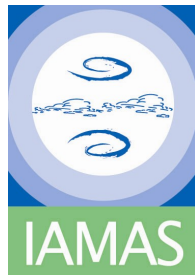


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# IAMAS Newsletter



ISSUE 9

DECEMBER 2009

## President's Message

Dear members of the IAMAS community,

It was a great pleasure to meet many of you during MOCA-09 on 19-29 July 2009. I think we all agree that the joint assembly was a great success in both science and organization. A resolution drafted by DSG John Turner was passed at the second IAMAS Executive Committee (EC) meeting to thank the local organizing committee of MOCA-09. Bravo to our Canadian colleagues!

Approximately 1340 scientists and students from 63 countries attended the assembly despite the global financial crisis and the H1N1 epidemic (although the negative impact was still noticeable). Altogether there were 1647 presentations and I was very glad to find the largest number of presentations, 666, was devoted to the joint symposia. In Chinese, 6 is a very popular number and 666 is certainly a very good sign. As a scientist I shouldn't be superstitious, but the robust science exchanges and discussions across three associations in MOCA-09 were exactly what we had expected when IAMAS, IAPSO and IACS started to plan this joint assembly and it also proved the clear value of multi-disciplinary research. I look forward to more productive multi-disciplinary cooperation starting from this good number.

In addition, the IAMAS community contributed 635 presentations to IAMAS-only symposia, including 422 oral and 213 poster presentations. I went to many of

the talks and had discussions with some of the poster presenters. I was very satisfied with these high-quality reports. IAMAS was also very proud to recommend two plenary speakers Dr. Susan Solomon (one of the co-chairs of Working Group 1, IPCC) and Dr. Maria Kanakidou (the president of ICACGP/IAMAS) and their talks were well attended and perfectly echoed the theme of the assembly, "our warming planet".

After MOCA-09, our SG Hans Volkert compiled a very detailed IAMAS EC meeting minutes with the help of Ms. Jenny Lin, the administrative assistant to the IAMAS Bureau, and sent it to the IAMAS community and IUGG EC. The biennial reports from 10 commissions were also included. I'm very grateful for your industrious efforts and voluntary contribution to our association.

Here I would like to highlight some decisions made at the IAMAS EC meetings:

- The IAMAS bureau will contact the IPCC and WCRP and suggest using IAMAS as the platform for their showcase activities and increasing the involvement of IAMAS in their activities to ensure that the most complete and up-to-date views of the science being presented at international meetings by the relevant scientific communities are included in their reports. The

*Continued on page 2*



**Early planning for Melbourne! From left: Guoxiong Wu (IAMAS President), Michael MacCracken (IAMAS Past President) and Hans Volkert (IAMAS Secretary General).**

## *President's Message continued from page 1*

letters were sent and we received positive responses very quickly. I noticed that GEWEX had contacted ICCL/IAMAS to organize a symposium at IUGG 2011.

- Commission officers were supposed to submit proposals for the symposia of IUGG 2011 by 31 August. Thanks to your timely input, Hans had a very good starting point to negotiate with other association SGs at an IUGG EC meeting in October. Hans and I attended the meeting, met the local organizers and visited the venue. We both felt it could be another big interesting conference after Montreal.
- IAMAS 2013 will be held with IACS in Davos, Switzerland on 8-12 July 2013 as well as Sunday July 7 and Saturday July 13, 2013 as extra days for association and commission meetings. Please mark this on your calendar.

See you in Melbourne in 2011!  
Merry Christmas and Happy New Year!

Guoxiong Wu, President, IAMAS



*IUGG Bureau members receive a 90th anniversary gift, 'china from China', from IAMAS after a dinner at Melbourne Cricket Ground. From left: Guoxiong Wu, Aksel Hansen (IUGG Treasurer), Tom Beer (IUGG President), Harsh Gupta (IUGG Vice-President), Hans Volkert, Alik Ismail-Zadeh (IUGG Secretary General).*

## Upcoming meetings

### 2010

**American Meteorological Society 90th Annual Meeting**, 17-21 January 2010 in Atlanta, Georgia.  
**ICACGP / IGAC Joint Conference**, 11-16 July 2010 in Halifax, Canada.  
**IAGA, 20th Electromagnetic Induction Workshop**, 18-24 September 2010 in Porto Sokhna, Egypt.  
**ICPM, Workshop on Antarctic Clouds**, 15-16 July 2010 in Columbus, Ohio, USA.

