Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California

División de Oceanología
Departamento de Oceanografía Física
Grupo de geomodelación cuantitativa y de sistemas
Quantitative and Systems Geomodelling Group

First Call: Physics dynamics coupling in geophysical models - bridging the gap

2nd - 4th of December 2014

Location: CICESE, Ensenada, Baja California, Mexico

Organizing Committee:
Markus Gross (CICESE)
Christiane Jablonowski (University of Michigan)
Sylvie Malardel (ECMWF)
Nigel Wood (UK Met Office)

Abstract

The coupling of physics parameterizations to the resolved fluid dynamics is an important aspect of geophysical models. However, often model development is strictly segregated into either physics or dynamics. Hence, this area has many more unanswered questions than in-depth understanding. Furthermore, recent developments in the design of dynamical cores (significant increase of resolution, move to non-hydrostatic equation sets etc), extended process physics (prognostic microphysics, 3D turbulence, non-vertical radiation etc) and predicted future changes of the computational infrastructure (Exascale with its need for task parallelism, data locality and asynchronous time stepping for example) is adding even more complexity and new questions. This workshop aims at bringing the international leaders in the field together in order to exchange ideas on the state of the art, facilitate collaboration and instigate joint projects.

1 Proposed sessions

Contributions do not have to fit exactly into any of the five sessions below. They are intended to illustrate the aims of the workshop and outline to subjects of interest. Any contribution will be welcome. The sessions anticipated are:

- **Background**: This session will outline the theoretical background and motivation behind some physics-dynamics coupling schemes currently in use. It will discuss advantages and disadvantages and methods of analysis (in simplified contexts).
- **Evidence in current models**: Impact of different schemes and experiences, for example using time-step convergence studies.
- **Future directions**: New dynamical core designs - new issues? Is the next generation dynamical cores more or less compatible with the next generation of physical parameterizations? Some of the upcoming issues are Finite Element discretizations, revision of the column structure, horizontal communication of parameterizations and dramatic changes in the computing architecture etc
- **Test strategies**: It is important to be able to identify good coupling schemes from inferior ones early on in the development cycle. Once the theoretical analysis of the scheme is complete, how can further evidence be collected to ensure the chosen scheme performs as anticipated? The full NWP trial stage usually only offers limited scope for (costly) change. The difficulty is to design tests with sufficient signal and validity, without being too complex such that they are useful in the early development/evaluation phase.
- **(Thermodynamic) compatibility**: Different formulations use different variable sets and coordinates, such as height versus pseudo-height, Lagrangian or pressure coordinates. Some schemes work with the constant pressure, others in the constant volume approximation (c_p vs. c_v). Development and practice often forces a mixture between physics and dynamics formulations, as rarely a whole new dynamical core is developed alongside a whole new suite of physical parameterizations. This session aims at illustrating the issues and potential impacts.

2 Presentation details

Keynote lectures are expected to be around 45 minutes and contributed lectures between 15-25 minutes. The conference language will be English. We envisage that the presented papers might lead to a joint publication in a refereed journal, and invite all authors to consider contributing to this effort (please contact Markus Gross for more details).

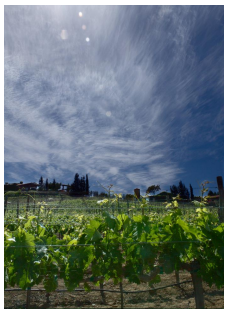
3 Fees and costs

No participation fee will be charged. Limited funds exist for refreshments. The delegates may need to pay for the workshop dinner.

4 Travel

Ensenada is located approximately 100km south of San Diego and can be reached easily from either the San Diego (USA) or Tijuana (Mexico) airport.






5 Accommodation

The main hotel will be the hotel Coral and Marina, located only a short distance from CICESE.

6 Registration

Please register online at your earliest convenience. Note that in the first instance only name and email address are required. However, it would greatly assist the organizers if you would complete the registration with as much detail as possible. The registration can be amended/completed later.

Email mgross@cicese.mx to register your interest and for any comments, suggestions and questions!