

***Interactive comment on “Topography induced spatial variations in diurnal cycles of assimilation and latent heat of Mediterranean forest” by C. van der Tol et al.***

**Anonymous Referee #2**

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General comments

This paper describes an interesting combination of micrometeorology, plant physiology and vegetation ecology, in relation to topography. The authors have managed to get across their main point that topography induced variation in vegetation parameters are of at least equal importance to the transpiration & photosynthesis fluxes as topography induced variations in environmental driving variables.

The paper is generally well written and the equations and methods appear sound. The majority of the figures are of good quality. I only have a few reservations as detailed below.

## Specific comments

\* The start of the Introduction appears to be a bit of a red herring. I think they should start with discussing the short- and long-term climate effect, rather than the the latest developments in SVAT models.

\* The focus of their study, as set out at the bottom of page 1633, i.e. the quantification of those spatial variations in weather conditions and vegetation characteristics on the diurnal cycle of latent heat flux, and in particular aim 2 has only been partly achieved in my opinion. Fig. 12 makes a clear point, but the sensitivity study really only underlines the importance of variation in vegetation parameters rather than exactly quantifying the different effects of short- and long-term climate.

\* At the top of page 1634 they talk about the novelty of their approach and they go on to say "contrary to studies....we used independent measurements...". I know of many other recent studies who use this same approach, so it is certainly not as novel as made out to be.

\* Page 1635, just below Eq. 2: ..."g is the effective aerodynamic and stomatal conductance". Variable g can't be both at the same time, so this will need to be rephrased (e.g. g is the effective resistance composed of a combination of...)

\* I am concerned about the rather empirical equation to calculate  $G_a$ . Why did the authors not use an equation based on e.g. the logarithmic windprofile (no doubt to keep the number of parameters down). Furthermore, this wind speed was measured 3 km away rather than at the sites. I believe that average wind speed could have varied significantly between the N, S, E and W sites thereby influencing the fluxes. Not taking this into account is a considerable shortcoming of the study.

\* Page 1640, line 18: when describing Fig. 3 it should be emphasised that these are relative differences.

\* The site description and other measurements are all somewhat muddled up. How

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were  $R_n$  and VPD measured? Why does the section of leaf sample analysis suddenly (page 1644, line 6) discuss temperature (air?), relative humidity (at what height?), vertical profiles of soil moisture content and rainfall (where/how are they used in the study?).

\* Page 1645, line 21: Figure 5 shows.... This is not an accurate description of what can be seen in the figure. Also: the discussion on  $C_i$  having to be independent of PAR is not entirely correct seeing that you are plotting  $C_i/C_a$  not just  $C_i$ .

\* Page 1646, lines 5-7. These observations raise some doubts about the validity of your model parameterisations based on these data

\* Page 1648, line 2. Why does Fig. 9 not also show measured A? I thought these data were available.

\* Page 1648, line 17/18. Modelled and measured transpiration don't match closely for N&E plots. I am not so sure about the word remarkable in this context. Quite a few models get a good fit when using independent data.

\* Page 1649, final paragraphs: If they get transpiration roughly right but  $T_s - T_a$  wrong (i.e. H wrong), does that mean that  $R_n$  was wrong (see Eq. 8)?

\*Page 1651, line 7. I am highly surprised that a standard deviation for VPD of 3 kPa had such a small effect (see Table 5, but do you mean hPa or kPa?), this is 30 mbar! I.e. the difference between the trees being exposed to a typical humid climate or a semi-arid climate. The fact that the model output only changes by 5% may mean that there is something wrong with the model.

#### Technical comments

\* Do we need Table 2, there is hardly any information in it.

\* Fig. 1: make sure all subscripts are printed properly

\* Fig. 2. The main map is not very clear.

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\* Fig. 3 may be superfluous seeing that you are describing the same information in words in your paper.

\* Fig. 9. Don't use the capital labda here!

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