

The authors present an update of the “global carbon budget” through 2014 primarily based on the methodology used in the assessments in the previous years. Clearly the main data set provided by this study is robust, consistent and valid, as witnessed by relatively minor changes in the main budget terms when comparing the present updated compilation with the past updates. It is an important data resource to the Earth system science community and a timely update. I just have a few minor comments regarding presentation, clarification and documentation as given in the specific comments below.

My main concern in the present update lies with the forecast of the fossil fuel emissions for the year 2015. Even the emission data for 2013 and 2014 are already based on preliminary data and needed various adjustments to make them compatible with the more consolidated emission data that are available only up to 2012 in this iteration. As the authors concede, these preliminary estimates in past assessments had to be substantially revised in the next assessment; sometimes beyond their previously assigned, perhaps too optimistic, uncertainty bracket. Extrapolating the consolidated emissions of UNFCC/CDIAC beyond 2011/12 for 2013 and 2014 makes sense, since they are confronted by the observational data from the atmosphere and the modelled ocean sink for these years and are thus in support of Earth system science as a preliminary assessment of the global carbon budget for these years. However the forecast of the fossil emissions for 2015 is just standing there without any connection to Earth system science; what is its purpose? Is it included for political reasons, because the forecast based on the data up to August 2015 indicate a tantalising levelling of the emissions forecast for 2015? But if so, is ESSD really the right outlet for this? Who reads ESSD? Should not this forecast, if reliable, be much more prominently announced, perhaps as an opinion piece in Nature or Science? The methodology could then also be properly reviewed by socio-economists; I do not have the expertise to do this given the short 7-day period allowed for making this review. Socio-economic datasets are not listed specifically in the subject areas of ESSD. I suggest to remove this forecast and keep in ESSD the robust natural science, as in the past.

Specific comments:

p11, L11 ff: Liu et al make a case for overestimating CO<sub>2</sub> emissions from China. However a recent news item e.g. in the NY times (<http://www.nytimes.com/2015/11/04/world/asia/china-burns-much-more-coal-than-reported-complicating-climate-talks.html>) based on the reported emissions in China’s Energy Statistics Yearbooks comes to a quite different conclusion. 600 million tons of coal more consumed in 2012 is a large number; exceeding the reported uncertainty on fossil emissions of 5-10%. While probably an issue of data analysis/conversion factors etc. can this not be addressed more clearly here? I guess this is touched upon in section 3.2.1, but without any clear statement on which of these different estimates can be trusted.

p21, L16 ff : what means “boundary conditions” in this context? This whole section 2.2.4 has many jargon terms which are not explained (e.g. “IPCC Tier 1 type approach”, “FRA data” etc.). These terms should be defined in order to make the section readable without going to the original cited literature.

p35, section 3.1.3, and legend to Figure 8: The term “surface CO<sub>2</sub> flux” is ambiguous. Better to replace it by “surface CO<sub>2</sub> sink” or perhaps more accurate “non-fossil fuel atmosphere-surface CO<sub>2</sub> flux”. Especially since the fossil emissions (which are also a surface-atmosphere flux) are not included here. It’s also somewhat questionable, why the land-use flux is included here...

Table 8 and Figure 2: perhaps a minor point, but my calculator gives for the error in the residual land sink in the 2005-2014 budget a value of 0.87 PgC/yr, which, if properly rounded, gives 0.9 PgC/yr, not 0.8 PgC/yr as shown here.

Figure 6 and Figure 8: I understand that the authors would like to use the same y-axis scale in the shown 3 panels. But this hides a lot of the detail of the displayed curves. Why not use the same ratio of y-units (GtC/yr) per cm, but have min- and max value different in the panels? This would allow for showing more detail while still preserving the correct size of the displayed variability for comparison among the panels.

Spreadsheet:

Explain the red colours: do these denote the preliminary extrapolated values or are they changes since the last update of the global carbon budget? If the former, why are the values for 2012 in the fossil table red, while in the main text the UNFCCC/CDIAC data go all the way to 2012? Or if the latter, then the corresponding numbers in the ocean and land sink (e.g. for 2014) should also be coloured.