### 2011

**IUGG, XXV General Assembly**, 27 June - 8 July 2011 in Melbourne, Australia.

## MOCA-2009

MOCA-09, which is an acronym for both MOntreal Canada and Meteorology, Oceanography, Cryospheric science Assembly 2009, was a true multi-disciplinary event and *the* highlight for IAMAS during 2009. The hard work and clear leadership of our Canadian colleagues, lead by Jacques Derome (McGill) as scientific coordinator and Michèle Bourgeois-Doyle as conference organiser, produced impressive results.

The media relation service, personally initiated by MOCA-09 chair Michel Béland (Environment Canada), proved to be important and effective. National media (print and electronic) used the occasion to obtain first-hand information about latest science results and underscored the important role of sustained and adequate funding of climate related research.

Organisationally, a repetitive time structure and the provision of clear guidelines for symposia convenors and session chairs aided the smooth running of the scientific programme. To reduce the impact of no shows at oral sessions the payment and registration status of speakers was considered in the ordering of individual sessions, with those who had not registered or paid placed last in each session. This was done in advance of the final programme going to print in May. This succeeded in reducing the impact of no shows since, as anticipated, the re-ordering resulted in gaps occurring at the end of sessions.

All these positive experiences are being fed into the planning of IUGG-2011.

Hans Volkert  
Tom Bracegirdle

### Featured Commission 1: ICCP

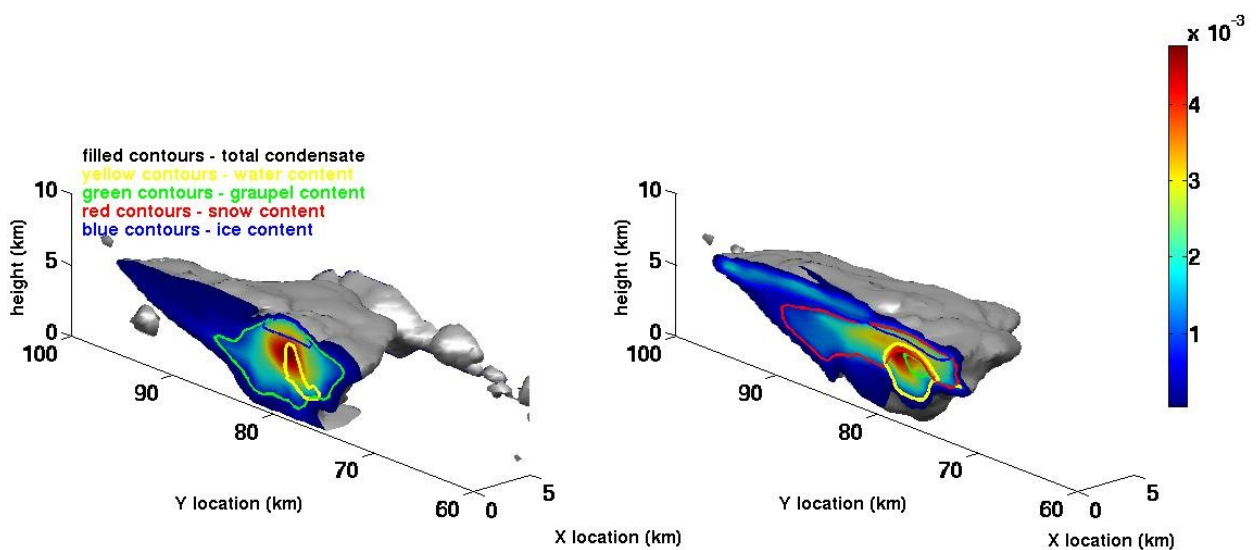
The International Commission on Clouds and Precipitation (ICCP) is one of ten commissions of IAMAS. Its objectives are to stimulate scientific research in the area of clouds and precipitation through organization of conferences, workshops and symposia, including symposia during the IAMAS and IUGG general assemblies. Every four years the commission holds its own international conference on clouds and precipitation. The first conference was held in Zürich in 1954. The last two international conferences were held in Bologna (2004) and in Cancun (2008). The ICCP also has an International Committee on Nucleation and Atmospheric Aerosols (ICNAA) whose aims include the promotion of scientific research related to nucleation processes in the atmosphere, including water and ice nucleation in clouds. The Committee holds its own conferences every four years, most recently in Prague (2009).

