

## Nuclear winter

International committee  
echoes gloomy forecasts

## Washington

THE study of the environmental consequences of nuclear war made public last week by the Scientific Committee on Problems of the Environment (SCOPE) is the most ambitious attempt yet to arrive at a comprehensive view of the problem. The report will be published in two volumes, and runs to 800 pages (see also p.192). The immediate effects of nuclear explosions and of radioactive fallout are considered, but it is inevitable that most attention will be given to what the study says about nuclear winter and the probable biological consequences for both natural and agricultural ecosystems that would follow. The modelling in the study "extends very greatly" previous work, according to the chairman of the study's steering committee, Sir Frederick Warner of the University of Essex in England.

The principal authors of the report acknowledge the many uncertainties surrounding estimates of the amount of smoke likely to be released from mass fires and its residence time in the atmosphere, two key factors for the nuclear winter principle. But the study found that all model simulations considered suggested "a strong potential for large-scale weather disruptions as a result of smoke injected by post-nuclear fires".

Although simplifications of the models and uncertainties about some physical processes may affect the details of predictions, they "probably do not affect the general character of the calculated atmospheric response". Tentative estimates indicate that for a nuclear exchange in summer months in the Northern Hemisphere with 6,500 megatonne (MT) equivalent of weapons exploded, a temperature drop of between 15 and 35° C in the few weeks after an attack is plausible for continental interiors in the northern midlatitudes, with the day-to-day values depending on the presence or otherwise of patchy dense smoke. (But SCOPE does not believe that thresholds in the relation between depth of smoke and the amount of radiation reaching the ground imply that there is an "acceptable" amount of smoke below which cooling effects do not occur.)

Other places in the Northern Hemisphere, especially coastal areas and islands, might experience much smaller temperature drops of between 0 and 5° C, because of the effects of convection near the ocean/land boundary. But long-term effects might last for years and would slowly spill over into the Southern Hemisphere, even if the attack were limited to the Northern Hemisphere. Effects of a nuclear attack during winter months

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affect the strategic relationship between the superpowers than the certainty, acknowledged for decades, that some tens of million would be put in hazard from radioactive fallout. The reasons of course are not technical but political. The SCOPE committee might have taken its courage in both hands and said that the two activities cannot be separated.

SCOPE seems to argue instead that it is for technical committees to stick to the production of technical reports and for others, called politicians, to interpret them. The obvious danger is that technical arguments and conclusions will be misinterpreted. Sometimes, they may even seem to be used mischievously. But how can that be done when the conclusion of a technical report is as factual as the statement that large-scale nuclear war may have consequences even more damaging than previously thought? The United States government is right to say that a democracy as open as it is itself, is more vulnerable than its adversaries to public fears of the results of present policies. Its claim on the sympathy even of its friends is however diminished as its own policy on arms control becomes to seem more like a means of keeping things the way they are. The chances are high that the SCOPE report will be used in ways like these to persuade governments to make concessions leading to action that may be unwise. SCOPE might have acknowledged that the danger exists.

What else might have been said? With the review conference of the Non-Proliferation Treaty coming to what seems (against the odds) to be an unexpectedly amicable end, but with several months of arms control negotiations, summit meetings and diplomatic troubles lying ahead, SCOPE might have acknowledged the subtlety of the problems facing governments. It is a sensible starting point to take 600 megatons as the assumed quantity of nuclear explosives likely to be used in a major nuclear war, but governments may also fight lesser wars, where one or two nuclear bombs may be used in anger before good sense gets the better of the combatants, and they stop. (That is where civil defence comes in.) And while countries that calculate that even nuclear war would leave them immune from direct attack, but which may find nuclear winter a novel threat, should be reminded that they have as much to lose from the general collapse of international order. That is a point that SCOPE does make.

What does this mean for research? The SCOPE report follows its predecessors in listing topics that call for urgent study. Many of these are problems that need more effort on other grounds in any case. Mesoscale processes in the atmosphere are a kind of missing link in climatology and meteorology. The effect of clouds (real clouds, not average cloudiness) on the insolation of the surface of the Earth is crucial to a proper understanding of the carbon dioxide problem, yet understanding is far from complete. These are problems that need most urgently to be taken up. The prospect that they may conspire to produce a nuclear winter after a nuclear war should be noted as yet another proof that nuclear wars are to be avoided, and such funds as there are for more research should be put where the scientific problems are. In a decade or so, SCOPE would probably be able to produce an even better document. The trouble is that the amplifiers of SCOPE's conclusions are already being tuned for action. When the United Nations secretariat wrote to *Nature* a few days ago requesting permission to reprint extracts from articles on nuclear winter, it became plain that its claims on others' copyright were curiously one-sided. The UN document is due to be published next year. □