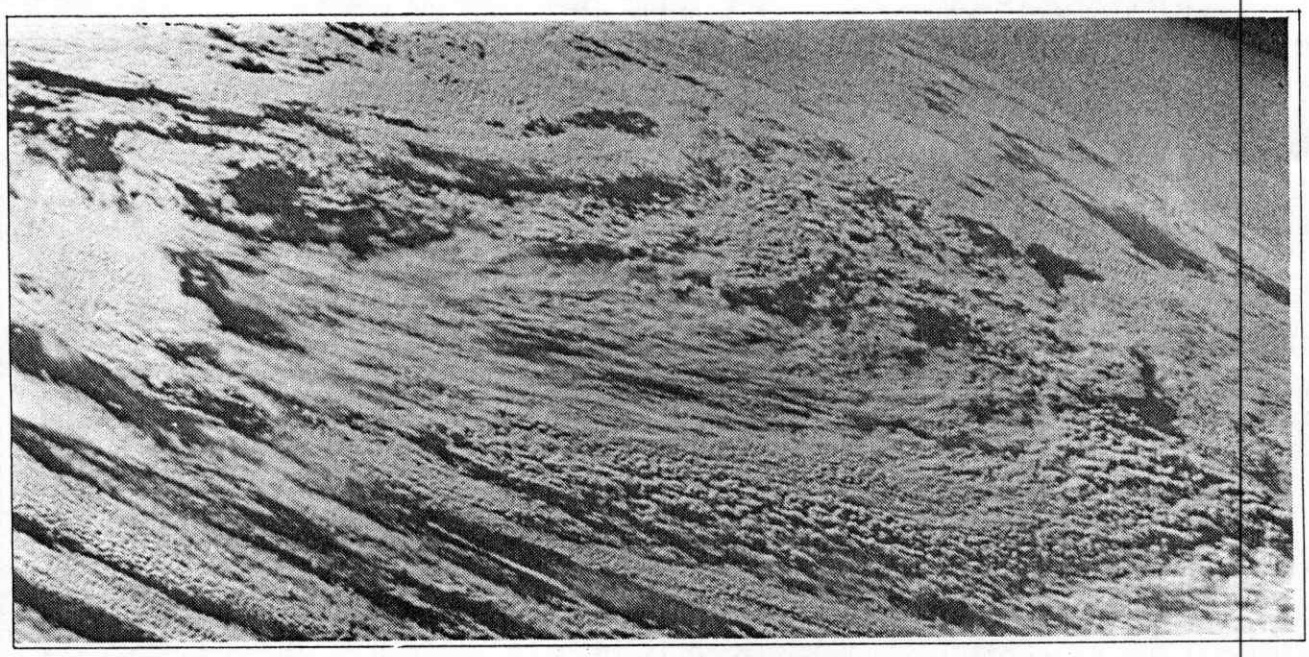

Storm cloud cover over the Pacific Ocean as seen from the Apollo 9 space flight in 1969. (Photo credit: United Nations/NASA)

Climatic effects update

A United Nations study in 1987/88 found that a major nuclear war could produce effects which might extend far beyond the regions where such weapons had been employed and would entail a high risk of global environmental disruption. This would include a significant reduction in the amount of sunlight and warmth reaching the Earth's surface owing to smoke, dust and soot in the atmosphere, and a major interference with normal weather patterns leading to areas of abnormally low temperatures or lack of precipitation affecting crop growth.

The UN study was one of several analyses in recent years that have helped to refine the findings from the early 1980s on the risks of "nuclear winter".

A recent review published in the January 1990 issue of the journal *Science* says that over the past five years many significant refinements have been made to the original nuclear winter theory, but that these adjustments have offset each other to a large degree so that relatively minor changes have occurred in the predicted effects.

The cooling predicted in the 1982/1983 studies was that summer temperatures would drop by 15 degrees to 25 degrees centigrade over large areas of the northern hemisphere. The 1990 estimates say that the drop would be 10 degrees to 20 degrees centigade or 18 to 36 degrees Fahrenheit.

While the amount of soot that would be generated is now thought to be less than was predicted in 1983, the proportion of this soot that would stabilize in the upper atmosphere is now estimated as much higher. Studies of the optical and physical properties of sooty smoke have made these predictions more accurate.

Remarkably, the *Science* article states, all the climate analyses carried out over the last five years predict strong cooling beneath extended smoke clouds.

Not only would these clouds last a long time, but also the solar heating of the soot particles from above would lead to accelerated interhemispheric transfers and persistent effects in the southern hemisphere. This would disrupt precipitation patterns and lead to drought. The calculated reduction in rainfall during the acute phase of a soot-cloud scenario would be drastic. Most of the simulation studies forecast failure of the summer Asian monsoon.

The persistent soot-cloud cover would also severely deplete the stratospheric ozone layer in the northern hemisphere. Recent studies indicate that the heated nuclear smoke pall, rising into the northern hemisphere stratosphere would physically displace the ambient ozone layer toward the southern hemisphere, and the smoke-borne nitrogen oxides would photochemically erode the remaining ozone in the northern hemisphere. Thus, according to the studies, the northern ozone layer would be reduced by 40% to 50% on average and lead to increased ultraviolet solar doses of 100% or more reaching Earth at middle latitudes for a year or longer after the smoke had cleared.