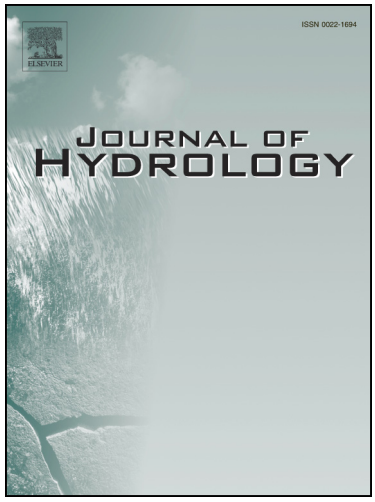


Review papers

# Remote sensing, hydrological modeling and in situ observations in snow cover research: a review

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# Remote sensing, hydrological modeling and in situ observations in snow cover research: a review

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## Abstract

Snow is an important component of the hydrological cycle. As a major part of the cryosphere, snow cover also represents a valuable terrestrial water resource. In the context of climate change, the dynamics of snow cover play a crucial role in rebalancing the global energy and water budgets. Remote sensing, hydrological modeling and in situ observations are three techniques frequently utilized for snowpack investigations. However, the uncertainties caused by systematic errors, scale gaps, and complicated snow physics, among other factors, limit the usability of these three approaches in snow studies. In this paper, an overview of the advantages, limitations and recent progress of the three methods is presented, and more effective ways to estimate snow cover properties are evaluated. The possibility of improving remotely sensed snow information using ground-based observations is discussed. As a rapidly growing source of volunteered geographic information (VGI), web-based geotagged photos have great potential to provide ground truth data for remotely sensed products and hydrological models and thus contribute to