

GABLS: the GEWEX Atmospheric Boundary Layer Study
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a) Current Status

GABLS was initiated in 2000 and endorsed as a GEWEX activity by the SSG in Barcelona, 2001. The objective of GABLS is to improve the representation of the atmospheric boundary layer in regional and large-scale models. The first focus of GABLS is on stable boundary layers (SBLs) over land. Realize that much of the warming predicted by climate models is during stable conditions over land (either in winter or at night), while at the same time the understanding and parameterization of the SBL is still very poor! GABLS aims to provide a platform in which scientists working on boundary layers at different scales will interact. Such activity is important in itself and also very relevant for other activities in GEWEX and for activities within WCRP and IGBP.

b) Last Years Accomplishments

A GABLS workshop on Stable Boundary Layers was held at the European Center for Medium-Range Weather Forecasting (ECMWF) in Reading, UK, on March 25-27, 2002. The workshop agenda covered the following topics: Modeling and parameterization experiences at the large-scale modeling centers, Progress in theory and understanding of SBLs, Large-eddy simulation (LES) of SBLs, and Observational SBL data sets (Cabauw, CASES, ARM, Lindenberg, and others). Discussion sessions were held on each of the above topics, and a planning session concluded the meeting. In total about 20 presentations were given by leading scientists and about 30 people attended the workshop where we start to lay out objectives and tasks for the next 5 years.

During the discussion sessions, it became clear that progress on the parameterization of SBLs over land would be made best by organizing our efforts into three task groups: (1) A Group working on the analysis of existing observations, who can provide data sets to validate LES results and to help scope out the parameterization problem, (2) LES modelers, who can provide detailed simulations to help guide and evaluate proposed parameterizations, and (3) Large-scale modelers who can further define the problem and provide feed back on updated parameterizations.

The management structure of GABLS was also established, with Bert Holtslag to serve as GABLS leader, and a steering committee to assist him. Ric Cederwall (Lawrence Livermore Nat. Lab.) will serve on the steering committee as an assistant to the GABLS leader. The (intended) members of the steering committee are Anton Beljaars (ECMWF), Joan Cuxart Rodamilans (University of Mallorca), Fred Bosveld (KNMI). Other key SBL researchers will be asked to join the committee, as such Larry Mahrt (OSU) and Bjorn Stevens (UCLA) already agreed.

The GABLS plans and the ECMWF workshop outcome were presented at an informal meeting at the AMS 15th Symposium on Boundary Layers and Turbulence in Wageningen, the Netherlands (Evening of 16 July 2002). About 80 conference participants joined that meeting and overall very positive feedback was received. As a first step a compilation of the CASES data set was made for a 1D benchmark study (compiled by staff members of the Meteorology and Air Quality Section at Wageningen University). In addition plans were initiated for an inter comparison of LES models.

Presentations on the GABLS plans and project aims were also presented at the AMIP workshop (15 November) and at the GMPP/WGNE meeting (18 November) in Toulouse. Very positive feedback on the future directions was given by the audience at both meetings, in particular the set up of sensitivity experiments (such as in Viterbo et al, QJRM, 1999, 125, 2401-2426).

c) Planned Accomplishments for 2003

The next step is the organization of intercomparison studies for LES and 1D models. The first case for LES models is based on the study by Kosovic and Curry (2000, J. Atmos Sci, 57, 1052-1068) and the case will be prepared and communicated by Malcolm MacVean (UKMO). Joan Cuxart Rodamilans (University of Mallorca) will chair the inter comparison of 1D models for this case.

In addition it is planned to further define the inter comparison study on basis of the observations of the SBL over land in CASES 99 (USA). A workshop on the achieved results is planned for Autumn 2003 (probably the workshop will be held in Mallorca, Spain).

A report of GABLS and the planned activities is in preparation for the GEWEX newsletter.

d) Issue for SSG attention

As mentioned before, GABLS aims to provide a platform in which scientists working on boundary layers at different scales will interact, both from the process-oriented point of view as well as the large-scale modeling point of view. At this moment mostly scientists are involved who bring expertise on process-oriented studies. Hopefully, SSG can motivate large-scale modeling centers to take part in the 1D model inter comparisons studies, as well as motivate their scientists to contribute and take part in the proposed activities!