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Interactive comment on "Filling the gaps in meteorological continuous data measured at FLUXNET sites with ERA-interim reanalysis" *by* N. Vuichard and D. Papale

Anonymous Referee #1

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The paper describes a gap-filling method that makes use of the ERA-Interim atmospheric reanalysis data to complement the field-site observations gathered at a given FLUXNET site.

This is of practical interest to create a uniform dataset that allow to access data reduction procedures (e.g. monthly mean, mean-diurnal cycle) without too many issues of representativity due to gaps, and enables also the direct use of FLUXNET data as model forcing to simulate land surface quantities. The results in downscaling ERA-Interim to field site are undertaken using a statistical approach and they are thoroughly evaluated. A linear de-biasing method is applied to ERA-Interim to match the slope

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and interception of observed data and then attention is devoted to the diurnal cycle.

The number and variety of sites considered enable to conclude that the gap filling method is applicable with generality of improvements with respect to using ERA-Interim as is. The improvements are however not of the same magnitude on all fields and all sites. The capacity of conserving the original statistical property of the observed field is also taken into account and some caveats are highlighted for wind speed and longwave radiation.

Despite the caveats identified the method presented has merits that come from the complementarity of reanalysis and in-situ information. The outlook of non-linear regression is indeed likely to increase the skill of the current downscaling algorithm. The meteorological gap filling of FLUXNET data series is of practical interest and can enable a greater use of the data therefore it is a valuable contribution to ESS. The code provided makes the method reproducible. I indicate hereafter few minor changes.

A question I would like the Authors to consider is related to budget closure that is a notorious issue of flux tower measurements and not an issue present in short-term forecast as produced by reanalysis (in which budget closure is numerically imposed). Is there a positive effect on a better closure of the energy budget as results of the gap filling and downscaling method? I realise that to answer this question there are other measured FLUXNET quantities involved (e.g. turbulent fluxes) that are not part of the forcing. However this could allow to qualify the proposed methodology also with respect to the energy closure.

Minor comments:

P30 L9 and L11 the equations if the expression "exp" is adopted it there a need to have exponent indentation (superscript).

P36L23 "to few" should be "too few".

P40L7 "incomming" should be "incoming".

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P41L7 remove "" from the word Results.

P41L13 remove "" from the word Introduction.

Interactive comment on Earth Syst. Sci. Data Discuss., 8, 23, 2015.