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Cavitation in trees monitored using simultaneously acoustics and optics ALEXANDRE PONOMARENKO, OLIVIER VINCENT, PHILIPPE MARMOTTANT, LIPhy, Grenoble University, Saint-Martin-dHères, France — Under hydric stress, in dry weather conditions, the sap within trees may reach extreme negative pressures and cavitate: bubbles appear, which eventually causes an embolism in the circulation. It has been shown that cavitation is associated with short acoustic emissions, and they can be recorded in the ultrasound range. However the precise origin of each acoustic emission is still not clear. In particular, the acoustic emissions could be not only the consequence of cavitation, but also of the collapse of xylem conduits, or of fractures in the wood. Here we present an original set-up where we can simultaneously record (i) the acoustic emissions, (ii) the location of cavitation events, by imaging the sap channels under light transmission microscopy. We are then able to correlate the sounds to the visible changes in channels, such as the appearance of cavitation bubbles. We hope the results of the present study might help to better understand the acoustic signals emitted by trees, and to obtain further information in the evolution of wood under dry stress conditions.

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