

# Centre for Alpine Environment

## S. Vito di Cadore (BL)

Tommaso Anfodillo



Founded in 1962 by S. Vito di Cadore  
Municipality

Agreement with the University of Padova

Prof. Lucio Susmel  
(Emeritus of Ecology)

### Aims:

- To develop a sustainable forest management in the area based on a ecological approach
- To support forest administrations with sound scientific information
- To promote an integrated management of the natural resources
- To develop the applied research in the mountain ecosystems
- To promote dissemination and training (post-graduate courses)

**In the 1962**  
**The First “Course of Applied Ecology” - Invited speakers**

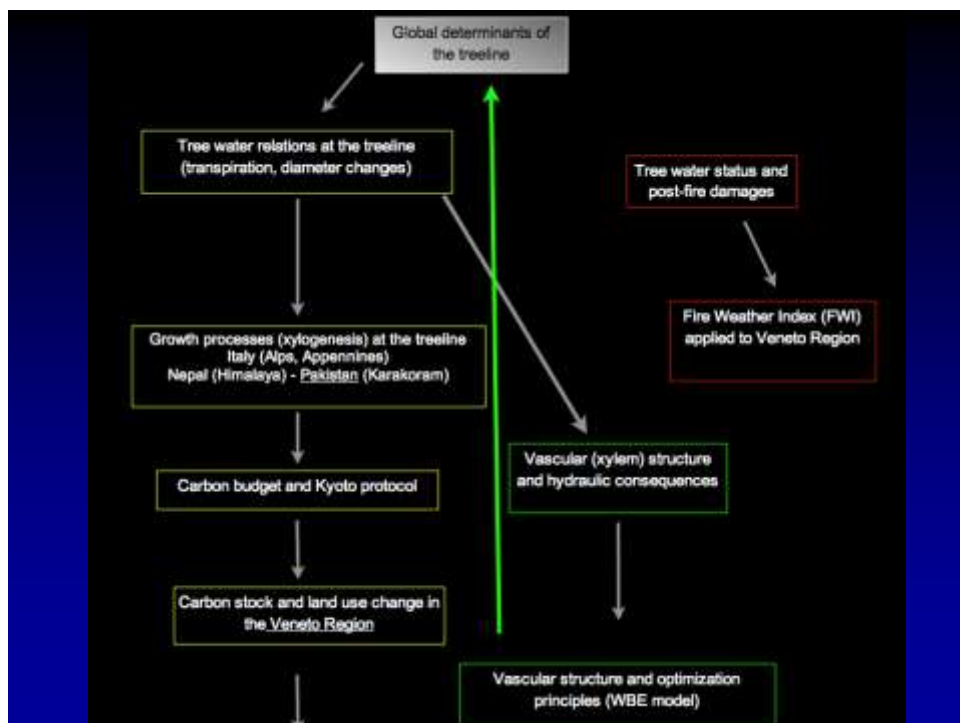
*See the WEB site for the complete list*

