

**NASA's 2011 Budget:  
Advancing Technology and Engaging the Next Generation**

Daniel N. Baker and Frederick A. Tarantino

There is much to applaud in the President's proposed FY2011 NASA budget. One should look beyond simply the transportation component of the NASA program and realize that many of the scientific and technological aspects of the budget proposal are extremely important for NASA's long-term success. In the upcoming budgetary debates, let us be mindful that future NASA missions will be ever more challenging and require continual technical advancement and engagement with the next generation of researchers at America's universities. We believe the President's budget request takes this long-term perspective that NASA requires.

As a "top line" matter, the Administration is proposing a budget increase of some \$6 billion more for NASA in the five-year run out than had previously been planned. This means that the average budget for NASA rises to about \$19 billion per year. Thus, critics who worry about loss of space program jobs should realize that there actually would be many more people employed under the Obama plan than currently are supported. While the geographic distribution and work being done by space employees will change, it would seem that nearly all should applaud more resources and more employment opportunities in the aerospace sector. This will almost certainly result in more progress in space, and preserving these increases for NASA is imperative.

One of the key specifics of the Obama budget is the proposed large new investment in an advanced technology funding line. New technology has been one of the most woefully neglected components in NASA's program plan for the past several decades; revitalizing the agency's capability for bringing about breakthrough technologies and game-changing innovation has been called for in a bipartisan fashion in Congress. Now at long last, the Obama administration is proposing to invest many hundreds of millions of dollars per year in propulsion, communication, detector, and data handling technologies. With such investment, one can foresee not only a much more efficient, effective, and capable NASA, both for human and robotic space missions, but also a

NASA empowered to continue its storied role of accomplishing technological feats that inspire our Nation and the world.

One area that has been sorely short-changed in space technology is science instrumentation. There has been little investment by NASA in new sensor concepts and other low technology readiness level research. This neglect has starved the university research community in which the most creative ideas tend to emerge and flourish. Renewed investment in this area is long overdue and the Agency should assure that a substantial fraction (at least three-quarters) of the NASA advanced technology funding line be openly and aggressively competed in a peer-review manner.

Peer reviewed competition is America's not-so-secret weapon for innovation. It is also the key to engaging universities and recruiting a new generation of space professionals. Today, innovation in our country occurs through a variety of interactions, many informal, among industry, government and universities. Since World War II, universities have become the backbone of America's research and development infrastructure. Tax dollars spent at universities deliver double the bang for the buck. In addition to accomplishing forefront research activities, universities couple this federal investment to education of the next generation of scientists and engineers. Competitively awarded research attracts the best university researchers, who in turn are a magnet for the best students. These students want to fly things in space.

Testing in space is a necessary part of advancing technology. A great way to perform such testing is to use the NASA suborbital program (sounding rockets, balloons, and aircraft). A new National Research Council (NRC) report entitled "Revitalizing NASA's Suborbital Program: Advancing Science, Driving Innovation and Developing Workforce" strongly urges NASA to put more resources in the small-end suborbital portion of its portfolio. This is an extraordinarily good suggestion. Putting a modest amount of the overall NASA budget into rockets and balloons (and small spacecraft) will pay tremendous scientific, technical and educational dividends. It will offer many more opportunities for students and university researchers to get "hands-on" experience and it is an ideal place to test the advanced technologies that NASA should be developing. As the NRC report found, "The science yield of suborbital programs and the opportunities for training they provide are so central to NASA's

mission and future that we recommend a marked change of course.” A revitalized suborbital program will reverse the decades long decline in small missions, provide a test bed for new technology development and provide our next generation of scientists and engineers with the experience they will need to design and deploy space systems of the future.

In addition to advanced technologies the presidential budget request makes other significant allocations to bolster space research, including human exploration of space. The International Space Station will begin its full utilization phase, which will involve important basic microgravity research for terrestrial utility sponsored by NASA, and translational research sponsored by NIH, other Federal agencies, and the private sector. It also sponsors critical applied and clinical research to ensure that astronauts can perform well on long-duration missions and not suffer lasting post-flight medical disabilities. Progress has been made in understanding radiation health concerns, bone loss, muscle atrophy, etc., and the research on these topics has brought to light other challenges for long-duration human space presence. The Administration’s request for significant increases in human-research funding recognizes that very careful study and resolution of these challenges must be accomplished before human exploration for sustained periods beyond Earth may be attempted.

The FY2011 Presidential budget request for NASA has been met with substantial criticism and strong opposition from members of Congress on both sides of the aisle. Most of this opposition has come about because of the Administration’s plan to make a major change in transportation elements associated with human spaceflight. However, if one looks beyond this aspect, there are compelling facets of the proposed spending plan. In fact, this budget represents a major statement on an element of strategy for NASA that has been absent, and without which NASA cannot ultimately succeed. It is a strategy that recognizes that our progress in space is limited without new innovations and without a new generation of human talent to develop and apply those innovations.