Hydrology and Earth System Sciences Discussions

Interactive comment on "Integrating MODIS images in a water budget model for dynamic functioning and drought simulation of a Mediterranean forest in Tunisia" *by* H. Chakroun et al.

Anonymous Referee #2

Received and published: 7 June 2012

This paper is fairly well written, it addresses an interesting topic that should be of interest to HESS readers. Leaf Area index derived from MODIS was used in a water budget model that simulates evapotranspiration and soil water content. In my opinion, several aspects should be enhanced before its publication, mainly in relation to the analysis performed and the discussion. I suggest (if feasible) to add an analysis from the original SIERRA model (with a calculated LAI) as well as some information on how MODIS-LAI performed over the studied area.

General Comments The paper reads like a technical report, both in terms of content and format. Please split it into more traditional sections (Introduction, Materials and Methods, Results, Discussions, Conclusions. . .).

The introduction also requires some modification, some sentences are rather vague while others are really focused (e.g. equation of the fAPAR). You state that "The lack of such studies over South Mediterranean areas [. . .]" is the main motivation of your work. You should at least discuss in the introduction international projects such as the HYMEX (Hydrological cycle in the Mediterranean EXperiment) project, SICMED (Surfaces et Interfaces Continentales en Méditerranée). . . Please see Szczypta el al. (2012, HESSD), Barbu et al. (2010, Biogeosciences) for more information on studies over the Mediterranean basin as well as on the use of land biophysical variables (such as LAI) in land surface model. A "State of the art" and a clear statement on the motivation of this study are missing.

Slide 6255, I am not sure to understand what you mean by '[. . .] framework for satellite data (MODIS-LAI) integration [. . .]', are you talking about the method? From what I understood, what you do is more or less a direct insertion of MODIS-LAI (?) into your water budget model. Slide 6255, the general process and equation of the model should be in the text, giving them in a Table make them very hard to follow. Slide 6257, Output from the original SIERRA model with a calculated LAI are required to see (i) the performance of the SIERRA model on your test site, (ii) the added value of your method (if there is one?). I believe that it is a pre-requisite, of greater interest than the sensitivity study you proposed in section 4.2. Slide 6260: Please give more indication on how LAI-MODIS performed in your studied area.

Section 2.1 describes the general component of the model but their sources are given in section3. I believe it should be together.

A specific section should be dedicated to the conclusion.

Specific Comments

Slide 6252, I believe acronyms used in an abstract should be avoided and if unavoidable, be defined. Please check which guidelines HESS applies to solve this issue.

Slide 6253, L.13-16: Please rephrase sentence. L.20-22: It is one method amongst others...

Slide 6255, L.7: Please give acronym for ASTER. L.15-17: Please rephrase sentence.

Slide 6257, L.9-10: Please use 'Saxton et al., 1986, 2006'.

Slide 6260, L.8-10: Any idea about the quality of Rg from ARPEGE Circulation model? Slide 6263, L.12: Please give acronym for STR.

Even if I recognize the quality if the figures, some of them are difficult to read (e.g., Fig.1, 6). What are the units on Fig.2? LAI in m2m-2.

Additional bibliography Szczypta et al. (2012), Impact of precipitation and land biophysical variables on the simulated discharge of European and Mediterranean rivers. http://www.hydrol-earth-syst-sci-discuss.net/9/5437/2012/hessd-9-5437-2012.html Barbu et al. (2011), Assimilation of Soil Wetness Index and Leaf Area Index into the ISBA-A-gs land surface model: grassland case study. http://www.biogeosciences.net/8/1971/2011/bg-8-1971-2011.html

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