Biogeosciences Discuss., 9, C588–C592, 2012
www.biogeosciences-discuss.net/9/C588/2012/

Biogeosciences Discussions

Interactive comment on "RECCAP uncertainty" *by* I. G. Enting et al.

Anonymous Referee #2

Received and published: 5 April 2012

1 General comment

This overview paper is one of the chapters contributing to the Regional Carbon Cycle Assessment and Processes synthesis coordinated by the Global Carbon Project. It discusses and classifies the sources of uncertainties for carbon budget estimations. This paper written on commission should be an ambitious and fascinating document. It may actually be too esoteric in its present form not to disappoint the reader. Significant work remains to be done to vulgarize and broaden the topic.

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2 Detailed comments

- p.1830, l.1: at the scale of regions (ie the RECCAP scale), the world can be considered as deterministic: it may not be obvious to the reader why characterizing regional carbon budget is inherently a statistical task.
- p.1830, l.9: The comparative could be omitted ("hard" rather than "harder") . For inversions for instance, uncertainties are not harder to compute than the mean because both come together.
- p.1830, l.15: The expression "designed to explicitly incorporate the spatial dimension" is not clear.
- p.1830, l.20: two analyses confirming each other do not necessarily reduce uncertainties because they may provide redundant information.
- p.1830, l.26 and p.1850, l.11: Referencing a paper in preparation is not appropriate.
- p.1831, l.21 and p.1851, l.13: The correlations are among the flux errors and not among the fluxes.
- p.1831, l.25: the top-down ellipse is not contained in the bottom-up ellipse, which indicates that the top-down ellipse has missed key bottom-up information. This is a counter example of how top-down should be used.
- p.1833, l.3: The covariance is not the most minimal description of the uncertainty, but rather bounds (actually used p.1848, l.1). Also nothing is said about systematic errors. This is a typical example of a paragraph that should be made broader.

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- p.1833, l.5: Using “low-resolution”/”high-resolution” as an example may make the matrix singular. Also, C was defined as a grid-point matrix in the previous section. The example may therefore not be appropriate.
- p.1835, ii: this point is not clear.
- p.1835, l.11: “disaggregation by process” is not clear.
- Section 3: this section piles up references but lacks numbers. The authors should say what they have learned from all these studies. For instance, Section 3.2 distinguishes four classes of model errors, but no indication is given about their relative importance.
- p.1837, l.1: this section only deals with a subset of models used in RECCAP (physical models of the ocean and of the terrestrial biosphere) and its title should reflect this fact.
- p.1837, l.2: “can” should be removed.
- p.1837, l.20-21: the sentence lacks substance. It basically says that the uncertainty of parameters arise when calibration is used and when calibration is not used.
- p.1837, l.24: OptIC is not defined.
- p.1837, l.26, 29: models of what?
- p.1838, l.7: what is the metric of uncertainty here?
- p.1838, l.12: “harmonized” would be a better word.
- p.1840, l.13: the reason for referencing Ciais et al. (2010) here is obscure.

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- p.1840, l.25: there has been other attempts like Lauvaux et al. (BG, 2009), who explicitly computed the error covariances. Their results can be easily exploited here to put errors in an order of importance.
- p.1840, l.25: There were similar studies before the one by Michalak et al. (2005), e.g., Dee and da Silva (Mon Wea Rev, 1999).
- p.1840, l.13: the reason for referencing Chevallier et al. (2010) here is obscure.
- p.1842, l.5: "for the purpose of RECCAP" should be moved before the ":". Indeed this caveat is specific to RECCAP.
- p.1842, l.5: there is also a positive side. This statement means that the inverse modelers have already estimated the "exabyte covariance matrix" (Section 2.1) for some of the bottom-up information. It would be very relevant and interesting here to discuss what they have learned.
- p.1847, l.9: "significant".
- p.1847, l.15: some information from Rayner et al. (JGR, 2010) would be interesting here.
- p.1849, l.9-12: the authors should say which uncertainty metric they use.
- p.1850, l.10-11: how does the 0.64 PgC/yr figure (actually not defined) compare with those from the other uncertainties listed in Section 3.2?
- p.1851, l.4: "North"
- p.1852, l.25: examples of other contexts should be given.
- p.1853, l.13: the added value of repeating those elements here is not obvious.
- p.1854, l.5: the sentence is too short to be of real interest to the reader.

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Interactive Comment

Interactive comment on Biogeosciences Discuss., 9, 1829, 2012.