The international conferences organised by the ICCP include sessions on current topics of research such as the formation of clouds and precipitation of various types including deep convective cloud systems and stratiform clouds, and from warm rain processes to snow processes. Other topics include cloud chemistry, the interactions of atmospheric

aerosols with clouds and their effects on precipitation and cloud radiative properties, the interaction of radiation with clouds, ice formation in clouds (often the key to precipitation), clouds and climate, new instrumentation, and applications of cloud physics and chemistry (e.g. icing on aeroplanes, effects of aqueous chemistry in clouds on the modification of aerosol composition, acid rain and more).

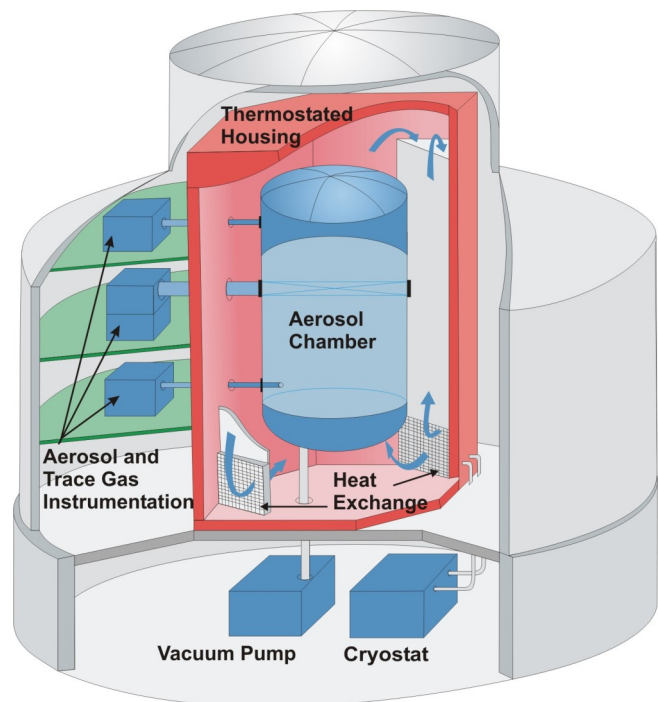
Current "hot" research topics, based on the number of papers presented in Cancun (2008), include the interactions of aerosols and radiation with

**Figure 1. The effects of pollution on the development of rainclouds in the Eastern Mediterranean as simulated by the Weather Research and Forecasting (WRF) model with detailed treatment of cloud microphysics. The figures represent the development of clouds with initial cloud condensation nuclei (CCN) concentrations of 100 and 1500  $\text{cm}^{-3}$  on the left and on the right, respectively. The polluted cloud develops slower and produces less precipitation after 80 min of simulation. It also shows that, in the polluted cloud, more ice and snow is transported to the anvil, and doesn't make it down to the ground in this cloud cycle. Thus, the hydrologic output is diminished while the radiative effect is enhanced.**



clouds and ice formation in the atmosphere. These two topics received a great deal of attention due to the many unanswered fundamental questions and the possible importance for climate change. For example, although it is fairly well understood that increased pollution, natural or anthropogenic, modifies the cloud microstructure by increasing the cloud drop concentrations, the effects on the total precipitation on the ground are not clear. In some cases, decreases in precipitation were reported due to the impact of pollution (Fig. 1), while the opposite observations have been reported in other cases. In many cases, it seems that the dominating factors in determining the amounts of precipitation on the ground are controlled by the dynamics on the larger scale as compared to those that are controlled by the microphysical processes. Numerical models suggest that although microphysical processes may play a secondary role, they may be responsible for modifying the spatial and temporal variability of precipitation on the ground (not a small matter when considering the need to get rain water into a specific watershed).

Similarly, one key unanswered question related to cloud and precipitation development, and to the interactions of clouds with climate, has to do with ice formation in clouds. High-level ice clouds comprise a significant linkage between the Earth's radiation budget and the hydrologic cycle but are not well characterized. A great deal of progress has been made in recent years to improve measurement techniques, but more needs to be done, both for in-situ measurements and also remote sensing measurements including global observations from space. There is still a lack of understanding of the connection between the concentrations of aerosols that act as ice nuclei and the concentrations of ice crystals in clouds (Fig. 2 shows the AIDA chamber, which is used to study ice formation in the atmosphere). It appears that the primary nucleation of ice crystals by aerosols (ice nuclei) is responsible for the initial ice crystals in clouds, but other processes take over to increase the ice crystal concentrations far above the initial values, especially in deep convective clouds that play a major role in the global hydrologic cycle. Significant uncertainties also remain in understanding the processes that determine the microphysical and radiative properties of cirrus clouds formed in situ. These clouds are important in regulating the planetary radiation budget.



