

PROPOSAL FOR FLUXNET SYNTHESIS PUBLICATION



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DATASET PROPOSED

La Thuile dataset and its 2013/2014 successor

TITLE OF PAPER AND OUTLINE

Global Patterns of Biosphere-Atmosphere Energy Fluxes in Terrestrial Ecosystems

Energy fluxes of heat and moisture between the land surface and atmosphere play an important role in the surface energy budget and in regulating climate. These fluxes and their feedbacks effects are constrained by biophysical and ecophysiological properties of terrestrial ecosystems, which are largely controlled by environmental conditions and associated changes. Previous research indicated for instance a contrasting response of forest and grassland energy exchange to drought that can affect regional and continental temperature patterns (Teuling et al., 2010). However, only few studies synthesized biosphere-atmosphere energy fluxes beyond the regional/continental scale (e.g., Jung et al. 2011, Stoy et al. 2013) and an early data-driven characterization of general patterns in energy fluxes (Valentini et al. 1999) was based on a limited number of ecosystems. Many open questions thus remain regarding biome and climate specific patterns, general functional relationships and the partitioning of available energy into sensible and latent heat fluxes. In addition, the effect of land-use on energy fluxes, their partitioning and coupling with air temperature are not well understood. Only a few comparative studies have been conducted on the local to regional scale for some land-use types so far (e.g., Amiro et al. 2006, Baldocchi et al. 2010, Baldocchi and Ma 2013, Rotenberg and Yakir 2011, Scott 2010). It also remains largely unknown how energy fluxes and their partitioning are altered following land-use changes and other disturbances (Liu and Randerson 2008).

Therefore, this synthesis aims to investigate general patterns of biosphere-atmosphere energy fluxes in terrestrial ecosystems across biomes and climates. Our objectives are to (1) characterize the diurnal, seasonal and inter-annual variability of latent and sensible heat fluxes, (2) to derive general functional relationships for the climatic and biophysical controls of energy fluxes, and (3) to quantify the effects of land-use change and disturbance on the partitioning of energy fluxes.

Among others, we will assess ecohydrological patterns and derive general functional relationships for the controls of energy fluxes. We would also like to test the controversial hypothesis that Evaporative Fraction (EF) remains stable throughout the day (Lhomme and Elguero 1999, Gentine et al. 2007). The general patterns and functional relationships derived from this synthesis will improve the understanding of variations in energy fluxes globally and will provide valuable insights for land-surface models based on direct measurements.

PROPOSED SITES TO BE INVOLVED

All sites containing at least 1 full year of available flux and meteorological data may be considered for this synthesis, and will be selected according to minimum requirements regarding data quality for all energy flux components.

PROPOSED RULES FOR CO-AUTHORSHIP

We will follow the rules as proposed in the disclaimer for the FLUXNET2007 (La Thuille) synthesis dataset. Co-authorship will be offered to PIs that provide significant intellectual input to the analysis that changes the study and participate in writing the paper. PIs can also request their site(s) to be excluded from this synthesis activity.

References

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