# ELECTRONIC DENDROMETERS AND INCREMENT CORES

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## INTRODUCTION

With electronic dendrometers we measure changes in girth (circumference) or in radial increment. As electronic dendrometers are high precision instrument they can detect very minute changes in circumference – even as small as 5 mm. They are particularly useful when we need a good insight into intra-annual variation of tree-ring formation and when we need to evaluate tree growth on specific sites in order to provide some tree / forest management guidelines. They can also be used as a tool for educa- tion, because changes in growth can be visualized and interested public can see how trees grow and what affects tree-growth. Important is that the installation of the dendrometer on a tree trunk doesn't cause any significant damages to tree. However, contrary to the increment cores, we only get information of the current growth.

Two types of electronic dendrometers –are: point and girth electronic dendrome- ters. P oint dendrometer measures radial increment on a specific point of the tree's circumference; it is recommended to have more than one point dendrometer per tree.

Circumferential electronic dendrometers measure small changes in the tree's circumference with a use of temperature-stabilized wire and strain gauge based electronic dendrometer. Since changes are measured along the whole circumference, result is an average growth of the tree in certain time window .

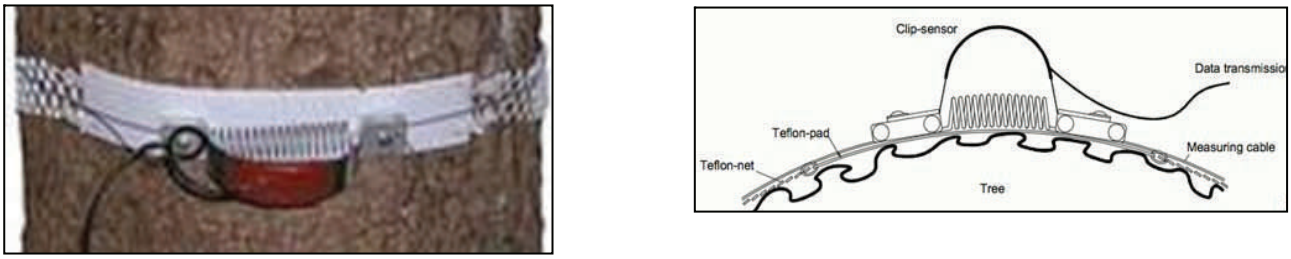


**Figure 1:** Schematic presentation of the circumferential electronic dendrometer D6 produced by UMS Munich, Germany (right) and the same dendrometer installed on a tree (left). White plastic beneath the dendrometer is super-smooth Teflon plastic, which allows undisturbed movement of the Invar wire going around the stem of tree. Source of images: UMS Munich Internet photo archive.

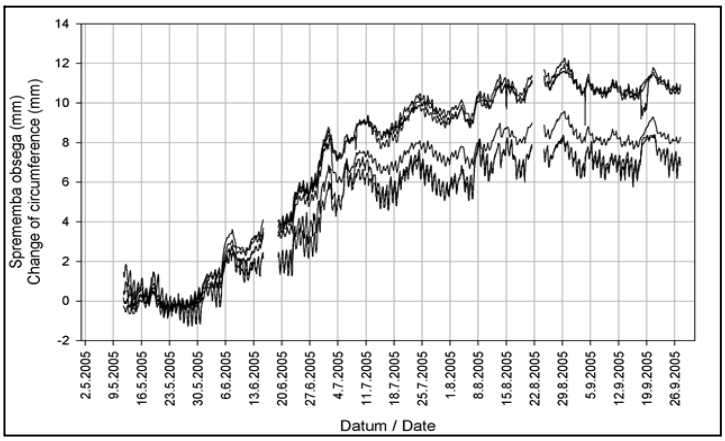


**Figure 2:** Typical sequence of electronic dendrometer measurements – increas- ing sinusoidal curve indicating radial growth and shrinking and swelling of the trunk in accordance with water availability. Beginning, period of most intensive growth and period of reduced growth is also visible.

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## ANALYSIS OF INCREMENT CORERS

Cores are particularly useful when we need to analyze yearly increments, and tree's response to different environmental factors, therefore with the analysis of the cores one can get a good insight into long-term dynamics of the tree growth. This is important if we want to put current status of the tree- growth into a broader time concept and asses perspective of the studied tree, or even whole stands.

Contrary to the installation of the electronic dendrometers, sampling is semi-destructive, because after the extraction of the core, borehole remains in the trunk, which opens path for potentially patho- gen organisms and further problems with the quality of the trunk. For that reason, number of cored trees should be kept as low as possible.

For the analysis of the cores you need a well-equipped dendrochronological laboratory and work- shop for the preparation of the samples. This is in comparison with the analysis of dendrometer data more demanding and cost more, however coring is in comparison with the installation of electronic den- drometers easier and cheaper.

**Figure 3:** Sampling trees using incre- ment corer (or Pressler's corer).

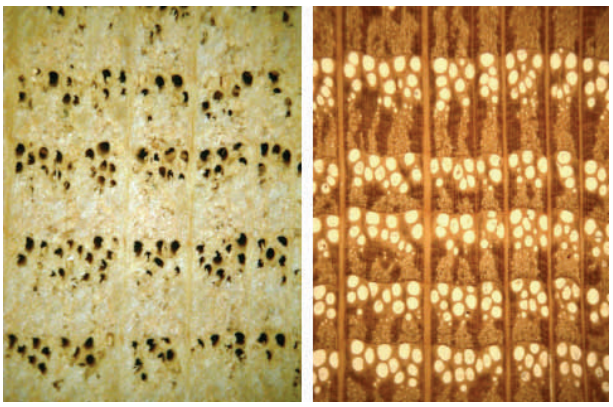

**Figure 4:** Preparation of the cores is cru-cial – badly prepared cores (left) does not allow accurate measurements and will yield dubious results

Both, coring and electronic dendrometer measurements are complementary methods, but can also be implemented as a standalone methods. Coring is providing a good insight into past growth of the tree, its response to climate, forest management, human impacts, and damages caused by people; however intra-annual component is more or less missing. The later is provided with electronic den- drometers, which offers incredible view into trees diurnal oscillations, response to microclimate, wounds and different other external influences.