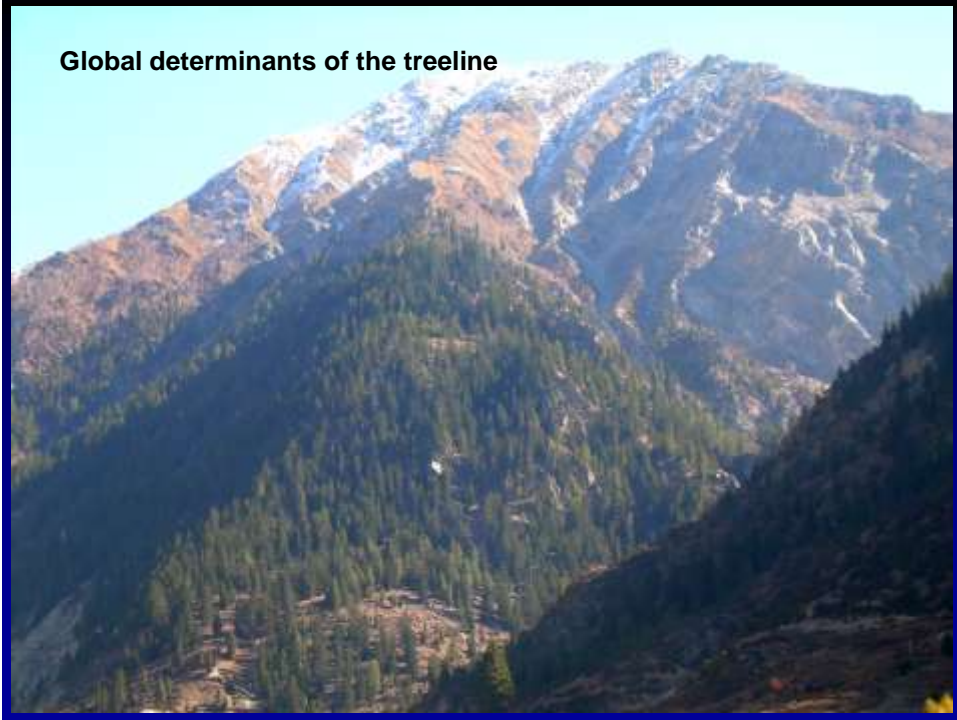
*Different topics each year*

**2008**

***Forest disturbances and carbon stock:  
the non-permanence issue***

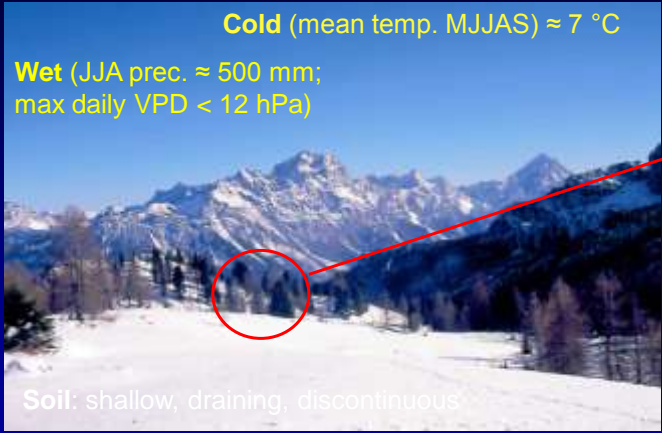
**Aim of this “presentation”**  
**-to give some information on researches carried out**  
**- to find some possible collaboration**





# Treeline environment

(Dolomites 2070 m a.s.l.)



