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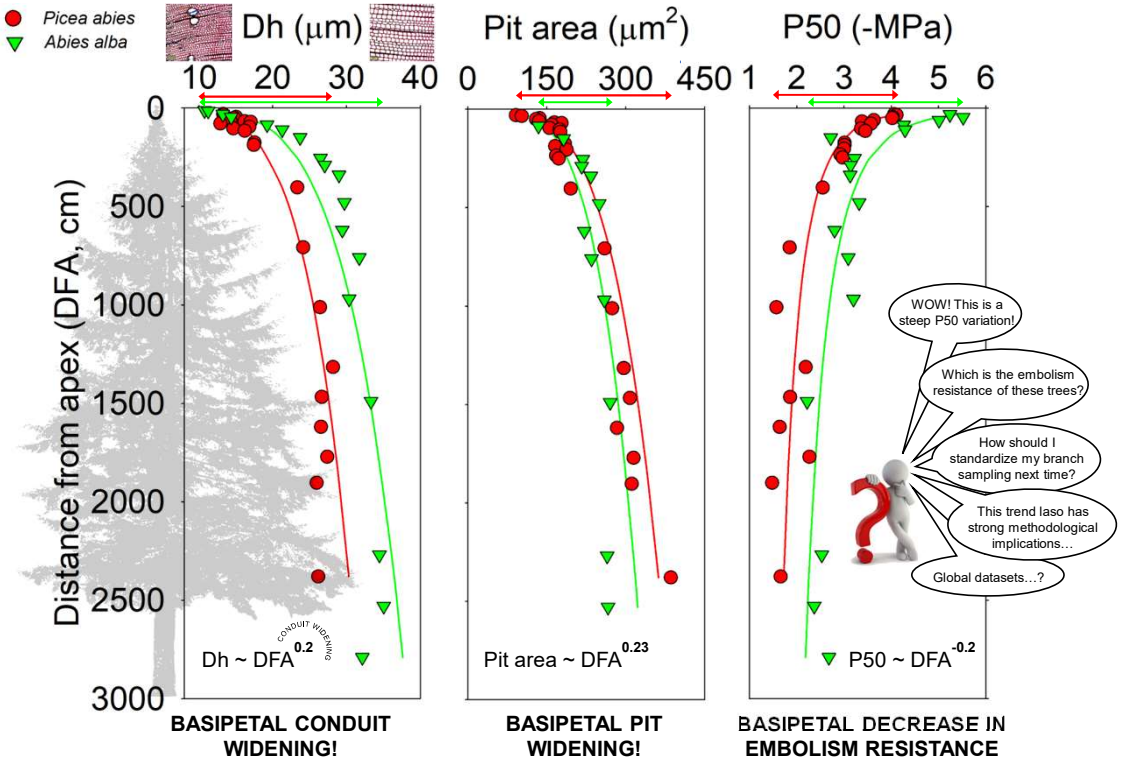
RESISTANCE TO XYLEM EMBOLISM IN CONIFER TREES

Apex-to-base anatomical patterns determines a steep axial variation in xylem embolism resistance along the stem in *Abies alba* and *Picea abies*

Samples: Longitudinal sticks of 15 cm taken at different position along the stem of a *P. abies* and an *A. alba* tree.

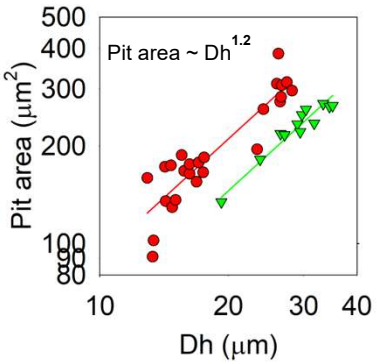
Methods: Vulnerability curves with air injection method; lumen area of all tracheids (20-50 thousands) in the cross section measured with ROXAS



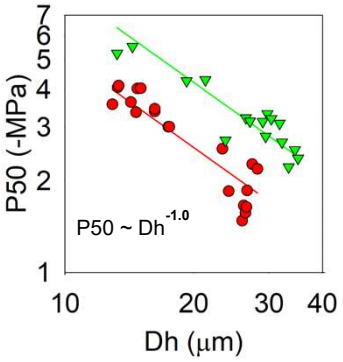
BASIPETAL CONDUIT WIDENING!

