

GENERALIA

Editorial remarks. The increasing production of CO₂ by industrial processes will, as is well known from changes in infrared absorption, lead to a disturbance in atmospheric heat circulation. Although modern coal-based technology is environmentally conscious, the output of world coal production could be as much as 7 billion tonnes by the year 2000 (from the 'World coal study' chaired by Prof. Carroll Wilson, Massachusetts Institute of Technology, May 12, 1980)¹ and, together with the expected increase in oil and gas production, will lead to threatening regional climatic changes worldwide.

Two international reports published in 1979 clearly pointed out the CO₂ problems that are discussed in this survey: SCOPE 13 'The global carbon cycle' (Scientific Committee on Problems of the Environment/International Council of Scientific Unions (ICSU))² and 'Carbon dioxide and climate' (The National Research Council, Climate Research Board/National Academy of Sciences, Washington)³. The following review 'The carbon dioxide problem' is an important topical continuation of these fundamental reports.

H. M.

The carbon dioxide problem. An interdisciplinary survey

W. Bach (coordinator), H. Bröhl, U. Fischbach, J. Goudriaan, U. Hampicke, G.H. Kohlmaier, G. Kratz, W. Louwerse, C. Marchetti, F. Niehaus, H. Oeschger, R.M. Rotty, W. Schunck, U. Siegenthaler, H. van Keulen and H.H. van Laar

Contents. 1. Introduction (W. Bach); 2. The C cycle: sources and sinks of atmospheric CO₂ (G.H. Kohlmaier, U. Fischbach, G. Kratz, H. Bröhl, W. Schunck); 3. The effect of the atmosphere-biosphere exchange on the global C cycle (U. Hampicke); 4. Past and future emission of CO₂ (R.M. Rotty); 5. Prediction of future CO₂ concentration in the atmosphere (U. Siegenthaler, H. Oeschger); 6. Physiological aspects of increased CO₂ concentration (H. van Keulen, H.H. van Laar, W. Louwerse, J. Goudriaan); 7. The impact of different energy options on atmospheric CO₂ levels (F. Niehaus); 8. Climatic effects of increasing atmospheric CO₂ levels (W. Bach); 9. Measures of CO₂ control (C. Marchetti); 10. Conclusions (H. Oeschger).

Introduction

by Wilfrid Bach

Center for Applied Climatology and Environmental Studies, University of Münster, D-4400 Münster (Federal Republic of Germany)

The basic problem can be briefly stated as follows: the increasing combustion of fossil fuels and the destruction of forests and organic matter in soil may lead to the release of large amounts of CO₂ to the atmosphere at a rate that is faster than the absorption rate by the natural system. The result is an accumulation of CO₂ and other heat-absorbing gases, which, by changing the heat budget of the earth-atmosphere system, may also change the earth's climate. There is a wide consensus that the increasing CO₂ concentrations in the atmosphere will lead also to an increase in the surface air temperature and to an enhancement of the

hydrologic cycle, both varying greatly by season and geographic region. The dilemma is that probably none of these effects caused by man's activities (the signal) will be detectable in the natural climatic trend

¹ 'World coal study'. Massachusetts Institute of Technology, 12 May, 1980. Ed. C. Wilson. MIT, in press 1980.

² SCOPE 13 'The global carbon cycle'. Ed. B. Bolin, E.T. Degens, S. Kempe and P. Ketner. J. Wiley, New York 1979.

³ 'Carbon dioxide and climate'. Report of an 'ad hoc study group' on CO₂ and climate, Woods Hole, Mass., 23-27 July, 1979. Ed. National Academy of Sciences, Washington, D.C., 1979.