

Alan W. Harris  
4603 Orange Knoll Ave.  
La Cañada, CA 91011

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To the members of the Human Space Flight Review Committee,

Since I will not be conveniently close to any of the meetings of the Committee where public comments will be received, I am submitting written comments. I thank my friend and colleague Chris Chyba for agreeing to transmit my comments to the rest of the Committee.

It is today the fortieth anniversary of the splash-down of the Apollo 11 mission. I am old enough to remember the event well; indeed I was employed by the Space Division of North American Rockwell in Downey at the time, the facility that built the Command and Service module. I had only modest involvement in the Apollo program while there and in graduate school at UCLA; most of my involvement in the space program was during the 28 years I was on the scientific staff of JPL, from 1974 to 2002. I am retired from JPL, but have been a frequent advisor to NASA, NSF and NRC up to the current time.

Last week's issue of *Nature* included several articles commemorating and commenting on the Apollo moon landing. In a poll of scientists conducted by *Nature*, fully half declared that they were inspired to pursue a career in science (and not just physical science) by the Apollo moon landings. I think it is widely agreed, and I certainly agree, that the most important legacy of the Apollo program was to inspire a generation toward science and technology. But that inspiration has waned. We are currently in a society where a significant fraction of the population is not even convinced the moon landings were real; approximately an equal number believe extraterrestrials have visited us, even if we have not visited them. In spite of this, the United States is not short of well trained scientists and engineers. Much of my involvement with the above named agencies is program and proposal reviews – there is no shortage of talented and well trained investigators proposing important and imaginative research. What there is a shortage of is public understanding and appreciation of these activities. What is needed for the future is a program or programs that will inspire confidence and understanding of the scientific endeavor in the general public. It is not necessary, or even desirable, to increase the fraction of the population that seeks to be employed in science and technology; it is essential to increase the fraction that understands science and technology, and can participate sensibly in a technical society.

It is in this context that I urge the Committee to take the broadest possible perspective on the human space program. The immediate question of whether the current program is “on track” and has a realistic chance of success given current budget limitation is of course essential and must be addressed. But beyond that is the larger question of whether such a program, even if successful, will reignite interest and appreciation of science and technology in the next generation. I fear the answer is no; certainly the current program of spinning around in low Earth orbit has not. The biggest tragedy of the Columbia disaster was, in my opinion, the fact

that almost none of the general public (myself included) even knew the shuttle was up there when the accident happened. NASA has been throwing a very expensive party, and nobody comes. How can you inspire a generation if only the failures are even noticed? So the broader question I hope the committee will address is, will the program plan of returning to the moon and beyond inspire appreciation and understanding of science and technology?

This debate has often been cast in terms of human versus robotic exploration. Certainly as robots become more capable the balance tips toward robotic exploration in terms of scientific return, and one can argue even the vicarious experience of “being there” is better served by robots. A few years ago I attended a lecture by Robert Ballard, the discoverer of the wreck of the *Titanic*, who commented that he rarely goes down in manned submersibles any more, since robotic craft are so much more capable. But I am not arguing here in favor of unmanned space exploration. Frankly, I doubt if space exploration, either manned or unmanned, is the right program to reignite the public’s appreciation of science and technology. I think in the recent past the human genome project came closest. I urge the committee to consider whether space exploration in any form is likely to accomplish the goal of inspiring scientific literacy and understanding in the public.

Sincerely,

A handwritten signature in cursive script that reads "Alan Harris". The signature is written in black ink and is positioned above the printed name.

Alan Harris

For identification purposes, my current institutional affiliation is with the Space Science Institute in Boulder, CO. This letter expresses my personal opinions only.