What would you consider the two most significant achievements in your career?

The first is the dynamical formulation of a "universal" model based on the fully elastic atmospheric equations solved by semi-implicit and semi-Lagrangian marching scheme (Tanguay, M., A. Robert and R. Laprise, 1990: A semi-implicit semi-Lagrangian fully compressible regional forecast model. Mon. Wea. Rev. 118: 1970-1980.), with terrain-following mass vertical coordinates (Laprise, R., 1992: The Euler equation of motion with hydrostatic pressure as independent coordinate. Mon. Wea. Rev. 120: 197-207.). This work demonstrated that the same model could be used efficiently from cloud-resolving scale (without the need to invoke the anelastic approximation) to global scales (without the need for the hydrostatic approximation). Similar approaches are now used in several models around the world, including GEM in Canada, WRF in the USA, HIRLAM in Scandinavia, ALADIN and AROME in France.

The second is clearly my 18-year endeavor to develop from scratch a regional climate modelling team in Canada (Laprise, R., 2008: Regional climate modelling. J. Comp. Phys. 227: 3641–3666.). With graduate students and junior research associates, we built an original (and efficient) Regional Climate Model, developed a suite of diagnostics analysis tools and graphics software, and initiated a set of climate simulations and climate-change projections over North America. Through this effort some 60 young scientists have been trained, and this highly qualified personnel constitutes in my opinion the most important legacy of this endeavour. This RCM team has been instrumental in initiating the Ouranos Consortium.

When you look back in time, what where the most significant, exciting or surprising developments in atmospheric science?

Sophisticated data assimilation techniques and widespread satellite remote sensing data have greatly improved the accuracy of the initial state of the atmosphere for weather forecasts. Faster computers have had tremendous impact, making possible the treatment of the vast amount of observational data, the integration of high-resolution complex numerical weather prediction models, and the automation of weather forecasting.

Is there a politicization of atmospheric science?

In my view, science gains by being policy relevant, but it should refrain from the temptation of becoming policy prescriptive. When asked by media to give my personal opinion on a topic such as global warming, and emission reduction targets or strategies, I always restrict myself from explaining the consequences on the climate of actions or inactions in terms of emissions, and some of the expected impacts on the natural environment. I feel that scientists lose the edge conferred by their profession when making statements outside their own specialisation area, and when they do they join the pack of ordinary opinionated citizens.

What constitutes "good" science?

I think that scientists should constantly question the current science paradigms. I have been rather surprised early in my career to find that, contrary to my initial naïve view of science aimed at pushing back the limits of knowledge, the majority of scientists tend to be very conservative and not much interested in encouraging the emergence of new scientific ideas.

For myself, I prefer to work on scientific topics that lend themselves to combining theory and application. Theory alone is what I would call "a solution that seeks a problem to solve;" not my cup of tea. Applications alone lead to engineering approaches; may be very important in practice, but not of much interest for me.

What is the subjective element in scientific practice? Does culture matter? What is the role of instinct?

I do not believe much in natural, spontaneous instinct. On the other hand I think that one's character and personality exert great impact on the scientific practice. I think that what is often referred to as instinct is in fact developed from previous experiences, personal progression, and hence one's scientific culture. For example, I do not think I would ever have conceived working on the formulation of a universal model if I had not been acquainted before with a hydrostatic global model while working at the Canadian Climate Centre, and later with an anelastic mountain wave model for my doctoral research.

The 2nd Lund Regional-scale Climate Modelling Workshop

Burkhardt Rockel, Lars Bärring and Marcus Reckermann

From 4-8 May 2009, about 200 climate scientists from around the world met in Lund, Sweden, for exchanging and discussing the latest developments in regional climate modelling. This Second Lund Regional-scale Climate Modelling Workshop was a follow-up to the first regional-scale climate modelling workshop held in Lund, Sweden in 2004. Now, five years later, it was time to take stock of the scientific progress in the wide range of topics that regional climate modelling spans. These range from the theoretical understanding and parametriza tion of meso-scale and regional processes in the atmosphere / ocean / land surface / biosphere system to the numerical methods and links between regional climate modelling and global climate/earth system models, as well as numerical weather prediction models, the evaluation of models using various observational datasets, the model intercomparison and ensemble-based methods, the production and utility of regional climate scenarios, and the application of regional climate modelling output for impact studies. In this Second Lund Regional-scale Climate Modelling Workshop those present summarised develop ments and progress achieved in the last five years, discussed open issues and focused on expected future challenges related to regional climate modelling. Thus, the overall theme for this workshop was 21st Century Challenges in Regional-scale Climate Modelling.

The response to the workshop was overwhelming. We received over 170 paper contributions from scientists from all continents, and a total of about 220 participants from 43 countries registered for the workshop. This was more than twice as many as in the first workshop in 2004, reflecting the growing interest in regional climate modelling, largely driven by the growing demand for high resolution climate projections.

