

## **Final Circular**

### **2015 International Workshop on “Quantifying Uncertainties in Land Surface Models”**

May 25-27, 2015, Beijing, China

Dear Colleagues,

It is our pleasure to announce the 2015 International Workshop on “Quantifying Uncertainties in Land Surface Models”, to be held on May 25-27, 2015, in Beijing, China. This workshop will be hosted by Beijing Normal University (BNU) and co-sponsored by Beijing Normal University, Chinese Natural Science Foundation and Australia Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Land surface models (LSMs) are an integral part of the Global Climate Models (GCMs) and Earth System Models (ESMs). They play a critical role in increasing our understanding of global climate changes and assess the impacts of anthropogenic activities on those changes. LSMs have been evolved from the original fixed boundary layer for the first generation GCMs, to simple bucket models in the 1960s and 1970s, to more physically based models such as Biosphere Atmosphere Transfer Schemes (BATS) and Simple Biosphere (SiB) models in the 1980s, to today’s 21<sup>st</sup> century LSMs which consider not only global water and energy cycles, but also biogeochemical cycles involving Carbon, Nitrogen and Phosphorous. Today, there are many different LSMs available and they are getting increasingly more complex. Meanwhile, when those LSMs, either as part of GCMs or ESMs or as stand-alone LSMs, are used to simulate and project the changes in land surface processes under various global change scenarios, the model outputs display tremendous discrepancies, signalling large uncertainties in land surface modelling. Furthermore, those uncertainties are not decreasing, but increasing, as the newer, more sophisticated and more physically realistic LSMs are developed. It is imperative for land surface modellers to understand the nature of uncertainties in land surface modelling, develop sensible ways to quantify

them, and ultimately reduce them. The purpose of this workshop is to bring together land surface modellers from several major LSM research centers to discuss the state of research on uncertainty analysis of LSMs, and explore ways forward for quantifying and reducing uncertainties in land surface modelling.

The main questions to be addressed are:

- (1) What are the most important parameters in the predicted annual evapotranspiration (ET) and gross primary production (GPP) of different plant functional types? Why the sensitivities are different among different models?
- (2) What trends over the last 30 years we have observed in ET, GPP? How well each model can reproduce those trends? What the key controlling mechanisms in the simulated responses by each model?
- (3) How different parameter sensitivities among different model affect their simulated responses of ET, GPP and GPP/ET over the last 110 years to increasing atmospheric CO<sub>2</sub>, climate change and nitrogen deposition? Why the simulated trends are different among different models?
- (4) How can we separate model structural errors from parameter errors? How different the model structural systematic errors differ among different models by comparing with observations from last 30 years?
- (5) What effects those systematic structural model errors vis parameter errors have on the predicted responses of ET, GPP and GPP/ET over the next 95 years by different models?
- (6) What observations do we need to reduce the uncertainties of predicted responses over the next 100 years?

Focusing on above questions, we plan to have the following themes for the workshop:

- A. Quantification of uncertainties of global land surface models
- B. Parameter sensitivity analysis: why are model outputs are so different?
- C. Observations: what trends have we identified in regional and global ET, GPP and GPP/ET and how to use observations to constrain model simulations?

D. Model error analysis: what can we learn from different models to reduce model error?

The expected outcomes of this workshop include (1) the assessment of major sources and magnitude of uncertainties in land surface modelling; (2) a review of major methodological development and applications for uncertainty quantification of LSMs; (3) proposing ways forward on reducing uncertainties in LSMs.

The meeting is tentatively scheduled on the campus of Beijing Normal University. Information on meeting logistics will be forthcoming. The participants are expected to be responsible for their travel and lodging expense. For more information, please contact meeting organizers: Prof. Qingyun Duan of Beijing Normal University: [qyduan@bnu.edu.cn](mailto:qyduan@bnu.edu.cn) and Dr. Yingping Wang of CSIRO: [Yingping.Wang@csiro.au](mailto:Yingping.Wang@csiro.au).

