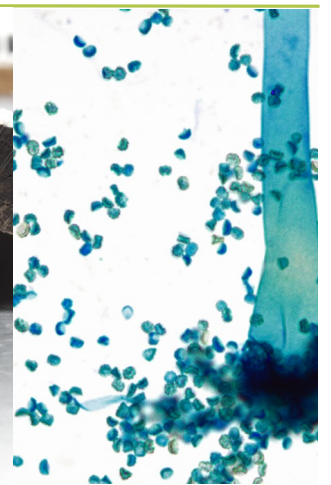
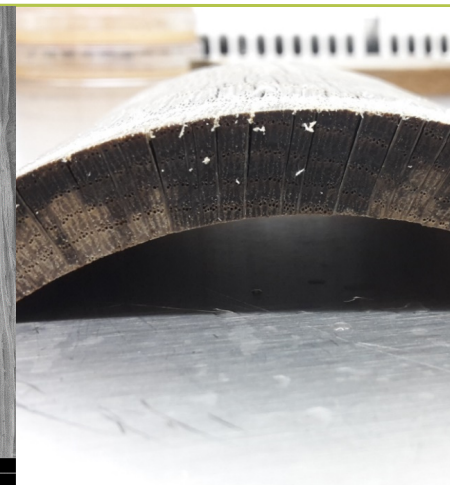
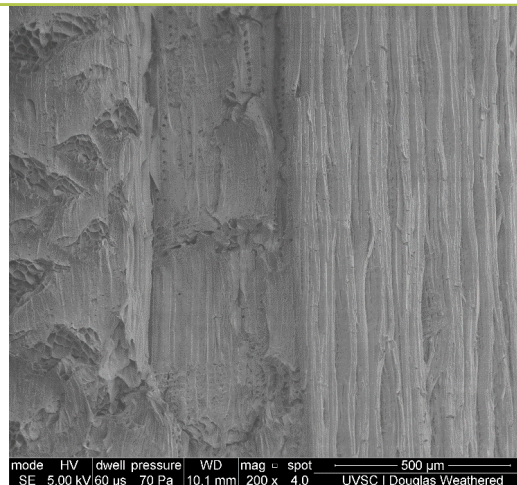
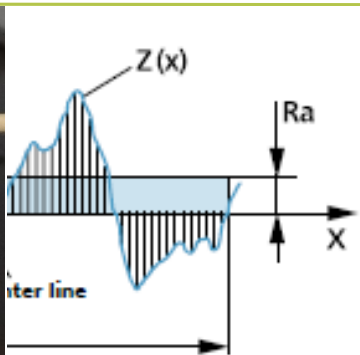
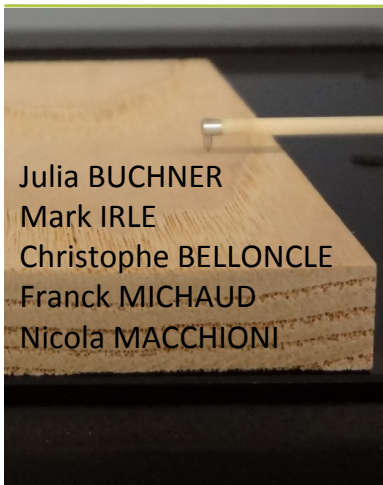