**Figure 2. Schematic of the 84 m<sup>3</sup> AIDA (Aerosol Interactions and Dynamics in the Atmosphere) chamber in Karlsruhe, Germany, which is used for the study of ice formation in the atmosphere and for calibration and comparison of ice measuring instruments from around the world. The AIDA is capable of operating over a temperature range from 183 to 333 K and at a pressure range from < 1 hPa to normal atmospheric surface pressure. Together, these ranges encompass almost every environmental situation that is encountered in the Earth's atmosphere.**

In addition to the international conferences, the ICCP also co-sponsors a workshop on cloud modeling. The last such workshop was held in Cozumel, Mexico, in 2008 where results were compared from different models that simulated identical case studies. The comparisons were aimed at improving cloud modeling and the microphysical parameterizations in particular.

Zev Levin (President ICCP)  
 David Starr (Secretary ICCP)  
 Andrea Flossmann (Vice-President ICCP)  
 George Isaac (Past President ICCP)

### Featured Commission 2: ICDM

The International Commission on Dynamical Meteorology was established in its current form by the International Association of Meteorology and Atmospheric Physics (IAMAP) (now the International Association of Meteorology and Atmospheric Sciences, IAMAS) at its plenary session in Zürich, Switzerland, in 1967. The commission was established in response to an increasing awareness of the importance of dynamical meteorology to an understanding of the atmosphere. The first President was Norman Phillips of MIT.

Indeed, the importance of dynamical meteorology is illustrated by the major improvements in the skill of operational numerical weather prediction over the four decades since ICDM was established. Fig. 1 shows how the skill of medium-range forecasts has varied since the early 1980s, as illustrated by the ECMWF 500hPa geopotential height predictions. These improvements can be attributed to the combination of improvements to the forecast model and data assimilation system, and developments to the observing system – particularly from improved satellite coverage of the southern hemisphere.

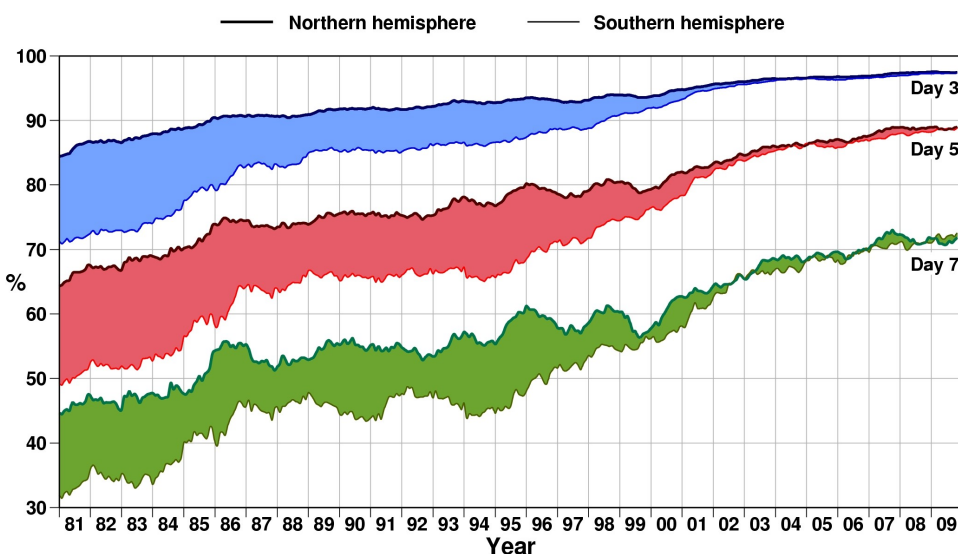
The ICDM has also been central to the leadership of IAMAS. Since its inception, the ICDM has seen

three of its members go on to become presidents of IAMAS: Brian Hoskins, Huw Davies, and current IAMAS president Guoxiong Wu.

