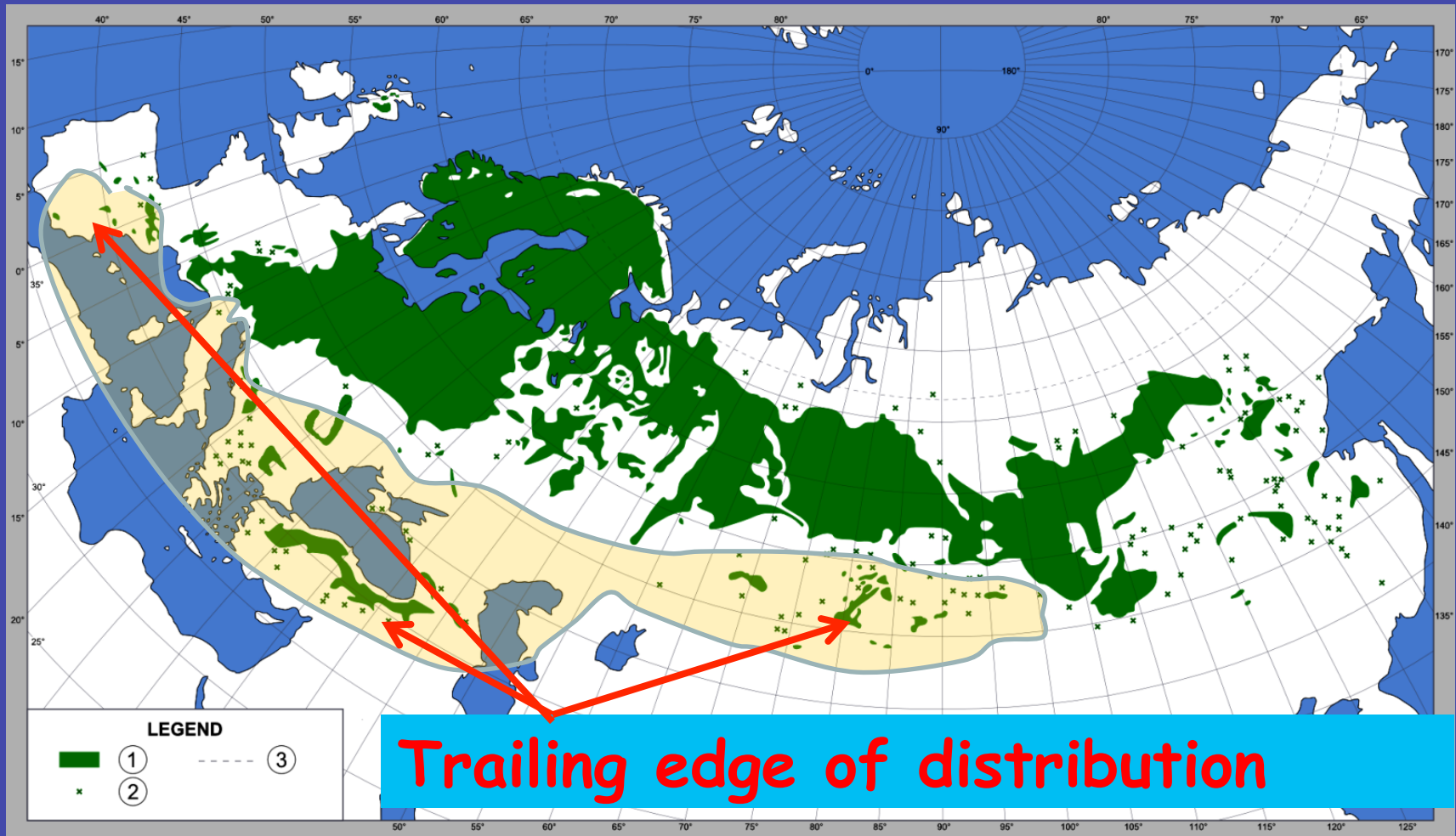# WSL: Pfynwald workshop 2014

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Limits to plasticity at the trailing edge of a species' distribution

Trailing edge of distribution

Pfynwald, Valeis / Rhone Valley (Switzer.)

