

WCRP ACSYS/CLiC Numerical Experimentation Group

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Talk Outline

ACSYS/CLiC NEG Activities/Plans

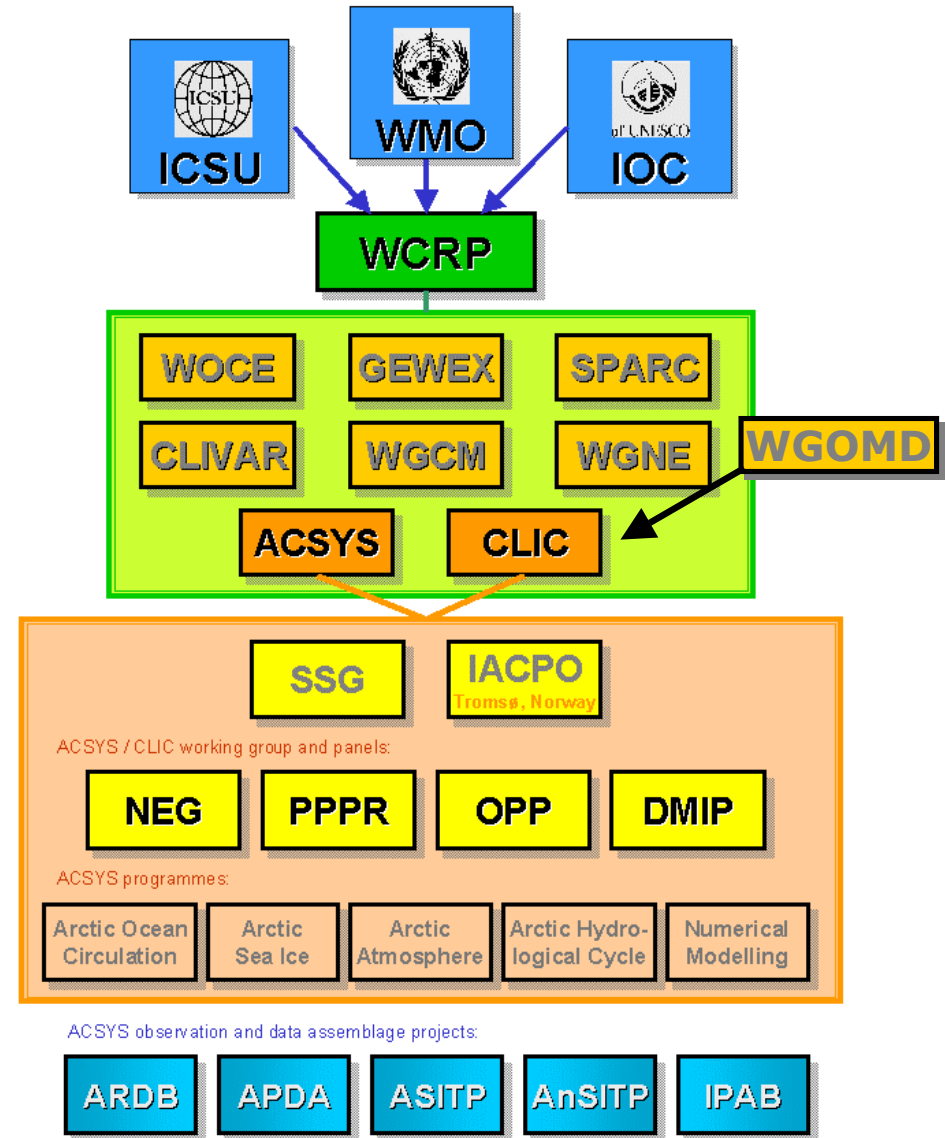
- Overview of ACSYS/CLiC
 - objectives
 - organization, the NEG in particular
- NEG Activities
 - SIMIP and SIMIP2
 - Arc-MIP
 - AOMIP
- The WCRP Working Group on Ocean Model Development
 - plans for OMIP

ACSYS/CLIC Organization

ACSYS started in 1993 and runs until 2003.

CLIC approved in 2000.

The two projects are combined until the end of the ACSYS era.



