

# Simultaneous monitoring of mass balance fluctuations of and runoff from Tien Shan glaciers

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## INTRODUCTION

Continuous monitoring of changes of glacier mass balance is based on an imitational model of monitoring of mass balance. The model's fundament is a supposition of the possibility of a change in correlation between annual values of mass balance,  $b_a$ , and equilibrium line altitude (ELA) (Dyurgerov, 1984, 1988).

Verification of the model for the glacierization area was realized by measurements at Tuyksu Glacier (Zailiyskiy Alatau Range). A number of multiannual measurements of changes of  $b_a$  and  $ELA_a$  was used from 1957 to 1989. 40 values of  $b_t$  and  $ELA_t$  were obtained for the summer periods of 1987 to 1989. It is established that relations of  $ELA_t(b_t)$  conserve changes as the relations of  $ELA_a(b_a)$ . The maximum deviations were observed during the extreme positive mass balance. At all altitudes, the relationship between  $ELA_a$  and  $b_a$ , as well as  $ELA_t$  and  $b_t$  is approximated by the hypsographic curve. With the linear approximation the errors reach  $70 \text{ g cm}^{-2}$  in conditions of extreme negative mass balance.

## CONCLUSIONS

Simultaneous monitoring of mass balance was undertaken for the three glaciers: Tuyuksu, Sary-Tor (in the central Tien Shan) and Glacier No.1 (in the eastern Tien Shan). During the summer period of 1989, the altitudinal gradient of mass balance  $db_t/dz$  varied on these glaciers.

Tuyuksu Glacier and Glacier No. 1 showed the maximum differences between the variations of  $db_t/dz$ . Glacier No. 1 has a positive  $db_t/dz$  in the initial part of the ablation season, when  $b_t$  increases with the elevation of  $ELA_t$ . The most probable reason for the differences lies in the difference in the proportion of annual total precipitation occurring in summer. Because of different altitude gradients of  $db_t/dz$  and  $ELA_t/db_t$ , the mass balances of the three glaciers do not vary simultaneously during summer, and at the end of the year have different sign magnitudes.

## REFERENCES

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