

shifts in land levels associated with tectonic plate movements which can also lead to rises and falls.

The scenarios of Working Group II are derived both from General Circulation Models and from palaeoanalog techniques. Palaeoclimate analogs are proposed by Soviet scientists as a means by which climate changes can be assessed. The methodology assumes that past warm geologic intervals provide insight into possible future climate conditions. The General Circulation Models, developed by Western scientists, are based on three-dimensional mathematical representations of the physical processes in the atmosphere and the interactions of the atmosphere with the earth's surface and the oceans. There is considerable scientific debate about the merits and demerits of each of these, as discussed in the report of Working Group I.

The palaeoclimate scenarios used by Soviet scientists are based on three warm geological periods with estimated future levels of concentration of CO_2 applied to them. The details of these are shown in Table 1. While these are superficially similar to the predictions of the general circulation model approach for different CO_2 concentrations, the factors which caused the climate changes in geologic times are not clear. Nevertheless, they have been used to make predictions of climate change of regions in the USSR.

The General Circulation Models are, in their current state of development, comparatively crude in their description of many of the processes involved. However they can be used to simulate regional changes resulting from a range of concentrations of CO_2 in the atmosphere. Working Group I has favoured the general circulation model approach

in producing its predictions of temperature rise and precipitation changes. In its report, estimates for 2030 have been given for central North America, southern Asia, Sahel, southern Europe and Australia. These are reproduced in Table 2 and are broadly similar to those used by Working Group II.

Despite the current uncertainties, both techniques have been used by Working Group II in the development of regional impacts to assist policy makers. There are problems with prediction of regional precipitation since there is disagreement between various general circulation model outputs as a result of simplifications to the representation of complex physical processes. Current research is seeking to improve the general circulation model approach and to increase resolution to enable better regional predictions. There are also problems with the palaeoanalog approach which yields differing scenarios for precipitation from the general circulation model approach. This leads to different assessments of impact on water resources and agriculture. Soviet scientists are working to validate their techniques and improve regional scenarios.

It should be noted that, in many situations, the overall impact is determined more by the changes in the magnitude and frequency of extreme events than by changes in the average. This is especially the case for tropical storms and droughts. The assessment of Working Group I of possible climate changes suggests a low probability of increased frequency of extreme events. However, it is entirely possible that shifts in climate regimes will result in changes in frequency in certain regions.