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to

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*European association  
for the science of  
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## EDITORIAL

Dear EURASAP members,

In this issue, apart from the list of a number of future events, you can read about two international workshops which had been held in Dubrovnik, Croatia. One of them addressed primarily to the climate change, human health and security. Nevertheless, these topics are closely related to the air pollution. The other workshop dealt with environmental physics - including analytical methods, modelling, monitoring and education.

Recently we have changed the EURASAP website <http://www.eurasap.org/> appearance. I hope you like the new look.

I wish you all a pleasant summer vacation.

*The Newsletter Editor*

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## *Future events*

**FINAL SYMPOSIUM OF THE EU FP7 PROJECT MEGAPOLI MEGACITIES: EMISSIONS, URBAN, REGIONAL AND GLOBAL ATMOSPHERIC POLLUTION AND CLIMATE EFFECTS, AND INTEGRATED TOOLS FOR ASSESSMENT AND MITIGATION**  
Paris, France, 6-28 September 2011

For more information, please visit the web site [http://megapoli.dmi.dk/nlet/FinalMegapoliSymposium\\_1stAnnouncement.pdf](http://megapoli.dmi.dk/nlet/FinalMegapoliSymposium_1stAnnouncement.pdf)

or contact Matthias Beekmann, CNRS-LISA team,  
[Matthias.Beekmann@lisa.univ-paris12.fr](mailto:Matthias.Beekmann@lisa.univ-paris12.fr)

**2<sup>ND</sup> INTERNATIONAL YOUNG SCIENTIST SUMMER SCHOOL (YSSS-2011) ON TOPICS OF INTEGRATED MODELLING OF METEOROLOGICAL AND CHEMICAL TRANSPORT PROCESSES, AND THE IMPACT OF CHEMICAL WEATHER ON CLIMATE PROCESSES**

Odessa, Ukraine, 3-9 July 2011

For more information, please visit the web sites

<http://www.ysss.osenu.org.ua/> or

<http://atmos.physic.ut.ee/~muscaten/YSSS/1info.html>

**14<sup>TH</sup> CONFERENCE ON THE ACCENT-PLUS SYMPOSIUM "AIR QUALITY AND CLIMATE CHANGE: INTERACTIONS AND FEEDBACKS"**

**Urbino, Italy, 13 - 16 September 2011**

For more information, please visit the web sites

<http://www.uniurb.it/SA/AccentPlus2011/leaflet2011.html>

and

<http://www.uniurb.it/SA/AccentPlus2011/information2011-date.html>

**2<sup>ND</sup> WORKSHOP "INFORMATICS & INTELLIGENT SYSTEMS APPLICATIONS FOR QUALITY OF LIFE INFORMATION SERVICES" ISQLIS**

**Corfu, Greece, 15 - 18 September 2011**

For more information, please visit the web site

<http://delab.csd.auth.gr/eann2011/isqlis.html>

**HARMO 14, 14<sup>TH</sup> INTERNATIONAL CONFERENCE ON HARMONISATION WITHIN ATMOSPHERIC DISPERSION MODELLING FOR REGULATORY PURPOSE**

**Kos Island, Greece, 2-6 October 2011**

For more information, please visit the web site

<http://www.harmo.org/harmo14>

**EMERGING REMOTE SENSING TECHNIQUES AND ASSOCIATED MODELING FOR AIR POLLUTION APPLICATION**  
**Eilat, Israel, 6 - 10 November 2011**

The main focus of the conference will be on the following subjects:

- Detection and mapping of gaseous and aerosol plumes;
- Aerosol/droplets measurement and characterization;
- Wind, temperature and turbulence profiling and retrieval;
- Networks and sensor-data fusion;
- Field campaigns and test beds;
- Model development and validation using remote-sensed data;
- Assimilation of remote-sensed observations in numerical models.

If you plan to attend the conference or wish to receive further details, please contact [Oholo@iibr.gov.il](mailto:Oholo@iibr.gov.il).

For more information, please visit the web site

[www.oholoconference.com](http://www.oholoconference.com).

**8<sup>TH</sup> INTERNATIONAL CONFERENCE ON AIR QUALITY - SCIENCE AND APPLICATION**

**Athens, Greece, 19-23 March 2012**

The 8<sup>th</sup> International Conference on Air Quality - Science and Application builds upon a long standing series that began at the University of Hertfordshire, UK in July 1996 with subsequent meetings at the Technical University of Madrid (1999), Loutraki, Greece (2001), Charles University, Prague (2003) and Valencia, Spain

(2005), Cyprus (2007) and Istanbul, Turkey (2009).

