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*EuCheMS news*

DIVISION OF ANALYTICAL CHEMISTRY  
EUROPEAN ASSOCIATION FOR CHEMICAL AND  
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EUCHEMS NEWS

**European analytical column No. 37 from the Division of Analytical Chemistry (DAC) of the European Association for Chemical and Molecular Sciences (EuCheMS)**

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INTRODUCTORY COMMENTS FROM THE CHAIRMAN OF DAC

The European Analytical Column has again a somewhat different format. We have once more invited a guest columnist to give their views on various matters related to Analytical Chemistry in Europe. This year we have invited Professor Manfred Grasserbauer of the Vienna University of Technology to present some of the current challenges for European analytical chemistry. During the period 2002–2007 Professor Grasserbauer was Director of the Institute for Environment and Sustainability, Joint Research Centre of the European Commission, Ispra. There is no doubt that many challenges exist at the present time for all of us representing a major branch of chemistry, namely analytical chemistry.

The global financial crisis is affecting all branches of chemistry but analytical chemistry in particular since our discipline by tradition has many close links to industry. We notice already now a decreased industrial commitment with respect to new research projects and sponsoring of conferences. It is therefore important that we strengthen our efforts and that we keep our presence at analytical chemistry meetings and conferences unchanged.

Recent activities of DAC and details regarding the major analytical-chemistry event this year in Europe, Euroanalysis XV in Innsbruck, are also reported.

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THE PERSONAL VIEWS OF MANFRED GRASSERBAUER ON “THE EUROPEAN UNION POLICY FOR SUSTAINABLE DEVELOPMENT – SOME CHALLENGES FOR ANALYTICAL CHEMISTRY”

During the “Anthropocene”<sup>1</sup> human beings have had a profound impact on our planet: up to now half of the land surface has been transformed by humans. In the past 3 centuries the population on earth increased 10-fold to 6 billion and industrial production increased 40-fold in the last 100 years.

These developments lead to a “Europe of Today” characterized by economic wealth, cultural richness and social security, but also caused significant problems in Europe and globally, particularly environmental pollution, excessive urbanisation, global warming and over-exploitation of natural resources.

This evolution eventually led to the present Policy Framework for the European Union where Sustainable Development is a key objective for all European Community Policies and thus one of the Guiding Principles for the European Union.

The present key issues for Sustainable Development are the management of natural resources, climate change and clean energy, and global poverty and development cooperation. The issue of sustainable management of natural sources concerns primarily air, water, soil and natural ecosystems like forests.

*Clean air for Europe*

Air pollution has been a major concern in Europe since the mid-sixties and has been addressed in a series of policy initiatives and legislation for the limitation of emissions from industry, energy production and transport dating back at the European level as early as 1970 with regular updates and revisions. Nevertheless recent health studies demonstrate that – even if major improvements in the quality of ambient air have been achieved – significant parts of the population still suffer from summer (ozone) or winter smog (particulate matter) and respiratory diseases are very common. Nowadays European hot spots for air pollution can be predominantly found in urban areas and regions with a very high traffic density. Road transport and shipping are responsible for a major part of the emissions of CO<sub>2</sub>, particulate matter, SO<sub>2</sub>, NO<sub>x</sub> and VOCs (forming ozone) in many regions. The key challenge is to develop a more sustainable transport system in Europe based on an integrated approach for the assessment of the environmental impact of transport aiming at the identification of a mix of different transport modes which is energy efficient, cost effective and environmentally friendly.

Analytical sciences play a major role in this context and faces many challenges, like improving the quality of relevant data by linking routine air quality monitoring to metrological measurement systems or harmonising/standardising PM<sub>2.5</sub> (fine particles of dimensions less than 2.5 micron) monitoring, establishing reliable methods for source apportionment of particulate matter, developing “on-board” emission diagnostic devices for heavy duty vehicles. Furthermore, the combination of monitoring and modeling for regional and hemispherical transport of pol-

lutants, assessment of non-local contributions to a particular emission situation as well as establishment of reliable models must be further advanced. The development of space based monitoring systems, *e.g.* within the frame of Copernicus project, and calibration/validation through *in-situ* measurements is another task which will require a massive contribution from Analytics and will represent a major contribution to a future Spatial Environmental Information System (SEIS).

