

GEWEX Global Atmospheric System Studies (GASS)

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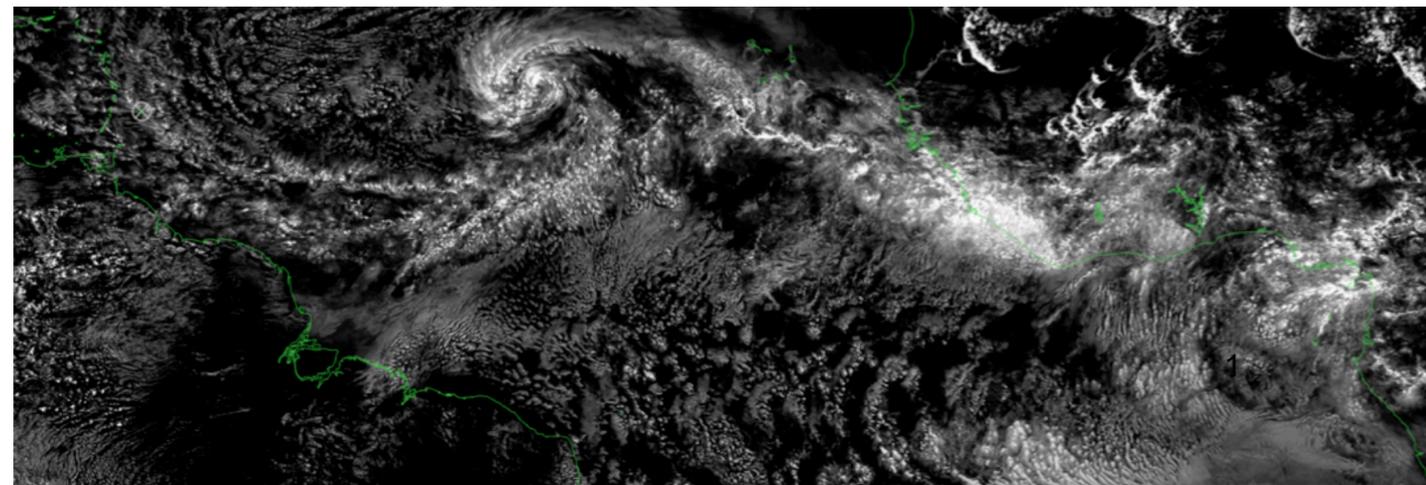
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GEWEX Open Science Conference

Canmore, Alberta, Canada



GASS: Global Atmospheric System Studies



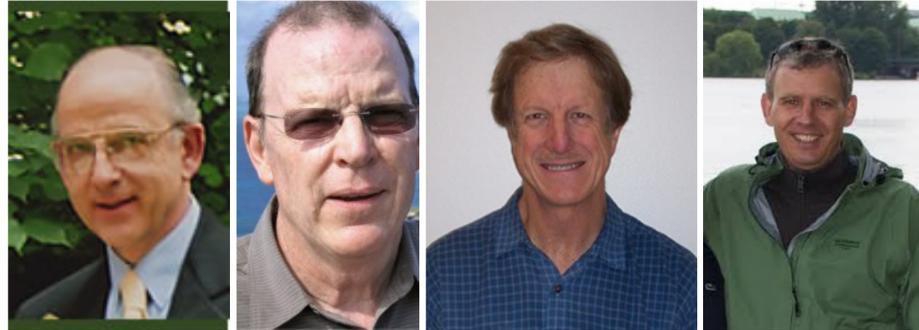
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Goal of GASS: to understand the physical processes and their coupling to atmospheric dynamics, particularly those that define the atmospheric branch of the **hydrological cycle**.

Mission of GASS:

- to facilitate and support the international community that carries out and uses observations, process studies, and numerical model experiments with the goal of developing and improving the representation of the atmosphere in **weather** and **climate** models.
- to coordinate scientific projects that bring together experts to contribute to the development of **atmospheric models**.

