Snow albedo feedback: comparing climate models with new observational data

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Snow albedo feedback (SAF) is expected to have both global and regional impacts on future climate, through changes to the climate sensitivity and through amplification of local land surface warming. This has important implications for the climate and hydrology of high latitude regions. Yet, the current generation of climate models shows a large spread in predictions of how strong the future SAF will be. Furthermore, a lack of adequate data has hampered previous attempts to determine what the real value of SAF is for the current climate. This has made it difficult to evaluate the performance of climate models and uncover potential improvements to their physics. Importantly, previous work has shown that the strength of SAF in the present-day seasonal cycle is a good predictor for its strength under climate change. We combine this knowledge with new satellite-based observational datasets to perform a detailed comparison of SAF in the 20th Century with the IPCC AR4 model simulations. We discuss potential implications of these findings for regional predictions of climate change and for model development.