



## **Regional climate and tree growth at Gran Campo Nevado, Chilean Patagonia**

**B. Weitzenkamp** (1), C. Schneider (1), R. Kilian (2), H. Spiecker (3), H.-P. Kahle (3)

(1) Department of Geography, RWTH Aachen University, Germany  
(christoph.schneider@geo.rwth-aachen.de), (2) Fachbereich Geowissenschaften, University of Trier, Germany, (3) Institute for Forest Growth, University of Freiburg, Germany

Intra-annual, daily radial growth variations of five *Pilgerodendron uviferum* trees, an endemic South American conifer species, were monitored at Gran Campo Nevado, southernmost Patagonia, Chile over a 5 year period. Data were acquired by continuous measurements with dendrometers and stored as hourly means in the data logger. In addition, these radial fluctuations were investigated regarding the prevailing atmospheric conditions and synoptic type weather patterns. An automatic weather station in the immediate vicinity recorded data for precipitation, incoming solar radiation, air temperature, relative humidity, wind velocity and wind direction as 3-hourly means. Growth-climate relationships were explored using Pearson product-moment correlation coefficients and multiple regression analysis.

Dendrometer data showed that tree growth rates varied considerably during the growing season of *Pilgerodendron uviferum*. The growing season lasted between 140 and 200 days. Climate conditions in this mid-latitude environment are best described as moderately cool in summer with large amounts of precipitation. Solar radiation and temperature amplitude are significant factors influencing tree radial growth in this climate. Precipitation and relative humidity correlate negatively with stem growth. Overall, applying meteorological data with a time lag of 1 to 2 days increases the correlation with stem growth.

The results explain how and to which degree specific atmospheric conditions and specific weather conditions influence tree growth in this environment. Incoming solar radiation and sensible heat are the most supporting factors of tree growth. When weather patterns are considered it becomes obvious that large-scale weather patterns with anti-

cyclonic conditions and above average sea level pressure during the growing season are responsible for the majority of tree growth. These synoptic weather types (“high pressure ridge” and “high pressure bridge”) occur during less than 20% of the time during the growth season and are generally associated with below average precipitation. Weather patterns with cyclonic conditions and westerly advection of moist air mass from the Pacific which occur on about 50% in summer are characterized by above-average precipitation and less than average solar radiation which results in only little tree growth.