"We Choose to Go to the Moon"

Channing Memorial Church

July 5th, 2009

Call to Worship

In 1961, a visionary leader inspired a nation to take on a great challenge:

"I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth. No single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish... in a very real sense, it will not be one man going to the moon--if we make this judgment affirmatively, it will be an entire nation. For all of us must work to put him there."[i] [i]

Today, let us reflect on what it meant to meet that challenge as we come together in worship.

Chalice Lighting

We affirm the unfailing renewal of life. Rising from the earth and reaching for the sun, all living creatures shall fulfill themselves.

We Choose to Go to the Moon

Reader 1:

And God made two great lights; the greater light to rule the day, and the lesser light to rule the night. (Genesis 1:16).

Narrator:

Since the Dawn of Man on Earth, we have looked up with fascination at the Moon (that lesser light), wondering how to reach out and touch it. As imagined in this reading from 2001: A Space Odyssey, Arthur C. Clarke speculates that perhaps that curiosity is what first set us apart from the animals.

Reader 2:

Of all the creatures who had yet walked on Earth, the man-apes were the first to look steadfastly at the Moon. And though he could not remember it, when he was very young Moon-Watcher would sometimes reach out and try to touch that ghostly face rising above the hills.

He had never succeeded, and now he was old enough to understand why. For first, of course, he must find a high enough tree to climb.[ii][ii]

Narrator:

Astronomers in all ancient and modern civilizations have observed the Moon, measured its motion, mapped its surface and speculated on the marvels that would be found there. In the following reading, Leonardo da Vinci shows us that he was one of the first truly scientific explorers of the Moon. He advocated for telescopic observation of its surface, observed how it reflected sunlight, discovered that it also reflected earthlight, and refuted past wild speculations on the Moon's nature by demonstrating how his own observations disproved them.

Reader 3:

Make glasses in order to see the moon large.

The Moon is not luminous in itself, but it is well fitted to take the characteristics of light after the manner of the mirror or of water or any other shining body; and it grows larger in the east and in the west like the sun and other planets, and the reason of this is that every luminous body grows larger as it becomes remote.

(Some people) have said that the Moon is made up of parts, some more, some less transparent, as though one part were after the manner of alabaster, and another like crystal or glass. It would then follow that when the rays of the sun struck the less transparent part the light would stay on the surface, and consequently the denser part would be illuminated and the transparent part would reveal the shadows of its obscure depths. Thus then they define the nature of the Moon, and this view has found favor with many philosophers, and especially with Aristotle; but nevertheless it is false, since the different phases which the Moon and the Sun

frequently present to our eyes we should be seeing those spots vary, and at one time they would appear dark and at another light.[iii][iii]

Narrator:

Building on the work of da Vinci, early modern scientists such as Kepler, Galileo, and Newton charted the Moon's movement through the heavens, developed a model of the Earth – Moon system, discovered the Moon's distance from the Earth and took the first steps in understanding its nature. They all understood, however, that to truly understand the Moon, one would need to voyage to it. The dreams of scientists and visionaries, therefore, gradually shifted from questions of the Moon's nature to speculations on how to get there. With the advent of modern science these speculations began to look more plausible. Jules Verne – one of the first true writers of science fiction – imagined a modern space capsule, launched from Florida, by a giant gun. In this reading from his novel <u>From the Earth to the Moon</u>, Verne forecasts the peaceful competition of the U.S. – Soviet space race, telling the story of the members of a club of artillery enthusiasts who, at the end of the Civil War, seek a new outlet for their enthusiasm by applying their skills to make a voyage to the Moon.

Reader 4:

On the 5th of October, at eight P.M., a dense crowd pressed toward the saloons of the Gun Club at 21 Union Square...the vast hall presented a curious spectacle. Its immense area was singularly adapted to the purpose. Lofty pillars formed of cannon, superposed upon huge mortars as a base, support the fine ironwork of the arches, a perfect piece of cast-iron lacework. Trophies of blunderbusses, matchlocks, arquesbuses, carbines, all kinds of firearms, ancient and modern, were picturesquely interlaced against the walls. Illuminating gas came in full glare from myriads of revolvers grouped in the form of chandeliers, while dents, plates battered by the shots of the Gun Club, assortments of rammers and sponges, chaplets of bombs, wreaths of projectiles, garlands of shells – in short, all the apparatus of the artilleryman – enchanted the eye by their wonderful arrangement and induced a kind of belief that their real purpose was more ornamental than deadly.

