



## ***Interactive comment on “ECOCLIMAP-II/Europe: a twofold database of ecosystems and surface parameters at 1-km resolution based on satellite information for use in land surface, meteorological and climate models” by S. Faroux et al.***

**S. Faroux et al.**

stephanie.faroux@meteo.fr

Received and published: 31 December 2012

General comments: The authors introduce a new dataset (ECOCLIMAPII) of land cover and related surface parameters (like roughness length, albedo, root depth, and others) for Europe. Such datasets are mandatory for numerical weather prediction and climate models, and as the authors point out, need to be updated from time to time. The derivation of the new dataset is based on two vegetation related variables, the leaf area index (LAI) and the NDVI, which are both satellite derived, allowing rather high spatial and temporal resolution of the final product. An advantage of the new dataset

C1141

is that it is based on multiannual consistent satellite observations, whereas products like ECOCLIMAPI refer only to single annual cycles of satellite data. The authors point out that one demand of the new dataset is a better regional characterization of land cover in accordance with the climatic environments of the different regions in Europe (latitude, continental or marine climate, topography). Of course, this could help to improve climate simulations for climate sensitive regions like the Mediterranean. Already from these points of view the paper is worth to be published. The authors also perform validation exercises using three different databases. Unfortunately, the validations using the high resolution French dataset AGRESTE and the high resolution satellite product FORMOSAT2 concentrate only on France. A validation for other region in Europe would be desirable. I doubt a little bit whether the comparison with ISLSCP2 C4 data, which have a rough resolution of 1°×1°, is of real value in the sense of validation. The authors also present a comparison of the new ECOCLIMAPII dataset with ECOCLIMAPI, which is certainly necessary. But only the differences between the two products are described. But this does not tell the reader and the potential user of the new dataset whether it is really better than the old one. For instance, is the higher representation of broadleaf trees in central Russia and their tendency to disappear from the Mediterranean regions more realistic than in ECOCLIMAPI (Section 5.3.2, Fig. 11d)? Or is the complete modification of the distribution of wetlands in ECOCLIMAPII (Section 5.3.2, Fig. 11l) more realistic? These questions can be summarized by the more general questions: what is the impact of the new dataset when being applied in NWP or regional climate simulations? Can the modeller expect an improvement of his results? Solely from reading the paper the potential user of the new dataset cannot answer these questions. In addition, for a modeller, who perhaps is not an expert in the generation of land cover datasets, the paper is not easy to read and to understand. Especially, the implementation of the ECOCLIMAPII database (Chapter 4) is hard to read. In summary: the paper describes an important study which should be published. However, in order to increase the value of the paper the authors should try to describe their methodologies in a more understandable manner, understandable

C1142

for interested readers who are not experts in the author's research fields. Although there are a lot of references, the reader should be able to follow the methods without reading additional literature. The authors should spend some effort to explain briefly the different terms, and their possible relationship. For instance, what is the difference, respectively the relationship, between land cover classes and PFTs? There are some more questions and suggestions in the specific comments, which are attached in a PDF document.

Please also note the supplement to this comment: [http://www.geoscimodeldevdiscuss.net/5/C1073/2012/gmdd5C10732012\\_supplement.pdf](http://www.geoscimodeldevdiscuss.net/5/C1073/2012/gmdd5C10732012_supplement.pdf) Interactive comment on Geosci. Model Dev. Discuss., 5, 3573, 2012.

First of all, we would like to thank the reviewer for his support of this work and detailed comments. First major concern of the referee is the lack of validation outside France while considering higher resolution products. One main reason is that statistical information in a format similar to AGRESTE was not available for other countries in Europe. Worth reminding here that the CORINE Land Cover already integrates such kind of information issued from a negotiation with the different countries. This was indeed not possible at our level to have access to more information. Besides, the acquisition of high resolution imagery like FORMOSAT has a cost and cannot be repeated easily. On the other hand, we believe that the fragmented landscapes of south-west of France are quite good examples to judge of the reliability of ECOCLIMAP-II product. The purpose of showing a comparison with ISLSCP2 is because we estimate that both products could enter in competition for time being and therefore we expect ECOCLIMAP-II to be advantageously more utilized in the future, especially for people already familiar with ISLSCP2 products. The question of the differences between the two versions of ECOCLIMAP is completely funded. We will improve the text in trying to get supporting arguments why the spatial patterns of broadleaved forests and wetlands have differently observed today compared to recent past. Furthermore, it is clear that such modifications would have a priori an impact in numerical weather prediction

C1143

(NWP) simulations. But sometimes a more realistic physiography may not show a clear improvement prior NWP model is tuned to the new situations. In fact, the two – surface parameters database and climate modelling – must be separated although a certain level of interactions is suitable, which happens in practice. On the other hand, we do agree that the development of land cover products and associated list of parameters should offer more readability to the meteorological community. We will do some effort to arrange the text in Chapter 4, probably being too technical in the actual version. In particular, we will check that the partitioning of a given land cover class into a series of Plant Functional Types (PFT relates to generic surface types) is well understandable in the text. Thanks for posting such comment as it certainly addresses a key issue.

