# Incorporating JULES into NASA's Land Information System (LIS) and Investigations of Land-Atmosphere Coupling

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NASA's Land Information System (LIS; lis.gsfc.nasa.gov) is a flexible land surface modeling and data assimilation framework developed over the past decade with the goal of integrating satellite- and ground-based observational data products and advanced land surface modeling techniques to produce optimal fields of land surface states and fluxes. LIS features a high performance and flexible design, and operates on an ensemble of land surface models for extension over user-specified regional or global domains. The extensible interfaces of LIS allow the incorporation of new domains, land surface models (LSMs), land surface parameters, meteorological inputs, data assimilation and optimization algorithms. In addition, LIS has also been demonstrated for parameter estimation and uncertainty estimation, and has been coupled to the Weather Research and Forecasting (WRF) mesoscale model.

A visiting fellowship is currently underway to implement JULES into LIS and to undertake some fundamental science on the feedbacks between the land surface and the atmosphere. An overview of the LIS system, features, and sample results will be presented in an effort to engage the community in the potential advantages of LIS-JULES for a range of applications. Ongoing efforts to develop a framework for diagnosing land-atmosphere coupling will also be presented using the suite of LSM and PBL schemes available in LIS and WRF along with observations from the U. S. Southern Great Plains. This methodology provides a potential pathway to study factors controlling local land-atmosphere coupling (LoCo) using the LIS-WRF system, which will serve as a testbed for future experiments to evaluate coupling diagnostics within the community.

*Joe Santanello is a Physical Scientist in the Hydrological Sciences Branch at NASA's Goddard Space Flight Center. Joe has been with NASA since 2005 where he specializes in land–atmosphere interaction research and the quantifying the role of the planetary boundary layer in modulating the energy and water cycle. He has published on a range of topics that combine mesoscale, boundary layer, and land surface modeling with satellite and ground–based remote sensing observations. Having been formally trained (BS and MSc) in meteorology, his PhD research in the Dept. Geography at Boston University provided the interdisciplinary expertise necessary to become a liaison between hydrologic and atmospheric research groups working towards a fuller understanding of Earth System Science. His current research focuses on developing diagnostics to quantify the strength and accuracy of the land–atmosphere coupling in prediction models, and evaluating the ability of satellite remote sensing to capture such interactions at global and daily time scales.*