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Updating the snow reservoir in hydrological models from satellite derived snow covered area

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It has been a longstanding wish to be able to update the snow reservoir in hydrological models with observed data in order to successfully simulate the spring runoff. Satellite derived snow covered area (SCA) has remained a promising means to this end for decades. Central to this study is that a strict analytical control of the spatial distribution of SWE is necessary for such an endeavour. The spatial distribution of snow water equivalent (SWE) and snowmelt are modelled as sums of correlated gamma distributed variables. Changes in modelled SCA derive from an assessment of the spatial frequencies of the accumulation- and melt distribution respectively. This principle also is applied when satellite derived SCA is retrieved and found different from that modelled. Observed SCA less than modelled triggers a "melting event" which result give matching SCA, and the accumulation distribution is adjusted with the "melted" amount. Observed SCA greater than modelled also triggers "a melting event", but with the observed SCA as point of departure. The simulated accumulation distribution is again adjusted with the "melted amount". The snow distribution model and the updating algorithms are implemented in the Nordic HBV model. Preliminary testing for alpine catchments shows that modelled SCA and SWE both are corrected in the direction suggested by the satellite derived SCA.