Specific Comments 1. I have the impression that sometimes terms like “surface types” and “land cover classes/categories” mean different things, sometimes they are used synonymously. For example, in the abstract (line 17 and 18) and in Chapter 2 (page 3578, line 24) the authors talk about “4 main surface type or tiles (sea, inland water bodies, urban areas, natural land areas). On the other hand, they define 14 categories of surface types (Section 3.1, page 3581, line 2 and 3) when combining GLC2000 and CLC2000 maps. There are other examples where terms like “classes” or “categories” or more general “land cover” are used, and it is not always clear to me whether they denote the same or different things.

We share the concern of the referee that there exists some confusion here. The term ‘surface types’ is appropriate for the big 4 land units (sea, inland water bodies, urban areas, natural land areas). Further, the 12 generic functional types within natural land areas can be also named ‘patch’ or ‘tile’. The rest is clearly the land cover types. The text will certainly be arranged.

2. Page 3582, line 26: I don't understand the first part of the sentence “This revealed conspicuous agreement between the two climate maps . . .”. What I can see in fig. 2 is the “boundary” between the two datasets. In Fig.2, page 3611, I miss a legend.

C1144

The boundaries between the two climate maps in Figure 2 is only visible because the authors enhanced the contrast. Otherwise, it could not even be seen the differences, which outlines the good continuity and thus agreement between both climate maps as it is suitable. A legend for climate zoning will be inserted in Figure 2. Thanks for posting this comment.

.3. I have the most difficulties with the description how the ECOCLIMAP-II dataset is really created. For me it is not clear .a. Which data sets are “disentangled” by the K-means method?

NDVI time profiles – each is associated to a land cover class – are disentangled as shown in Figure 3 and explain in the body of the text.

.b. What is classified by the clustering algorithm (the objects to be clustered) and according to which attributes the objects are clustered? Again NDVI products form the results of classification. Since they reveal the behaviour of a specific land cover class, then a land cover map can be derived. The attributes are the time profile and amplitude of NDVI.

.c. What do the resulting clusters represent? Land cover? Vegetation types? Does a cluster represent a specific geographical region? Or is it possible that a cluster contains information from different regions?

The resulting clusters represent land cover classes. A cluster may be specific to a give region because of the use of a climate stratification. For this reason, a given cluster cannot belong to different regions. We will check that the text makes clear this point.

.d. Reducing the numbers of clusters: which “mean 10-day NDVI profiles” (page 3585, line 23)? Where do they come from? From the clustering? Without some basic understanding of the clustering process and its outcome the rest of chapter 4 is also hardly to understand.

After a first level of classification (or clustering), a refinement is searched. The different

C1145

steps are resumed in Figure 3. We believe that understanding Figure 3 makes Chapter 4 readable.

.e. Also the role of the C14 map is not clear to me? Does it serve as a kind of “true reference” which, on the one hand, is used to verify basically whether the results of the clustering make sense, on the other hand, should be refined by the new dataset?

In fact, C14 map is highly desirable for a large community (carbon people merely) and that it may be regarded at first. It does no mean a specific effort was done for this class and that quality is necessary better.

.f. Page 3587, line 4: “Climate maps were finally used to avoid the segregation of pixels belonging to different climate units . . .”. I don’t understand this. I understand the usage of the climate map in such a way that one wants, for instance, to prove whether a pixel representing the continental climate over Russia has not been assigned to a land cover class belonging to marine climate along the Atlantic coast.

Since our concern is to reduce the number of classes as possible (in an optimum sense), then gathering classes belonging to different climates is not possible here. This is to what the sentence is designed for.

4. Section 4.4 “Defining the surface parameters” is also hard to understand. What do the authors mean with “a thorough interpretation of the (combined 14?) CLC2000/GLC2000 classes appearing in a given cover” (page 3587, line 18)? What is the difference between these CLC2000/GLC2000 classes and the covers?

This means here that the labelling of the classes must agree with both given name in CLC2000/GLC2000. The text will be arranged for the sake of clear understanding.

Do I understand this section correctly that only temporal LAI profiles are determined by the procedure? The values for other surface parameters (root depth, total soil depth, tree heights) are taken from ECOCLIMAP-I due to lack of better and more reliable data sources. What is the “total soil depth”? What’s about other parameters like roughness

C1146

length, emissivity, albedo?

