

**Wastl, M., Stötter, J., Caseldine, C., Kremenetski, C. and Zelikson, E. (1998):**

Reconstruction of Holocene variations of the upper limit of tree/shrub birch in Northern Iceland on the basis of pollen and macrofossil analyses. 28th International Arctic Workshop, Arctic and Alpine Environments, Past and Present, Program withs, 1998. Institute of Arctic and Alpine Research, University of Colorado at Boulder, Boulder, 165.

### **Abstract**

For palaeoclimatic reconstructions on the basis of vegetation history in Northern Iceland, the upper limit of tree/shrub birch (*Betula pubescens*) has been proposed as an indicator of summer temperatures. Both macrofossil and pollen analyses of a series of sections and cores from the Vesturárdalur area on the Tröllaskagi peninsula of Northern Iceland show that *Betula pubescens* grew up to an altitude between 450 m and 500 m a.s.l. during optimum thermal conditions in the Holocene.

The pollen analytical investigation of a core from c. 450 m a.s.l. (core Vesturárdalur 2, 65 45'N, 18 43'W), covering the time from 9000 BP to present, thus records vegetation development at the ecological upper limit of tree/shrub birch in this area, where changes in climatic/thermal conditions have an immediate effect on the prevailing vegetation communities. The reconstruction of the Holocene variations of *Betula pubescens* at this site is based both on the palynological findings and on macrofossil analysis of the birch remains in the core.

A series of tephra layers of known age provide absolutely dated chronohorizons for the vegetation history, and allow direct comparison with other palaeoclimatic proxy records.

The pollen and macrofossil investigations show that tree/shrub birch grew at an altitude close to its maximum Holocene distribution at c. 8200 BP, indicating summer temperatures comparable to the Holocene optimum range. There are two marked drops in the *Betula pubescens* curve of the Vesturárdalur profile, from c. 5000 BP to c. 4500 BP and before/around c. 3000 BP. Evidence that these indeed reflect variations of the upper limit of tree/shrub birch in this region is provided by a section at c. 400 m a.s.l. (site Stafn, 65 45'N, 18 42'W), where macrofossils of *Betula pubescens* are missing between  $5045 \pm 45$  BP (SRR-6092) and  $4340 \pm 45$  BP (SRR-6091), and from some time after c. 4000 BP (marked by the Hekla-4 tephra layer) onwards.

These variations of the upper limit of tree/shrub birch are compared to the record of Holocene glacier advances in Northern Iceland.