Estimating North American Snow Water Equivalent by Assimilating GRACE and MODIS into CLM

Hua Su, Zong-Liang Yang, Yu-Sha Niu, Robert E. Dickinson, and Clark R. Wilson
Department of Geological Sciences, The University of Texas at Austin
(Edward_Su@mail.utexas.edu, Yang@mail.utexas.edu)

Introduction

Since snow covers are an important component in the Earth’s climate system, and are key in regions with large seasonal snow cover variability, it is important to accurately parameterize snow cover processes, including snow water equivalent (SWE). This is especially important in regions with large seasonal snow cover variability, such as the Rocky Mountains and the Great Lakes region. Accurate estimation of SWE is crucial for hydrological modeling and understanding the impact of climate change on water resources.

Assimilation Results

The MODIS snow cover fraction (SCF) data is used to constrain the snow simulation in the Community Land Model (CLM). The assimilation of MODIS SCF data results in a more accurate simulation of SWE, especially in regions whereMODIS SCF data is available. The assimilation of MODIS SCF data improves the SWE simulation in areas with sparse observational data, such as the Arctic and high latitudes.

Multi-Sensor Data Assimilation of MODIS and GRACE: The Incremental Value of GRACE Information

The assimilation of GRACE data, which provides information on the distribution of water stored in groundwater aquifers, improves the SWE simulation in regions where ground-based data is sparse. The combination of MODIS and GRACE data provides a more accurate simulation of SWE, especially in regions with large seasonal snow cover variability.

Concluding Remarks

The results of this study demonstrate the importance of assimilating multi-sensor data, including MODIS and GRACE, to improve the simulation of SWE. The assimilation of MODIS and GRACE data provides a more accurate simulation of SWE, especially in regions with large seasonal snow cover variability.