



Modelling of hydrological response to climate scenarios in glacierised Central Asian catchments

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The arid lowlands of Central Asia are highly dependent on the water supplied by the Tien Shan mountains. Snow and ice storage make large contributions to current runoff, particularly in summer. A runoff model with a monthly time-step was used to produce runoff scenarios for three glaciated catchments of the Tien Shan mountains for predicted climate change caused by the doubling of atmospheric CO₂, which is expected to take effect between 2050 and 2075. Scenario runs were produced for a 50% reduction of glaciation extent compared to current area, and for complete loss of glaciation. Results were compared to studies of runoff change for the same catchments carried out using a runoff model with a daily time-step. The application of the monthly time-step model was successful for two out of the three catchments. Agreement with results obtained using the daily time-step model was best for runs based on 50% glaciation loss, where both models predict an increase in spring and summer runoff compared to current levels. Scenarios for complete loss of glaciation predict an increase in spring runoff levels, followed by lower runoff levels for July and August. Model predictions differ concerning the degree of reduction of late summer runoff. These scenarios are sensitive to model simulation of basin precipitation, as well as to reduction of glaciation extent. The monthly time-step model is suitable for the study of runoff change in the Tien Shan, adding valuable insight to scenarios produced using the daily time-step model.