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Multicenturies summer temperature reconstruction for Southern Carpathians

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The first 600 years long tree-ring width chronology for Southern Carpathians was established based on living and subfossil Swiss stone pine (Pinus cembra L.) samples from an upper timberline forest located in Retezat Mts. (Romania). Study area is located in Retezat Mts. where we can find the most expanded population of stone pine from Southern Carpathians. The timberline is represented by a mixed stands of Norway spruce and stone pine which is replace by mountain pine toward higher altitude. We have compiled the longest tree rings chronology from Carpathians using samples from dead and living trees of stone pine (Pinus cembra). To preserve the low frequencies in the tree ring chronologies the Regional curve standardization method (RCS) was used. The samples without an important inner part were excluded from the chronology building. Very few cores and disks have missed the pith about 5-10 rings. Since the RCS curve for living and dead trees are significantly different we chose processing the standardization separately for the two subsets. In order to extend the instrumental data we use the temperature data from 0.5°x0.5° resolution CRU2.1 grid data-basis. The correlation between grid and instrumental normalized temperature is over 0.90 for March to September and range from 0.70 to 0.89 for October to February. To assess the influence of monthly temperature of radial tree growth we have computed the correlation between tree-ring index and May previous year to October of current year of tree ring formation. Also multiple monthly temperature means of current summer was included: June-July, June-July-August and July-August. To avoid the loss of variance we have decided to use the scaling method for reconstruction of summer temperature.The derived tree-ring width chronology covers the period 1361 to 2009, having a total length of 649 years, been the longest chronology for the Southern Carpathians.