# Surface characterisation of untreated wood surfaces after artificial and natural weathering



## Surface characterisation of untreated wood surfaces after artificial and natural weathering



### Wood species:

*Quercus sp.*

*Castanea sp.*

*Pseudotsuga menziesii*

### Measurements carried out:

FTIR

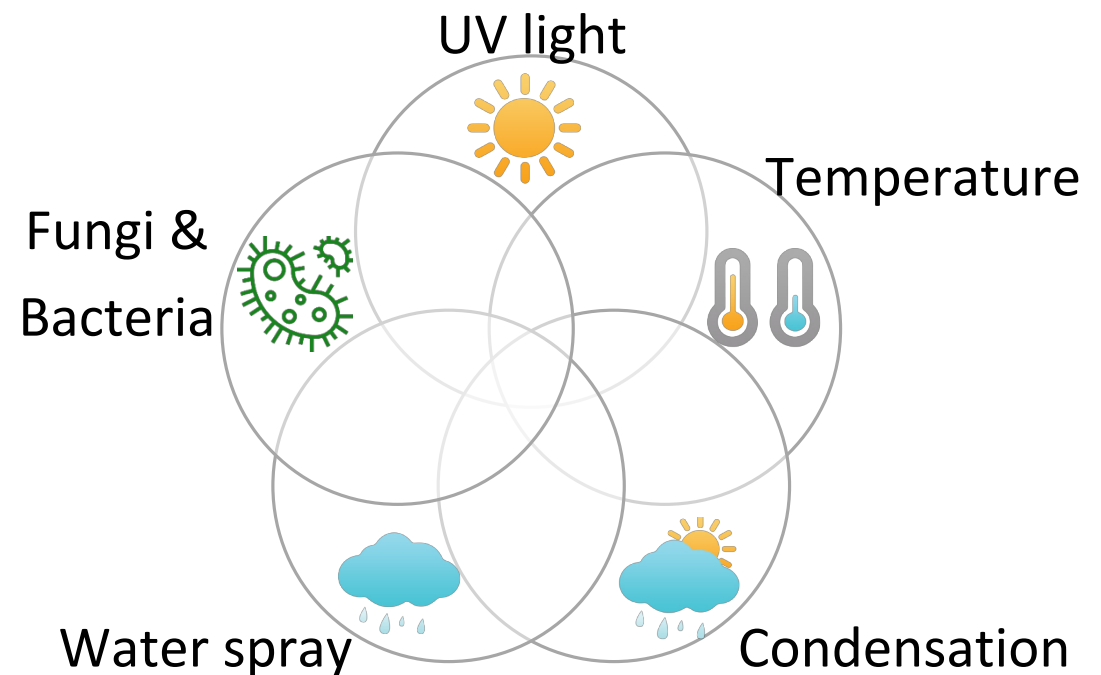
ESEM observation

Visual observation

Surface roughness

Colour measurements

Microbiological contamination



# Poster No. D 16



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**Wood weathering**

## Surface characterisation of untreated wood surfaces after artificial and natural weathering

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Franck MICHAUD, Nicola MACCHIONI

### Research background

The aim of the project is to identify any synergistic effects between biotic factors such as bacteria (*Actinomycetes* and *Eubacteria*) and fungi (*Basidiomycota* and *Ascomycota*) and abiotic factors such as light, temperature and moisture on the weathering of wood surfaces in use class 3. It is expected that through the exposure of several wood species to natural and artificial weathering, each of the weathering parameters can be understood more clearly and especially the influence of biotic factors can be estimated.

### Objectives

Wood samples are weathered naturally outdoors (for half a year and one year) as well as artificially (for 6 and 12 weeks) in a QUV as shown in Table 1. Visual, chemical as well as microbiological changes to the surfaces will be measured.

### Samples and Measurements

Mainly tangential surfaces of oak (*Quercus sp.*), chestnut (*Castanea sp.*) and Douglas fir wood (*Pseudotsuga menziesii*) are used to investigate the surface characteristics. Following measurements are carried out:

- Microbiological contamination
- Scans/ Visual observation
- Colour measurements
- ESEM observation
- Surface roughness
- FTIR measurements (in early- and latewood areas)

Figure 1: Indication of the areas of measurements for each method

### Weathering methods

Natural as well as artificial weathering methods have been chosen for this weathering experiment.

Weathering technique	Step	Function	Specification	Time [h]
EN 927 (UVSC)	1	Condensation	45±3 °C	24
	2	Sub cycle	Step 3+4 (48x)	144
	3	UVA-340	60±3 °C, 0,89 W/m²/nm	2,5
	4	Spray	-	0,5
EN 927 without spray (UVC)	1	Condensation	45±3 °C	24
	2	Sub cycle	Step 3+4 (48x)	144
	3	UVA-340	60±3 °C, 0,89 W/m²/nm	2,5
	4	Idle	-	0,5
EN 927 with higher irradiation (UVASC)	1	Condensation	45±3 °C	24
	2	Sub cycle	Step 3+4 (48x)	144
	3	UVA-340	60±3 °C, 1,55 W/m²/nm	2,5
	4	Spray	-	0,5

Table 1: Artificial weathering techniques derived from EN 927-6

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### Results

The experiments are ongoing, therefore only parts of the results can be demonstrated

#### Surface roughness

	R <sub>s</sub>	P <sub>a</sub>	W <sub>a</sub>	Pt	Wt	Rsk	Rku	Rpk
<i>Pseudotsuga menziesii</i>	6,3	20,7	18,8	155,9	104,5	-0,5	12,1	15,4
<i>Quercus robur</i>	7,5	17,5	13,8	179,3	69,3	-3,3	20,5	12,6
<i>Castanea sp.</i>	9,9	32,5	29,0	247,1	129,9	-3,5	21,5	11,9

Table 2: Surface roughness of wood surfaces before exposure to weathering

#### Visual observation

Observing the artificially weathered wood surfaces with the naked eye, a difference in colour and solidity of the top layer can be observed. The impact of spraying is noticeable.

Oak  
Before weathering

UVC

UVSC

Chestnut

UVC

UVSC

Douglas

UVC

UVSC

Figure 2: Samples prior to weathering compared to samples exposed to UV light and condensation and lastly additionally with spray.

#### ESEM observation

A pin was used to make a marker hole in the lower left corner of each sample in order to help locate the same observation point after weathering.

Figure 3: ESEM observation of a Oak (upper pictures) and Douglas (lower pictures) before weathering (left) and after exposure to UVC, spray and condensation (right)