Air quality continues to be a key issue for achieving sustainable development and to reduce health impacts. Its impact spans multiple scales from street level to global including interactions with climate change. As always the conference is one of most prominent forums for discussing the latest scientific developments, applications and implications for policy and other users. An important feature of the conference is that it brings together scientists and other stakeholders from the air pollution, climate change, policy and health communities.

Important deadlines:

- Submission on one page abstracts - Friday 23 September 2011
- Notification of acceptance to authors - October 2011
- Submission of short papers - Friday 9 December 2011
- Early bird rate for registration fees - Friday 20 January 2012
- Application for exhibitors - Friday 20 January 2012
- Booking room at the Conference Hotel (Divani Caravel) - Friday 27 January 2012 (Code Air Quality 2012)

For more information please see the conference website

[www.airqualityconference.org](http://www.airqualityconference.org) or  
<http://airqualityconference.org/contact>.

**32<sup>ND</sup> NATO/SPS INTERNATIONAL TECHNICAL MEETING ON  
AIR POLLUTION MODELLING AND ITS APPLICATION  
Utrecht, The Netherlands, 7 - 11 May 2012**

Key topics:

1. Local and urban scale modelling (including the effects of building wakes, street canyons, urban canopy, urban energy balance)
2. Regional and intercontinental modelling (including observational and modelling of current and future scenarios, and impacts on meeting and maintaining air quality standards)
3. Data assimilation and air quality forecasting (including new research on focusing ground -and satellite- based observations into model outputs in creating high-resolution spatial maps of air quality, network design)
4. Model assessment and verification (including performance evaluation, diagnostic evaluation, dynamical evaluation, and probabilistic evaluation as part of comparison of model outputs with observations)
5. Aerosols in the atmosphere (aerosol dynamics, aerosol formation, interaction with multiphase chemistry)
6. Interactions between air quality and climate change (observational analysis and modelling analysis of the effects of air pollution on climate and the impact of changing climate on future air quality)
7. Air quality effects on human health, ecosystems and economy (including air quality trend assessments, cost benefit analysis of regulatory programs and their effects on air quality, human exposure and ecosystem burden, integrated modelling approaches)

Young researchers

Younger researchers are encouraged to participate through a competition for the best paper/poster from young researchers (younger than 35 years old on the first day of the conference). Adjudication will be based on scientific content and quality of the presentation. Young researchers should participate in the ITM as any other attendee, but should inform the Scientific Committee Chair at the time of submission of papers that they are candidates for the award. Three winners will receive cash awards supported by EURASAP.

For more information, please visit the web site  
<http://www.int-tech-mtng.org/ITM32/index.html>

**32<sup>ND</sup> NATO/SPS INTERNATIONAL TECHNICAL MEETING ON  
AIR POLLUTION MODELLING AND ITS APPLICATION, 7 - 11  
MAY, 2012, UTRECHT, THE NETHERLANDS**

Abstracts (maximum of 300 words), should be submitted using instructions on [www.int-tech-mtng.org](http://www.int-tech-mtng.org) by 31 July 2011.

More information at: <http://www.eurasap.org/FutureEvents.html>

**4<sup>TH</sup> INTERNATIONAL CONFERENCE BALWOIS 2012 ON  
WATER, CLIMATE AND ENVIRONMENT  
Ohrid, Republic of Macedonia, 28 May - 02 June 2012**

All information are available at [www.balwois.com/2012](http://www.balwois.com/2012).  
Deadline for submitting an abstract is 31<sup>ST</sup> of October 2011.

*Past events*

**NATO ADVANCED RESEARCH WORKSHOP - CLIMATE CHANGE,  
HUMAN HEALTH AND NATIONAL SECURITY  
Dubrovnik, Croatia, 28 - 30 April 2011**

*Zvezdana B. Klaić<sup>1</sup> and Harindra Joseph S. Fernando<sup>2</sup>*

<sup>1</sup>*Andrija Mohorovičić Geophysical Institute, Department of  
Geophysics, Faculty of Science, University of Zagreb, Zagreb,  
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The NATO Advanced Research Workshop (ARW) on Climate Change, Human Health and National Security (Dubrovnik, Croatia, 28-30 April 2011, <http://www.nd.edu/~dynamics/NATOWorkshop.htm>) was sponsored by the NATO Science for Peace and Security Program. The workshop was hosted by the Andrija Mohorovičić Geophysical Institute, Department of Geophysics, Faculty of Science, University

of Zagreb. For thirty two invited experts from various disciplines from seventeen countries it was one of the rare occasions to gather together and to exchange their knowledge on adverse effects of climate change on humans and their well-being. Although the workshop primarily focused on the climate change and its consequences, here we present its main conclusions, since climate change discussions cannot be separated from the issues of anthropogenic pollution of the atmosphere. The most valuable outcomes of the workshop were merging of ideas, aspects and results originating from numerous different backgrounds (such as, natural, social and political sciences, modelling, engineering, epidemiology and health care, energetic, urban planning, etc.), and, expression of necessity of future collaboration among scientist and professionals from multiple fields.

