Can MODIS reflectance assimilation improve snowpack simulations in alpine terrain ?

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Abstract:
Uncertainties of meteorological forcing and shortcomings in the modelling of snow physical processes, when accumulated on time along a snow season, could produce large deviations in the simulations from real snowpack state. Ensemble snowpack simulations generated from an ensemble of meteorological forcings and snowpack model configurations have recently demonstrated a good capability on representing snowpack evolution. However, such ensemble simulations need to be combined with assimilation techniques in order to reduce the spread of the ensemble.

This work presents the first results of assimilating snow surface reflectance and snow covered areas in a ensemble of Crocus snowpack simulations with a particle filter technique. The study site where the evaluation is performed is the Col du Lautaret study area (French Alps). The evaluation compares the impact on the ensemble simulations of assimilation either "synthetic observations" (one member of the ensemble selected as an observations) or "real observations" from MODIS satellite imagery. Despite the results are prefatory, they show a good potential improving snowpack forecasting capabilities, reducing the spread of the ensemble. However, for particular dates, important differences between MODIS and simulated reflectances for particular bands, only allowed the assimilation of "synthetic observations" what shows the necessity of understanding the origin of this disagreement and improving assimilation techniques.