Results from Assimilating AMSR-E Soil Moisture Estimates into a Land Surface Model using an Ensemble Kalman Filter in the Land Information System (LIS)

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Fractional soil moisture, Jan. – July 2003

North Texas Nebraska

AMSR-E retrieved soil moisture for August 2, 2008 over the SE US

AMSR-E observed soil moisture minus DA

Benchmark (LIS/Stage IV) minus DA

Soil moisture estimated using a forward radiative transfer model for various study sites.

The USRA Agricultural Research Service (ARS) Grading Research Laboratory has measured meteorological and hydrological conditions in the Little Washes Experimental Watershed near WSU Microsite in southwestern Oklahoma since 1961.

Soil moisture estimated by a forward radiative transfer model.  Due to excessive radar frequency interference in the 8.6 GHz channel, 10.7 and 18.7 GHz observations are used for soil moisture estimation.

The LIS/Stage IV model cannot be used to generate soil moisture estimates for the current study.  The dataset has a 1.5x space-time resolution in all three bands.  Since the LIS/Stage IV does not have a 1.5x data assimilation scheme, the data cannot be used for this study.

The data assimilation scheme is designed to improve simulations of soil moisture/temperature, and consequently hydrologic processes, by assimilating AMSR-E soil moisture estimates into a coupled land surface-mesoscale model in a data assimilation framework for running land surface models.

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Heritage: Biosphere-Atmosphere Transfer Scheme (BATS)

Features of LIS

• Highly customizable at run-time, facilitating modeling experiments & intercomparisons
• Land Surface Model
• Flexible vertical layer configuration designed to facilitate microwave data assimilation
• Contains radiative transfer model for microwave applications

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The final ensemble mean value per grid cell is used to create a soil moisture mask that can be compared with the 1.5x assimilation results.

We have performed off-line simulations over a Great Plains domain in LIS to provide initial conditions for future WRF SHELS coupled simulations.  SHELS' simplicity has been performed off-line, forced with North American Land Data Assimilation System (NLDAS) data from 1992/1993 through 1992/1993.

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Provides short-run estimates of soil moisture/temperature, and consequently hydrologic processes, by assimilating AMSR-E soil moisture estimates into a coupled land surface-mesoscale model in a data assimilation framework for running land surface models.

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