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Interactive comment on “Annual evapotranspiration retrieved solely from satellites’ vegetation indices for the Eastern Mediterranean” by D. Helman et al.

Anonymous Referee #2

Received and published: 7 July 2015

The discussion paper "Annual evapotranspiration retrieved solely from satellites’ vegetation indices for the Eastern Mediterranean" by D. Helman, I. M. Lensky and A. Givati fits the scope of ACP and addresses a relevant scientific question of estimating the evapotranspiration of spatially extended areas. The work presented in the paper is on a solid scientific base. The methods and assumptions are outlined clearly with an exception of the data intensity question I will discuss below in more detail. The conclusions reached by the authors are therefore well-justified and bring new understanding to this field of research. The paper is well structured and reasonably well written. Unfortunately, it still contains language errors. Some of the errors cause ambiguity in text

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and should be corrected. A careful proofreading is strongly suggested. The language of the paper is not 'fluent and precise' as required by the journal.

The biggest shortcoming of the paper is the lack of new concepts or ideas. While the research is scientifically sound, it resembles a technical report of successfully applying well-established methods with basic statistics in a specified geographical area. However, such reassuring knowledge is required by the scientific community and other stakeholders.

The manuscript suffers from a fundamental or philosophical issue of the data or information richness of the empirical approach used by the authors. The authors stress that their approach requires less information compared to the physically based ones (line 12, page 15399). The same is implied by the word 'solely' in the title of the paper. In reality, the method described in the paper requires spatially and temporally extensive field measurement data to establish and validate the empirical relationships. Thus, the results are not based solely on satellite data, but rather include a very significant ground-based information component. I suggest deleting the word 'solely' from title and mentioning this in manuscript text.

A second shortcoming is the use of exponential equations in the model proposed to estimate ET from VIs. This should be discussed in more detail and more thoroughly. Exponential model does indeed allow to produce the low ET values reported by the authors on page 15409. However, it increases considerably ET at high VI values compared with the linear one. This should be quantified, or a linear model should be used with negative ET values discarded for producing ET maps. The continuity of the ET prediction mentioned on page 15410 is indeed rather a disadvantage. The continuity is achieved by using the ad hoc exponential function. No theoretical justification is given for it. Scientifically, it would be more appropriate and to use a linear model indicated by the flux site data with negative values omitted or set to zero.

A technical shortcoming of the paper is the lack of the description of the data source

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for the six catchments in Table 2. The relevant section in section Data is missing. Thus, it is impossible to objectively validate the performance of the various satellite products on the catchments.

Minor comments

page 15401 line 3. Delete "well" which is not a quantitative descriptor. It may be argued that for many applications, the phenological changes are rapid and correlated with e.g. cloudiness thus that the 16-day window may lead to statistically relevant artefacts.

page 15402 line 1. Why were only the images for NAfr tile averaged remains unclear. It unclear why this is brought out in the manuscript. line 20. Change 'singular' to 'single'. Also, rephrase the sentence as it is not grammatically correct.

page 15403 line 19. Replace 'alone' by 'single'. line 19. The sentence starting with 'In AN we used...' VI does not have a growth season, the vegetation does. Rephrase the sentence as "In AN we subtracted the annual minimum VI before integrating it over the growing season..."

page 15404 line 16. Replace 'rational' by 'rationale'. line 22. Replace 'considered as those' by 'chosen as the ones.' Alternatively, reorder the sentence. It's no good English. line 23. Replace 'student' by 'Student's'

page 15405 line 1. Delete the parentheses around 'p-value.' line 3. Delete parentheses. line 17. Delete 'automatically.' line 18. Chose a more appropriate word for 'a bit.' line 18. Replace 'upon' by 'to.'

page 15406 line 6. The source of P and Q should be specified, preferably already much earlier. line 21. Replace 'In average' by 'On average.' line 22. Use a more quantitative word instead of 'better.' Name the quantity which increased by 40 and 60%, respectively.

page 15407 line 9. Add 'annual' before 'data.' line 10. Replace 'high as in' by 'as high as for'. line 10. Replace 'using' by 'for.' Add 'both' before 'linear.' Currently, the text is

ambiguous. line 11. Add 'estimating' before 'functions.' line 11. The use of non-linear regression should be justified here, not later in the manuscript. line 18. Add 'a' before 'dominant.' line 18. Replace 'significant to' by 'significant for.'

page 15408 line 10. Add ', respectively' after the first occurrence of 'EVI.' line 10. Unclear. What is the simple model? Did include LST? why is "(for LST with NDVI or EVI)" repeated? line 12. Replace 'substantially improved' by 'were substantially better.' line 14. Add ', respectively' after both occurrences of 'EVI.' line 15. Delete 'But.' line 17. Add ', respectively' after 'EVI.' line 19. Delete 'alone.' Add a ', respectively' after 'EVI.'

page 15410 line 6. Replace 'relatively high' by 'higher.' line 11. Add 'a' after 'such.' line 19. Relative biases should be in plural. line 21. The slash is used to denote division. Use parentheses as in '...the relatively higher (lower) MOD 16...'

page 15411 line 2. Replace 'from' by 'for.' line 20. Replace 'VIs relationships' by 'ET-VI relationships.' line 23. Delete 'Yet.'

page 15412 line 3. The text is overly cumbersome and difficult to read. Delete the words 'Following a performance-simplicity criterion we used' and 'interannual relationships to retrieve total annual ET for the Eastern Mediterranean. This' line 5. Add comma before 'had.' line 6. Add comma at the end of the line. line 11. The sentences 'Improvement in the estimation of ET is essential for water budget calculations and water resource management especially in water limited regions. Here we propose the use of a simple model to retrieve annual ET at 250 m spatial resolution suitable for the Eastern Mediterranean region' are not conclusions and need to be deleted.

Caption to Table 1. Use 'Top' instead of 'Up.' Table 2. The names in the table are technical abbreviation, not names Give clear and unambiguous names allowing the catchments to be identified in nature. Legend to Figure 3. Give here or elsewhere also the coefficients of the linear models. Figure 5. Use also different symbols, not just different color.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 15397, 2015.

ACPD

15, C4492–C4496, 2015

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