

International Conference

CLIMATE CHANGES AND THEIR IMPACT ON BOREAL AND TEMPERATE FORESTS

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THE CHANGING CLIMATE OF FINLAND

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Annual temperatures are generally rising in the northern hemisphere, but the trend is not that clear in Finland. First, there was an ascending of temperatures up to the mid-1930s, after which a descending trend up to the mid-1980s occurred. Thereafter, an ascending trend up has prevailed to the present. The rise of warming trends seems, however, to be less significant as moving towards the north.

The temperature record of Sodankylä climate station (Northern Finland, starting from 1901), has proved to be a useful general climatic indicator at the Finnish timberline regions. This record shows that global warming cannot so far been recognized as drastically elevating temperatures or as increased tree growth. According to the Sodankylä record, the last seven summers were, however, warmer than the 100-yr average of the record. Tree-ring indices from northern Finland show similar results. This may indicate a trend-like warming, or just the beginning of a warmer short-period cycle. Another interesting issue is the rise of monthly minimum temperatures almost to the level of the 100-yr average of the record. As a conclusion, the Finnish pine timberline continues its advancing to the north and to higher altitudes.

Steady climate pattern in Finland is a result of the geographical location of Finland just beside the Scandinavian mountains, the atmospheric circulation (the prevailing positive NAO) and the warmth of Gulf Stream. This climatic setting seems to result in mean temperatures close to long-term averages, mild winters, cool summers and smaller in year-to-year variation. If the easterly winds dominate in Finland, the summers are warmer and winters colder.

Tree-rings are an ultimate proxy tool for providing climate information from locations where no climate stations exist. Tree-rings work fairly well also for interpreting past climate changes. Metla, in cooperation with the universities of Helsinki and Joensuu, completed a 7638-year tree-ring chronology of timberline Scots pine in 1999. This record is now used as a basis for our studies of past climate variations.

Considering the causes of the currently trend-like warming, it is useful to look how climate varied during and after the warm and moist Atlantic period (about 7 500 to 5 000 years ago). At that time, pine timberlines reached their maximum appearance in Finnish Lapland, growing 100-200 m higher and even 80 km northern than today. Summer mean temperatures were accordingly 2 to 4 degrees warmer than today. Obviously, the warmer summer climate of Atlantic period did not seem cause any crucial consequences, e.g. the melting of glaciers did not cause a dramatic global climate cooling, comparable to 8.2k event.