The workshop was structured in seven topic areas, which were represented both in the oral and the poster sessions. Since a prominent application of regional climate models is the provision of high resolution climate scenarios by downscaling global climate model scenarios, it was not surprising that the session on dynamical downscaling was the most frequented. In particular, the use of spectral nudging techniques (a method imposing time-variable large-scale atmospheric states on regional atmospheric models in order to improve downscaling), received much attention. Spectral nudging techniques are now used in regional "reconstructions," i.e., downscaling of re-analyses of the last few decades, dealing with, for instance, the changing statistics of the East Asian summer monsoon, or of polar lows. Results from the next generation of regional climate models, which are applicable

Participants in the 2nd Lund Regional-scale Climate Modelling School.

to very high resolution simulations (10 km grid mesh size and smaller) were shown and they gave an insight on the future possibilities of regional climate models.

In recent years there has been a growing number of large projects around the world, in which regional climate modelling plays a major role. The results from several of these projects were presented at the workshop (e.g. ENSEMBLES, NARCCAP, GEWEX/CEOP, AMMA, CLARIS, CLAVIER). An outlook on the future of regional climate modelling was given in a special session. In the future, the coupling of regional systems will become more and more standard, e.g. regional atmosphere and ocean models will increasingly run in a coupled mode, rather than independently. Other modules, like ice models, aerosol chemistry, dynamic vegetation and others may also be coupled to the atmosphere and ocean models. All this goes into the direction of regional earth system, or regional environment models. Other aspects discussed were the use of global climate models (GCMs) with regional refinement in grid mesh size, dynamic grid stretching and mosaic GCMs. The "added value" of regional climate models in comparison to global models, which had been a topic already at the Lund meeting in 2004, was again discussed. An added value has been identified with respect to the presentation of medium spatial scale variability, which is regions with physiographic details, such as coastlines or mountain ranges, as well as sub-synoptic dynamical phenomena such as polar lows.

Results from regional climate scenarios, or projections, are the basic input for many impact studies. Therefore, a special session was dedicated to this aspect. There was a broad range of applications dealing with water quality, forest damage, the Sahel zone, socio-economic impacts, urban areas and mega cities, and the impact of land use change on regional climate projections.

The workshop was co-organised by Lars Bärring from the Swedish Meteorological and Hydrological Institute (SMHI) and Lund University, Burkhardt Rockel of GKSS-Forschungszentrum Geesthacht GmbH (GKSS), the Danish Meteorological Institute (DMI), and the International BALTEX Secretariat. BALTEX is a regional environmental research network for the Baltic Sea basin. Regional climate modelling for the Baltic Sea region is one of the major research objectives of BALTEX.

Extended abstracts of all contributions are compiled in the Workshop Proceedings (International BALTEX Secretariat, ISSN 1681-6471, Publication No. 41, April 2009), and are available online: http://www.baltex-research.eu/RCM2009/. A special issue on the workshop will be published in a dedicated international climate research journal, tentatively to be published in 2010.

The Olympic Legacy: What Were the Effects of the Pollution Controls During Beijing Summer Olympics?

Anna Harper

More than a year has past since the world's eyes were on the city of Beijing for the Summer Olympics. The athletic ability, courage, and determination of Olympic athletes can leave a lasting impression on their spectators. The people of Beijing may enjoy an additional legacy from the 2008 Olympics. Pollution controls during the Olympics reduced concentrations of particulate matter and black carbon, and Beijing has continued to implement some of these controls. In July 2008, we reported on Beijing's plans for curbing emission (http://atmospheres.agu.org/Newsletters/ASnewsletterVol2No3.pdf).

Here we report on some of the research that was done during the Olympics and Paralympics, which lasted from Aug. 8 through Sept. 17. Several posters on the Beijing pollution controls were presented at the Fall and Spring AGU meetings. At the 2009 Joint Assembly, a special section entitled "Characterization of air pollution and its interactions with weather and climate in East Asia before, during, and after the 2008 Beijing Olympic games" included six talks and six posters. Gary Morris from Valparaiso University, and Edward Celarier from the Goddard Earth Sciences and Technology Center presided over the session. "This was a very good, focused session. It does appear that the pollution controls implemented by the Chinese government have had an impact," said Morris.

Pollution has been linked to many respiratory diseases, and China is a long-sufferer of these effects of industrialization. According to the World Health Organization (WHO), in China in 2006 39 million people suffered from asthma and 32.8 million had chronic obstructive pulmonary disease (which includes lung diseases such as bronchitis). Beijing air masses also carry pollutants to other regions. Morris said the most polluted day out of a 19-day field campaign in Sapporo, Japan was influenced by the lower atmosphere near Beijing, based on air mass trajectories and the shape of the ozonesonde profile. Therefore, reduced pollution during the Olympic games benefited many more people than just the athletes.

Two recently released articles confirm the effectiveness of pollution controls during the Olympics and the Paralympics. Starting in early 2008, vehicle emissions standards were raised to European levels (Euro IV) [*X. Wang et al.*, 2009]. The first indication of success was from emission factors of carbon monoxide, black carbon (BC), and ultrafine particles (UFP). The emission factor is a measure of fuel cleanliness and is defined as the grams of pollutant released per kilogram of fuel consumed. Compared to 2007, the 2008 emission factors for light duty vehicles decreased by 33%, 47%, and 78% for BC, CO, and UFP, respectively. Heavy duty vehicle emission factors decreased by 67% for UFPs,