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Dendrochronological reconstruction of summer precipitation since 1884 in the arid Tian-Shan regions

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The research is devoted to the reconstruction of summer precipitation in the arid inner regions of Tian-Shan Mountains (At-Bashi mountain range and Aksay-Chatyrkul area) using dendrochronological information. The economy of this high-mountainous region is determined by the subsistence agriculture but dynamics of natural factors is still understudied because of short and incomplete meteorological data.
During the field expeditions of 2015–2016 the dendrochronological samples were collected on the upper (3200 m) and lower (2600 m) borders of sparse mountainous forests in the north-facing slopes. Sample cores were taken from 120 living trees of spruce (Picea Schrenkiana) from 9 sites. The dendrochronological analysis, that was made using basic dendrochronological techniques, allowed receiving regional ring-width chronology (ATS, 1884–2015).
The dendroclimatological analysis was made using meteorological data from the regional weather stations (Aksay, Arpa, Chatyrkul, Atbashi, Naryn, Tian-Shan). The tree-ring growth is sensitive to the previous summer precipitation changes that resulting in according reconstruction (R=0,69, R2=0,47, Radj= 0,46, F(1,29)=26,2, DW=1,9). It shows arid conditions during 1907–1949, 1972–1984 and humid during 1884–1907, 1949–1972, 1984–2007. In whole in the first half of the 20th century there was less precipitation than in the second half in this region.