1993



2011



2017



GCSS

GASS

GABLS

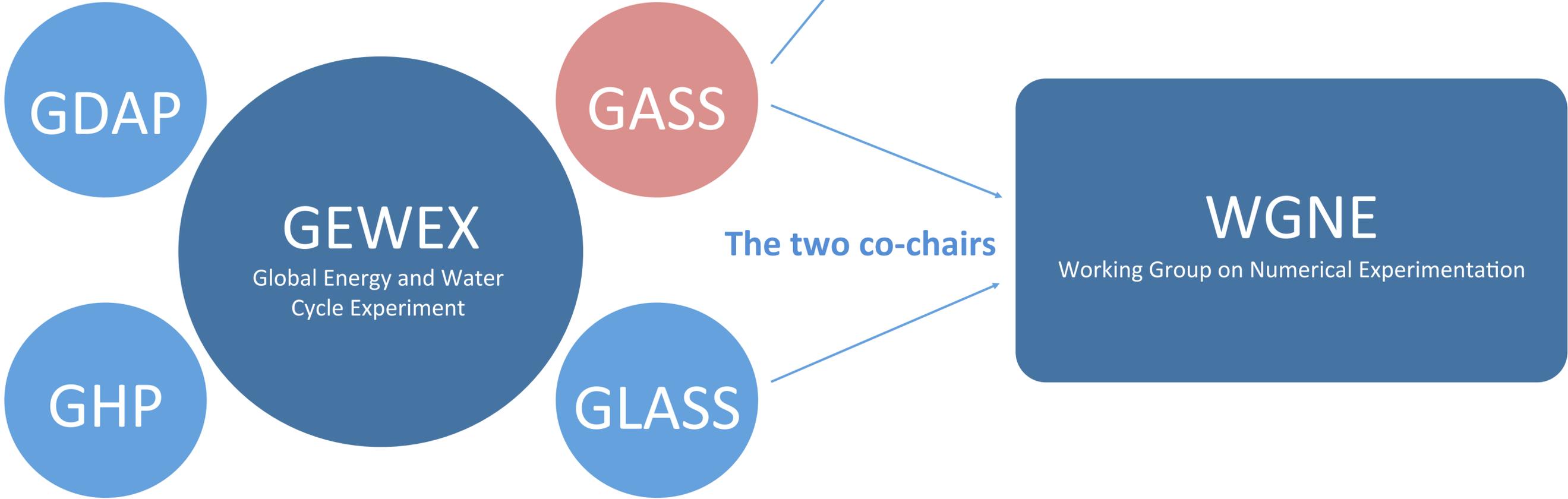
CIRC

ICRCCM

Radiation
 Micro-physics
 Clouds
 Boundary layer
 Convection
 Drag

Dynamics-physics coupling
 S₃S prediction





GASS: Global Atmospheric System Studies GLASS: Global Land/Atmospheric System Studies
GHP: GEWEX Hydroclimatology Panel GDAP: GEWEX Data and Assessments Panel

Conference presentations are available at the site!

About 160 participants from around 20 countries, including individuals from academia, government agencies, private sector, and international organizations



Understanding and Modelling Atmospheric Processes

The 2nd Pan-GASS meeting sponsored by the ARC Centre of Excellence for Climate System Science

26TH FEBRUARY 2018 - 2ND MARCH 2018, LORNE, VICTORIA, AUSTRALIA

HOME

VENUE & LOCAL INFORMATION

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For all enquiries about the UMAP 2018 meeting please email umap2018@monash.edu

MAILING LIST

To keep up to date with UMAP 2018 announcements, sign up to our [mailing list](#).

VENUE

The UMAP 2018 meeting will take place at the [Cumberland Lorne Resort](#), situated on the beautiful

<http://singh.sci.monash.edu/Pan-GASS/index.shtml>

Session Topics

- **Surface drag and momentum transport:** orographic drag, convective momentum transport, drag coefficients, boundary-layer mixing
- **Processes relevant for polar prediction:** stable boundary layers, mixed-phase clouds, coupling to the surface
- **Shallow and deep convection:** stochasticity, scale-awareness, organization, grey zone issues
- **Clouds, radiation, and circulation feedbacks:** boundary-layer clouds, CFMIP, cirrus, interaction between radiation and clouds
- **Microphysics and aerosol-cloud interactions:** microphysical observations, parameterization, process studies on aerosol-cloud interactions
- **Land-atmosphere interactions:** Role of land processes (snow, soil moisture, soil temperature, and vegetation) in sub-seasonal to seasonal (S2S) prediction
- **Physics-dynamics coupling:** numerical methods, scale-separation and grey-zone, thermodynamic consistency
- **Next generation model development:** the challenge of exascale, dynamical core developments, regional refinement, super-parameterization
- **New observational efforts:** field experiments, technology development
- **methods for gaining model insight:** LES, CRM, Radiative-Convective Equilibrium modeling, ...

Seven White Papers for six potential GASS projects

Constraining drag processes:

- Can high-resolution simulations and Large-Eddy Simulations (LES) really be used as a proxy for the truth, and at which resolutions are we fully resolving particular processes?
- How can we make better use of existing observations (e.g. lidars) or upcoming satellite data, and what can we learn from model inter-comparisons of drag processes?

Modeling the precipitation diurnal cycle (using the ARM data):

- Which sub-diurnal processes are most essential for the simulation of the diurnal cycle and sub-diurnal extreme events, and how can these be improved in weather and climate models?
- What is the role of convective memory (advection), and what is the role of the night-time boundary-layer and elevated convection initiation?

Fog modeling intercomparison (using the LANFEX data over UK):

- How well can models simulate the development of radiation fog?
- What are the key processes governing the development of radiation fog, i.e. aerosol, cloud microphysics, radiation, turbulence, dew deposition, ...?

Dynamics-physics coupling:

- How do different models behave when run with different time steps?
- How does any change in behaviour relate to climate sensitivities or sensitivities in model tuning?

Land temperature and snowpack impacts on subseasonal to seasonal (S2S) prediction (using the TPE data over Tibet):

- What is the impact of the initialization of large scale land surface and subsurface temperature and snow pack, including the aerosol in snow, in climate models on the S2S prediction over different regions?
- What are the relative role and uncertainties in these land processes versus in sea surface temperature in S2S prediction? How do they synergistically enhance the S2S predictability?

