Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07937, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07937
EGU General Assembly 2008

Towards improved understanding of land-atmosphere coupling: An alternative metric of coupling strength.

S. Steele-Dunne, N. van de Giesen
Technische Universiteit Delft

The objective of this project is the development of a proper diagnostic framework within which the land-atmosphere system can be studied as a complex integrated system. The impact of soil moisture on atmospheric boundary layer processes has been shown to depend on other states such as stability above the boundary layer. Consequently, representing the coupled land-atmosphere system as a collection of simple feedbacks may be understating the problem. Rather, it should be considered a complex but integrated system whose states may be involved in competing mechanisms. In this study, a measure of coupling strength is sought which can take this complexity into account.

Koster et al. (2004) implied a feedback between soil moisture and precipitation by a non-zero value of the change in intra-ensemble coherence between an ensemble of differently initialized, freely evolving land surface state variables, and an ensemble where the land surface state variables (notably soil moisture) are specified to match one case from the control ensemble. However, this index requires ensemble simulations and is therefore inappropriate for observational data in its current guise. Dirmeyer et al. (2006) proposed an alternative coupling metric which is essentially a 'goodness-of-fit' parameter calculated with observed data.

Here, field observation data are used to assess the adequacy of these measures of coupling strength. Can they provide a truly meaningful measure of coupling strength given the complexity of the integrated land-atmosphere system? Can we devise an improved metric which will allow us to account for the fact that surface states are may be involved in competing mechanisms and distinguish between local and remote surface influences on precipitation/ABL cloud growth?