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Seasonal snow cover and glacier change impact on water and energy cycle of Central Asia Endorheic Basin

Vladimir Eisen and Elena Eisen
University of Idaho, Geography, Moscow, United States (aizen@uidaho.edu, 208 885 2855)

High mountains of Central Asia Endorheic Basin (CAEB) hold one of the greatest in the World concentration of snow and glacier ice water resources at mid- latitudes thousands of miles from the oceans providing up to 80% of total river runoff.
The total external atmospheric moisture flow over the CAEB comprises approximately 200 billion cubic meters per year. The glaciers of CAEB receive and retain annually up to 10% of moisture transferred over the mountains. However, the area of seasonal snow and glaciers has declining rapidly as result of recent climatic change causes by increase in air temperature and precipitation partitioning between snow and rain, and evaporation fluxes.
Based on remote sensing data CAEB glaciers shrunk by 5% between the middle of 1940th and 1970th and 10% during the next 30 years. Evaluation of seasonal snow cover for the same period revealed 20% seasonal snow covered area reduction. During the last thirty years, the duration of snow melt reduced by 30 days from the date of maximum snow cover to the date of its disappearance. Further decrease in seasonal snow cover will be accelerated due to increase of rainfall instead of snowfall in early spring months at high elevations, and consequently a lesser heat expenditure for snowmelt. At high mountains, about 40% of snow ablated during the penultimate 10 days of snow cover. During ablation season, the amount of energy used to melt snow and glacier ice is in the same order as the combination of other components of the heat budget (e.g., heat associated with atmospheric advection, radiation balance and turbulent heat exchange). Heating of the air would have been 3 times higher if snow and glacier ice melt had not occurred.
Analysis of shallow ice-cores from high elevation snow/ice fields of CAEB has helped determining the climatic processes controlling hydrological regimes via the changes in global and regional atmospheric circulation patterns and simulates impact of these changes on water and energy cycle.