#### *Water quality and quantity*

As far as the natural resource, water, is concerned the European problems are primarily that 20 % of the surface water bodies are still seriously threatened by pollution (*e.g.* by nitrate and pesticides), that 30.000 km<sup>2</sup> of European freshwaters are affected by acidification and that the ecological status of inland waters is often poor. European seas are significantly affected by eutrophication. In addition, there is a wide-spread over-consumption of water, particularly in the South of Europe. Water scarcity affects now already 100 million people in Europe and a dramatic increase is predicted for Southern Europe as a consequence of global warming.

Several initiatives of the European Commission address these issues, in particular the Water Framework Directive of 2000 and the Marine Thematic Strategy of 2005.

The challenges for Analytical Sciences relate to the development of methods and their harmonisation/standardisation for priority pollutants, emerging pollutants and ecological quality parameters of lake, river and coastal waters. Furthermore, new cost effective monitoring strategies based on “learning networks“, dedicated sensor networks, space based monitoring systems (particularly for eutrophication assessment) an effective combination of monitoring and modeling for input, transport and effects of pollutants should be developed. The establishment of the SEIS element “Water Quality and Quantity“ based on the “WISE“ Water Information System for Europe is a further priority.

#### *Climate change*

Climate Change provides the probably biggest challenge for Europe and the whole world. Green House Gas emissions have strongly enhanced the natural warming having led to an overall increase of the global mean temperature by 0.78±0.18 °C and a sea level rise by 15 cm over the past century. Under baseline scenarios CO<sub>2</sub> emissions will further increase (by 70 % in industrialized countries and by 250 % by countries in development till 2050) leading to a temperature increase of more than 2 degrees by 2050 and ca. 4 degrees by 2100 according to the IPCC report of 2007. The contribution of various countries to the Green House gas emissions differ widely, also on a *per capita* basis: annual emissions are less than 1 ton per inhabitant for developing countries and India, ca. 4 tons for China, nearly 10 tons for the European Union and nearly 20 tons for the

USA. Approximately 75 % of GHG emissions are from consumption of fossil fuel and biomass.

We have become aware of many different effects of global warming, like the strong retreat of Alpine glaciers, the reduction of the Arctic ice shield by 40 % since 1970, a warming of the Mediterranean Sea by 2–3 °C during the last 25 years.

The European Union has reacted to global warming by introducing the European Climate Change Programs I and II. These include ratification of the Kyoto Protocol in 1997 and the proposal of an integrated climate and energy policy in 2006 aiming at a 20 % reduction target for GHG emissions, a 20 % increase of the efficiency of energy consumption and a 20 % share of renewable energies by 2020, and a massive efforts to arrive at a global agreement for mitigation of global warming.

The EU policy to combat climate change requires massive efforts to develop new clean and sustainable technologies and we need to aim at a “Third Industrial Evolution” (Hans Joachim Schellnhuber, Climate Advisor to President Barroso and Chancellor Merkel). Analytical Sciences have a particularly important role in assessing the “Green House Gas Problem” and monitoring global change. The quality assurance systems for emission inventories need to be further developed, by *e.g.* reducing uncertainties in the flux of Green House Gases in the domain agriculture, forestry and land use, new assessment systems based on a combination of monitoring and modeling for emission and transport of Green House Gases and air pollutants need to be established. Of particular importance is the development of space based monitoring systems which need to be calibrated and validated through *in-situ* measurements for the assessment of the global concentrations of climate effective gases and aerosols and the study of climate change impacts.

#### *Global poverty and development cooperation*

In respect to the priority theme, Global Poverty and Development Cooperation, the main issues are on the one hand, that changes outside Europe are exerting pressures on the European Union through air pollution, GHG emissions of other countries etc., but on the other hand, that Europe is also exporting pressure on the environment by consumption of global resources: its ecological foot print is 3 times as much as its “fair earth share” and is not in line with the “One Planet Living” concept.

The EU has made many important initiatives to foster development cooperation, such as fully endorsing the Doha Development Agenda of the WTO Member States of 2001, the Cotonou agreement of 2000 with Africa, Caribbean and Pacific States, and it is strongly supporting to achieve the UN Millennium Development Goals.

The principles of Sustainable Development have been introduced in all relevant policies, like External Relations, Trade, Security and Development Cooperation.

The environmental pressures on the ecosystems in areas outside Europe are increasing at a dramatic speed. In the rapidly growing economies, we encounter massive land spoilisation, water and air pollution in and around new mega-cities.

The “Less Developed Economies” are stricken by different problems: lack of essential infrastructure and services (2 billion people without energy services, like access to electricity), shortage of agricultural land, food and water (globally only 12 % of land surface is usable for agriculture and overall only 2.5 % is high value farmland, 1 billion people are without access to safe drinking water), widespread diseases and poverty (in Sub-Saharan Africa 50 % of the people live on less than 1 Euro/day, there are millions of potential migrants).