This is a correct statement. Only LAI parameter is updated here while most other parameters are identical to ECOCLIMAP-I as mentioned in the text. In fact, roughness length may depend on LAI (for forested areas for instance) and will consequently be also updated. Further, LAI serves to partition the contributions from soil and vegetation. Therefore, total emissivity and albedo will also be updated. The text will certainly be arranged. Thanks for asking. Besides, total soil depth means inclusion of superficial and deep reservoirs.

5. Page 3587, line 23: there is no assessment of functional type fractions in Sect. 3.2.1, since Sect. 3.2.1 does not exist.

This is correct. The reference will be removed.

6. Section 5.1: To my opinion this section is simply a description of the resulting ECOCLIMAP-II map, not a validation. Please, create a new chapter.

We do agree. Chapter 5 will be renamed 'Analysis of the results and validation.'

7. Section 5.1.1 Forests, page 3589, line 19: "Clearly, permanently cool temperatures coupled with sunny days. ....". Is "cool" really correct? If yes, why?

This is certainly an acceptable statement. The word 'cool' will be replaced by 'warm'.

8. Section 5.1.2, page 3590, lines 16 to 18, description of Fig. 5l: I don't see a shift of the peak towards winter. The peaks are very similar to Fig. 5k, except that the minimum values in Fig 5l are at a slightly higher level. In Fig. 5 (page 3614) the beginning of a year is hardly to identify. Perhaps, the length of the corresponding tick can be increased a little bit.

We do agree. The figure will be improved to better see the onset of a new year. Also, we will revise the comments to include the suggestion of the referee.

9. Section 5.2.1, Comparison with AGRESTE: "AGRESTE data are used to calcu-

C1147

late "observational" PFTs that correspond to the PFTs of ECOCLIMAP-II, right?

Yes, this is correct. "The AGRESTE data are given in hectares (Section 3.5, page 3583, line 9). Which data set is interpolated, ECOCLIMAP-II to AGRESTE or vice versa?"

AGRESTE information was projected onto ECOCLIMAP-II grid. Thanks for the comment. Text will be revised accordingly.

"What are the "representative fractions of the covers" (page 3593, line 11)? Does "cover" mean "PFT"? "The weighting using the representative fractions: which PFT fractions are weighted with which representative fraction?"

The representative fractions of the covers mean the percentage of the land cover classes given by AGRESTE. There exists a large number of covers and only (potentially) 12 PFTs. Thus, it is absolutely not the same thing and instead PFTs fractions are by construction due to land cover representative fractions. We recognized that the text needs some improvements here, which will be done.

10. Section 5.2.3, page 3596 line 5 and 6: why do urban areas belong to the PFT? In section 2, page 3578, line 27, the PFTs are defined without urban areas. This is again an example of the steady mixture of definitions. Please, avoid this! It confuses the reader.

We do agree. We will change the text to remove any confusion. Thanks.

11. Section 5.2.3, page 3596, line 7: what are the "12 most representative ECOCLIMAP-II and FORMOSAT land covers"? How are they determined?

In fact, the best correspondence is searched in ECOCLIMAP-II to find land cover classes matching with FORMOSAT in terms of definition. We believe it is clearly already detailed and explained in section 5.2.3.

12. Fig. 9, page 3618: Please, explain the abbreviation "ecov2" and "fms" (figure leg-

C1148

ends) in the figure captions. Other curves in yellow and light blue (C4 crops, grassland, urban areas) are neither explained in the figure caption nor discussed in the text.

“ecov2” refers to ECOCLIMAP-II and ‘fms’ refers to FORMOSAT. The text will be arranged. The other curves will also be commented. Thanks for the point.

13. Section 5.3, Comparison with ECOCLIMAP-I: This section is by no doubt necessary. But the simple description of the differences does not really help the potential user to judge whether the new dataset is more realistic than the old ECOCLIMAP-I dataset. The authors should spend some more lines in order to argue why one should now use the ECOCLIMAP-II data.

This is certainly a good question. Actually, due to enhanced spatial resolution and working with longer and more recent time series, there is no doubt to advise the use of ECOCLIMAP-II. Maybe we need to put emphasize here in this direction and we will then follow the suggestion of the referee.

14. Page 3600, line 13: Please insert “(Fig. 11g)” after “The fractions of C3 crops”

Will be done.

15. Caption of Fig 11, page 3620: please reorder the enumeration of vegetation types according to the alphabet.

Will also be done.

Technical corrections 1. 1. Page 3575, line 27: insert a blank between “and” and “red”  
2. 2. Page 3578, line 3: delete the dot after “resolution”  
3. 3. Page 3587, line 23: once more, Sect. 3.2.1 does not exist  
4. 4. Page 3599, line 27: should be “(Fig. 11e)”, not “(Fig. 11b)”

All these technical corrections will be taken into account.

---

Interactive comment on Geosci. Model Dev. Discuss., 5, 3573, 2012.