Hydrol. Earth Syst. Sci. Discuss., 6, C807–C810, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C807/2009/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Recycling of moisture in Europe: contribution of evaporation to variability in very wet and dry years" *by* B. Bisselink and A. J. Dolman

P. Dirmeyer (Referee)

dirmeyer@cola.iges.org

Received and published: 20 May 2009

The authors extend their previous work and examine the impact of local water cycle variations over central Europe on the severe drought year of 2003 and a less severe year of 2006. The authors apply the approach of F. Dominguez to estimate "recycling ratio" – the impact of terrestrial evaporation as a moisture supply for rainfall. The paper presents a novel combination of setting, data and approach to extend previous conclusions to specific situations. The periods examined by the authors manage to traverse the full range of conditions for local water cycle feedbacks. These range from the humid situation where nearly all precipitation over land originates from remote oceanic

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

sources, to the intermediate state where weak circulation or a long terrestrial fetch allows for a larger proportion of land evaporation to contribute to precipitation, to the other extreme where the land is so dry and evaporation so low that, again, terrestrial contributions are low despite the circulation regime.

Major comments:

Why not do a clean experiment with the RACMO regional model – pairs of integrations where the only difference is the land surface state? As it is, the comparisons are complicated by the fact that many factors are varying between 2003 and 2006, including the large-scale force circulation at the boundaries of the regional model.

Minor comments:

L22: "long path length" - this is confusing terminology - it is short in space but long in time due to weak winds. Perhaps say "long duration" instead.

p3304, L10: Note that Salvucci et al (2002) showed that the apparent “predictability” shown by Findell and Eltahir (1997) is an artifact of how they did their calculation, and not applicable or present in a true predictive context.

p3308, L5-7: This argument is very hand-wavy – not firm at all. Please consider strengthening it.

L22-27: Can this quantity <rho> be explained more clearly. It took me quite a bit of time and effort to understand exactly what this “local recycling” is. The definition is quite different from that of Brubaker et al. (1993) or Dirmeyer and Brubaker (2007). In contrast to those and related papers, here it does not have to rain in order for recycling ratio to be defined.

L27: How much variation is there in the area of the grid boxes in this model? I suspect it is not great, given the limited meridional extent, but it will affect comparison of recycling ratio across the domain.

HESSD

6, C807–C810, 2009

p3309, L15-17: It is difficult to imagine that time series of daily recycling ratio (or precipitation, evaporation, etc) are statistically independent from one day to the next. How are the degrees of freedom calculated for the estimation of significance for the correlations? What are the decorrelation time scales for these quantities? I suspect the significance thresholds should be set much more conservatively.

p3311, L19-23: The use of ANOVA for establishing causality makes me a little nervous. Would an approach that incorporates characteristics of cross-validation, like Granger Causality, be better here? There exist interconnections between these causal factors, after all.

L26-29: The same argument can be said for specific geographical regions over the same times – that in arid regions evaporation is more important for recycling ratio, and in humid regions it's the atmospheric characteristics.

Figs 5-9: These monochrome scales are very hard to read and compare. The color choices here are more artistic than illustrative.

Technical points:

p3302, L4: mode -> model

L19-22: Please rewrite - language is unclear

p3310, L7: start -> starts

L16: interannual -> intraseasonal

p3312, L23: negative -> negatively

p3313: L22: contains already -> already contains

Bosilovich (2003) should be Bosilovich (2002)

—

Dirmeyer, P. A., and K. L. Brubaker, 2007: Global characterization of the hydrologic

HESSD

6, C807–C810, 2009

Interactive Comment

cycle from a quasi-isentropic back-trajectory analysis of atmospheric water vapor. J. Hydrometeor. 8, 20-37.

Salvucci, G. D., J. A. Saleem, and R. Kaufmann, 2002: Investigating soil moisture feedbacks on precipitation with tests of Granger causality. Adv. Water Resour., 25, 1305-1312.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 3301, 2009.