Control plot

Irrigated plot

Prades Mountains, Catalunya (Spain)

P. Sylvestris, Q.ilex, Q. pyrenaica

Site: Prades Mountains, NE Spain
Picture: Richard Martin Vidal

Pinarbasi, Central Anatolia (Turkey)

P. sylvestris, J. macrocarpa, J. Foetidissima / excelsa

Two-point dendrometry (xylem)

E$_x$, bulk volumetric
modulus of xylem

$$\frac{\Delta r}{r} = \Delta P / E_X$$

Two-point dendrometry (bark)

Growth
Capacitance
Bark turgor pressure

$$\frac{\Delta r}{r} = \Delta P / E_B$$

Dendrometry set-up

Linear variable differential transducers (LVDT)
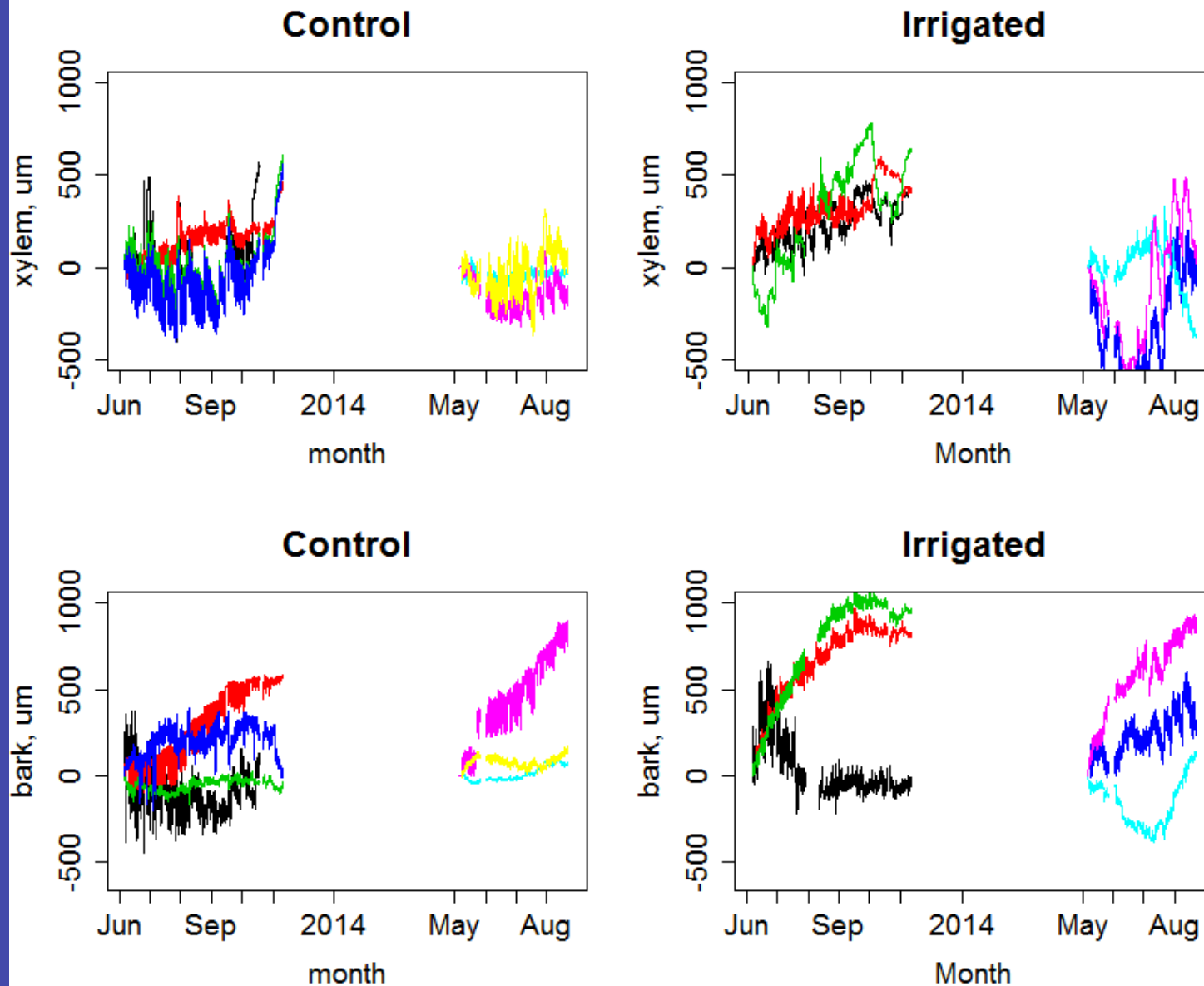
Resolution: theoretical (infinite), in practice (~1-2μm)

