LETTERS

Weather Satellites and Climate Research

M. Mitchell Waldrop, in his article, "What price privatizing Landsat?" (News and Comment, 11 Feb., p. 752) discusses the government's intent to commercialize the earth resources satellite, Landsat, and the National Oceanic and Atmospheric Administration's (NOAA's) operational weather satellites. He does not, however, point out the potential of the operational weather satellites for climate research, something that also appears to have gone unnoticed by those seeking to commercialize the satellites.

This potential for climate research stems from a growing history of fairly routine observations. Observations began in the 1970's with the scanning radiometer (SR) and the vertical temperature profile radiometer (VTPR) on NOAA-2 through NOAA-5. If not squelched, they will continue through the 1980's with the advanced very high resolution radiometer (AVHRR) and the high resolution infrared radiation sounder (HIRS/2) on the TIROS(N) series. These satellites provide fairly standardized observations for the entire Earth.

Aside from rudimentary studies of time and space average, the data have yet to be exploited for climate studies. They are primarily used for preparing weather forecasts. The problem facing the climate research community is that the volume of data is enormous—approximately 5000 tapes each year for AVHRR and 500 for HIRS/2. Because of this volume, researchers must learn to design efficient, automated algorithms to extract the desired signals. Because of the complexity of the earth's atmosphere and surface, such automated algorithms are akin to pattern recognition schemes and have proved difficult to construct.

One envisions, however, that just as we now turn to carefully preserved temperature and pressure records, future generations will turn to the satellite data now being collected to gain further insight into the dynamics of climate and climate change. With added experience and new technology, researchers will be able to gain the skill and ability to process the large volume of data. The value of these data, however, rests on three conditions: (i) that the observations continue; (ii) that they are carefully collected in archives; and (iii) that researchers are encouraged to develop the complex tools needed to explore the wealth of information provided by the data.

Inasmuch as the government contributes to the well-being of its people, its job is to maintain standardized observations, to collect and preserve these observations, and to support research focused on their use. I see no reason for giving this task to industry. It is unlikely that industry would always be able to maintain the standards required of a useful climatological data set.

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Nuclear Plant Performance

George Huhn (Letters, 25 Mar., p. 1377) writes that I stated that the average capacity factor of U.S. reactors ranged from 50 percent to 62 percent from 1975 through 1980. This was the range for reactors with a capacity greater than 800 megawatts. The all-reactor average was about 5 percentage points higher.

In answering Huhn, Eliot Marshall cites nuclear plant "availability" factors. Availability is a power-industry buzz-word denoting the percentage of time a generating unit is "available to operate" without netting out inability to maintain full power. For nuclear units, what matters economically is capacity factor, and that is typically 10 to 15 percentage points less than availability, because of equipment failure, on-line inspection, and safety-related restrictions.

For the record, the U.S. nuclear capacity factor average was 56 percent in 1982 and 59 percent for all years through 1982 (*1*).

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Note

1. Calculated with original reactor design electrical ratings, based on net generation, for all units 400 megawatts or larger, omitting any operation before the first New Year's Day of commercial service.

Cancer Chemotherapy

In his article about the National Cancer Chemotherapy Program (13 Aug., p. 600), Emil Frei III reviews the progress since 1955. He points out that certain types of cancer now can often be cured, thanks to advances in radiotherapy and chemotherapy. He then says that these advances were responsible for the 20 to 40 percent drop in cancer mortality recently seen in people under 45, and he states that each year in the United States more than 40,000 patients are being cured of cancer by chemotherapy.

The National Cancer Institute has just published the assembled statistics for cancer mortality in the United States between 1950 and 1977 (*1*). These figures show exactly which cancers have been the main contributors to the overall decline in cancer mortality among the young (Table 1). Numerically the most important change has been in cervical cancer; in 1977, there were more than 1000 fewer deaths in women under 45 than would have occurred in 1950. Next in the list come leukemia and colorectal cancer (each about 800 fewer deaths), followed by Hodgkin's disease, breast cancer, and stomach cancer (each 200 to 400 fewer deaths). It is hard to determine how much these numbers really represent the successes of treatment and how much they reflect the decline in incidence that is now being seen in younger age groups (*2*). The reduction in deaths from leukemia could be entirely attributed to treatment if we are prepared to believe that all children with leukemia are now being looked after as well as the children in clinical trials (*3*), which is somewhat doubtful (*4*). But the fall in deaths from cervical and colorectal cancer cannot be due to treatment; in each case, the decline has been going on steadily for 30 years, despite the absence of any conspicuous advances in treatment. Deaths from cancer of the cervix have gone down threefold, and colorectal cancer deaths have been halved. As a result, between 1950 and 1977 the chance that an infant's mother might die of cancer has decreased much more than the chance that the infant itself will die of cancer. In other words, more benefit has come to young families as the result of certain unexpected changes in cancer incidence than has come, so far, from the National Cancer Chemotherapy Program.

Frei estimates that each year in the United States more than 40,000 patients are being cured by chemotherapy. He does not say how he arrives at that figure, but it seems too high by a factor of about 10. Recently, de Vita *et al.* (*5*) calculated that 11,000 patients could be cured by chemotherapy each year, assuming that survival for 5 years can be counted as a cure (which is not always true) and that the results of the best available treatment can be extrapolated to the nation as a whole (which is too optimistic for even a simple procedure, let alone something as hazardous as treatment with the cytotoxic agents used