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Crucial Experiment

By using the entire earth as a laboratory, the Defense Department, in its Project Argus, posed some fresh problems concerning the role of the military establishment in this country's program of fundamental research. Project Argus involved exploding three small atom bombs some 300 miles above the South Atlantic to produce, among other effects, a temporary belt of electrons around the earth. The experiments were carried out last August and September by the Advanced Research Projects Agency of the Defense Department but came to public attention only last month when the *New York Times* published the story and government officials confirmed it.

Since the full circumstances of Project Argus have not yet been disclosed, it is difficult to say much about the effort except that it seems to be a very important contribution to fundamental knowledge and that it has transformed the study of large-scale geophysical phenomena from an observational science to an experimental science. But even without knowing the special circumstances of this particular experiment, it is still possible to show in general terms the difficulties it raises for the conduct of scientific experiments on a large scale.

In the study of the physics of the upper atmosphere, meteorology, oceanography, and other geophysical phenomena, what is sometimes required is not only a great mass of data but also the collection of these data simultaneously at many different parts of the globe. Scientists must make measurements at a number of observing stations on a common schedule and then combine their results. The data of any one observer are useless for purposes of interpretation until they have been examined in conjunction with the data of the other observers. As long as geophysics on a large scale was simply an observational science, no special problems arose concerning the conduct of a cooperative effort. With the new techniques, the situation is changed.

If a military agency conducts large-scale experiments, then, because of its unique security requirements, it has more reason than other agencies to conduct them secretly. And if such experiments are carried out secretly, this can work to the disadvantage of the general scientific community. Thus, observers outside the privileged agency may, without realizing it, be recording man-made disturbances along with phenomena of natural origin. Further, these observers, also without realizing it, may be participating in the experiments, for their data, being public, are available to the group conducting the experiments. Another point is that investigators outside the privileged agency may at a later date recognize—or be advised—that anomalies in their records have an artificial source, but they may be handicapped in attempting to evaluate the records because of insufficient information about the disturbing causes.

To devise arrangements for the conduct of global experiments that can prove satisfactory to most groups of scientists engaged in geophysical investigations is not in principle a hard task, even though the experiments of one group may affect the data gathered by other groups. The search for cooperative arrangements does become difficult, however, when one of the groups conducting such experiments has strong security requirements, and the stronger the requirements the greater the difficulty.—J.T.