**Cold** (mean temp. MJJAS)  $\approx 7\text{ }^{\circ}\text{C}$

**Wet** (JJA prec.  $\approx 500\text{ mm}$ ;  
max daily VPD  $< 12\text{ hPa}$ )

Soil: shallow, draining, discontinuous

**Sparse trees**  
(low competition)  
**Trees well coupled**  
to the environment

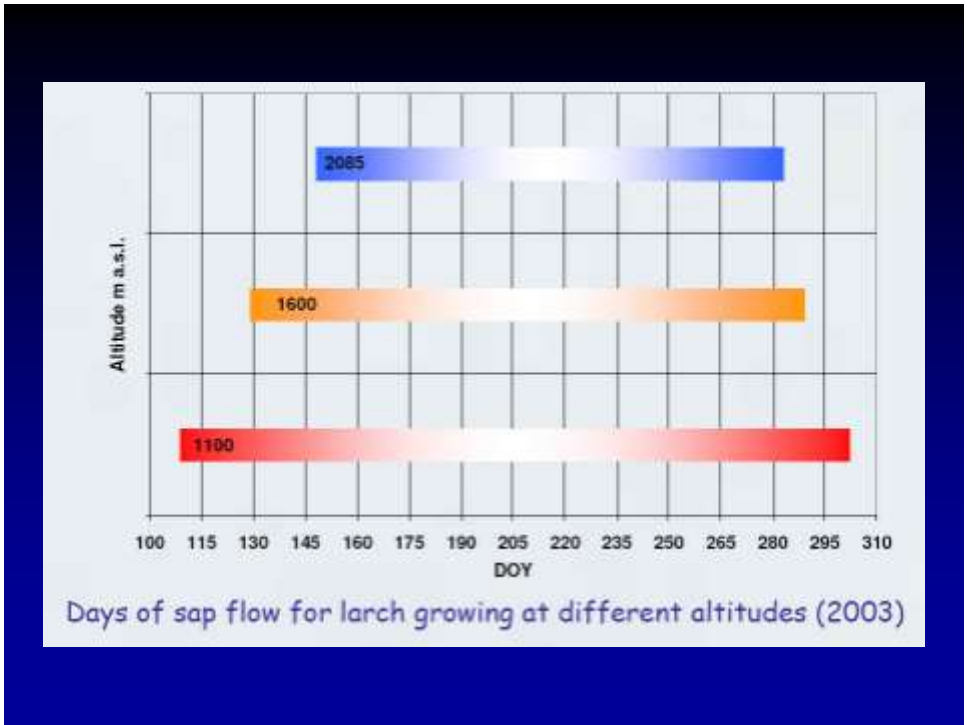
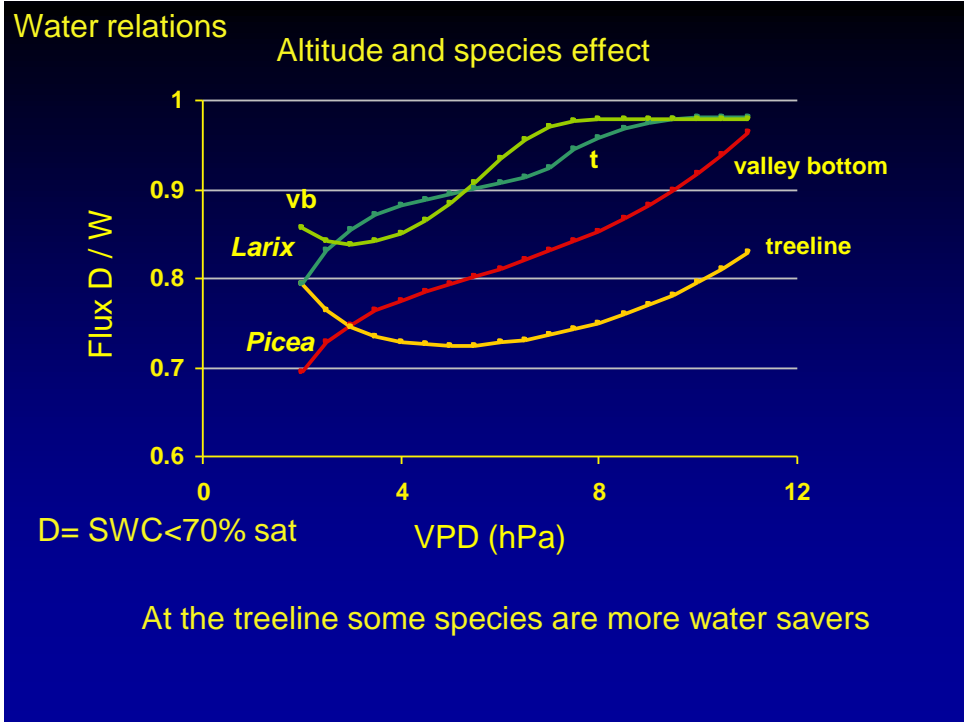




## Water relations summer and winter (frost drought)

Effects of 10 days with precipitation < 0.5 mm/day (growing season)  
on sapflow (transpiration)

