

SPACE NEWS

Do Not Lose the Great Observatory for Sun-Earth Connections

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The United States -- through NASA -- together with its key international partners in Europe, Russia, Japan and China, has assembled the most remarkable and capable constellation of spacecraft ever put in place to study the connected Sun-Earth-planetary system. From the detailed examination of the Sun and its corona by SOHO and TRACE, to the studies of the Earth's magnetosphere and upper atmosphere by missions such as POLAR and TIMED, to the exploration of the farthest reaches of the solar system by the Voyagers and Ulysses, the armada of space physics missions is working together to revolutionize our understanding of the Sun, the interplanetary medium and the atmosphere-ionosphere-magnetosphere system.

All of the missions (more than 20 in number) originally cost billions of U.S. dollars to design, integrate, test and launch. This represents a huge capital investment by the space-faring nations of the world. Now, after all of this previous work, the scientists of the world are reaping the benefits of the unprecedented flow of data about our most important star -- the Sun -- and about our most important planet -- our home planet, Earth.

The so-called Halloween Storms of October-November 2003 are a good case in point. In that period of time, the Sun erupted in a spectacular sequence of powerful flares and coronal mass ejections. These struck the Earth causing huge geomagnetic storms and driving the Earth's radiation belts into a dramatically altered state. The space weather consequences were substantial. Some eight months later, the same solar disturbances reached the outer edge of the solar system and increased the volume of the heliosphere by at least 30 percent (as seen by the Voyager missions). The point is that the space physics armada working together was able to give us an absolutely unprecedented picture of the entire Sun-Earth-solar system event.

The president's 2006 budget request contains some good news (relatively speaking) for NASA. Overall the NASA budget would increase by 2.4 percent over 2005. In a time when most other agencies' budgets are flat, or even decreasing, it is a wonderful testament to NASA's importance that its budget would increase. Moreover, science (Earth and space) within NASA would receive about one-third of the overall NASA spending in the 2006 presidential budget. Again, this is a healthy recognition of the importance of science to NASA, now and in the future.

However, as one looks deeper into the budget details, one sees some disturbing, and ill-advised, implications in NASA's program planning. In the 2005 NASA budget (and runout), there was a \$117 million reduction in the Mission Operations and Data Analysis (MO&DA) budget for the Sun-Solar System Connection of NASA through 2009. The president's 2006 budget would remove another \$78 million from MO&DA for the years 2006 through 2010, including a drastic reduction of \$21 million next year alone.

If these MO&DA cuts are allowed to stand, NASA will have to turn off the TRACE, FAST, WIND, POLAR, Voyager, Ulysses (joint with the European Space Agency), and GEOTAIL (joint with the Japan Aerospace Exploration Agency) spacecraft before the end of 2005. In 2006, the four-spacecraft Cluster constellation (joint with Europe) and TIMED missions would have to be terminated. This represents the wholesale slaughter of a highly coordinated and productive set of scientific missions that are returning unique data addressing new science questions and are supporting hundreds of graduate students in the university community.

It is widely recognized by scientists and managers that missions cannot continue to be supported forever: If we want NASA to do new things, then old things must come to an end. For the past several years NASA has had in place a senior review process in which all operating missions are judged for health, scientific productivity and programmatic relevance. All of the Sun-Solar System Connection spacecraft have been through the senior review process at least once,

and an orderly ramp down and termination process was already in place for each project. The 2006 budget cuts would short-circuit these orderly processes and throw the NASA space physics program into disarray.

Another feature of NASA's program plans is that new starts of Sun-Solar System missions have been stretched out and delayed to a very substantial degree. This has been done to provide more funds for the president's exploration vision. Even such traditional workhorse programs as the Explorer line have been raided by NASA to free up funds for the exploration vision.

It is ironic that operating missions -- which are now particularly low cost and efficient in returning science per dollar invested -- are being turned off to provide very, very modest sums of money to support the exploration vision. And even more incomprehensibly, NASA is not launching the new missions that would replace and carry on in areas where the old missions are to be terminated. If this occurs, we will lose our "eyes and ears" on the Sun, the solar system and the Earth's space environment, and in all likelihood we will kill much of the university research community in this discipline. Where then will the future workforce of NASA come from when the exploration vision gets into high gear?

The answer to this relatively modest budgetary problem is quite simple. NASA and the administration have been given unprecedented authority by Congress to reprogram funds in the best way to carry forward a sensible program of science and exploration. A trivially small fraction (\$20 million, or 0.12 percent) of the NASA budget should be shifted back to supporting the Sun-Solar System fleet. This will help a key science component of NASA, it will help the university community, and it will ultimately help the exploration vision by supporting a discipline that is crucial for human and robotic missions to move beyond Earth orbit.

The Sun-Solar System Connection fleet operating in concert is a case where the whole is much greater than the sum of its parts. Let us not blow one of the greatest of the Great Observatories by failing to invest wisely a tenth of a percent of NASA's funding.

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