

Coupled modelling of soil thaw/freeze dynamics and runoff generation in permafrost landscapes, Upper Kolyma, Russia

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Abstract The distributed process-based runoff formation hydrograph model was applied and tested against soil thaw/freeze depth and runoff data in several permafrost landscapes of the Kolyma Water Balance Station (KWBS). The parameterization describing different permafrost conditions was elaborated. Soil thaw/freeze depths were simulated for three sites comprising rocky talus, mountainous tundra and larch forest landscapes. The runoff model was applied and calibrated for three plot-scale homogenous watersheds related to certain landscapes and one larger Kontakovy Creek basin enclosing the mentioned land surface types (21.2 km²). The hydrograph model proved its capability to simulate both surface and subsurface processes of runoff formation in different permafrost landscapes.

Key words permafrost hydrology; hydrograph model; Kolyma water balance station