## **Agenda: 25-26 May 2015, Beijing Normal University**

**9:00-9:15 Introduction and logistics for the workshop:** *Qingyun Duan, Beijing Normal University, China*

### **A. Quantifying uncertainties of global land models: (chair: Professor Qingyun Duan)**

9:20- 9:50 Identifiability methods for environmental models: *Professor Tony Jakeman Australian National University, Australia*

9:50- 10:20 Major uncertainties in global land models: some key issues: *Yingping Wang, CSIRO, Australia*

*10:20-10:50 Morning tea break*

10:50-11:20: The Use of Perturbed Physics Ensembles at the Hadley Centre: *Eddy Robertson, UK Metoffice, UK*

11:20-11:50: Benchmarking global land surface models in CMIP5: analysis of ecosystem water- and light-use efficiencies within a Budyko framework: *Dr Longhui Li, University of Technology Sydney, Australia*

11:50-14:00 lunch and mid-day break

### **Theme B. Parameter sensitivity analysis: why model outputs are so different (Professor Tony Jakeman)**

14:00-14:30 Methodology for sensitivity analysis: *Dr Wei Gong, Beijing Normal University, China*

14:30-15:00 Sensitivity analysis of parameters in global land surface models: *Jianduo Li, Beijing Normal University, China*

15:00-15:30 UQ-PyL - A GUI platform for uncertainty quantification of complex dynamical models: *Chen Wang, Beijing Normal University, China*

*15:30:1600 afternoon tea break*

15:30-16:00 Sensitivity of the Community Land Model to biogeochemical and biogeophysical parameters: *Daniel Ricciuto, Oakridge National Lab, USA*

16:00-16:30 Narrowing the uncertainty range of land surface model parameters-Adjoint method applying to Richards' equation: *Professor Diandong Ren, Curtin University, Australia*

**16:30:17:30 Social interaction**

**18:00: Dinner**

**Theme C. Observations: what trends have we identified in regional and global ET, GPP and GPP/ET? (Jiafu Mao)**

9:00-9:30 interannual variability of global terrestrial carbon cycle: *Professor Shilong Piao, Peking University, China*

9:30-10:00 Spatio-temporal patterns of GPP simulation based on BEPS and LUE models in China from 1982 to 2012: *Professor Shaoqiang Wang, Chinese Academy of Sciences, China*

10:00 to 10:30 Global patterns and the underlying biogeographic controlling mechanisms of terrestrial ecosystem carbon fluxes: *Professor Quirui Yu, Chinese Academy of Sciences, China*

*10:30 -11:00 morning tea break*

11:00-11:30 Contributions of different drivers to the global terrestrial carbon sink during 1981-2012, *Professor Weimin Ju, Nanjing University, China.*

11:30-12:00 General discussion

12:00-14:00 Lunch and midday break

**Theme D. Model error analysis: what can we learn from different models to reduce model error? (Shilong Piao)**

14:00-14:30 On assimilating atmospheric CO<sub>2</sub> concentration data into multi-ecosystem models for estimation of global surface carbon flux: *Professor Xiaogu Zheng, Beijing Normal University, China*

14:30 -15:00 Impacts of natural and human forcings on the global land evapotranspiration and vegetation growth: *Dr Jiafu Mao, Oak Ridge National Laboratory, USA*

15:00-15:30 Model parameter uncertainty analysis based on comprehensive carbon component measurements: *Dr Quan Zhang, Wuhan University, China*

*15:30-16:00 Afternoon tea break*

16:00-16:30 *Summary of the workshop: Qingyun Duan, Beijing Normal University, China*

**18:00 Dinner**

### **Accommodation**

We have negotiated with Jingshi Hotel to allocate a block of rooms for participants. The hotel rate for the workshop is ¥608/night (CNY) for a standard room (single large bed).

Jingshi Hotel Location:

北京市海淀区新街口外大街 19 号北京师范大学京师大厦

Beijing Normal University, Jingshi Hotel, 19 Xijiekouwai, Haidian District, Beijing

Jingshi Hotel [Tel:086-10-58802288](tel:086-10-58802288)

Beijing Capital Airport to Jingshi Hotel by taxi : about 100 CNY

### **Meeting Location**

北京市海淀区学院南路 12 号北京师范大学京师科技大厦 B 座 520 报告厅

520 Conference Room, Jingshi Keji Building Block B, 12 Xueyuan Nan Road, Haidian District, Beijing

### **Contacts**

Qingyun Duan

E-mail: [qyduan@bnu.edu.cn](mailto:qyduan@bnu.edu.cn)

Tel: (010) 58804191

Ying-Ping Wang

E-mail: [Yingping.Wang@csiro.au](mailto:Yingping.Wang@csiro.au)



# 北京师范大学 平面图

BEIJING NORMAL UNIVERSITY



注释:

- 教学科研区及学生宿舍区楼宇名称
- 家属区楼宇名称
- 大门及道路名称

**京师大厦**

**Jingshi Hotel**

**京师科技大厦**

**Jingshi keji Building**

设计制作: 北京师范大学信息网络中心  
制作时间: 2014年8月