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CliC Goals

- Improve understanding of physical processes and feedbacks through which cryosphere interacts with climate system.
- Improve representation of cryospheric processes in climate models.
- Assess and quantify impacts of past and future climate variability/change on cryosphere components and their consequences.
- Enhance observation and monitoring of cryosphere in support of process studies, model evaluation and change detection.

NEG: Numerical Experimentation Group

- **Members represent various aspects of cryosphere/climate modelling.**
 - **G. Flato (Canada): sea-ice and global climate modelling**
 - **A. Beckmann (Germany): coupled ice-ocean modelling, Antarctic**
 - **J. Christensen (Denmark): regional climate modelling**
 - **P. Huybrechts (Belgium): glacier and ice sheet modelling**
 - **W. Maslowski (USA): coupled ice-ocean modelling, Arctic**
 - **V. Romanovsky (USA): permafrost and frozen ground**
 - **??? : terrestrial snow and land surface process modelling**
- **www.cccma.bc.ec.gc.ca/acsys**

General terms of reference

1. In liaison with other NEGs within the WCRP:
 - to address cryospheric modelling issues of the coupled system (atmosphere, sea ice, ocean, ice sheets, ice shelves, ice caps, glaciers, and land hydrology including snow cover, frozen ground, permafrost, and lake and river ice) relevant to ACSYS/CLIC;
 - to promote the investigation and improvement of the parameterisation of specific cryospheric processes in climate models;
 - to distribute the improved parameterisations.
2. To advise the ACSYS/CLIC SSG on data requirements for model development, validation and optimisation, and on archiving model output, and

General terms of reference (con't)

3. To develop, review and update as appropriate the ACSYS and CLIC implementation plans on a regular basis.

Specific terms of reference are:

4. To create temporary task groups where required to:

- promote the improvement and evaluation of models of individual components of the cryosphere;
- investigate coupling processes and techniques in models whose representations of cryospheric components are interactively connected in part or in combination, and;
- advise the ACSYS/CLIC SSG on the use of data assimilation techniques applied to individual components and coupled models.