Joint modeling activity over the Caribbean; and

Grey-zone modeling (using the EUREC4A data around Barbados):

- what controls the convective mass flux, convective mixing, cloud depth and cloud fraction of shallow cumulus clouds?
- What is the role of the wind and vertical momentum transport? What is the role of meso-scale organisation?

Where do we go from here?

Panel



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- The leaders of these white papers are developing the implementation plan
- These white papers will be developed into GASS projects whenever they are ready
- They will be organized into four theme areas: representation of physical processes, high-resolution modeling, dynamics-physics coupling, predictability
- Some of them will be jointly sponsored by GASS and other international programs
- Project leaders will be invited to join the GASS Panel
- Additional leaders independent of these projects will also be invited to join the GASS Panel

Direction of future GASS projects:

If you want to propose new white papers, please contact the GASS Co-Chairs

- Adopt a more integrated view (processes + system)
- Seek close cooperation with WGNE and other GEWEX panels (e.g., GLASS, CLIVAR/GEWEX Monsoon Panel)
- Seek cooperation with CFMIP, ACPC, and other projects
- Establish close link with WWRP and its projects

Potential Gaps:

- Radiation: circulation coupling; interaction between radiation and clouds
- High Impact and Extreme Weather: role of convective scale models; ensembles; relevant challenges for model development
- Processes relevant for polar prediction: stable boundary layers, mixed-phase clouds, coupling to the surface

Progress since the GASS Conference in late Feb 2018

First new GASS Project to be launched soon

- “Surface drag and momentum transport” led by scientists from ECMWF, Netherlands, and UK, as a joint GASS/WGNE project

Second new GASS Project to be launched

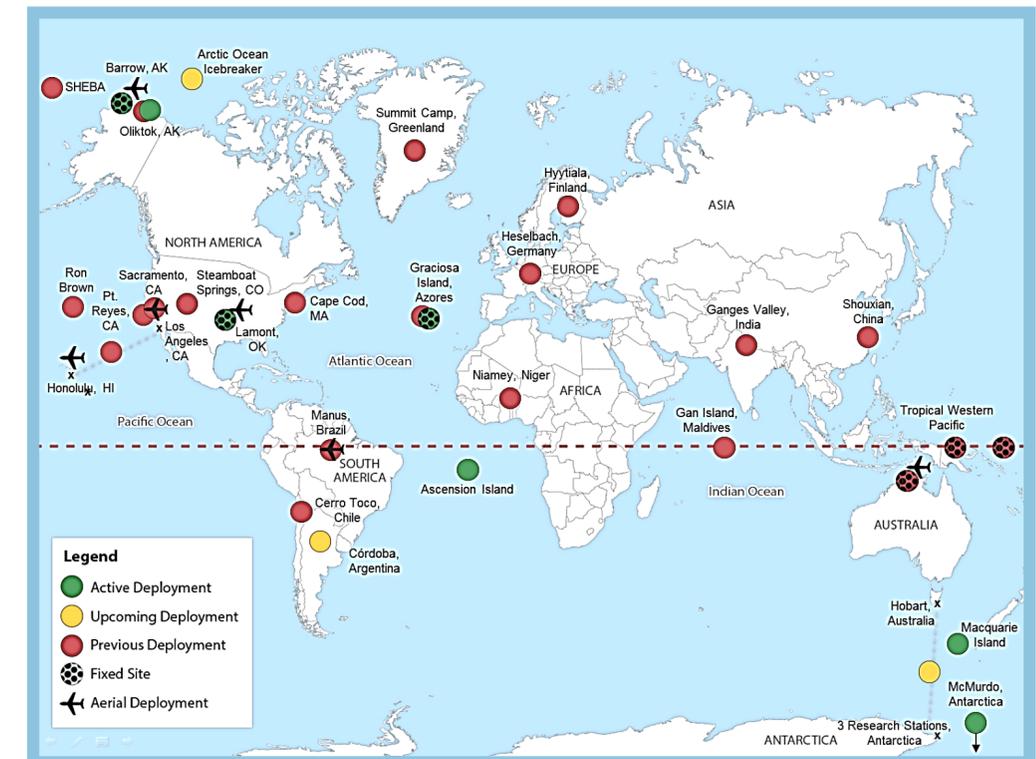
- “Impact of initialized land temperature and snowpack on subseasonal to seasonal prediction” led by scientists from USA, China, and France, as a joint project with other programs

Potential collaborations with DOE ARM:

- Archive and provide access to the input/output data from GASS projects
- Support GASS to hold annual international conferences with a focus on specific areas each year

Other alignments with GEWEX Process Evaluations (PROES)

- Upper Tropospheric Clouds and Convection (UTCC PROES)
- GEWEX Aerosol Precipitation (GAP) initiative?



Conclusions

- GASS is alive and getting back up to speed
 - Building panel and projects
 - It is the right time to get involved!