Nonlinear Processes
in Geophysics

Discussions

NPGD

Interactive
comment

Interactive comment on "Extended Application of the CNOP-P method in the Inner Mongolia using the Common Land Model" *by* B. Wang et al.

B. Wang et al.

wangbo_sdu@163.com

Received and published: 17 February 2016

Reply to EC1-supplement:

First of all, all authors of the npg-2016-13 thank Dr. Talagrand for the valuable questions. We'd like to give proper revise to our manuscript in the future. Here, we give the replies as follows:

1. In our research, the Common Land Model is a single-point offline model, which considers the biophysical, biochemical, ecological and hydrological processes. The energy and water transmission among soil, vegetation, snow and atmosphere is well described. This model has one vegetation layer with a realistic photosynthesis-conductance model, 10 unevenly spaced vertical soil layers, and five snow layers (depending on the total snow depth). Model state variables include snow and soil

Full screen / Esc

Printer-friendly version

Discussion paper

temperature, ice lens mass and liquid mass in each layer, leaf temperature, canopy water storage, nondimensional snow age, snow-layer number, and snow-layer thickness. This model also has characteristics as follows: Two big leaf model; Two-stream approximation for canopy albedoes calculation; a photosynthesis–stomatal conductance model for sunlit and shaded leaves separately; using a well-built quasi-Newton–Raphson method for simultaneous solution of temperatures of the sunlit and shaded leaves.

2. In our study, the control vector p is a 2-dimension variable, and it contains sand and clay contents of the soil. In the model CoLM, sand and clay (units: %) are independent inputs in CoLM, and for each of the grid point, there is one couple of values for sand and clay contents of the soil. In view of the units, in our experiments, both in the single-parameter experiment and the double-parameter experiment, these parameters should satisfy constraint condition(see line 312)

3. No, we haven't normalized objective and reference functions, and we haven't compared these two functions in our manuscript.

In our research, these two functions are obtained by the same variables, the simulation and observation of shallow soil moisture, the units of these variables are same, and the reference function is also a objective function. For distinguished from the objective function we defined with Eq. (9), we called the function defined with Eq. (10) as reference function. At the same time, the results that we want to verify is, which kind of experiments can get the more accurate optimal results, so, we just compare the three experimental results for objective function and reference function separately. Our results showed that, the conclusions are same for both of these two functions.

4. From the reply to '3.', we can get a guess that, if we choose other kind of objective function, such as associated with physical measures, maybe we can get the same conclusions with the three experiments in our manuscript.

5. Yes, in view of the results of our manuscript, with the 'extended CNOP-P' method,

we can get the minimization of the objective function as variational assimilation method can do. But we also can use this method to obtain the maximal growth of the model which has no adjoint model.

Please also note the supplement to this comment:
http://www.nonlin-processes-geophys-discuss.net/npg-2016-13/npg-2016-13-AC1-supplement.pdf

---

Interactive comment on Nonlin. Processes Geophys. Discuss., doi:10.5194/npg-2016-13, 2016.