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Visualization and quantification of liquid water transport in softwood by means of neutron radiography

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Liquid water uptake in three softwood species, in the radial, tangential and longitudinal directions, is investigated using neutron radiography at the wood growth ring scale. The high sensitivity of neutron to hydrogen atoms enables an accurate determination of the moisture content evolution in the wood. The spatial and temporal evolution of water content distribution during liquid water transport shows that latewood cells play a significant role in water uptake compared to earlywood cells and that ray tracheids contribute to liquid transport, particularly in radial and tangential directions. All water transport is accompanied by vapor sorption in the cell walls which can also be imaged with neutron radiography. In addition, we perform decane uptake experiments, as this non-polar liquid is not adsorbed in the cell walls, to study liquid transport in the absence of wood swelling.

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