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Georg Götz

Global Change
Interviews with Leading Climate Scientists

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Preface

What are climate scientists doing exactly? Which methods are they using for their research? What is the current level of understanding about climate change and global warming? What is still uncertain or unknown?

These questions are not only interesting for the scientific community itself but also draw an increasing attention from a more general public. Terms like "climate change", "global warming" or "the greenhouse effect" have become part of common speech during the past decade. Sometimes, it seems important to recall that it is still the scientific research, that forms the basis for all the statements and opinions, which are debated so widely today. The scientific results dealing with global warming and the impacts of a changing climate are discussed extensively and often controversial. This has lead to an increased interest in the methods which are used to obtain these scientific results and conclusions. But the techniques and concepts used in climate science may not be easy to understand immediately by everyone. It seems evident that it is very difficult to obtain a "complete" description of the earth's climate, as soon as one realizes the complexity of the problem and the endless number of aspects involved, as well as all the possible interactions between various mechanisms that can influence the climate and the extremely long timescales involved.

Nevertheless, great progress has been made during the past decades on many aspects: understanding the climate of the past, identifying and quantifying key processes that influence the earth's climate, recognizing the way climate and biosphere influence each other, the human impact on the climate and many more. At the same time, many questions are still subject of ongoing research, such as the exact role of clouds for the climate system or the rate at which the Greenland and Antarctic ice sheets are melting. Computer models that allow to simulate the evolution of the climate under different scenarios are extremely important and widely used in climate science. There are few scientific disciplines that use such large and complex computer models. An important question is how to verify these models and quantify their uncertainty since the involved timescales are that long that is is difficult to check these models is situ. But also field measurements are still important and instructive: obtaining information about the past climate or the

interactions between climate and biosphere from so called proxydata is a widely used concept.

During the last years, the field of climate science has grown explosively. Not only regarding the number of researchers participating and scientific papers published, but also regarding the number and variety of scientific disciplines involved: mathematics, physics, geology, biology or econometrics, just to name a few. This makes climate science a truly multidisciplinary field and it is interesting to see how results from the different sub-fields contribute to a large picture. Today, not only climate change itself is a subject of research; also the impacts of a changing climate on, for example, ecosystems, the human society or economy are investigated scientifically.

Coming from a different scientific field, I was always interested to learn more about the scientific methods of climate science. Following the huge public debate about global warming and its impacts on environment and society, I realized soon that I did not know much about the scientific background or the "daily research work" in climate science. And I noticed that this experience was shared by many other people. For this reason, I found that a book where different scientists explain their own field of research could be an interesting addition to the existing literature about climate science.

This book consists of interviews with leading climate scientists from many different fields. The covered subjects include the greenhouse effect, glaciers, sea-level rise, computer models of the earth's climate and the role of the oceans for the climate system. The last few interviews in this book deal with impact assessment and the historical, political and economic dimensions of climate change. Each expert is interviewed mainly about his own area of research but also about his views on the ongoing public debate and interdisciplinary questions. Very few areas of science are subject of such a wide—and sometimes also heavy—public and political discussion as it is the case for climate science and it might be interesting to hear how this fact is experienced by different scientists and how it influences their research work.

As mentioned above, this book is intended to present opinions from experts in some of the many different areas associated with climate science and motivate the readers to go into more detail of what they find interesting. Neither the selection of subjects nor the interviews itself are meant to present a complete picture—there are many more topics that could have a place in a book like this. But I hope the reader will get some insight into the present status of climate science and the views of some of the experts on both past and possible future developments in their field.

Finally, I would like to express my gratitude to all the scientists that contributed to this book by talking to me about their area of research and also their personal views on this exciting and important area of science.

Georg Götz