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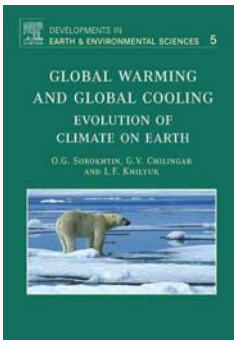
***Global Warming and Global Cooling***—*Evolution of Climate on Earth*, by O.G. Sorokhtin, G.V. Chilingar & L.F. Khilyuk, 2007. Developments in Earth and Environmental Sciences 5. Elsevier, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. Hardback, 313 pages. Price EUR 130.00; USD 160.00; GBP 90.00. ISBN 978-0-44-52815-5.




Global climate change has become one of the most hotly contested science-based public policy issues in the last 20 years. The debate is one of data versus theoretical computer modelling. Most contributions about global warming are published by Anglo-Saxon authors. We have therefore to thank Elsevier for publishing this oxygenated Russian view. This is a global view of the Earth evolution system from its basic planetary components to the impact of microbial activity on the climate. Russians, who lately got access to informatics, developed judicious and evolved mathematical and physical approaches to analyse data concerning various processes.

In the present-day debate, a good understanding of climate evolution along with the shaping of thew Earth is of great importance for a thorough analysis of the present-day climate trends. Hard-rock geologists and geochemists have a vision based on knowledge of climate changes in the geological past, but they tend to be attacked by scientists who deal exclusively with data from the short time that (only some!) climate parameters were monitored. Although the anthropocentric view presented by J. Lovelock is very interesting, we should not forget when considering the recent climate changes what has been the impact of fundamental processes (that also played a role in the remote past) such as the production of abiogenic methane by the hydration of the oceanic crust, with as a result a negative $\delta^{13}C$ concentration ( -5.5‰), presently commonly attributed to the burning of fossil fuels! Much attention is paid to the very early impact of the microbial biosphere on our atmosphere, on ore deposition and fuel formation. This early impact of the microbial biosphere on our atmosphere is primordial, as has been stressed already by Boucot and Gray (2001), but this fact is purposely ignored by the advocates of Snowball Earth, a hypothesis that is one of the fundamental features underlying the theory of $CO_2$-induced global warming.

The adiabatic theory of the greenhouse effect is the masterpiece of this volume, and forms the link between the newborn Earth geology and ... the Global Change. Most interpretations and models, as managed by the IPCC, are related with the radiation budget of the atmosphere, the ocean and the landmasses. The adiabatic theory considers Earth as an open, dissipative system that can be described by non-linear equations of mathematical physics, taking in account the formation of stable thermodynamic structures in each compartment, between compartments, and ruled by strong feedbacks (e.g. convection, water cycles). It allows to deal with global atmospheric phenomena such as the greenhouse effect for the entire planet. This approach may be completed by additional parameters; these may be global, such as the inclination of the earth rotation axis, or more local, such as the reflection capacity of the seasonal snow cover. It allows to build 3-D or even 4-D models (time included) of the greenhouse effect. It implies already that convection alone accounts for approx. 67%, radiation for some 8%, and water condensation for about 25% of the total heat transfer to the atmosphere. The troposphere is definitively dominated

by convection and water-vapour forcing! The estimation of the impact of the anthropogenic $CO_2$ emission practically does not change the global atmospheric temperature. With the consumption of oxygen by burning, it will lead by 2100 to a cooling of 0.01 °C ... In other words: a pinchnet rapidly equilibrated by the biosphere and especially the plants!

This theory is further applied to a cautious analysis of the earth climate, especially for the Cenozoic cooling and the present-day "global warming." The authors stress, using logical and quantitative analyses from both Western and Russian publications, that the anthropogenic $CO_2$-induced global warming is a myth: it is only a fourth-order parameter, common for trace gases. Sun forcing is, with the atmospheric composition, of the first order, especially with a solar constant (that is now commonly considered as stable, although it is evolving in time!). Landmass distribution by plate tectonics is of the second order. Solar orbital forcing and activity are in the third rank as has been demonstrated, indeed, by numerous scientists, but their findings are denied by the afvocates of ongoin global warming. Volcanoes, weathering and other perturbations belong to the fourth rank, even higher than man-induced impact. Some 99.95% of the energy driving the global climate is derived from solar irradiation and its hiccups.

The adiabatic theory of heat transfer makes Sorokhtin and his co-authors raise the seemingly paradoxical conclusion that an increase in $CO_2$ content of the atmosphere will eventually lead to global cooling, although limited, of the atmosphere.

With natural cooling induced by the current orbital forcing and by a man-made albedo increase (deforestation, soil erosion, urbanisation), enhanced by a lowering of the related water-vapour content in the atmosphere (the "desertification"), this book, which is not written by aggressive sceptics, brings supplementary arguments for cautious management of the Earth, and for avoiding overexploiting our planet and its energy resources. Climate panic mongers will probably neglect this book or deny its conclusions, like they usually do. For me, its is a bottle of oxygen dropped in the ocean of science, a surprising example of free thinking cropping out from the Lysenko world. I recommend it for teaching, especially at master level and I hope that a cheap paperback version will soon become available so that this interesting theory can be presented to a wider public, including politicians, economists and clerical people.

Although the figures are all in black and white, and not always well printed, And although there is a lack of well-drawn images of models (such as commonly present in the classical literature and on websites), the contents are clear and accessible for most scientists. An important advantage of the book is that the authors refer both to Russian publications and to the most common recent Western literature.

Reference

Boucot, A.J., Gray, J., 2001. A critique of Phanerozoic climatic models involving changes in the $CO_2$ content of the atmosphere. Earth-Science Reviews 56,1-159.

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