

Geoscientific Model Development An interactive open-access journal of the European Geoscience

EGU Journals

EGU



About

Editorial board Articles GMD

- Recent final revised papers
- Volumes and issues
- Special issues
- Full text search
- Title and author search

Articles GMDD

Subscribe to alerts

Peer review

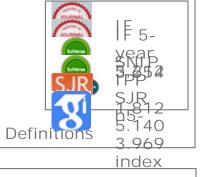
For authors

For reviewers

User I D	
Password	
New user? Lo	ost login?

Follow @EGU_GMD

Journal metrics



Abstracted/indexed

- Science Citation Index Expanded
- Current Contents/PCE
- Scopus
- ADS
- Chemical Abstracts
- CLOCKSS
- CNKI
- DOAJ
- EBSCO
- GBA
- Gale/Cengage
- GeoBase
- GeoRef
- Google Scholar
- J-Gate
- Portico
- ProQuest
- World Public Library

Geosci. Model Dev., 6, 45-55, 2013 www.geosci-model-dev.net/6/45/2013/ doi:10.5194/gmd-6-45-2013 © Author(s) 2013. This work is distributed under the Creative Commons Attribution 3.0 License.

Article Metrics Relat

Related Articles

11 Jan 2013

Quantifying the model structural error in carbon cycle data assimilation systems

S. Kuppel, F. Chevallier, and P. Peylin

Laboratoire des Sciences du Climat et de l'Environnement, UMR8212, CEA-CNRS-UVSQ, 91191 Gif-sur-Yvette cedex, France

Received: 06 Jul 2012 – Published in Geosci. Model Dev. Discuss.: 14 Aug 2012 Revised: 21 Nov 2012 – Accepted: 26 Nov 2012 – Published: 11 Jan 2013

Abstract. This study explores the impact of the structural error of biosphere models when assimilating net ecosystem exchange (NEE) measurements or CO_2 concentration measurements to optimise uncertain model parameters within carbon cycle data assimilation systems (CCDASs). This error has been proven difficult to identify and is often neglected in the total uncertainty budget. We propose a simple method which is derived from the model-minus-observation mismatch statistics. This

diagnosis is applied to a state-of-the-art biogeochemical model using measurements of the net surface CO_2 flux at twelve sites located in temperate, deciduous, broadleaf forests. We find that the structural model error in the NEE space has a standard deviation of 1.5 to 1.7 gC m⁻² d⁻¹, without a significant correlation structure beyond the lag of a few days, and a large spatial structure that can be approximated with an exponential decay of e-folding length of 500 km. In the space of concentrations, its characteristics are commensurate with the transport errors, both for surface air sample measurements and total column measurements. The inferred characteristics are confirmed by complementary optimality diagnostics performed after site-scale parameter optimisations.

Citation: Kuppel, S., Chevallier, F., and Peylin, P.: Quantifying the model structural error in carbon cycle data assimilation systems, Geosci. Model Dev., 6, 45-55, doi:10.5194/gmd-6-45-2013, 2013.