The highlights of the workshop are the following:

- Climate change and/or extreme weather events are a worldwide threat to water and food supply, human health and security. In Europe, the efficiency of a system of civil protection, which demands efficient social infrastructures, differs from country to country. Particularly, there is a need for further improvement of civil protection in Balkans, Moldova and Caucasian region. In Africa, the climate change can affect the quantity and quality of water supply, reduce agricultural productivity, and facilitate economic collapse, human migrations and potential conflicts. North and South American coastal areas are vulnerable to sea level rise coupled with more intense hurricanes. In Asia, almost 40% of population lives within coastal regions, and thus, they can be

exposed to climate change-induced water quality deterioration and a spread of infectious diseases.

- Anthropogenic influence on water access and availability is direct (pollution and overuse) and indirect (destruction of ecosystems that have important roles in hydrological cycle such as, forests or wetlands). Considering quantity and quality of global water supply, particularly vulnerable are northern Africa, Middle East and south-western Asia. In Europe, particularly sensitive to climate change are regions with arid and semi-arid climates, such as Mediterranean and South Eastern Europe, where hydropower production and irrigation can be affected. The change of rainfall distribution over the Mediterranean is already recorded. While total precipitation amount decreases, precipitation amounts during extreme rainfalls increase. Observed is also deterioration of the lake waters, accompanied with increased turbidity and eutrophication (e.g. Lake Sevan in Armenia). Thus, there is a need for an increase of awareness of the water-food-energy connection, as well as for better technologies and practices for more efficient agriculture (currently, 69 % of globally used water is consumed by agriculture). Although they are frequently overlooked, local water conflicts are common and affect the everyday life of many communities around the world.
- The responses of the confined water bodies, semi-enclosed and inland seas to climate change are generally more complex than those of open ocean since they reflect a complicated spectrum of interactions between the ocean, atmosphere, and the continents.

- According to IPCC, global warming rates over the globe over the last 35 years are not uniform. Climate model projections suggest an increase in duration and intensity of heat waves for some areas in the future. This is of high concern due to several reasons. If accompanied with elevated NO<sub>2</sub> concentrations, high temperatures can increase mortality. Further, although the transmission of vector-borne diseases is multi-factorial, it seems that exceptional heat waves can favour outbreaks of some diseases (e.g. West Nile Virus disease in Eurasia during summer 2010). In fighting vector-borne diseases, a new concept of tele-epidemiology based on remote sensing, can be useful.
- If climate change becomes non-linear, that is self-reinforcing and accelerated (and consequently, more difficult to predict), this will produce security, rather than humanitarian, economic, or technological problem. Recently, a concept of a 'tipping element' (Lenton et al., 2008), which describes a large, at least sub-continental scale (~ 1000 km) components of the Earth system that may pass a 'tipping point', is introduced, where the tipping point is a critical threshold at which a tiny perturbation of a control variable can qualitatively alter the state of the system. Some examples of tipping elements that affect human well-being and biodiversity are instability of the West-Antarctic Ice Sheet, lowering of the pH of sea water, and, Amazon rain forest die-back. All of the above are related to different mechanisms, triggering and control variables. Some of

scientific questions are still open - it is unknown how to design an early warning system for tipping, and, how do biogeophysical and socio-economic feed-backs involved in the tipping elements interact.

- In the current climate, El Niño-Southern Oscillation (ENSO) impact on the wintertime interannual climate variability in North Atlantic European region is weak. However, a hypothetical, warmer climate with increased CO<sub>2</sub> concentrations would produce substantially modified wintertime precipitation and temperature fields over the region compared to current patterns. Although ENSO exhibits considerable variability from event to event, with climate change it is expected that the Pacific islands states will be exposed to conditions generally drier in the east and wetter in the west and with shifting tropical cyclone patterns.
- Urban environments and particularly megacities interact with both the air quality and climate at different scales due to their emissions and urban heat islands. Urban heat island circulation affects pollutants dispersions, and consequently, the air quality. Megacities emissions (and specifically, greenhouse gases emissions, i.e., emissions of CO<sub>2</sub>, CFC, CH<sub>4</sub>, N<sub>2</sub>O and tropospheric O<sub>3</sub>) affect climates ranging from urban to global scale, while urban heat islands of megacities influence urban and meso-scale climate. On the other hand, the outcomes of global warming (such as, a sea level rise, desertification, adjustment of hydrological cycle and enhanced cloud cover) can significantly modify local climates. For example, they can cause a reduction of the diurnal



