

A slight nuclear chill could destroy the world's crops

Marcus Chown

A NUCLEAR winter, in which much of the Earth is plunged into freezing darkness, may follow a nuclear war. Then again, it may not. But debating this point is like arguing over shades of grey. The fact is that the world's major agricultural systems can stand only a small drop in temperature, no more than a few degrees Celsius, before they crumple.

This warning is spelled out in the most comprehensive study yet on the environmental effects of nuclear war. Two years in the making, the study by the Scientific Committee on the Problems of the Environment (SCOPE), has involved several hundred scientists from more than a dozen nations, including both the superpowers. One volume of the study, on the indirect human, biological and ecological consequences of nuclear war is published tomorrow (Friday). Its companion volume on the direct atmospheric effects is to follow in January.

The study by SCOPE found that if only a few hundred megatonnes of explosive were to rain down on a hundred major cities, 25 per cent of the combustibles of the developed world would go up in smoke. The result would be 80 million tonnes of smoke, of which 45 million tonnes would be pure carbon, the best absorber of sunlight of all. There could even be more carbon, the study says, if large-scale fires burned so fiercely that they became starved of oxygen.

Powerful Cray computers were used to model in three dimensions the spread of the smoke into the atmosphere. A great uncertainty in the calculations is just how long the smoke can be expected to remain in the atmosphere before being rained out. One very important finding is that solar heating of the smoke-laden air will cause it to rise into the stratosphere, the layer of the

Earth's atmosphere above the weather. It would stay there for years and, in the case of a war in the northern hemisphere, drift into the southern hemisphere.

Massive injections of smoke reaching many kilometres up into the atmosphere will reduce land surface temperatures over continents by 20 to 40° C within a few days. Summer temperatures in the northern hemisphere could be more like autumn or winter. Freezing conditions in the southern hemisphere are thought to be unlikely.

But the uncertainties in the models may not matter to living organisms. Paul Crutzen, an atmospheric chemist involved with SCOPE, says: "The high sensitivity of agricultural productivity to relatively small alterations in climate conditions indicates that the unresolved issues among the physical science experts may not be of great consequence."

The SCOPE study finds that a 3- to 5-degree drop in temperature at the beginning of the growing season would destroy the Canadian wheat harvest. "It turns out to be very easy indeed to wipe out the grain crops of North America and the Soviet Union," says Sir Frederick Warner, chairman of the SCOPE study. Historical records show that the normal year-to-year fluctuation in average temperature is less than a degree. Volcanic eruptions, some of which have topped this, are known to have affected crop yields.

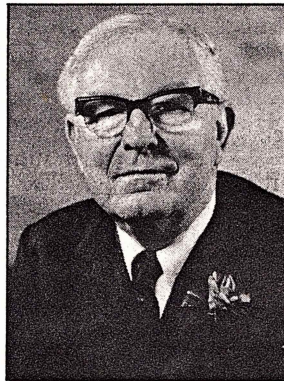
But more serious, Warner says, is the effect on rice growing of changes in climate. The Japanese rice crop will fail, he says, if, at any time during the growing season, the temperature drops below 15 degrees. The SCOPE study predicts that atmospheric circulation could be disrupted to such an extent that the monsoons would vanish. Rice in Southeast Asia, India and Africa will, therefore, be wiped out. "The direct effects of a war," says Warner, "don't compare with the 4000 million deaths which will follow of starvation."

The only reasonable harvests of any crop after a war in the northern hemisphere will be in Argentina and Australia. Australian ecology is under stress at the best of times and is able to regenerate itself after devastating bush fires.

The destruction of the Earth's ozone shield, exposing all life to increased ultraviolet radiation is another effect considered by the study. Nitrous oxides, generated in nuclear

fireballs and injected into the stratosphere, could deplete the ozone layer by 10 to 30 per cent in a few months.

Air pollutants and toxic chemicals from burning chemical factories have not been considered by any study before. They will hang over cities in smog and cold acid fogs. It will be the natural consequence of putting a heated layer high in the atmosphere and cooling the ground—a temperature inversion. "Still," says Sir Frederick, "we'll be dead already, so we won't cough ourselves to death!" □



Godfrey Argent

Warner: 4 billion deaths