



Glacier retreat and climate change in Teberda valley, West Caucasus, Russian Federation

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Teberda valley is a densely populated area with traditional agriculture and developing tourism. Reconstruction and forecast of glacier and snow cover regime are important in terms of prediction of future changes in high elevation landscape, river runoff, catastrophic events, such as avalanches, mudflows, glacier surges, dammed lake outbursts etc.

In June, 2006, we studied moraines of Alibek and Amanaus glaciers and collected 58 samples of pine (*Pinus hamata* D. Sosn.) and of fir (*Abies nordmanniana* (Steve.) Spach) in the vicinity of the upper tree limit (2300 m and 1800 m respectively) for tree-ring analysis in Teberda valley.

We mapped the terminal positions of Alibek and Amanaus glaciers using the historical pictures of Bush, 1905; Merzbacher, 1901; Mushketov, 1898 as well as aerial photographs of 1955 and ASTER images (2004). The dates of moraines are based on lichenometry. We have been able to use the growth curve suggested by Solomina et al., 2005 for Central Caucasus, because we found out that additional control points from the Teberda valley fit to this curve. Several stages of moraines deposited and were identified on the base of lichenometry and historical data and the shape and sizes of glaciers for all these stages were reconstructed using the map of 1:10000.

Despite of several attempts to use tree-rings for climatic reconstructions (Turmanina, 1971, Lukianova, Brukstus, 1987; Brukstus, Balchunas, 1978, 1981) no reliable cross-dated chronologies suitable for this purpose exists up till now in Western and Central Caucasus

Our new pine (1678-2005) and fir (1800-2005) ring width chronologies from Teberda

valley both correlate positively with May-July precipitation, (Teberda met station, 1960-2004, Klukhorsky 1960- 2004). Despite of their location at the upper tree limit both chronologies do not correlate with the temperature. In the last two centuries (when the sample replication is high) the fir and pine chronologies from Teberda and the pine chronology from Baksan valley (Jomelli et al., 2005) correlate and clearly display a similar climatic signal. Kyncl (1989) noticed that the year of Katmai eruption (AD1912) is not narrow in the Caucasus chronologies. The sensitivity to precipitation may explain why the Caucasus chronologies do not show narrow rings coinciding with the climatically effective eruptions.

Since the LIA all glaciers in Teberda valley retreated and lost their length. After a fairly stable mass balance conditions in 1960, 1970s the retreat has been intensified in the last decade (Panov, 1968, 1993; Lurye, 2002; Ilychev, 2003, Dolgova et al., 2006).