

**Integration of Energy and Water Cycle Research Products in a  
Global Land Surface Modeling and Assimilation System**  
Annual NEWS Project Progress Report  
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***Project Status and Progress***

- Results from multiple global simulations continue to be served from NASA/GSFC's Data and Information Services Center (DISC) via FTP and GrADS-DODS Server:
  - GLDAS/Noah, 1 degree, 1979-present
  - GLDAS/VIC, 1 degree, 1979-present
  - GLDAS/CLM2, 1 degree, 1979-present
  - GLDAS/Mosaic, 1 degree, 1979-present
  - GLDAS/Noah, 0.25 degree, 2000-present (MODIS snow cover assimilation)
  
- Rasmus Houborg joined the project team in January, 2009, replacing Ben Zaitchik, who began a State Department fellowship in September, 2008.
  
- Continuing to lead "State of the Global Water Cycle" assessment (NEWS question #3).
  
- Installing CLM3.5, which includes a groundwater module, in LIS.
  
- Preparing global time series of satellite derived LAI to replace existing climatologies in LIS.
  
- Continuing to support Global Modeling and Assimilation Office with monthly forcing for their seasonal forecasts.
  
- Analyzing the validity of trends in our long term simulations and evaluating related forcing and spin-up issues; preparing for next generation of GLDAS simulations.
  
- Reprocessing 1948-present Princeton-data-forced simulation.
  
- Testing and implementation of LIS, including required data, libraries, and code, on our new Thinkmate server.
  
- Grid-to-grid regression and correlation analyses to search for teleconnections in our global model output.

- Completed development of a source-to-sink runoff routing system; paper submitted.
- Completed development of irrigation and specific crop type modeling for the US; paper published.
- Completed development of new MODIS snow cover assimilation technique, which modifies air temperature and precipitation forcing fields to maintain the local water balance during assimilation updates; paper published
- Completed comprehensive comparison of GRACE and GLDAS based terrestrial water storage variations in collaboration with Jay Famiglietti's group. Paper published.
- Participation in GLASS panel and CEOP (leading land surface model subgroup).
- Collaboration on South American LDAS project.

### ***Collaborations***

- Leading NEWS Group #3: global climatology (including Adler, Schlosser, Bosilovich, Famiglietti, Lin, and Hilburn)
- Peters-Lidard: land-atmosphere coupling
- Famiglietti: global measurements of the water cycle
- Koster – soil moisture influence on land-atm coupling (summer student focusing on India)
- Bosilovich – evaluation of global water cycle data
- Adler – global precipitation analysis
- Schlosser - global runoff estimates
- Lin: GLDAS estimates for the energy cycle climatology
- Sorooshian – precipitation and irrigation
- Denning and Lu – vegetation modeling

### ***Publications***

- van der Velde, R., Su, Z., **Rodell, M.**, Ek, M.B., and Bosveld, F.C., The impact of vertical discretization of soil water flow on surface energy budgets simulated by the Noah LSM, *J. Hydrometeor.*, submitted, 2009.
- Zaitchik, B.F., **M. Rodell**, and F. Olivera, Evaluation of the Global Land Data Assimilation System using global river discharge data and a source to sink routing scheme, *Water Resour. Res.*, in review, 2009.
- van der Velde, R., Z. Su, M. Ek, **M. Rodell**, and Y. Ma, Influence of thermodynamic soil and vegetation parameterizations on the simulation of soil temperature states and surface fluxes by the Noah LSM over a Tibetan plateau site, *Hydrology and Earth System Sciences*, in review, 2009.
- Ozdogan, M., **M. Rodell**, H.K. Beaudoin, and D. Toll, Simulating the Effects of irrigation over the U.S. in a land surface model based on satellite derived agricultural data, *J. Hydrometeor.*, in press, 2009.
- Roads, J., E. Bainto, K. Masuda, **M. Rodell**, and W. Rossow, GEWEX Water and Energy Budget Study, *Earth Interactions*, in review, 2009.

Zaitchik, B.F., and **M. Rodell**, Forward-looking assimilation of MODIS-derived snow covered area into a land surface model, *J. Hydrometeor.*, 10 (1), 130-148, 2009.

Syed, T.H., J.S. Famiglietti, **M. Rodell**, J.L. Chen, and C.R. Wilson, Analysis of terrestrial water storage changes from GRACE and GLDAS, *Wat. Resour. Res.*, 44, W02433, doi:10.1029/2006WR005779, 2008.

### ***Issues or Concerns***

- Funding for five year projects will end in about a year. Will there be a recompet? If so, when?
- In my opinion, the integration questions/groups are the way to go with NEWS. They allow the right mix of collaboration and individual, proposal-driven, non-collaborative, blinders-on research, which is the default that most scientists veer toward in the absence of some outside stimulus. But they need leaders who are committed to the group goals. Most of us thought that the Integration Team would be those leaders, but they, too, seemed to hole-up in their offices except for a few weeks before a NEWS meetings. Perhaps the leaders should rise up from the group, rather than being appointed, and the incentive should be glory (first authorship and the badge of "leader") rather than or in addition to money.

### ***Integration***

- I've been leading Integration Group 3, NEWS Climatology (State of the Global Water Cycle). Active participants in this group include the teams led by Bob Adler, Adam Schlosser, Mike Bosilovich, Jay Famiglietti, and Kyle Hilburn. Carol Anne Clayson also has promised to provide data. Tim Liu has been unresponsive to requests. We've provided GLDAS output to Bing Lin for the companion study, State of the Global Energy Cycle.