

MEETING

Challenges to Understanding Past and Future Climate in Africa

MARUM Workshop: Response of North African Ecosystems to Abrupt Climate Change; Bremen, Germany, 14–16 November 2007

PAGE 196

The future response of African ecosystems to global change is highly uncertain. North Africa is one of the regions where many state-of-the-art climate models fail to reproduce major features of the monsoonal precipitation system, and consequently, projections of future changes are not coherent among different models. A 3-day workshop brought together 50 international experts in atmosphere physics, African paleoclimate, and archaeology. The workshop aimed to explore the role of Africa in global climate change throughout the geological past, the present, and the future. The following principal recommendations resulted from the workshop:

1. The Intertropical Convergence Zone is effectively independent of the system that produces most of the rainfall over West Africa. Recent meteorological observations show that the rainfall belt is produced by a deep core of rising air that lies between the axes of the midtropospheric African easterly jet and the upper tropospheric tropical easterly jet. While the location and intensity of the African easterly jet has long been

implicated as a major factor in interannual rainfall variability, the role of the tropical easterly jet has been largely ignored until recently. Future research should focus on mechanisms that control the dynamics of the two jets in order to improve predictions of West African precipitation.

2. Marine and terrestrial paleoclimatic records from all around and throughout the African continent show pronounced dry spells between the Mediterranean and about 10°S that are associated with slow-downs of the Atlantic meridional overturning circulation during known millennial-scale periods of the Pleistocene (1.8 million to about 10,000 years ago) when anomalously cold conditions prevailed in the North Atlantic realm (so-called Heinrich events and Dansgaard-Oeschger stadials). It is still an open question as to whether this drying was due to an overall drying in tropical Africa or whether these events represent southward shifts of the tropical rain belt. Because a slowing of the overturning circulation is to be expected for the future, further studies should address this question by extending the paleoclimatic archive.

3. Another open question concerns the abruptness of environmental changes in North Africa during the Holocene (the past 10,000 years). Although the early Holocene's rapid change to humid conditions is now widely accepted, increasing support speaks for a gradual rather than abrupt decline of precipitation along with a decrease of summer insolation. Climate models show contradictory results. While one model suggests an abrupt collapse in vegetation and precipitation caused by a strong positive vegetation-climate feedback, another model shows a gradual retreat of rainfall. To resolve this discrepancy, independent paleobotanic and paleoclimatic estimates of Holocene changes in Saharan vegetation and rainfall are sorely needed.

4. Modeling of climate-dust feedbacks is still in its infancy. Besides tremendous uncertainties regarding dust radiative forcing, simulating the global dust cycle is still a challenge, in particular due to uncertainties in the dust emission term. So far, there is no consensus as to whether mineral dust aerosols will increase or decrease in the future and what their impact on climate will be. Implementing and improving dust feedbacks in climate models should be on the top priority list of model developers.


The workshop agenda and more details can be found at <http://www.marum.de/african-workshop.html>.

The full text of this meeting report can be found in the electronic supplement to this *Eos* issue (http://www.agu.org/eos_elec).

—JAN-BEREND STUUT, STEFAN MÜLTZA, and MATTHIAS PRANGE, Center for Marine Environmental Sciences (MARUM), University of Bremen, Bremen, Germany; E-mail: jbstuut@marum.de

BOOK REVIEW

Fundamental Astronomy, Fifth Edition

 Hannu Karttunen, Pekka Kröger, Heikki Oja, Markku Poutanen, and Karl J. Donner, Editors
Springer; 2007; 510 pp.; ISBN 978-3-540-34143-7; \$69.95

PAGE 197

Writing a spectacular astronomy book is relatively easy these days. The impressive images of the latest observations of the celestial world capture the attention even of those who may not be interested in anything else in the world. In the bookstores, one can find a wide variety of beautifully illustrated books that display all of the known members of the celestial realm. The books present us with the planets and their moons, the Sun, some spectacular stars and constellations, the Milky Way, other galaxies, and the incomprehensible dimensions and depths of space. Undoubtedly, all of us—regardless of age or social or academic

background—need these books, simply because we would like to know where we actually live.

This book is not simply one of those types of astronomy books. Showing a number of shiny astronomical objects cannot satisfy the book's editors. This is evident for the reader even without opening the book. The title, *Fundamental Astronomy*, already places the level of our expectations high. And the cover photo does not show any magnificent solar prominence before a violent eruption or the lofty Horsehead Nebula in Orion or any astonishing infrared view of the Andromeda Spiral Galaxy. Instead, the photo displays the massive James Clerk Maxwell Telescope, in Hawaii. The picture

expresses the desire of the editors, and of eager amateur and professional astronomers, to explore the universe and discover the laws governing it.

More than two decades ago, the book's editors—a handful of Finnish astronomy teachers, solar physicists, and astronomers—decided to provide a textbook for astronomy students and, at the same time, a handbook for serious amateurs. In this book, the editors have proven their claim that the reader needs only standard high-school knowledge of mathematics and physics to digest the chapters, which, one by one, cover every field of astronomy.

The reader can learn basic observational techniques first. This leads to the detailed description of the solar system, various classes of stars, interstellar medium, star clusters, and galaxies. These various subjects of astronomy follow upon each other in a carefully structured order.

In addition to presenting the fundamentals of astronomy, the editors have been working hard to include the latest discoveries and an up-to-date understanding of astronomical questions. For example, the editors take into account the redefinition of a planet by the International Astronomical