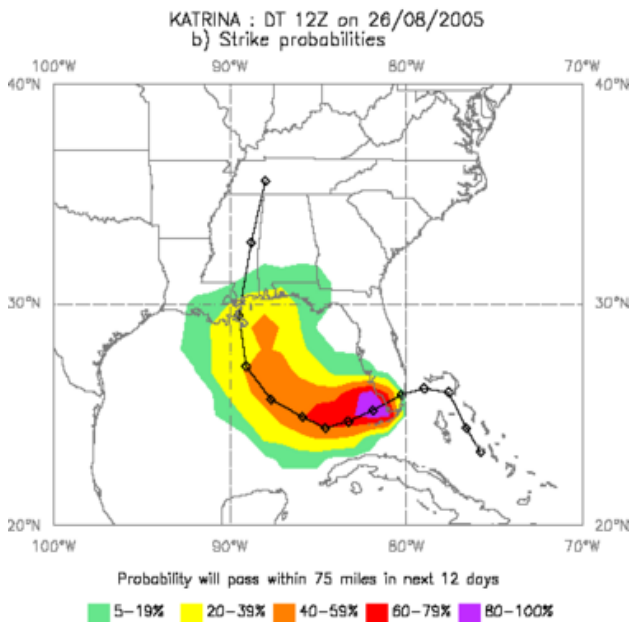
An understanding of dynamical meteorology is key to the prediction of climate change as well as weather forecasting. While many scientists are focused purely on weather forecasting or climate modelling, there is an increasing emphasis on “seamless prediction” over a wide range of time-scales ranging from “nowcasting” a few hours ahead all the way to predicting climate centuries ahead. There is a strong similarity between numerical models used for weather forecasting and climate prediction; for example, at the UK Met Office essentially the same model is used for operational weather forecasting as for the Hadley Centre climate simulations. The main difference is that for climate prediction, coupled models are used to represent longer-term interactions with the ocean, land surface and cryosphere.

A major emphasis of research on weather forecasting is to improve the prediction of high-impact weather events. High-impact weather includes events such as severe storms, where strong winds and heavy rain lead to loss of life, but also, for example, prolonged droughts that lead to severe food shortages. Figure 2 shows an example of the prediction of hurricane Katrina, a few days before

**Anomaly correlation of 500hPa height forecasts**



*Figure 1. Time series of ECMWF 500 hPa height anomaly correlation scores at forecast ranges 3, 5 and 7 days for both hemispheres, updated from Simmons and Hollingsworth (2002). © Copyright ECMWF*



**Figure 2. Forecast of strike probabilities for hurricane Katrina based on Met Office ensemble forecasts. The black line shows the observed track, with symbols marking the hurricane centre every 12 hours. © British Crown Copyright, Met Office.**

it struck New Orleans. Improving the prediction of high-impact weather is the focus of a major international research programme, THORPEX, established by the World Meteorological Organisation. During the past two scientific assemblies, the ICDM has sponsored a symposium on the dynamics of predicting high-impact weather events, including papers based on THORPEX research projects.

The ICDM has initiated planning for a future workshop focused on the prediction of high-impact weather events, with an emphasis on their relationship to tropical cyclones, monsoons and tropical circulations such as ENSO and the MJO. An important topic at the workshop will be how high-impact weather events are likely to change as the global climate changes.

Data Assimilation is a key technique used to produce initial conditions for atmospheric models. Development of sophisticated techniques, such as variational assimilation methods, is the key to extracting as much as possible information from ob-

servations to produce the best possible analyses of the atmospheric state. Ensemble methods, using multiple parallel model runs that are performed with slight differences to initial conditions or model configurations, are also becoming increasingly important for producing probabilistic forecasts of weather and climate – particularly at time ranges and scales where deterministic forecasts are not reliable. For example, ensemble techniques were used to predict the likely range of tracks of hurricane Katrina in Fig. 2. There is an increasing convergence between data assimilation and ensemble forecasting, particularly with the increasing use of ensemble data assimilation techniques, in which an ensemble of short-range forecasts is used to quantify uncertainties in the atmospheric state. At the Melbourne assembly in 2011, the ICDM will be sponsoring a combined symposium covering both topics. Since Data Assimilation and Ensemble methods are applicable across a range of earth science disciplines, the symposium will also be co-sponsored by other IUGG associations, including IAPSO, IACS and IAHS.

In addition to these symposia on specific applications of dynamical meteorology, the ICDM also organises a wide range of other symposia at the IAMAS scientific assemblies. We organise a general symposium that covers all aspects of the application of dynamical theory and models to improving our understanding of atmospheric dynamics. Other proposed symposia in Melbourne will cover dynamical meteorology and its links to tropical weather and climate, predictability of the climate system, and coupling between the troposphere and stratosphere. We invite all IAMAS scientists to join us as participants in the dynamical meteorology sessions at the 2011 IUGG general assembly.

Richard Swinbank, secretary ICDM

### The IAMAS Newsletter

We welcome short reports from the individual IAMAS Commissions at any time.

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