ABSTRACT

The National Centers for Environmental Prediction’s (NCEP) Environmental Modeling Center (EMC) and the University of Washington (UW) run parallel drought monitoring systems based on the North American Land Data Assimilation System (NLDAS). Both systems use a suite of land surface models, one of which is the Variable Infiltration Capacity (VIC) model. We performed an assessment of differences in drought characteristics estimated using both systems for the period 1979-2008. For soil moisture (SM) percentiles and runoff indices, differences are small among different models in the same system. However, the ensemble mean differences between the two systems are large over the western United States – in some cases exceeding 20% for Soil Moisture Percentile (SMP) and Standardized Runoff Index-6 (SRI-6) differences, which is too large for drought classification purposes.

BACKGROUND

- Both systems use a suite of land surface models (LSMs).
- Both systems are used by USDM authors and the National Drought Monitor (NCEP) and the National Integrated Drought Information System (NIDIS).
- The ensemble mean differences between the two systems are large over the western United States – in some cases exceeding 20% for SM and runoff percentile differences. These differences are most apparent after 2002.
- We found that precipitation forcing differences are the source of the SM and runoff differences - while temperature forcing differences are also large after 2002, their contribution to SM and runoff differences are much smaller than for precipitation.

RESULTS (cont.)

CONCLUSIONS AND DISCUSSION

- Based on the experiments conducted we conclude that differences in precipitation forcings are the main source of uncertainties in the UW and NCEP systems.
- The uncertainties are particularly large post 2001 due to the use of precipitation gauges reporting data used by NCEP.
- For example as shown in the figure below the number of precipitation gauges reporting data used by NCEP decreased substantially post 2001. This pattern is observed in other lesser extent using UW index stations post 2004.

REFERENCE


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Uncertainties in the North American Land Data Assimilation Systems

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