

CarboAfrica modelling workshop 2007 short report

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The CarboAfrica modeling workshop took place in at the Max Planck Institute for Biogeochemistry in Jena, April 12.-13. 2007. The main goals of this workshop were to

- organize to the first CARBOAFRICA model intercomparison at continental scale
- discuss – particularly in this modelling context – the links and collaboration with the Africa Carbon Exchange Project (ACE)
- examine the link to the site level and fire workpackages

The objective of this first CARBOAFRICA model intercomparison at continental scale is to provide a baseline data set of modeled seasonal and interannual variability and associated climate sensitivity of ecosystem-atmosphere CO₂ and water exchange. This data set will represent the knowledge ‘prior-to-CARBOAFRICA-data ingestion’ about carbon and water cycles as implemented in the participating models, will help to identify areas and conditions with large uncertainties and can serve as a reference for various follow on modeling work (e.g. effects of including dynamic vegetation and land-use change, fire emissions, and using different climate data, improvements via data assimilation of ecosystem level data).

Briefly, a modeling protocol was delineated that contains elements from the ACE modeling study with the SIB2 model (Williams, Hanan et al. in prep.) and the CARBOEUROPE-IP integration component model intercomparison (Reichstein et al, Vetter et al. 2007) as outlined in Table 1. Participating models include: ANN, JULES, LPJ-DGVM, LPJ-GUESS, MOD17+, ORCHIDEE, SIB2 (from ACE; see below). A more detailed protocol with minimum and optional requirements will follow until end of April.

A deadline was not fixed, but a tentative timeline may be: data sets prepared until August 1, model runs performed until October, 1, first comparative analysis by end of the year. The limiting factor likely is the preparation of the extended and corrected NCEP meteorology data set.

Table 1: Brief overview about model intercomparison protocol at continental scale

Temporal coverage and res.	Spatial resolution	Data sources	Outputs
Period 1982-2003, 6 hourly meteo input (NCEP II based) (as ACE setup for diagnostic models) Ideally* 1948-2003, 6 hourly, with spin-up 1948-1958, then transient (ss in CE-IP)	1 degree lat-lon.; subgrid heterogeneity represented by fractions of vegetation types as veg.type specific NDVI, fPAR	<u>Meteo:</u> NCEP II: Swrad, u, Tair, spec.hum., precip adjusted as ACE <u>Soil:</u> IGBP DIS textures <u>Vegetation:</u> run for IGBP classes with mixtures as defined below Vegetation indices: AVHRR-GIMMSg, NDVI; aerosol seasonality bias corrected with MODIS (ACE product)	GPP/NPP/TER/ Ra/Rh/NEP/ ET, Transp./ gcan, soil water content, vegetation stress; above- and belowground carbon pools daily
* needs correction of NCEP with CRU as in ACE			

For model runs for the very recent years we agreed to use state-of-the-art remote sensing products and potentially higher-resolution meteorological data from ECMWF. The availability of NDVI/fPAR remote sensing products from different sources will be checked (SEAWIFFS-JRC: Dario; A. Huete inhouse 4km NDVI: Niall; Spot Veg: Nicolas). On landcover/vegetation products WP1 where J. Latham/FAO is involved needs to be consulted.

Collaboration between ACE and CARBOAFRICA modeling was agreed on. The model intercomparison was viewed as a valuable extension of previous ACE modeling and compatibility with the past and current ACE modeling will be pursued. ACE SIB2 will participate in the model intercomparison, either with runs already performed or with new ones. We agreed on mutual exchange of data sets and algorithms between ACE and CARBOAFRICA. That means currently that data sets and algorithms developed by ACE will be largely used by CARBOAFRICA, and that any modifications and extensions will be made available to ACE or successor projects. Similarly mutual access to flux data is suggested.

Based on previous email exchange and discussions during the workshop, the modeling WP participants suggest Niall Hanan (who currently coordinates the ACE project) as member of the advisory board from the modeling perspective. A sufficient level of independence despite the ACE-CARBOAFRICA collaboration is assumed.

The measurements needed to drive and validate model at the intensive observation sites were discussed with Werner Kutsch (WP2 lead)

The importance of adequate characterization of soil hydrology (within rooting zone), seasonality of grass and tree phenology (incl. senescence and drying for grasses), distribution of carbon pools above and belowground, litter amount and chemistry and photosynthetic parameters incl. maximum stomatal conductance were highlighted. Werner Kutsch is asked to send around the updated version of the observation protocol for final comments.

Fire will not be treated in the intercomparison, but in WP4 with the single LPJ-guess-SPITFIRE and evaluated with remote sensing based approaches.

(Markus Reichstein)