

PROPOSAL FOR FLUXNET SYNTHESIS PUBLICATION



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DATASET PROPOSED

LaThuile FLUXNET synthesis dataset

TITLE OF PAPER AND OUTLINE

TITLE

The impact of evapotranspiration on convective rainfall events

Description

The focus of this study is on the impact of morning evapotranspiration on afternoon convection. Previous model- and reanalysis-based studies (e.g. Findell et al., 2003) have highlighted the importance of early-morning conditions for the sign and strength of the soil moisture-precipitation feedback, and defined geographical zones characterized by positive or negative feedbacks. So far, *observational* studies investigating soil moisture impacts on the triggering of convection have been inconclusive, due to the confounding effect of precipitation impact on soil moisture when only precipitation and/or soil moisture observations are considered (Seneviratne et al., 2010). Here we investigate this process by combining direct observations of evapotranspiration from FLUXNET stations together with measurements of precipitation and other variables from available datasets (relating e.g. to the atmospheric state). We will avoid confounding effects from precipitation forcing by disaggregating the data based on the diurnal cycle (evaluation of morning evapotranspiration vs afternoon precipitation). The focus will be set on regions with known strong coupling between surface moisture conditions and evapotranspiration (e.g. Teuling et al. 2009).

Research questions

To which extent and how does morning evapotranspiration influences the triggering of convection, and thus the frequency of afternoon convective precipitation events?

Does morning ET impacts the frequency of precipitation only or does it influences the amount of rain as well?

Is this effect dependent on early morning conditions and/or limited to specific regions (e.g. climate zones)?

Other key collaborators

Kirsten L. Findell, GFDL, USA
Bart van den Hurk, KNMI, The Netherlands
Pierre Gentine, Columbia University, USA

References

- Findell K.L., Eltahir E.A.B., 2003. Atmospheric controls on soil moisture-boundary layer interactions. Part I: framework development. *J. Hydrometeorology*. 4(3), 552-569.
- Seneviratne, Corti T., Davin E., Hirschi M., Jaeger E. B., Lehner I., Orlowsky B., Teuling A.J., 2010. Investigating soil moisture-climate interactions in a changing climate: A review. *Earth-Science Review*, 99, 125-161.
- Teuling A.J., Hirschi M., Ohmura A., Wild M., Reichstein M., Ciais P., Buchmann N., Ammann C., Montagnani L., Richardson A.D., Wohlfarth G., Seneviratne S.I., 2009. A regional perspective on trends in continental evaporation. *Geophys. Res. Lett.* 36, L02404. doi: 10.1029/2008GL036584.

PROPOSED SITES TO BE INVOLVED

Mostly continental sites from the US and Europe with long record of latent heat flux and other variables (minimum 5 years), but the analysis could potentially include all sites by regrouping them into categories (e.g. climate zones, land cover, typical early morning condition, etc.)

PROPOSED RULES FOR CO-AUTHORSHIP

Persons that have given intellectual input to the paper will be invited for co-authorship. All data contributors will be invited to give intellectual input.

NB: CV of all collaborators have already been submitted, except those of Benoît Guillod and Boris Orlowsky (attached).