

appearing to be a very large step to take in a short time, the increasing sensitivity of man's activities to climatic variability (by, for example, using crop varieties highly tuned to optimum climate and farming land of only marginal agricultural value) demands that this very complex problem be successfully understood in a relatively short time. Despite its great breadth, the report was not intended to, and did not, emphasize many matters related to atmospheric chemistry, in particular in the stratosphere and the urban atmosphere, and the potential perturbations by man. Needed efforts in these areas are thus, in part, beyond the recommendations of that study and as such are presently a bit diffused throughout the government—a situation most appropriate for needed research but not for centralized response to practical problems.

The program proposed by the U.S. Committee on GARP focused on both data needs, analysis programs, and the need for support of numerical models as a means to assist in theoretical understanding. Commensurate with such efforts is the need to continually update application studies (e.g., the potential effect of CO₂, chlorine, etc.) with the most up-to-date models of various types so that a current consensus can be maintained on potential effects. Such input then needs to be provided to the decision makers in a way that offers a balancing of benefits and the potential for change.

7. Approaches to standard setting

Because the energy involved in natural climatic processes is so large, programs that would either benefit from or detrimentally affect climatic processes are normally sizable in terms of both investment capital and operational effort. Therefore, although research activities (e.g., several supersonic aircraft for test purposes) will have essentially negligible impact and thus show no definitive effects, the decision to pursue full utilization should be based on an assessment of the probability of detrimental effects carried out using a spectrum of the most up-to-date approaches to evaluation.

The potentially serious threat from each of these pollutants (or actions) is that, because they build up to noticeable levels only over long times, they involve large capital investments and thus are hard to change once initiated. Without proper evaluation, a course of little

apparent climatic consequence, but great expense, in the short term, can lock us into a long term course that makes any alternative appear inordinately expensive. An example is development of coal—it may be much better to spend the extra money to utilize solar or wind energy quickly than to become tied to a course that will more rapidly increase carbon dioxide emissions. It is disappointing that so little consideration is being given to considering the future climate in making the decision to pursue coal.

Because the methodology available for evaluation will change, the standards must be carefully considered initially and be susceptible to later reconsideration or continued reconfirmation at periodic intervals, based on facts, probabilities, and conscious value judgments, not on emotion and impossibilities. By considering the factors just suggested, we can reinterpret the calls for non-scientific standards as properly being requests to regard reasonable uncertainties as within the realm of the possible and to consider the detrimental effects by weighing the effect by both its magnitude and its likelihood.

Of great assistance would be intercomparison of benefits and detriments of a variety of human choices (e.g., the effects of CO₂, SO₂, and sulfate from fossil fuel combustion versus effects of radionuclides from nuclear power versus the present high cost of solar power). Once presented, decisions and opinions relative to the consequences of various actions can be rational, but not solely scientific, and should be broad based, not solely special-group oriented.

As to needed legislative actions, we would offer the following:

- 1) increased support of atmospheric research that is oriented around a set of broad goals, one of which should be understanding the short- and long-term variability of the natural climate and another assessing the potential impact of man;
- 2) efforts that encourage taking a longer look at the benefits and consequences of various actions, focusing for example on both operational and initial effects (e.g., solar energy may initially be more cost intensive but over the long run may result in far fewer negative impacts);
- 3) continued efforts to solicit the input from both broad-based scientific and public groupings, so that the sampling of value judgments is more statistically significant.

AMS 57th Annual Business Meeting

The Annual Meeting of the Membership of the American Meteorological Society will be held on Monday, January 17, 1977, at 5:15 p.m. in the Marriott Hotel, Tucson, Ariz., to hear the following reports: Report of the Ballot Tellers, Report of the Secretary-Treasurer, and Report of the President, and to transact such other business as may be required.

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Secretary of the Council