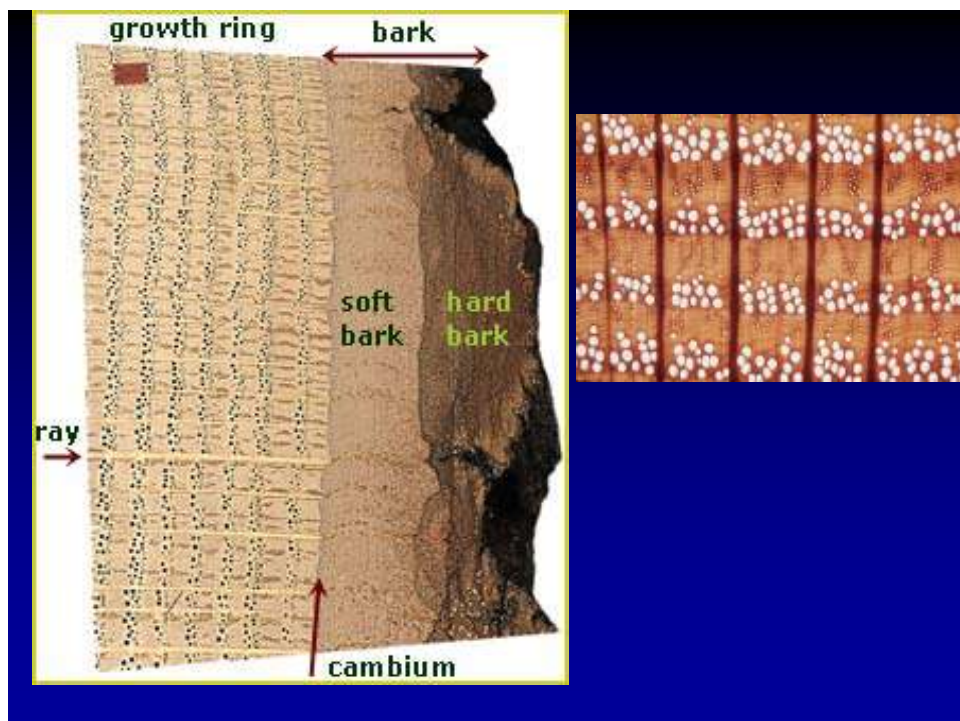
Species	Cumulated Fd 'wet' period	Cumulated Fd MWDP	Ratio $\frac{\text{MWDP}}{\text{'wet'}}$	Fd Reduction versus L. decidua
<i>L. decidua</i>	206	211.2	1.03	—
<i>P. abies</i>	74.3	56.8	0.76	0.75
<i>P. cembra</i>	56.9	39.6	0.70	0.68



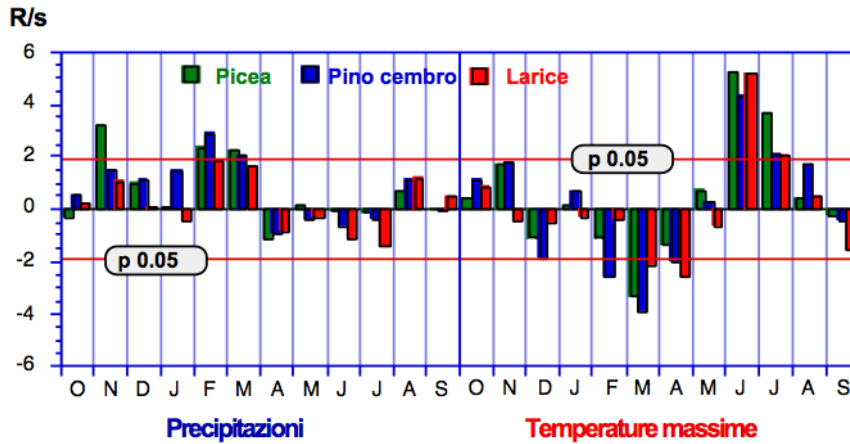
## Functional explanation of treeline (Körner, 1998) *growth limitation hypothesis*

- there is a minimum temperature that permits the formation of new cells
- thermal threshold for trees growth; carbon sink rather than carbon source controls production

Simple explanation for the abundance of non-structural carbohydrates and high N content in treeline trees



