

Nuclear winter

by Paul Buteux

Recently, considerable attention has been given to the arguments of Carl Sagan and his associates that nuclear war could result in global climatic catastrophe. The essential thesis is that following a nuclear war, severe and prolonged low temperatures would result which in extreme cases would be severe enough to eliminate human life on the planet. Thus an important conclusion of the Sagan *et al* studies is that a nuclear war conducted in the northern hemisphere would have very serious consequences for the global ecosystem as a whole, and that catastrophe would not be restricted to the northern hemisphere alone. It is not possible to assume therefore that a relatively undamaged south would ensure species survival. Further, "nuclear winter" could be brought about by the detonation of "somewhere around 500-2,000 warheads;" far fewer than the number of warheads presently in the strategic arsenals of the two superpowers.

Quite apart from underlining the overwhelmingly apocalyptic character of the nuclear winter thesis, its authors have drawn a number of more specific conclusions concerning nuclear doctrine and policy. First of all, the threat of nuclear winter is offered as one further argument against the desirability and possibility of developing a credible first-strike posture. Even if it were theoretically possible to effect a successful first strike against the strategic forces of a superpower, the number of warheads necessary to do this would be well above the nuclear winter threshold. The accomplishment of a "successful" first-strike would involve national suicide nonetheless. In addition, the risk of nuclear winter undermines nuclear doctrines and military plans premised on a capacity for limited strategic nuclear exchanges. The likelihood of escalation following such exchanges provides yet another mechanism by which the threshold of climatic catastrophe could be crossed. For example, the efforts of the Carter and Reagan administrations to develop strategies of limited nuclear options are considered futile and dangerous because they contain no effective safeguards against the possibility of climatic disaster.

The possibility of nuclear winter is not restricted to the consequences of a central strategic nuclear war. Large-scale "theatre nuclear war" in Europe could also cross the threshold of disastrous climatic effects. Indeed, in Sagan's view, because of the density and proximity of military and population targets in Europe, the threshold of climatic catastrophe may be significantly lower than for a central strategic exchange. The situation in Europe is made even more disturbing by the planned modernization and expansion of both the French and British nuclear forces. If cur-

rently planned programs are completed, each country will have sufficient warheads to cross the climatic threshold. No longer would the capacity for initiating global catastrophe be restricted to the superpowers, but a "theatre" war involving the nuclear forces of the two West European nuclear powers and the intermediate and medium-range forces of the Soviet Union could eliminate life on the planet also.

This gloomy estimate of the possibilities of total catastrophe inherent in the arsenals of the nuclear powers is not susceptible to technological fixes. For example, suggestions that the development of "earth penetrator" warheads might significantly raise the numbers of weapons required to cause the onset of nuclear winter are dismissed. These weapons, through a combination of high accuracy and sub-surface detonation, would enable hardened military targets to be attacked with relatively low-yield warheads. The problem here, according to Sagan, is that the development of such weapons would likely be provocative and destabilizing in their first-strike implications, and would encourage the refinement of counterforce strategies. Similarly, ballistic missile defence does not offer a way out either. Quite apart from the very considerable doubts that must exist about the effectiveness of any ballistic missile defence, in so far as ballistic missile defence itself involves the detonation of nuclear warheads, and in so far as the existence of a missile defence encourages an attacker to increase warhead numbers, then the climatic threshold is more readily crossed. And, of course, no program of civil defence could deal with the consequences of a nuclear war on this scale.

In these circumstances in which neither doctrinal nor technological solutions to the prospect of global disaster in the event of nuclear war are possible, major efforts at arms limitations are seen as the only possible route to global security. Thus Sagan suggests that the primary object of arms control should be, in the first instance, to bring strategic nuclear arsenals below the levels that risk climatic catastrophe. Historically, it is pointed out, such levels have been regarded as sufficient for mutual deterrence.

Emotional reponses

The Sagan thesis generates strong emotional responses. It attempts to provide visions of the apocalypse with a scientific foundation, and in the process it presents a fundamental challenge to the premises and the adequacy of the strategic policies of all the nuclear powers, although those of the United States are singled out in particular. In

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