A climate of uncertainty

Professor Dr Johannes Orphal, Director of the Institute for Meteorology and Climate Research at KIT, calls for greater European efforts to tackle environmental changes...

Changes in the Earth's atmosphere are occurring more rapidly than ever before, with substantial evidence that human activities are the primary cause. Increasing CO_2 concentrations are obviously related to the combustion of fossil fuel, while increases in CH_4 and N_2O concentrations can be related to agriculture. Air pollution has become a serious problem in megacities worldwide.

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Atmospheric measurements conducted since the 1980s, obtained using sophisticated instrumentation on-board satellites, stratospheric balloons and aircraft, as well as ground-based stations, show dramatic changes in atmospheric composition. Most measurements confirm global and regional climate change, when compared to data obtained from different research institutions over the last hundred years and with data based on air bubbles in ice cores from Greenland and Antarctica. Together, this data provides a clear picture of increasing greenhouse gases, ozone-destroying compounds, pollutants and aerosols in the atmosphere.

Without a doubt, these trace substances have an impact on the Earth's climate. Summer 2010 will be one of the warmest summers (if not the hottest) ever observed in the history of meteorology. Sea levels are rising, while the Arctic ice sheet is melting away.

Climate change: certainty and scepticism

It is less clear, and certainly less well known by the general public and most policy-makers, what the detailed consequences of atmospheric change will be. Numerous climate models have been used to estimate the scope of global and regional climate change. In addition to the

extreme environmental effects, some of which are already being observed, the economic impact will be immense. It may take several hundred years before the Earth's climate stabilises again. Of course, there have been significant climate changes in the past, but probably none as dramatic and rapid as the ones observed today.

There remains, however, severe public scepticism concerning the quality of climate models. The IPCC and the entire community in climate research have been heavily criticised in the last year. Why is the overwhelming evidence for climate change still questioned, and why are scientists still not considered to be trustworthy? Would scientists worldwide need to exaggerate the significance of their findings, when there is clear evidence for change within the measured data?

Towards a European Centre for Climate Research

Here in Europe, the bridge between the scientific observations of a changing planet, and the public awareness of future environmental changes and challenges, cannot be established without appropriate structures at European level. Climate research is already well-established in many European countries, but is at present dominated by many individual institutions, even at national levels. The creation of a facility dedicated specifically to European research would substantially improve the visibility of climate research in Europe, and hence foster public outreach. Such a centre would require an annual budget of less than €50m, estimated on the basis of a few hundred scientists working there. A European Climate Research Centre would collaborate closely with national ministries and research organisations (such as CNRS/INSU in France, HGF and DFG in Germany, NERC in the UK, CSIC in Spain, etc.) and of course with European organisations (such as ESA, EUMETSAT, ECMWF, JRL, etc.) and the European Commission. Internationally it would interact with the Intergovernmental Panel on Climate Change (IPCC), the World Meteorological Organisation (WMO), the United Nations Environment Programme (UNEP), and the Group on Earth Observations (GEO), to name just a few.

Over the years, I have personally experienced European networking through many different research projects and actions funded by the EU. We have worked together with partners from Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, Sweden, and the UK. I fully believe in the power of research through integration of national structures into appropriate organisations on a larger, European, scale.

Today, the European Commission supports climate research in Europe with considerable funding. In France and Germany, huge research organisations like the CNRS or the HGF work with annual budgets of several hundred million euros for climate research – furthermore, the two countries have recently agreed to build a new climate satellite. The European Space Agency (ESA) launched the Climate Change Initiative in 2009, again with a very substantial budget, while the huge Living Planet satellite programme already provides essential data to monitor climate change.

Hence, in my opinion, climate research is well supported in Europe. But great problems like climate change require not only financial support, but also a suitable institutional infrastructure appropriate for the task.

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Today in Europe, there are several, very successful, examples of such entities – the European Space Agency with centres in Paris, Noordwijk, Darmstadt and Frascati, the Centre Européen de Recherche Nucleaire (CERN) in Geneva, the Joint Research Laboratories (JRL) of the EU, and the ITER project in Cadarache (which set out to meet the energy challenge of the future through nuclear fusion).

Climate research is an issue that warrants a similar institutional entity at European level. I sincerely hope that in the future, European climate research will achieve more visibility through the creation of an appropriate institutional research structure, one that will support the European Commission as well as national and international organisations to target the most important issues in this field.

Climate change is a challenge for Europe. Now is the time to take a new, important step, for the future of climate research in Europe. It is important not just for science. It is important for Europe's citizens.

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