## Classical dendroecological studies



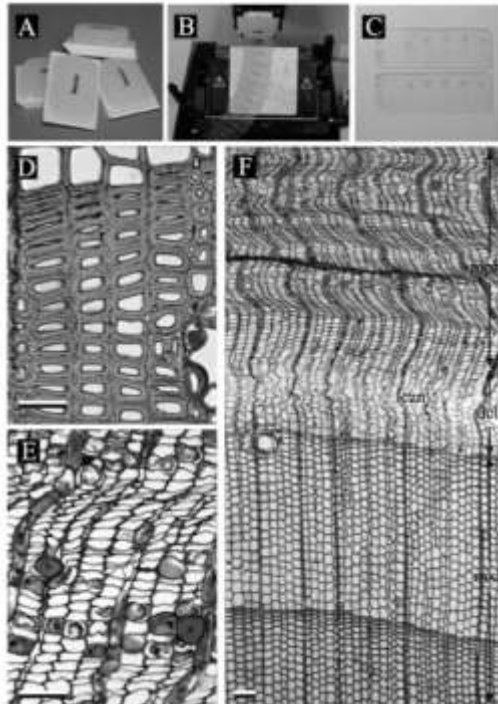
## Intra-annual growth

IAWA Journal, Vol. 27(1), 2006: 89-97

### TREPHOR: A NEW TOOL FOR SAMPLING MICROCORES FROM TREE STEMS

Sergio Rossi, Tommaso Anfodillo and Roberto Menardi

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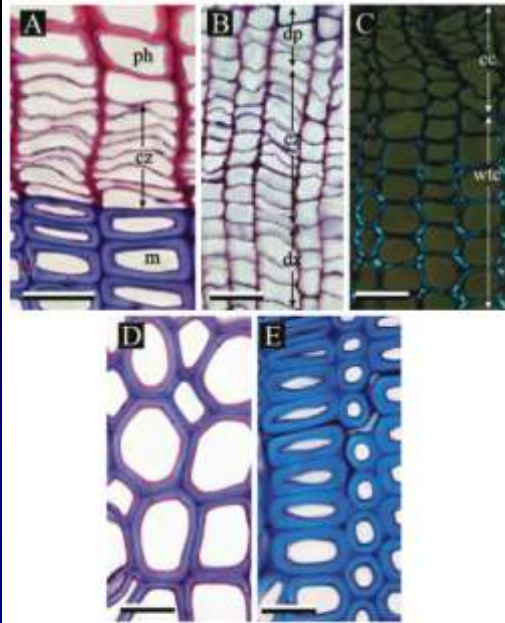
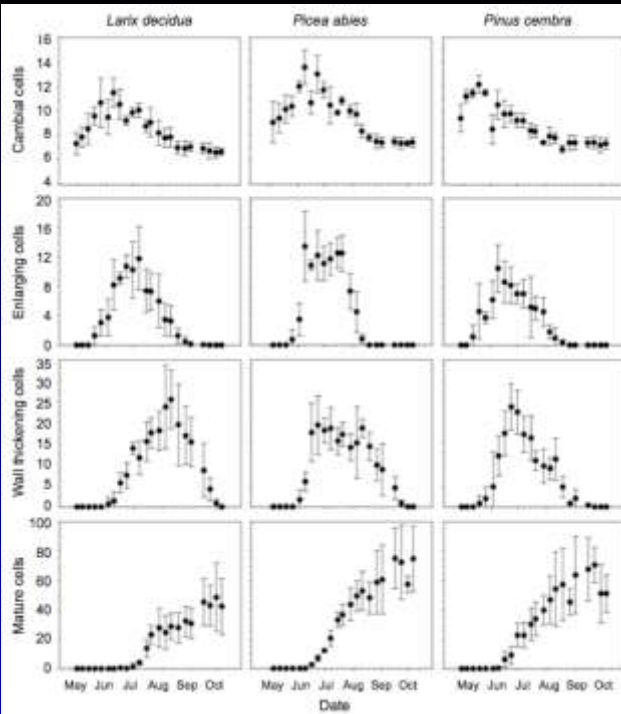
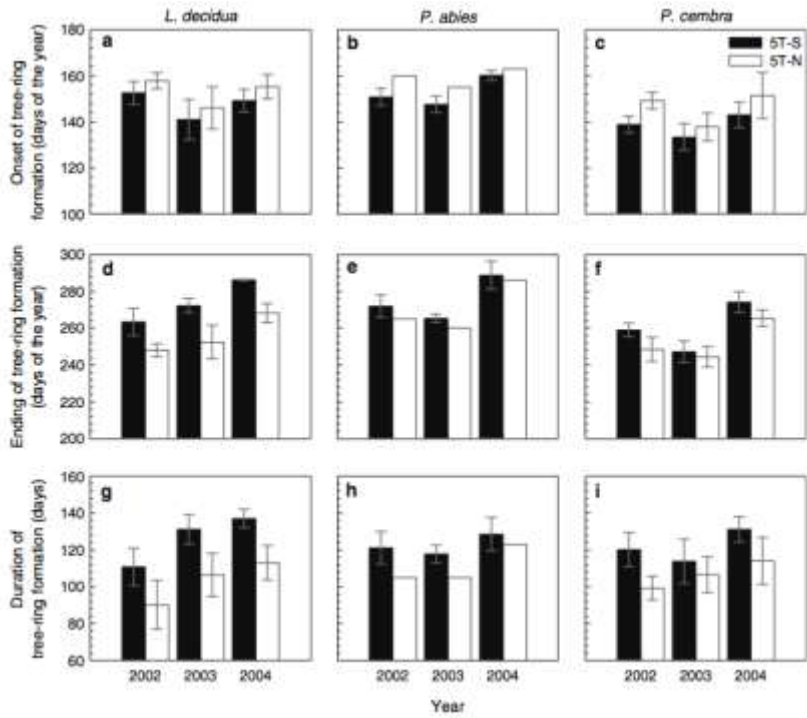
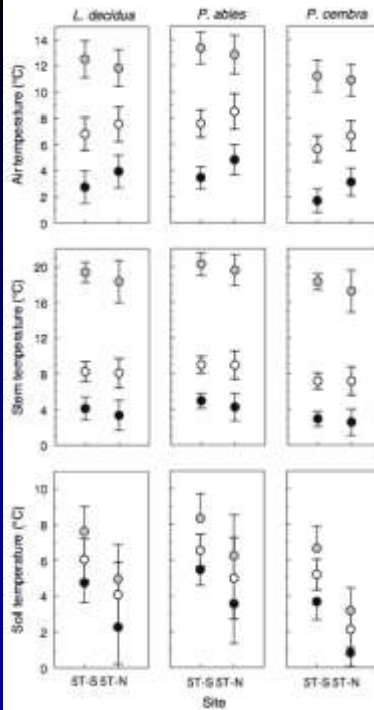