temperature range and/or shift of a local meteorological regimes, and consequent modifications of the pollutant concentrations fields patterns. Further, compared to previous times, urban areas in many parts of the world grow to an exceptional scale. Thus, during several decades the number of megacities (over 10 million inhabitants) increased from 4 (in 1950) to 39 (in 2002). Therefore, there is a need to reduce risks for their population, which can be achieved through short and long term measures both for protecting people and infrastructure. These require development in science, technology and institutional organizations, as well as improvement of the education of communities that are particularly vulnerable to risk.

- Atmospheric boundary layer (ABL) has a key role in both the air pollution and the microclimate. However, current climate, weather-forecast and air-quality models still need improvement of the physical background incorporated in the algorithms for calculation the BL height and the fluxes at the upper boundary of convective ABL. Wind-tunnel simulations of the ABL are shown to be useful for assessing the turbulence intensity and mean velocity profiles above different surfaces (i.e., urban, suburban and rural).
- Atmospheric aerosol, which among others affects climate, human health and visibility, generally exhibit different behaviour in different environments. Remote places are characterized by a low aerosol variations and low atmospheric turbidity, while urban sites have higher turbidity and they are strongly affected by anthropogenic

activities. However, dust storms can transport airborne particles over very large distances, thus, producing visibility degradation and health issues. Further, mass concentrations of the fine particles ( $PM_{10}$ , aerodynamic diameter  $\leq 10 \mu m$ ) in urban atmosphere depend on atmospheric conditions such as, a wind speed, air pressure and relative humidity. Thus, the climate change can at least locally affect  $PM_{10}$  levels, and accordingly, influence health, visibility and local climate. Global warming causes a decrease of a soil humidity and increase of dust particles natural emissions. Accordingly, heavy metals (which are present in the dust particles) are more efficiently resuspended in warmer climate. Resuspension is more efficient for urban, compared to rural areas.

- Eco-indexes are efficient instruments for tracing the state of the ecosystem. In particular, they can be used, in analyses of the long-term data series. A new concept of meteo-diffusivity indicator (MDI) is proposed as a policy tool for environmental sustainable development. MDI is designed to be applicable in industrial areas of high complexity, such as coastal domains with complex topographies, where severe pollution episodes occur due to specific meteorological conditions rather than elevated emissions. In order to improve the air quality management, a new profession, 'meteo-diffusivity expert' is also proposed. Apart from monitoring, such an expert should also diagnose, treat and prevent the occurrence of severe pollution episodes. Finally, landscape management should be officially recognized as an

efficient tool in legal, administrative and technical frameworks aiming to protect local, healthy environments.



*Workshop Attendees, Dubrovnik, 29 April 2011*

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**INTERNATIONAL WORKSHOP - INTEGRATION OF GEOSPHERES IN EARTH SYSTEMS: MODERN QUERIES TO ENVIRONMENTAL PHYSICS, MODELLING, MONITORING & EDUCATION**

Dubrovnik, Croatia, 30 April - 3 May 2011

*Alexander A. Baklanov<sup>1</sup>, Valeriy G. Bondur<sup>2</sup>, Zvezdana B. Klaić<sup>3</sup>, Sergej S. Zilitinkevich<sup>4,5</sup>*

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The workshop "Integration of Geospheres in Earth Systems: Modern Queries to Environmental Physics, Modelling, Monitoring & Education" was a joint meeting of the four ongoing projects:

- PBL-PMES "Atmospheric Planetary Boundary Layers - Physics, Modelling and Role in Earth Systems" (FP7 Specific Programme IDEAS, ERC Advanced Grant No. 227915, 2009-2013, coordinator S.S. Zilitinkevich) <http://pbl-pmes.fmi.fi/>;
- MEGAPOLI "Megacities: Emissions, urban, regional and Global Atmospheric POLLution and climate effects, and Integrated tools for assessment and mitigation (FP7-ENV-2007.1.1.2.1 project 212520, 2008-2011, coordinator A.A. Baklanov) <http://megapoli.info>;

- MEGAPOLIS "Integration technologies for evaluation of atmospheric pollution in megacities on regional and global scales based on air, space and ground monitoring for reduction of negative consequences of anthropogenic impacts" (Russian project, customer Ministry of Science and Education of the Russian Federation, 2009-2011, coordinator V.G. Bondur) [http://www.geogr.msu.ru/news/news\\_detail.php?ID=2288](http://www.geogr.msu.ru/news/news_detail.php?ID=2288);
- QUALIMET "Development of Qualification Framework in Meteorology" (EU TEMPUS project No. 159352, 2010-2013, coordinator S.S. Zilitinkevich) <http://qualimet.net/>.

