WGCM workshop on model tuning

6-8 October 2014
Garmisch-Partenkirchen, Germany

Monday

9:00-09:45 :   **Welcome and Introduction**
From Pasadena to Garmisch-Partenkirchen (Frédéric Hourdin)
Expectations from WGCM and CMIP (Sandrine Bony)
Meeting : presentation and expectations (Thorsten Mauritsen)

Part I : Strategies of modeling groups

Chaired by : Larissa Nazarenko and Chris Golaz

*In the first part we will have modeling groups present their tuning strategies. The emphasis here is on **global coupled climate models** and the particular issues related to tuning these. Presentations can include the specific tuning procedure, describing tuning targets and weighing, the processes that are tuned and how they influence results, and perhaps what you think about model tuning and what are the remaining outstanding problems. We are **neither** interested in details of your model or institute, **nor** advertising how good your model is.*

09:45 (15+10) : **A brief history of AOGCM tuning methods over the past 30 years or so**
Ronald J Stouffer

10:10 (10+5) : **Distress and dilemmas in developing and tuning models**
Hideaki Kawai

10:25 (10+5) : **Tuning and development of EC-Earth 3.1**
Jost von Hardenberg

10:40 **Coffee break**

11:10 (15+10) : **Tuning Strategy in the Community Earth System Model**
Gokhan Danabasoglu, Jean-Francois Lamarque, Andrew Gettelman

11:35: (10+5) : **Towards Credible and Transparent Model-Based Climate Science**
John Scinocca

12:00: (10+5) : **Tuning the GISS climate model to the past climate**
Larissa Nazarenko

12:15 : (10+5) : **CNRM-CM coupled model tuning protocol**
David Salas

12:30 : **Lunch Break**
14:00 : **Social event: Hike around Eibsee**
15:30 : **coffee break**

16:00 (15+10) : **On the development, tuning procedure, and parameter sensitivity of the climate model MIROC**
Hiroaki Tatebe

16:25 (15+10) : **Approaches for the tuning of the radiative balance in the IPSL climate model**
Frédéric Hourdin, et al.

16:50 (10+5) : **Tuning climate model INMCM**
Evgeny Volodin

17:05 (10+5) : **Tuning with expensive model physics: MPI-ESM-HAM, a progress report**
Doris Folini

19:00 **Dinner**

20:30 : **Why historians, sociologists and philosophers are interested in climate modelling.**
Hélène Guillemot (Science and Technology Studies) and Johannes Lenhard (philosopher)

9:00 : **Synthesis and discussions on tuning strategies**
Chaired by : Andrew Gettelman, Larissa Nazarenko and Chris Golaz

10:30 : **Coffee Break**

Session 1, Tuning models to past climate change

Chaired by : Karl Taylor and David Salas

To some extent reliable climate models should be able to reproduce the climate changes and variations that have been observed in the recent and more distant past. Exact correspondence, however, between observed and simulated climate changes is not expected because of internal (unforced) climate variability. In this session discussion will focus on the potential for using past climate history to constrain climate models and the implications of such practices for simulation of future climate, including quantification and perception of projection uncertainty. Contributions are invited on methods of tuning to 20th century climate change (e.g., modifying cloud feedbacks, aerosol indirect effects, or ocean heat uptake efficiency), use of historical and paleoclimate information to constrain climate sensitivity, and ways to address the uncertainty in unforced climate variability and other factors that can hamper efforts to tune models precisely. The session should lead to an open discussion of this somewhat controversial practice and the difficulties associated in communicating it to those outside the field.

11:00 (15+5) : **Tuning the climate sensitivity of MPI-ESM1.1**
Thorsten Mauritsen

11:20 (5+5) : **Why it could make sense to transparently tune the climate sensitivity range of ESMs**
Florian Rauser

1130 (10+5) : **Tuning aerosol in-direct effect. Include new processes or tune old**
Øyvind Seland

11:45 (10+5) : **Cloud tuning and twentieth century warming**
Chris Golaz

12:00 : General discussion

12:30 : **Lunch Break**

Session 2, Model development, tuning and evaluation

Chaired by : Masahiro Watanabe and Catherine Rio

Structural development of model physics and numerics, parametric tuning and evaluation against observations goes hand-in-hand at multiple levels during the model development cycles. The session will accommodate examples and perspectives on the model development process. For instance cases of implementing new or improved parameterizations where the re-tuning of the model was challenging, perhaps due to compensating errors, or possibly if model errors of disparate kinds had to be weighed against each other. But also perspectives on the model development process as a whole are welcomed, for instance how community-wide evaluation of CMIP influences the model development process.