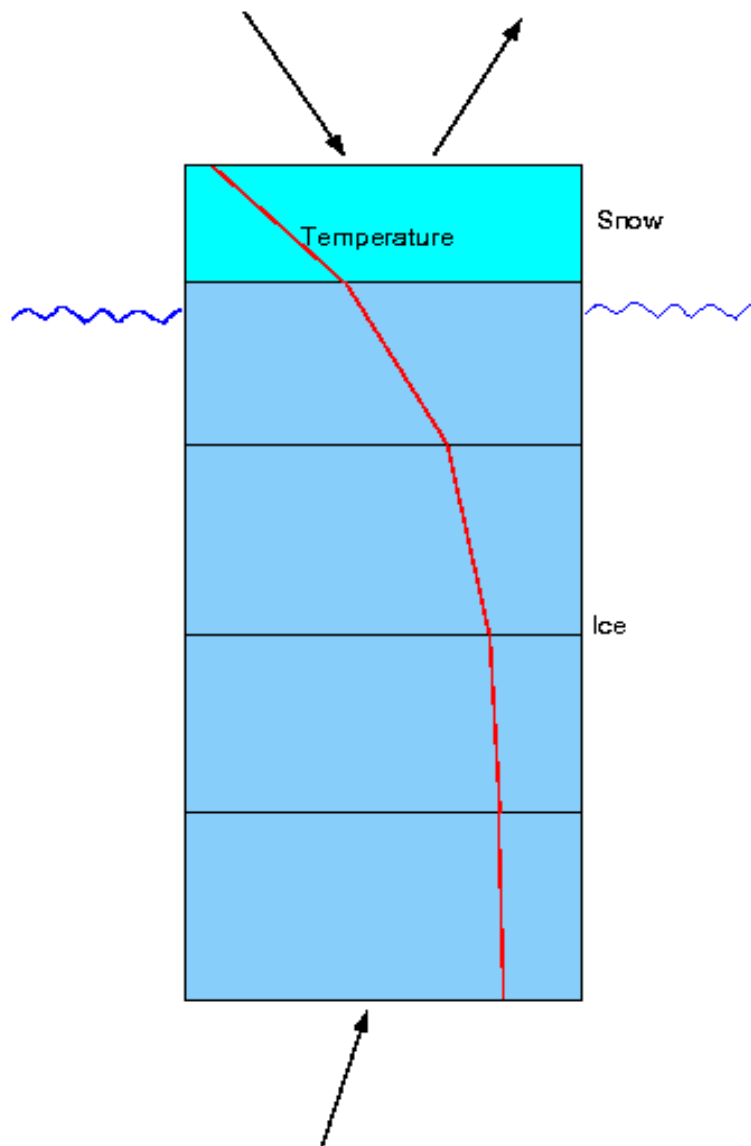
ACSYS/CLIC NEG Projects

- **SIMIP:** dynamic ice model intercomparison - completed (see Kreyscher et al., JGR, 105:11299-11320, 2000).
- **SIMIP2:** thermodynamic ice model intercomparison
- **ARC-MIP:** Arctic regional climate model intercomparison
- **AOMIP:** Arctic ocean model intercomparison.

SIMIP2 Objectives:

- to compare different thermodynamic models (numerical schemes, resolution, ...) and assess their pros/cons
- to evaluate different parameterizations of thermodynamic processes (heat storage, brine pockets, surface energy exchanges, ...)
- to provide guidance to the climate modelling community regarding representation of sea-ice thermodynamics