The workshop was hosted by the Andrija Mohorovičić Geophysical Institute, Department of Geophysics, Faculty of Science, University of Zagreb. In total, 39 members of projects teams and external collaborators from a number of countries (namely, Croatia, Denmark, Estonia, Finland, Israel, Italy, Russia, Saudi Arabia, Serbia, South Africa, Sweden, Switzerland, Ukraine and USA) participated in the workshop activities. These comprised of:

- Topical presentations of the current state of the above projects: achievements, prospects, dissemination activities and collaboration with other projects and end users.
- Focused discussions on:
  - (i) ERC project PBL-PMES: current advancement of the theory of geophysical turbulence, and parameterization of PBLs as modules linking geospheres in weather-prediction, air-quality and climate models.

- (ii) EU and Russian Federation partner projects MEGAPOLI - MEGAPOLIS: observations, monitoring and integrated modelling of urban environment, accounting for dynamic-chemical feedbacks and local-regional scale interactions and using modern satellite remote sensing technologies.
  - (iii) TEMPUS project QUALIMET: modern challenges to the environmental (in particular, meteorological) education in view of threatening human impacts on the environment and climate, ultimate demand for sustainable development, and mass-scale higher education.
- General discussions aimed to facilitate networking and exchange of ideas / know-how within and beyond the consortia of the above projects.

Some of the workshop conclusions can be summarized as follows:

- Fluctuations of climate correlate with variations of Sun radiation at the scale of hundred years but in the last decades such relationship does not exist.
- The temperature changes given by IPCC are not uniform over the globe. Therefore, true magnitudes of local climate changes require determination of segmented trends on correct scales. Urban/megacity effects on climate depend on the scale concerned. Thus, city- and meso-scales are definitely affected by both urban heat island (UHI) and urban emissions, while global-scale climate is affected by urban/megacities emissions, particularly of greenhouse gases and aerosols.



*Workshop Attendees, Dubrovnik, 3 May 2011*

- According to the preliminary calculations by a method developed under the MEGALOPOLIS project and with the contributions of the MEGAPOLI project, the concentration levels of PM10 and NO2 are the most significant for a comprehensive air quality assessment in Moscow. The influence of the Moscow megacity on air quality can be detected as far as 100 km.

- Successful testing of technology for remote sensing monitoring of wildfires, developed under the project MEGAPOLIS, allowed calculating the emission of carbon monoxide from the summer fires of 2010 and evaluating their impact on air quality in Moscow - the largest metropolis in Europe.
- Extreme natural phenomena can drastically deteriorate environmental conditions in urban areas. For example, the effect of the interaction between natural and anthropogenic factors in the atmosphere of the Moscow metropolis during the heat of summer in 2010 led to the fact that on some days the average daily concentrations of gaseous pollutants were higher in 20-30 times than MPC, and single concentration - in 8 times.
- Regional climate change in the Middle East is closely linked to global circulation processes.
- In the absence of gravity waves, the spectral behaviour of winds at mesoscale (spatial scale 1 - 500 km, temporal scale 10 min - 24 h) is similar to one described in literature, and, the Taylor hypothesis is valid. However, well organized gravity waves modify above conclusions.
- Life-times and spatial scales of the semi-organized structures (i.e. cloud streets and cloud cells) are much larger than the turbulent scales.
- The direction of the geostrophic wind is an important control parameter for the Ekman Boundary Layer (EBL). Thus, it must be introduced to the EBL parameterization as a new control parameter.

- Mass concentrations of particulate matter with aerodynamic diameter up to 1  $\mu\text{m}$  (PM1) increase with an increase of relative humidity.
- Po Valley pollutants emissions impact the regional air quality at distances up to at least 500 km. Areas affected by these emissions are larger during the winter, while the mass of pollutants injected in the free troposphere is larger during the summer.

Workshop participants also highlighted the importance of educational and specifically inter-disciplinary educational programs, such as programs on physical and chemical weather, climate change adaptation etc. Finally, they raised some scientific questions, which need further investigations, such as:

- How large is the current impact of megacities on regional and global climate?
- How will the growth of megacities affect future climate at global and regional scales?

The participants stressed that MEGAPOLIS - MEGAPOLI partner projects results show the efficient cooperation of EU and Russian Federation in national environmental monitoring systems, and, the need to integrate the international practice in formation of similar projects.

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