Africa has been identified as a Priority Partner of the European Union. 3 billion Euros are provided annually as development aid to support infrastructure development, the sustainable use of natural resources, and food security.

Important tasks for Analytical Sciences include the provision of environmental monitoring systems and knowledge/know-how to the rapidly developing economies and the developing countries, furthermore the development of globally operating space based observation systems with calibration/validation through *in-situ* measurements for monitoring of pollution of air and water, the exploitation of natural resources, the assessment of climate change impacts, and the monitoring of agricultural productivity and, last but not least, the establishment of data and observation systems for environmental health.

The overall major challenge for the European Union, as for other highly industrialized and wealthy societies, is without doubt to develop a functioning an interdependent global system where the presently 6.7 billion people (and 10 billion in 2050) from 1000 nations and 200 countries can live together peacefully. Key questions will relate to environmental quality, the sustainable management of natural resources, combating climate change and achieving a better equilibrium in the distribution of resources. New technologies and an integrated thinking will be the key to progress. Analytical Sciences as a key discipline for providing reliable and useful information will play an important role in this evolution.

#### INFORMATION FROM THE EUCHEMS DIVISION OF ANALYTICAL CHEMISTRY

Great achievements this year for EuCheMS! DAC welcomes the Division of Inorganic Chemistry and the Division of Organic Chemistry as new Divisions of EuCheMS. This move certainly strengthens the EuCheMS as a whole, and DAC is looking forward to collaborations maintaining a high level of activity. Most likely, the new Divisions are going to organize conferences of their own but before a series of successive events is established; DAC encourages delegates and members to participate in Euroanalysis XV, 6-10 September 2009 in Innsbruck, Austria. The head-line title of the conference is “The Impact of Analytical Chemistry on Quality of Life”.

The expansion of EuCheMS led by the former Chairman Giovanni Natile and by the new Chairman Luis Oro calls for appointment of liaison persons to participate in planning of events and optimizing resources in times where they might be limited. The DAC liaison to other organizations operates well with exchanges of newsletters and minutes of meetings. The Delegates are urged to supply information to the Secretary for distribution in EuCheMS Newsletter, CITAC Newsletter and Eurachem Newsletter. The EuCheMS Newsletter and the associated Brussels News Update both available at the EuCheMS homepage ([www.euchems.org](http://www.euchems.org)) should be circulated by Delegates nationwide.

The DAC Annual Meeting 2008 was held in Turin, Italy, on Tuesday, 09 September 2008. The Meeting was hosted by Luigia Sabbatini of the Italian Chemical Society and by Maria Careri of the Italian Division of Analytical Chemistry and took place at the Lingotto Congress Centre. Our Italian colleagues made a great effort to organize the Annual Meeting and to ensure a prominent position of analytical chemistry at the EuCheMS 2nd European Chemistry Congress; two half-day sessions of analytical chemistry, a school of analytical chemistry, short courses, seminars and workshops. Many thanks are due to the organizers who also published<sup>2</sup> a tribute to P. G. Zambonin who has contributed for many years to analytical chemistry and to the work of the DAC.

The quality label "Organized in Cooperation with DAC" was awarded to five international meetings and conferences on analytical chemistry in 2008. A best-poster award worth 200 € introduced by Springer Publishers was given to young scientists at Analysdagarna in Gothenburg, Sweden. This very prominent courtesy generously announced by Steffen Pauli ([Steffen.Pauli@springer.com](mailto:Steffen.Pauli@springer.com)) of Springer will also be awarded at forthcoming meetings that have obtained the DAC designation. The guidelines (Appendix II of the DAC Statutes) prescribe, that a DAC Delegate addresses the participants with information on the Division, and the designation also imply that the Delegate reports in writing to the following Annual Meeting. A report template may be downloaded from the DAC site ([www.dac-euchems.org](http://www.dac-euchems.org)).

The Study Group of Education headed by Reiner Salzer has created a number of templates for case studies, which may be downloaded from the DAC site. The Members, Delegates and Guest are encouraged to contribute case studies to teaching at all university levels by using the templates. The Study Group Education intends to collect a series of case studies that may be used by the teacher to demonstrate fundamental principles of analytical chemistry using real-life measurements.

#### REFERENCES

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2. E. Desimoni, F. Palmisano, L. Sabbatini, *Anal. Bioanal. Chem.* **389** (2007) 2051.