

The view from Leningrad

A. Barrie Pittock

Climate Shocks: Natural and Anthropogenic. By K. Ya. Kondratyev. Wiley: 1988. Pp.296. \$54.95, £50.

IN THE foreword to *Climate Shocks*, Will Kellogg describes the book as "an extraordinary *tour de force*" and "a scholarly achievement that is unmatched, to my knowledge". Unfortunately, I cannot agree. The book is certainly interesting to a relative insider, and it raises a number of points which deserve further attention. But, despite his eminence, Kondratyev puts forward a rather idiosyncratic view which will leave many readers bewildered rather than enlightened.

After a brief introduction to physical climatology, there follows an account of the greenhouse effect, and longer chapters on the climatic consequences of volcanic eruptions and on those that might result from a nuclear war. The latter contains a large section on the possible effects of the Tunguska meteor fall in 1908. A final chapter purports to present recent results and conclusions, but in fact largely summarizes the unrefereed papers that were presented at one particular conference held in 1985.

Throughout the book Kondratyev tends to give rather uncritical, detailed and technical summaries of selected papers, many of which are out of date, there being frequent confusion between the views contained in the original papers and those which the authors now hold. The result is a perplexing array of often contradictory statements, with too little attempt to mould the material into a rounded overview.

A central theme is the author's conviction that oxides of nitrogen, supposedly produced in large quantities by the atmospheric nuclear bomb tests of the 1950s and 1960s, caused a significant surface cooling in the Northern Hemisphere (an 'anti-greenhouse effect'), and that they would have caused a decrease in stratospheric ozone had it not been for a simultaneous injection of water vapour into the stratosphere. Kondratyev invokes the mechanism to reconcile the observed average surface temperature trends in the Northern Hemisphere in the 1930s through to the 1970s with the expected warming due to the greenhouse effect. But this requires him to add a contribution from industrial NO_x production before the bomb tests; as this input is tropospheric, the theory hardly stands up to close examination.

The NO_x theory is based on a controversial paper by Hampson (*Nature*, **250**, 189; 1974) and a time series of NO_x con-

centrations derived by Kondratyev and coworkers by working back from the time series of ozone amounts. On p.177 he blames other people's failure to agree with his interpretation of the ozone record following the nuclear tests on rejection of the Soviet data obtained with the M-83 ozonometer; yet on p.192 he concedes that turbidity caused errors in the M-83 measurements.

Nitrogen oxides are also invoked to help 'explain' phenomena associated with the Tunguska meteorite event. Much space is devoted to explanations of the time series of atmospheric optical thickness over Mt Wilson, which shows peaks

estimates of the mass, velocity and other characteristics of the Tunguska meteorite, which Kondratyev says was a cometary nucleus composed largely of solid methane, seem to be plucked out of the air. Perhaps the primary literature is more convincing.

Kondratyev's account of the climatic consequences of nuclear war is largely built on selected early results, with an added emphasis on the possible effects of NO_x and other gaseous products. Like a number of other reviewers, he fails to identify clearly the critical role of absorption of solar radiation by carbon particles, as distinct from scattering. Use of the terms "optical depth" and "extinction", both of which include scattering as well as absorption, obscures the key point that most scattered light still reaches Earth's surface unless it is absorbed by the carbon particles. Thus on p.197 he quotes Crutzen and Birks as reporting solar radiation "extinction" by a factor of 2 to 150, when in fact they wrote that the "average sunlight penetration to the ground will be reduced by a factor of 2 to 150", which is quite different. This may be a fault in the translation, but it is a common misconception.

Other oddities may also be artefacts of translation — for example, a reference to 1815 as "a year without the sun" instead of "a year without a summer" (p.74).

With regard to the climatic consequences of nuclear war, Kondratyev, like many others, concentrates on the surface-temperature effects, giving too little emphasis to the perhaps more serious and robust results which show that rainfall would be dramatically reduced, especially in the tropics. He also fails to give proper attention to the importance of lofting of smoke due to its absorption of sunlight, and the resulting prolongation of the lifetime of the effects.

There is a natural and useful bias in the book towards the Soviet literature. But there is also a tendency to concentrate too much on results from Kondratyev's own group in Leningrad, and not enough effort is made at least to temper the view from Leningrad by comparing it with relevant non-Soviet studies. The treatment of the global carbon cycle is a case in point, with an extensive reference (p.12) to a controversial paper by Gorshov which claimed that "even after burning all existing fossil fuels, the CO_2 concentration in the atmosphere cannot increase by more than 35% to 40%". No contrary view is given.

In summary this is a confusing and somewhat partisan book, one which is perhaps more interesting for what it says implicitly about Soviet science than for what it contributes to an understanding of its subject matter. □

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Perturbation for climate (and much else besides) — Krakatoa blows its top in 1883.

on 4 June 1908 and some 60 days later. The Tunguska event occurred on 30 June, so Kondratyev postulates another "pre-Tunguska stone meteorite" which supposedly disintegrated over Tibet on 4 June, the resulting cloud of particles taking 60 days to travel around the globe twice. Without any supporting evidence for the earlier event, this looks like special pleading. Indeed, the rather detailed