Fluxnet synthesis proposal

Title:
Globally assessing the utility of alternative approaches to upscaling latent heat flux for thermal remote sensing studies

Short outline:
We would like to apply the generic theoretical framework for comparing any upscaling approach that assumes self-preservation developed in Van Niel et al (2012, applied to two Australian flux towers with contrasting moisture dynamics) to the entire global Fluxnet network. This framework enables correction of biases to upscale latent heat flux from specific time-of-day observations, akin to those made with thermal remote sensing, to monthly totals. The 253 flux towers are located across a wide-range of evaporative conditions, being: (i) energy-limited (EL); (ii) water-limited (WL); and (iii) equitant (i.e., those that seasonally straddle the EL and WL divide; McVicar et al (2012)). Firstly we would explore if there are consistent upscaling biases across these three evaporative classes. Secondly, we would explore if adjusted models that correct for upscaling bias and are suitable for global application can be developed as a function of the wetness index. So results could be linked to operational remotely sensed-based systems generating estimates of evaporative flux across the entire globe, we would use the solar irradiance top-of-atmosphere (S_{TOA}; Ryu et al, 2012) and solar irradiance modelled with a sine curve (S_{SIN}) approaches. These are two of the four approaches tested in Van Niel et al (2012), and for global use a requirement is that the underlying spatial variables be synoptically available for the entire globe (as opposed to other two methods tested in Van Niel et al (2012) that require flux tower observations). Having the ability to correct for the bias and so be able to upscale latent heat flux from specific time-of-day observations to monthly totals with a view to remotely sensed based application would overcome a currently challenging upscaling issue.

Van Niel T.G., McVicar, T.R., Roderick, M.L., van Dijk, A.I.J.M., Beringer, J., Hutley, L.B. and van Gorsel, E. (2012) Upscaling latent heat flux for thermal remote sensing studies: Comparison of alternative approaches and correction of bias. *Journal of Hydrology* 468-469, 35-46. doi:10.1016/j.jhydrol.2012.08.005

McVicar, T.R., Roderick, M.L., Donohue, R.J. and Van Niel, T.G. (2012) Less bluster ahead? Overlooked ecohydrological implications of global trends of terrestrial near-surface wind speeds. *Ecohydrology* 5(4), 381-388. doi: 10.1002/eco.1298

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Sites involved:
All 253 sites that are part of FluxNet.

Rules applied for co-authorship:
Every site contributor can nominate co-authors. All co-authors are expected to actively contribute to the manuscript.