Setup in the field:
Plot 1 : 4 trees
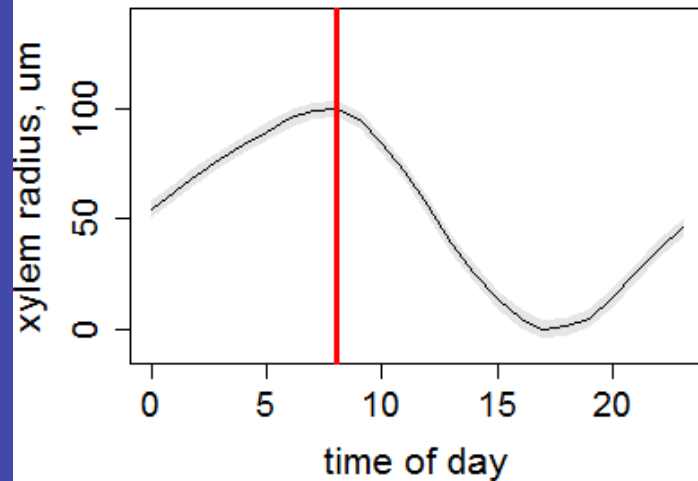Plot 2: 4 trees

Each tree: 2 sensors, one on bark, one on xylem

Dendrometry dataset

Diurnal cycles
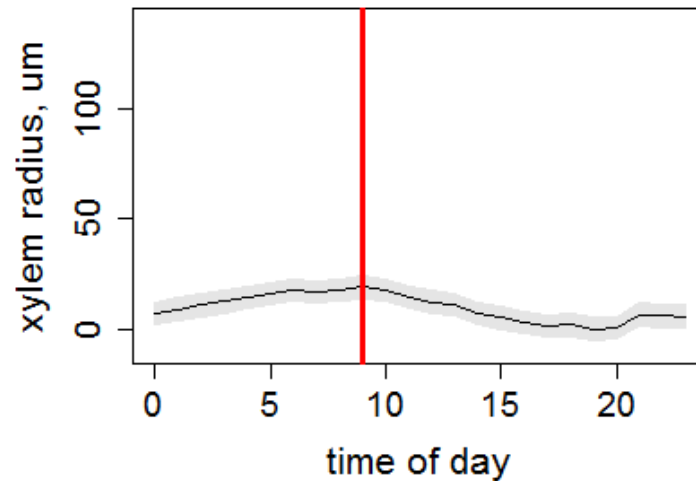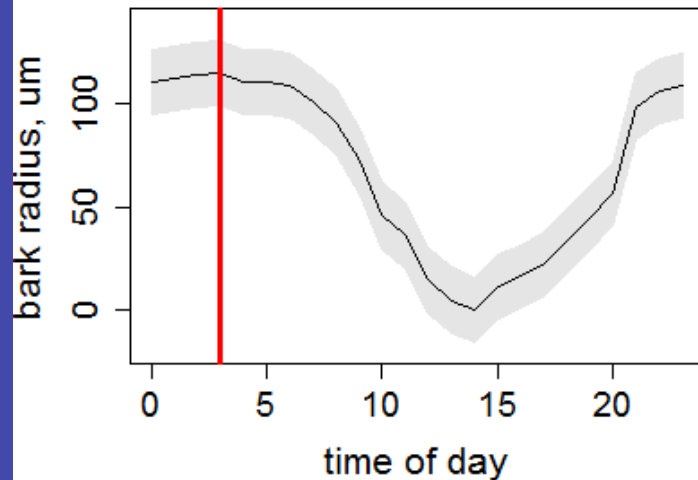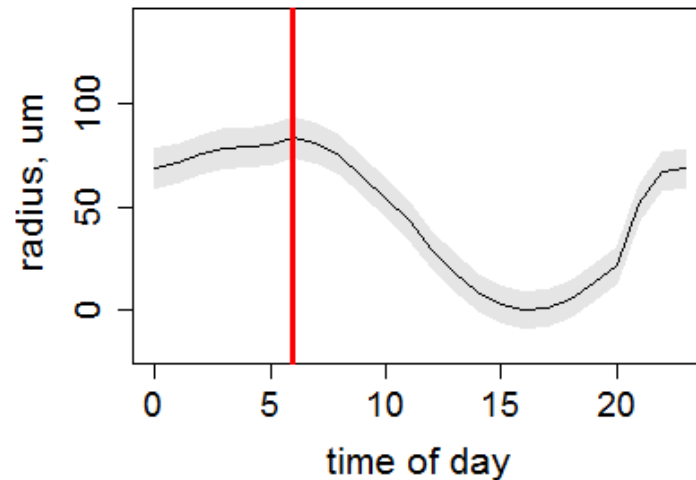
Diurnal cycles
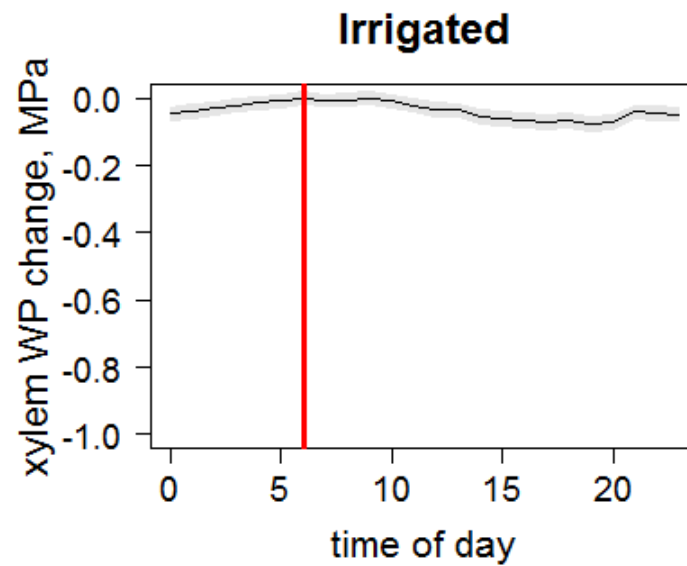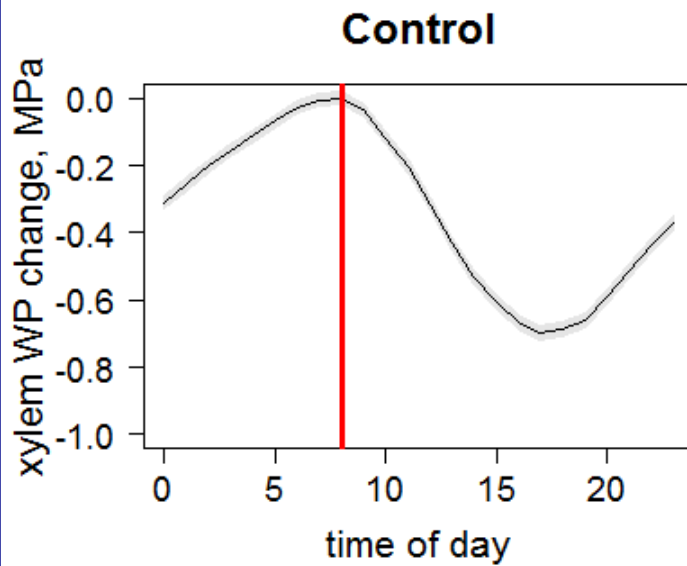
Interpreting bark diameter signals

