

A glance back, a glance ahead

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32 lectures and posters were presented at the Symposium covering a rather broad spectrum of dendrochronological research themes. Among the topics discussed were archaeological studies, investigations on landscape development, vegetation history, vegetation dynamics, geomorphology, wood biology, dendrochronological statistics and analytical techniques. Last but not least problems related to the reconstruction of climate history were discussed. The temporal dimension bridged the gap between late glacial and today while the geographical areas explored covered regions from Siberia, Mongolia, South America and Central Europe, also allowing for altitudinal aspects ranging from sea level to high alpine locations. Contributions with regard to research in the realm of snow, wind and fire as well as plant pathology were, however, missing.

Looking back to the varying presentations given, a number of trends can be traced:

The compilation and combination of data in networks or transects

The annual sequence of any proxies derived from a single tree just mirrors the behaviour of an individual. If the sequences of several individuals are combined conclusions can be drawn with regard to the environmental conditions at a site. Large scale statements, however, can only be the result of a comparison with chronologies from different sites. In this respect networks of European and even hemispheric dimensions are needed to allow for climatological statements. Some first initiatives were presented which allow statements of climate development. In addition archaeological, ecological and geomorphological networks on local scales could be treated.

It is self-evident that chronologies in particular from prehistoric, historic and present day times, stored in computers of countless laboratories world wide, should be available to all dendrochronologists free of charge. The International Tree Ring Data Bank as well as the Institution at Birmensdorf, namely the WSL, provide the necessary means for the safe incorporation of such data.

Long sequences - the ultimate approach to assess the climate trend of our century

The major question of global change centres on the problem of whether or not human activities are possibly responsible for the climatic change of past decades. To answer this question reliably, several thousand year long chronologies are required; including chronologies originating from extreme sites as from the upper and northernmost timberline, from temperate zones of all continents and if possible, incorporating atypical areas such as deserts and the tropics. Some such chronologies have been presented, showing the potential inherent in them, however, much more is required and should be initiated.

Besides the potential inherent in tree rings by being able to provide many different proxies leading to a wealth of different information, they represent the best archives for precisely dating any events that can be traced by them.

Climatic and geomorphic extremes have an effect upon the development and composition of the vegetation

This statement is a truism, however, by including frost rings, density fluctuations, abrupt increment changes and many other intra-annually appearing symptoms - frequently only to be grasped microscopically - it is possible to extend our knowledge on the behaviour of plants and to contribute new elements to the present discussion on the environment. A number of presentations have clearly demonstrated the potential inherent in this approach. It has to be stressed that not only 'normally' growing trees supply valuable data but also ecologically dwarfed individuals, i. e. 'crippled trees'. However, much more effort has to be devoted to these subjects. In this respect discontinuous time series, heeding pointer years are as important as continuous time series allowing the set up of response functions.

How much carbon is stored in the vegetation cover?

Contrary to present day practise dendrochronologists will have to include in future projects roots and branches and not just limit themselves to trunks. In this respect all 'non-trees' are important. Millions of square kilometers of deserts, taiga and tundra are partly covered by shrubs or dwarf shrubs, plants we do hardly know anything about, especially with regard to their growth, their age and their biomass production. In many cases even less is known about the life cycle of herbs which often can be dated by annual rings. Dendrochronologists should broaden their activities in this respect because news from these objects might lead to much additional information.

The methodical development in the field of dendrochronology is far from concluded.

New studies and developments introduced lately have demonstrated that dendrochronology is a lively field of research with vast potentials still lying ahead. Especially the latest investigations in the application of stable isotopes, studies in wood anatomy, advances in analytical measuring devices and progress in statistics open a new understanding, yet more important new scientific dimensions.

Isotope studies on tree rings have lately expanded enormously. They may probably not only be able to trace temperatures or precipitation but may also give information on atmospheric circulation patterns etc. Various studies have shown their potential not only for setting up 'climate chronologies' but also for getting information on carbon fluxes or the distribution of particular storage materials. Plant physiological aspects are another possible field of research. Some such information was presented at the conference.

The basis for solving the real big questions remains to be the study of ecophysiological processes in wood.

Any study in this respect is valuable and will advance our knowledge especially in view of the possibility to open up new drawers from tree rings as an archive of past environmental information.

Every dendrochronologist has to raise the question in which larger scientific context he can place the results that have painstakingly been produced. Discussions in small groups in whatever language held, be it in Chinese or Russian, at small symposia as the ones of Bonn or Verona – in German or Italian – but also those of larger congresses as e. g. Eurodendro or in Montreal – in English – and the large-scale and generous exchange of data are an irrevocable necessity for the scientific progress.

The young, newly founded 'Association for Tree Ring Research' (Gesellschaft für Jahrringforschung) is a platform for exchange on all aspects that need to be tackled in the future.