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Environmental impact on crack propagation of biobased building materials: application to *Abies Alba* Mil

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One of the main objective of French ANR project CLIMBOIS N° ANR-13-JS09-0003-01, is to know the impact of climatic variations on the behaviour of timber structures. To reach this goal some tests are performed on notched beams of European species. This work presents the first experimental results of creep test carried out on a notched beam of *Abies Alba* Mil.

Material and Methods

According to European code Eurocode 5, a notched beam of *Abies Alba* Mil has been dimensioned as presented on figure 1a. Then, the beam is submitted de environmental effects coupled with creep loadings induced by a four points bending during 5 days until the total collapse, Figure 1b. During the test, there appeared cracks at the right of the notches on the four faces of the beam, a daily follow-up of the opening and propagation of the tips of cracks versus the climatic parameters (Temperature, HR) is carried out.

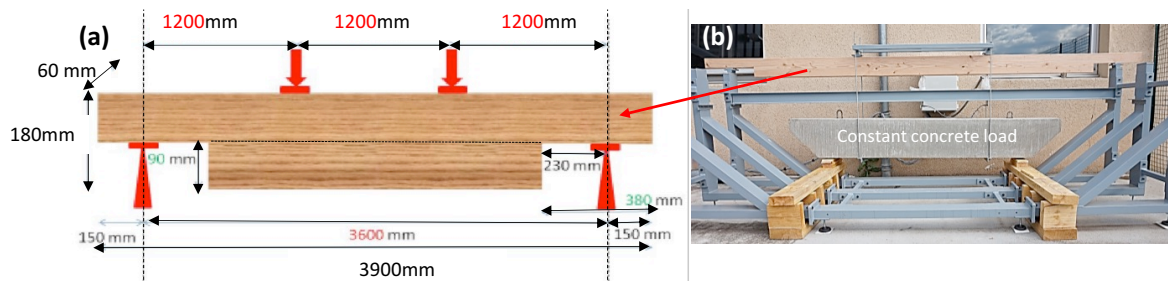


Figure 1: Scheme of notched beam tested (a). Real experimental devices (b).

Results

Figure 2a shows the propagation of the tips of cracks of the four faces versus the climatic parameters (Temperature T, Relative Humidity HR). Between the times 70-80H there are a pronounced impact of T and HR on the propagation of the tips of cracks. Figure 2b shows also the influence of T and HR on the opening of crack during the test and before is break. We can remark that there is a correlation between the opening of crack and the augmentation or the diminution of T and HR (figure 2b, 0-40H). These experimental results (Figure 2) are in an accordance with the results obtained by (Pambou *et al.* 2016) on the *Pseudotsuga menziesii* J.L. The evolution of the deflexion versus environmental parameters will be investigated in the coming works.

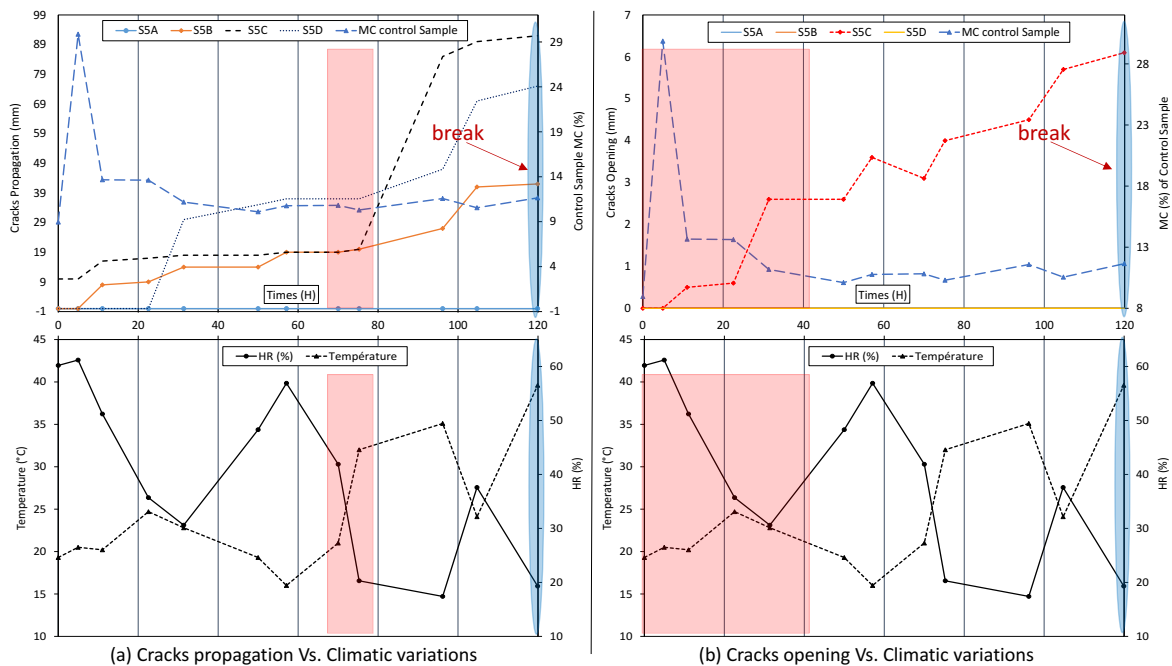


Figure 1: Propagation of cracks versus climatic parameters (T, HR).

References

Pambou Nziengui C. F., Moutou Pitti R., Fournely E. *et al.* 2016. Projet ANR JCJC CLIMBOIS: impact des conditions climatiques sur la propagation de fissure de poutres de Douglas en fluage extérieur. 5ièmes journées du GDR 3544 "sciences du bois"- Bordeaux, 8-10 novembre 2016.

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