**Biogeosciences
Discussions**

Interactive comment on "Revisiting land cover observations to address the needs of the climate modelling community" *by* S. Bontemps et al.

Anonymous Referee #1

Received and published: 14 September 2011

General Comments This is a timely paper given the current levels of effort expended on producing essential climate variables from data collected by earth observing satellites. The paper contains some interesting material, is reasonably well written and is generally well referenced. The original content appears to hinge around three topics; the survey of users, an experiment to highlight one of the perceived shortcomings resulting from the survey and a new paradigm to address this shortcoming. The material needs to be restructured to make the links clear. Currently it reads as though the ghosts of two distinct papers have merged; one dealing with a survey of users and one an analysis of the challenges of creating global land cover maps from 1 km spatial resolution optical imagery from satellite-borne sensors. Because the relationships between the findings from the survey, the action performed in the experiment and the resulting new proposal are not clearly explained the conclusions seem more insubstantial than

they may actually be. The authors' tendency to employ unsupported value judgments further weakens what is, at its core, substantial work. Reworking the material to improve the flow, eliminating value judgments and addressing the occasional unresolved scientific question can rectify all of this.

Specific Comments

Title. Is it the climate modeling community, or the three communities identified in the opening line of section 2 (page 7716, lines 24, 25)?

Abstract. This will need to be re-written once the material is reorganized. It also opens in an odd manner suggesting that the monitoring of Essential Climate Variables is a goal of the UNFCCC, which isn't the case. The Convention highlights the need for climate observations but only as a means to an end, i.e. "to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable." You must read article 4 (g) of the text of the Convention.

Page 7714, line 20. Make it clear that land cover (or at least land surface processes) have a significant role in the forcing of the climate system too. See your later arguments on page 7716, lines 11-13, which do hint at this.

Page 7715, line 20. It would be very useful if you could provide more background on error structures in thematic maps. What do these figures of 68-73% really mean? It would also help strengthen the connections between the different threads of your story if you introduced and defined some of the key terms at this juncture – before reporting on the survey. The most notable omission (no pun intended) is on stability – this is a crux point in your work, but the reader has to guess what you mean by stability.

Page 7715, lines 22, 23 introduce the idea of land surface characteristics, but without explaining what these might be. Again it will significantly improve the paper's flow if you explain this early on.

Page 7715, lines 24, 28 reads like a conclusion, rather than framing a problem.

Page 7716, lines 1-3. see comments under Abstract.

Page 7716, line 11. Make it clear that land cover is in fact two ECVs and that this paper only addresses one of these T26 (orT27). Reference Table 1 too. You should refer to T27 (or T28) in your later discussion (Page 7726, lines 13 – 15) as this is one of the key reasons why T27 is needed and why you struggle so much in satisfying users' requirements with T26 alone. It would also be useful to say how many ECVs there are in total – what % of the total does ESA's goal of 11 actually equate too?

Page 7717, lines 20, 21. Could the fact that respondents are already partners in the ESA CCI lead to bias?

Page 7717, line 23 should be precise concerning number of users – if it includes some, perhaps it excludes others. You are very precise elsewhere (e.g. concerning 15 out of 85 responses, and 372 out of 8000).

Page 7719, lines 6-10. This is really important new information. You need to make far more of the statistics shown in figure 2. Integrate some of the key findings into your text.

Page 7720, line 4. What range of scales do you consider? You need to be precise here given that you don't consider the higher resolution land cover ECV (T27).

Page 7720, line 9. Same issue as above… what more detailed resolutions are called for?

Page 7720, line 14. What's a 'remote sensing time series signal'? This would seem to be quite important given your later proposals for a new land cover classification. Please define.

Page 7721, line 3. You must define stability and accuracy, especially given the importance you subsequently attach to the lack of 'stability'.

Page 7721, lines 6-15. Please re-read and re-write this material. The argument is very

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unclear.

Page 7722, lines 18-26. This level of detail appears a little irrelevant. You need to think hard about the point you are trying to make here. How does the discussion on spatial detail equate with the goals of two different scales of land cover ECVs (T26 and T27)?

Page 7723, lines 11-14. Bring out the relevant results from your survey. This will strengthen the links between the different elements of your work. It would be interesting if you could give some thought as to why the old IGBP dataset keeps getting so much use given the stement you make here.

Page 7724, lines 1-18. This is extremely interesting new material. But the links between this work and the survey results are just not clear enough. Please explain how one led to the other.

Page 7724, lines 19-21. I disagree with this. Papers based on higher resolution (T27 equivalent) data have often measured annual deforestation rates of change far greater than 1%.

Pages 7724 – 7725. Section 3.3. is the least convincing bit of the paper. You need to re-write this so that the results of the survey combined with the results of the experiment you designed to test the shortcoming(s?) emerging from the survey fully justify the new proposal outlined here. The links at the moment are at best tenuous – and therefore read more like some personal preference than a new idea emerging from a scientific process.

Page 7726, lines 13-15. Wouldn't T27 resolve this problem?

Pages 7727, 7728. The conclusions lack conviction because the way in which you reach them seem so disconnected –and therefore untested. This is largely a consequence of the way you present the work, not weak work. Tell a more coherent story and the conclusions could stand up.

Technical corrections

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Page 7715, line 1. What is the basis for the judgment that remote sensing approaches to land cover mapping are 'one of the most efficient'? How is efficiency measured here?

Page 7715, line 4. Make it clear that the mapping 'several times' you refer to is mapping from remotely sensed data.

Page 7716, line 5. How do you determine what is 'adequate'?

Page 7719, line 25. How do you judge the 'most important' information?

Page 7720, line 1. How do you judge the degree of relevance?

Page 7723, lines 17,18. How do you determine a 'big step forward'?

Page 7723, line 24. Cut fugure 3. It doesn't add any real value to the description.

Page 7724, line 23. You do need to define stability and 'instability' too now it seems.

Page 7727, line 9. Is the new validation protocol already designed? If so, what is it? If not, then re-word – but even if you do re-word it still seems a bit as though you are trying to avoid the issue.

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