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## Tree-ring and 14C dates of moraines of the Greater Azau Glacier (Baksan valley, Northern Caucasus)

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The age of moraines of the Greater Azau Glacier was identified by tree-ring analysis of more than 150 Scots pines, by historical and cartographic data, remote sensing, lichenometric and radiocarbon dating. We determined the limits of the area covered by the glacier tongue at the end of the 19th century. We also discuss the controversial issue of the position of the moraine of 1849 CE, which was described by H. Abich [1]. The highest and most clearly shaped lateral moraine, conventionally called the "17th century moraine", was formed earlier than the end of the 16th century (tree-ring minimum age). The oldest tree in the valley (1598 CE) was found at the "forested island" end moraine (2294 m asl). Judging by the size of the lichens *Rhizocarpon geographicum* (120-130 mm) on this surface the moraine may be several centuries older. We re-examined the trunk of a pine which was discovered in the 1960s buried in the fluvio-glacial sediments presumably formed in 1880s (historical descriptions). It was dated earlier by radiocarbon (140 +/- 75 BP [2] (calibrated date - 1650-1960 CE). According to the ring width cross-dating, the most probable dates of the buried tree are 1759-1883 CE, however, the second likely dates are 1826-1950 CE. Suppressions of pine growth at the forefields of the Greater Azau in the 1640s, 1710s, 1800s, 1840s-1860s CE are synchronous with the advances of the Bosson, Mer de Glace and Grindelwald glaciers in the Alps [2]. Three soil horizons buried in the moraine of the Greater Azau glacier were identified in the artificial outcrop on the left side of the valley (N43.26583, E42.4767, 2370 m asl). The uppermost horizon located 0.6 m below the surface of the moraine is a thin layer of loam developed in a short time interval (130±20 BP (IGAN ams - 6826) 1680-1939cal BP (charcoal). Two lower thicker horizons (buried 13 and 15 m below the surface) indicate longer periods of continuous soil formation lasting for about 720 years (between 774-89 CE and 1496-1641 CE) and for 1750 years (between ca 3 ka BP and 7-8 centuries CE), respectively. They both are well developed soils formed within the loam layers without detrital material, containing a thick dark humus horizon with a high content of soil organic matter, as well as fragments of charcoal and tree bark. During these three periods, the glacier was relatively small.

### References

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