BASIPETAL PIT WIDENING!

BASIPETAL DECREASE IN EMBOLISM RESISTANCE



EMBOLISM RESISTANCE DEPENDS ON PIT PROPERTIES

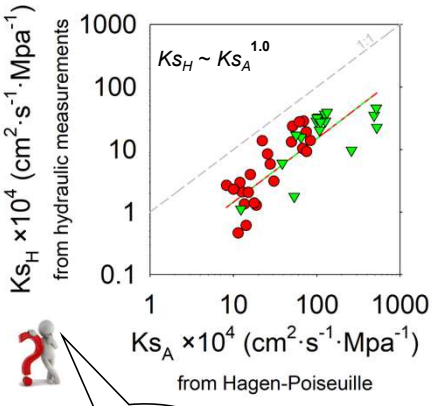


BUT LARGER TRACHEIDS EMBOLIZE AT HIGHER Ψ_{XYLEM}

The wider tracheids with narrower pits of *A. alba* are more resistant to drought embolism than those of *P. abies*

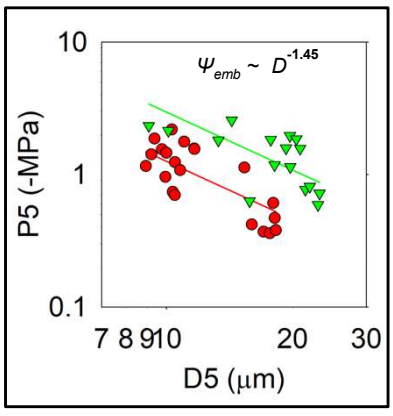
ASSESSMENT OF THE SINGLE TRACHEID VULNERABILITY CURVE

I. Assessment of the scaling of tracheid conductance and its lumen area using Ks data

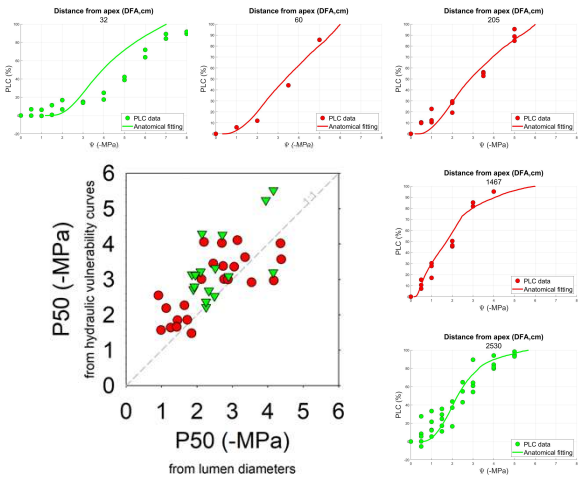


This is critical for the assessment of the tracheid VC

II. Relationship between P5 of the hydraulic vulnerability curve and the diameter corresponding to the 5 % of the total conductance cumulating tracheids in descending order



III. Prediction of hydraulic vulnerability curves based on the distribution of tracheid D and the relationship P5 – D5



THE SHAPE OF THE VULNERABILITY CURVES ARE STRONGLY AFFECTED BY TRACHEID ANATOMY (E.G. DIAMETER OR PIT AREA) BECAUSE THE MORE CONDUCTIVE TRACHEIDS (WIDER DIAMETERS AND WIDER PITS) ARE MORE VULNERABLE TO DROUGHT EMBOLISM (LARGER PITS).