

## United States Senate

WASHINGTON, D.C. 20510

May 5, 1981

The Honorable Harrison Schmitt  
Chairman  
Science, Technology and Space Subcommittee  
U.S. Senate  
237-A Russell Senate Office Building  
Washington, D.C. 20510

Dear Mr. Chairman:

I am writing to express my concern and dismay over the Administration's proposed cuts in the research and education programs in the National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA) budgets. As you are well aware, research and development is vital for regenerating and expanding our economy and for maintaining our national security. Science has always been our competitive edge over foreign powers. Yet today, we are neither training adequate manpower nor providing many of them, particularly those in our universities, with the scientific instruments they need to perform the R & D that is indispensable to our economic well-being and national security.

Quite simply, we are throwing away one of our greatest assets. In light of recent years of neglect, support for research and development and for science education should be increased significantly, not decreased as the Administration has proposed.

There are many worthwhile science programs that deserve our support this year; let me detail the basis for my support of the following:

NSF Science and Engineering Education. We face a critical shortage of science and engineering manpower in the next decade. With the renewed emphasis on defense, the shortage of civilian R & D manpower will be even more acute. Yet our ability to produce such trained manpower appears to be decreasing. U.S. graduate enrollments in engineering, physics, and chemistry have declined by anywhere from 20 to 40 percent from levels a decade ago -- and nearly a third of those enrolled are now foreign students. International comparisons are also telling. Between 1963 and 1977, Japan awarded approximately as many degrees to engineers as did the United States, even though Japan's population is only about half the size of our own. In the Soviet Union, an estimated five million of this year's graduates from secondary schools will have studied two years of calculus, compared to only 105,000 U.S. high school graduates who will have taken only one year of calculus. The disparity is just as marked in the rest of the mathematics and science curricula. To remain competitive in the international marketplace and maintain our national security, we must be able to draw on a large pool of trained scientific manpower.

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It is not enough to train a scientific elite, however. A cornerstone of our democracy has been an informed public. For our democracy to function in the face of increasingly sophisticated technological and scientific public policy issues, there must be broad public understanding and discussion. Programs to improve the public understanding of science should be strengthened.

NSF Social and Economic Science Program. Our current economic performance is, so far, more a reflection of our social organization and economic institutions than of a failure in our technology. Without understanding social and economic institutions here and abroad, we cannot expect to understand our current problems of productivity, marketing and inflation. NSF has become the major source of support for economics research, especially in its more basic theoretical and econometric aspects. This support is especially important to young researchers on whom the future of economics and the quality of future economic policy depends. Many of the recent "conservative" ideas about "rational expectations", disincentive effects of various income support programs, and the impotency of economic policy, originated in NSF-supported research by young researchers. Today the Administration is embarking on one of the largest macroeconomic policy experiments in our history, yet the proposed cuts would destroy our tools to measure the impact of this experiment and to better understand how to tune it to our needs.

University Research Laboratories and Instrumentation Program. University Research labs do over half of all the basic R & D in this country and depend on the federal government for over half of their instrumentation funding. Only the federal government has the resources to upgrade their facilities and update their equipment, yet federal support has been inadequate to meet these needs. University research instruments are now, on the average, twice the age of those in industry and lag well behind those in Japan and West Germany in particular. With the rapidly rising costs of ever-more sophisticated state-of-the-art research instruments on top of inflation, and generally tight university budgets, this trend can only get worse without federal intervention. University scientists who must work with antiquated instruments are handicapped in trying to do state-of-the-art research and making the technological innovations so vital to our economy's future growth.

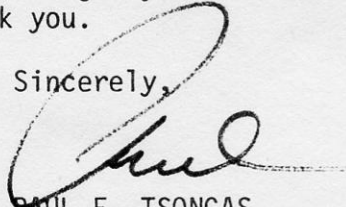
NOAA Sea Grant Program. Sea Grant is a cost shared program among universities, industry, and the federal government that supports and directs research into all aspects of the ocean sector of our economy -- fishing, mining, transportation, etc. Economic activity in the ocean sector is estimated to be \$30 billion per year -- roughly comparable to such land-based activities as agriculture (\$35 B), mining (\$19 B), communications (\$29 B), transportation (\$46 B), and construction (\$58 B). Yet the ocean sector receives a tiny fraction of the R & D funds received by the others. Since 1968, the Sea Grant program has received a total of \$285 million in federal support. Analysis of just 57 Sea Grant projects has shown a net return of \$217 million to the industries involved per year -- a highly cost effective return. The Heritage Foundation has noted Sea Grant's remarkable record of success and recommended a 10 percent annual increase in funding for the next five years.

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NOAA/NASA Remote Sensing Programs. For agriculture, fishing, mineral exploitation, weather forecasting, transportation and basic research among many others, remote sensing has been an incomparable and highly cost effective tool. The National Oceanic Satellite System (NOSS), Geological Applications Program (GAP), Upper Atmosphere Research Satellite (UARS), and many other such remote sensing ventures should be expedited -- not cut back, deferred, or eliminated. In addition to their near term cost effectiveness, such programs promise scientific data of longer term value. For example, we have undertaken a potentially drastic climatic experiment with our CO<sub>2</sub> and fluorochlorocarbon loading of the atmosphere. It is vital that we resolve the remaining scientific uncertainties of the impacts as quickly as possible.

With just this brief overview of these programs, I believe it is clear that the Administration is being penny wise and pound foolish in reducing its budgetary support. Such research and education investments are vital to the continued health of our nation. I hope that in your upcoming consideration of the budget you will be able to provide support for these programs. Thank you.

Sincerely,



PAUL E. TSONGAS  
United States Senator

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