$$J = L\ A\left(P_x - \left(P_b - \Pi\right)\right)$$

$$\frac{dD_b}{dt} = \alpha\left(\beta\ \Delta D_x - \Delta D_b\right) + \gamma$$
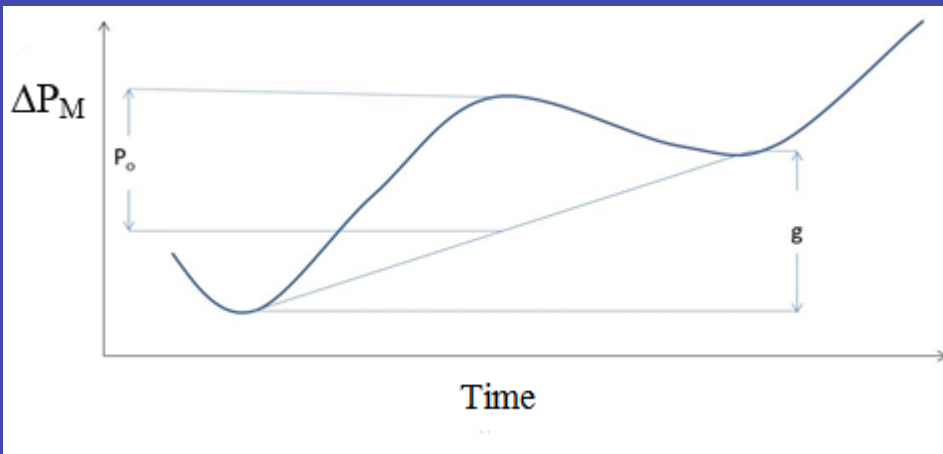
Mencuccini et al (2013)
Chan et al., in review

* small in diurnal and annual amplitude
** large in diurnal amplitude, small in annual amplitude