14:00 (10+5) **: Simulation of East Asian-Western Pacific Summer Monsoon: From CMIP3 to CMIP5**
Tianjun Zhou

14:15 (10+5) : **On the effectiveness and limitation of parameter tuning**
Tomoo Ogura

14:30 (15+5) : **How Bright is a Cloud? Parametric Tuning in the Model Development and Evaluation Process**
Andrew Gettelman

14:50 (10+5) : **The "process-oriented" tuning strategy of the LMDZ model**
Catherine Rio, Frédéric Hourdin, Arnaud Jam and Fleur Couvreux

15:05 (10+5) : **Designing a Sensitivity Model Intercomparison Project (SensMIP)**
Peter Gleckler and David Neelin

15:20: **Discussion**

15:50: **Coffee break**

Session 3, Challenges and prospects in high resolution climate modeling

Chaired by : Peter Caldwell and Jie Zhang

Climate modeling has always been pushing the boundaries of our computational power requiring both large and long calculations that increases exponentially with resolution. The tuning and spin-up of high resolution models is particularly challenging – relative to mainstream resolutions – because of the high cost of running these models to equilibrium. The session aims at sharing experience, methods and strategies to achieve high resolution modeling, both success stories as well as failures are welcome. Further, possibly prospects of what can be achieved with higher resolutions and what problems persists at higher resolutions are welcome.

16:20 (15+5) : **High-Resolution Tuning Overview and ACME Tuning Plans**
Peter Caldwell

16:40 (15+5) : **Results and Tuning Lessons from High and Variable Resolution Climate Simulations using the Community Earth System Model**
Andrew Gettelman

17:00 (10+5) : **Tuning a high resolution AGCM to improve its performances in simulating East Asia Summer monsoon**
Jie Zhang and Tongwen Wu

17:15 : **Discussion**

Wednesday

Session 4, From short timescales to climate

Chairman : Daniel Klocke and Alistair Sellar

Most atmospheric processes relevant to a models climate occur on relatively short timescales from nanoseconds (radiation) to hours to months (convection). Such processes can be studied and improved leveraging weather forecasts, DNS/LES/CRM and field campaigns. The session welcomes contributions describing seamless approaches using nearly the same model for both weather and seasonal prediction to climate modeling, tuning experience from weather forecasting models, as well as innovative observational studies with a linkage to modelled global climate.

09:00 (15+5) : **Using numerical weather prediction methods to improve climate projections**
Daniel Klocke

09:20 (15+5) : **How the Met Office develops a global model for timescales from NWP to climate**
Alistair Sellar

09:40 (10+5) : **Is tuning based on hourly forecast range valid at annual range?**
Martin Köhler

09:55 : **Discussion**

10:30: **Coffee break**

Session 5, Automatic or alternative tuning methods

Chairman : Florian Rauser and Danny Williamson

Climate model tuning at most centres tends to be artisanal, a time-consuming and slow process, carried out by skilled persons or groups frequently making subjective choices based on their preference and experience. Therefore several different approaches have been devised recently to tune models automatically using objective tuning targets and weighing. The session welcomes contributions describing such automatic methods, as well as other possible alternatives to the normal manual tuning process or examples of applications e.g. to perturbed physics ensembles.

11:00 (5) : **Introduction remarks**
Florian Rauser

11:05 (12+3) : **Statistical tuning for GCMs with history matching and emulation**
Danny Williamson

11:20 (7+3) : **Statistical model validation**
Jean-Francois Lamarque

11:30 (12+3) : **Parametric sensitivity and auto-tuning of precipitation in the CAM5**
Yun Qian

11:45 (7+3) : **The Parametric Sensitivity of CAM5's MJO**
Hsi-Yen Ma

11:55 : **Discussions**

12:30: **Lunch break**

14:00 **Discussions**

15:30 **coffee break**

16:00 **summary and planning**

17:00 **end of meeting**