Fig. 1. - A: Cross section of *Pinus cembra* stem in winter; mature tracheid (m), cambial zone (cz), phloem cell (ph). - B: Cambial zone (initial cells and derivatives) during the growing season in *Pinus abies*; developing xylem (dx), cambial zone (cz), developing phloem (dp). - C: Wall thickening and enlarging cells of *Pinus abies* under polarized light; wall thickening cells (wtc), enlarging cells (wte). - D: Enlarging cells of *Pinus abies* with cellulose microfibrils. - E: Mature





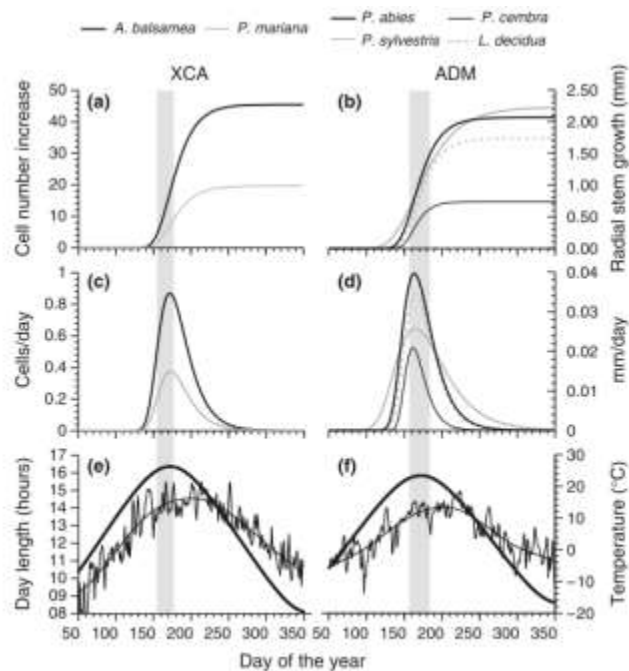
**Threshold temp. for xylogenesis**



## Conifers in cold environments synchronize maximum growth rate of tree-ring formation with day length

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**Fig. 2** Tree-ring formation assessed by xylem cell analysis (XCA) for *Abies balsamea* (L23) and *Picea mariana* (MIS) in 2001 (left side) and