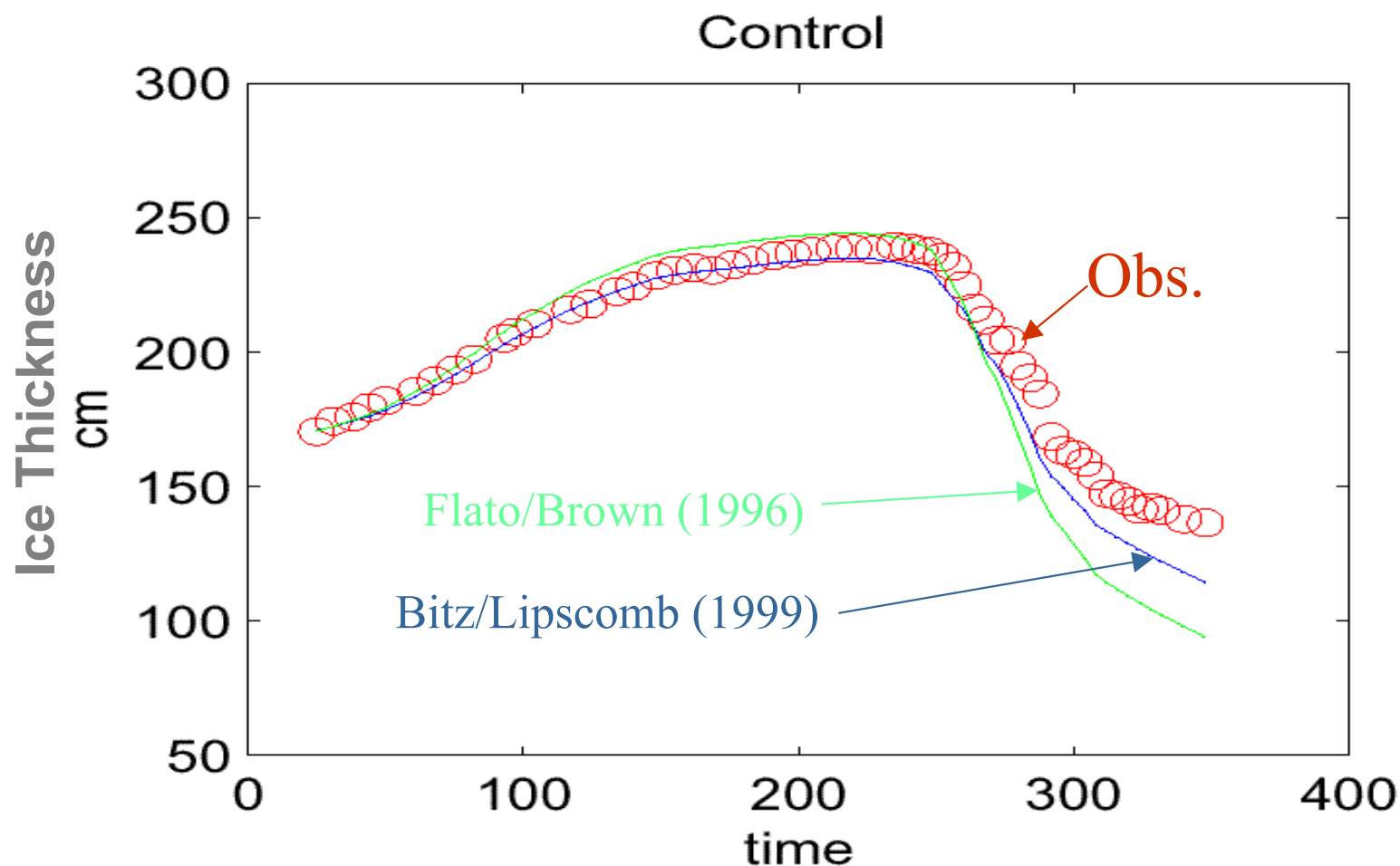
Assemble a hierarchy of 1-D ice models



- multi-year ice
- forced with SHEBA boundary conditions over an annual cycle
- compare to observations (growth/melt, temperature profiles, ...)
- conduct parameter studies
- several modelling groups have agreed to participate

Some initial SIMIP2 results:

- two different models, forced with SHEBA atmospheric data, compared to observed ice thickness. (O. Saenko and G. Flato, in progress).



<http://www.cccma.bc.ec.gc.ca/acsys/simip2>

ARC-MIP

- an intercomparison of regional climate models applied to the Arctic.
 - A joint undertaking of the ACSYS/CliC NEG and the GEWEX Working Group on Polar Clouds (Profs. J. Curry and A. Lynch, U. Colorado).
 - Planning/implementation meeting in Fairbanks in Sept., 2000 (in conjunction with NEG I).
 - Several RCM groups have agreed to participate.
 - Domain, boundary condition data, and evaluation data have been agreed upon.
 - Individual groups/investigators to focus on specific science questions.
 - <http://cires.colorado.edu/lynch/arcmip>

Southern Ocean Modelling

- The 'theme topic' of the upcoming NEG meeting.
- Initial focus will be on Weddell sea coupled ice-ocean models.
- No plan for a formal 'intercomparison project', but rather an attempt at promoting interaction among groups involved in this area.
- Some commonality, and hopefully some coordination with AOMIP in the future.

WGOMD:

Working Group on Ocean Model Development

- **A WCRP working group aimed at improving the representation of the ocean in global climate simulations.**
- **At their last meeting (March/2001), they launched a *Pilot OMIP*.**
 - **7 groups planning to participate so far**
 - **coordinated by Frank Bryan (NCAR)**
 - **100 year model integration with climatological forcing derived from ECMWF reanalysis.**
 - **Global coupled ocean-ice models.**
 - **Initial results to be discussed at meeting in May, 2002, at which time full OMIP would likely be launched.**

WGOMD (cont'd)

- **Clearly some overlap with AOMIP, and maybe some potential for coordination and mutual benefit.**
- **In particular, using common forcing data might be valuable in subsequent comparisons and evaluation.**
- **AOMIP results could (and should) inform full OMIP effort on issues related to ice-covered oceans, especially the Arctic.**

Summary and Conclusions

The WCRP ACSYS/CliC Numerical Experimentation Group

- ACSYS/CliC NEG is happy to have AOMIP as one of its projects.
 - **Fits nicely with other ongoing and planned efforts.**
- WGOMD desires input from NEG on sea-ice and ice-ocean coupling issues.
 - **AOMIP will be one source of such input.**
- Since OMIP pilot phase will be concurrent with AOMIP, it would be desirable to coordinate projects to some extent.
 - **Using common forcing data would facilitate comparison of results.**
 - **AOMIP investigators might wish to analyze OMIP results and vice-versa.**
 - **Some potential benefit in coordinated analyses (similar approaches, similar observational data, etc.)**