree position, …)
  - test information
  - environment
  - …

- Original data values :
  - Time range as original
  - Raw sollicitation
  - Raw measurement

- Computed data values :
  - Time range (in various time step)
  - Processed sollicitation
  - Processed measurement

Up to now ~130 data.

example of a data set


```
{
    "Reference": "1384H0YL",
    "Wood Name": "Douglas fir",
    "Wood Type": "softwoods",
    "SciName": "Pseudotsuga menziesii",
    "Density": "0.48",
    "T(C)": "21",
    "RH(%)": "65",
    "Testing": "CPR-3R",
    "Size": "3550-89-89",
    "Data Number": "data00305",
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        21.17650756,
        26.93069115,
        33.86655322,
        37.66480878,
        43.4095804,
        55.65374825,
        59.8623537,
        65.2189152,
        71.72195243,
        75.55033974,
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        86.63205824,
        90.45039824,
        93.80750491,
        99.61858544,
        104.190728,
        110.295408,
        117.9260757,
        130.1318108,
        138.5185848,
        152.2372545,
        167.4782874,
        180.4305095,
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        397.289817
    ],
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        21.17650756,
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        71.72195243,
        75.55033974,
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        86.63205824,
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        104.190728,
        110.295408,
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        152.2372545,
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        397.289817
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        4.825174825,
        5.282898919,
        5.83598822,
        6.846709574,
        7.398882545,
        7.628734901,
        8.143678507,
        8.406967571,
        8.88747515,
```
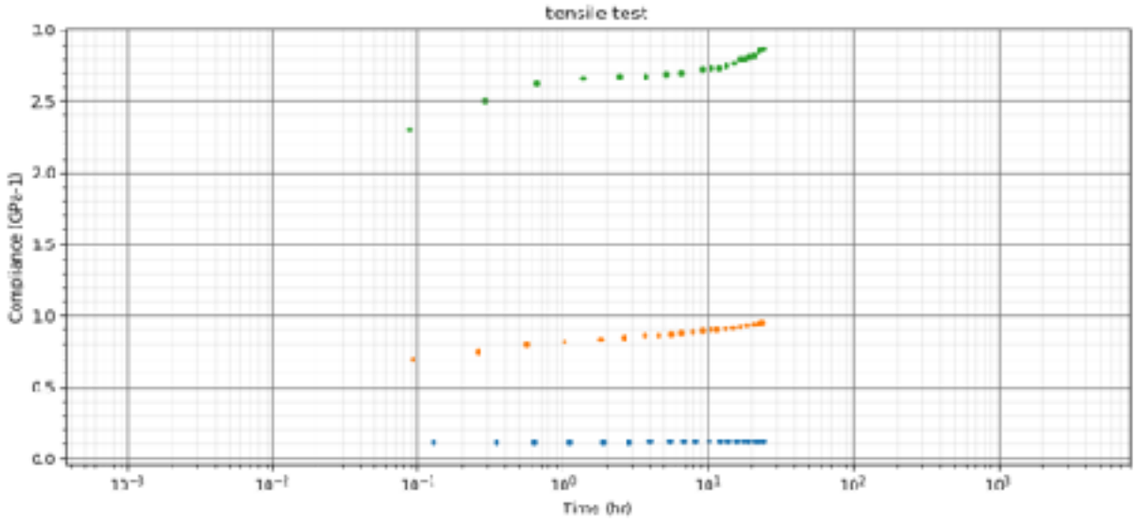
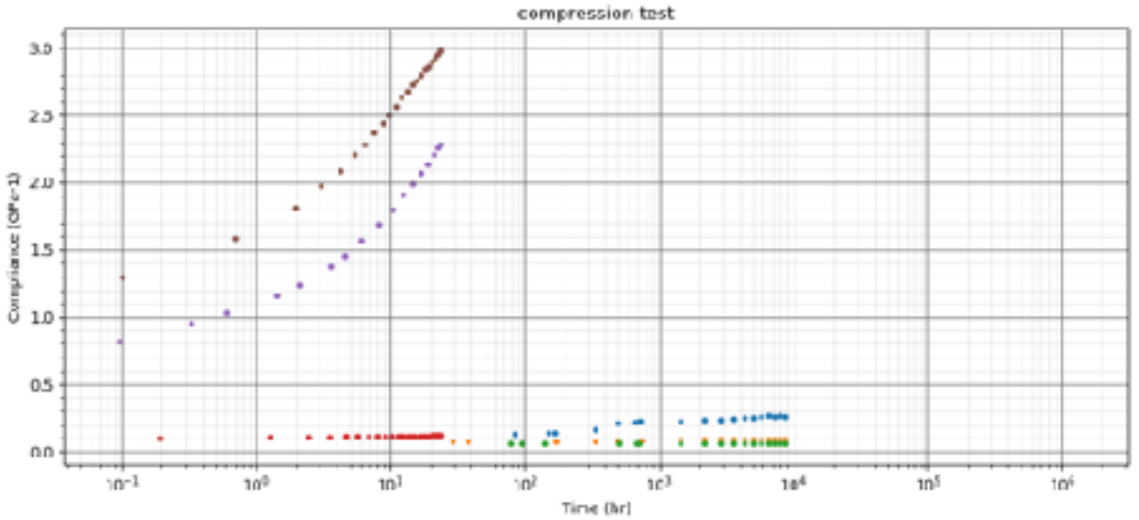
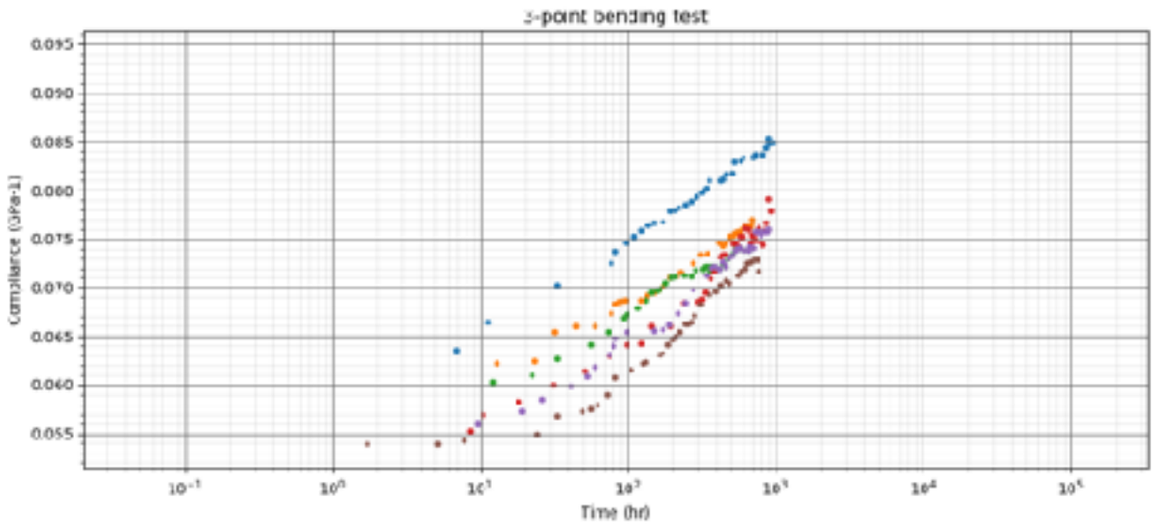
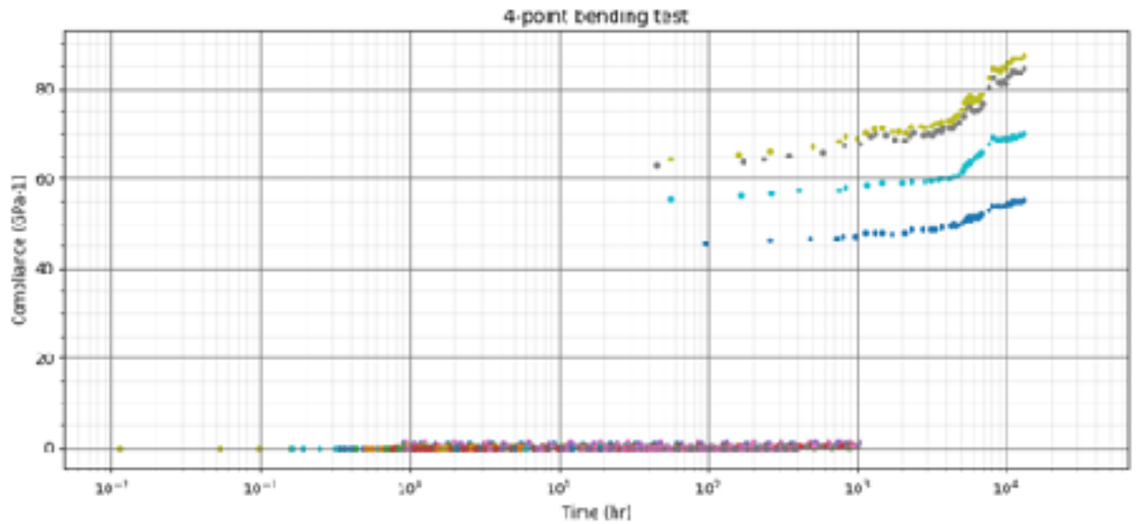

An exemple of analysis :

on a selected range of temperature and RH according to sollicitation mode.









Perspectives

Where are the data and/or tools ?

now …

GitLab

later …

… ?

Referencing ?

… ?

Manipulation & visualisation ?

… ?

Publication ?

… ?

Conclusion

- if you have are or have been interested on wood rheology
- if you have some measurements to enhance the data collection
- if you have some ideas or needs around …
- if you have some experience in data management

Feel free to contact us.

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RheoWoodDatabase

A unified collection of scientific data on wood rheology

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