Impey Barbicane (the president) was a man forty years of age, calm, cold, austere; of a singularly serious and determined mind, punctual as a chronometer, of imperturbable temper and

immovable character; by no means chivalrous, yet adventurous withal, and always bringing practical ideas to bear upon the very rashest enterprises; a New Englander *par excellence*, a Northern colonist, a descendant of the old anti Stuart Roundheads, and the implacable enemy of the Southern gentlemen, those old Cavaliers of the mother country. In a word, he was all Yankee and a yard wide.

At this moment, he was sitting motionlessly in his armchair, silent, absorbed, lost in reflection, sheltered under his high-crowned hat – a kind of black silk cylinder which seems to be screwed on to all American heads.

His colleagues were talking noisily all about him without disturbing him...Just when the deep-toned clock in the great hall struck eight, Barbicane, as if he had been set in motion by a spring, raised himself up. A profound silence ensued, and (Barbicane), in a somewhat emphatic tone of voice, commenced as follows:

"Worthy colleagues, too long already a paralyzing peace has plunged the members of the Gun Club into deplorable inactivity. After a period of a few years full of incidents we have been compelled to abandon our labors, to stop short on the road of progress. I do not hesitate to state, boldly, that any war which should recall us to arms would be welcome!"

"Yes, war!" cried the impetuous J. T. Matson.

"Hear, hear!" came the shout from all sides.

"But war," said Barbicane, "is impossible under existing circumstances; and, however we may desire it, many years may elapse before our cannon shall again thunder in the field of battle. We must make up our minds, then, to seek in another order of ideas some field for the activity which we all pine for."

... "The Moon, gentlemen, has been carefully studied," continued Barbicane; "her mass, density, and weight; her constitution, motions, distance, as well as her place in the solar system, have all been exactly determined...Photography has given us proofs of the incomparable beauty of our satellite; in short, we know about the moon all that mathematical science, astronomy, geology, and optics can learn about her. But up to the present moment no direct communication has been established with her."

"You know," said he, "what progress artillery science has made during the last few years, and what a degree of perfection firearms of every kind would have reached, had the war gone on. Moreover, you are well aware that, in general, the resisting power of cannon and the expansive force of gunpowder are practically unlimited. Well! Starting from this principle, I ask myself whether, supposing adequate apparatus, constructed upon conditions of ascertained resistance, it might not be possible to project a shot up to the moon?'

... "I have looked at the question in all its bearings, I have resolutely attacked it, and by incontrovertible calculations I find that a projectile endowed with an initial velocity of 12,000 yards per second, and aimed at the moon, must necessarily reach it. I therefore have the honor, my worthy colleagues, to propose to you that we attempt this little experiment!"[iv][iv]

Narrator:

By the beginning of the twentieth century, scientists began to move beyond the dreams and speculation of authors such as Verne, conducting the first practical experiments in powered aviation and space flight. Dr. Robert Goddard is remembered as a visionary but he was first and foremost a scientist. His experiments in rocketry spanned three decades and laid the foundation for practical space flight in the second half of the twentieth century. In the following excerpt from his 1919 treatise, "A Method of Reaching Extreme Altitudes," Goddard not only articulates the theoretical basis for his own research but accurately forecasts practical aspects of modern space flight including solid rocket propulsion, rocket booster configuration, and recovery of space vehicles by parachute assisted reentry.

Reader 5:

An important part of the atmosphere, that extends for many miles beyond the reach of sounding balloons, has up to the present time been considered inaccessible. Data of great value in meteorology and in solar physics could be obtained by recording instruments sent into this region.

The rocket, in principle, is ideally suited for reaching high altitudes, in that it carries apparatus without jar, and does not depend upon the presence of air for propulsion. A new form

of rocket apparatus, which embodies a number of improvements over the common form, is described in the present paper.

A theoretical treatment of the rocket principle shows that, if the velocity of expulsion of the gases were considerably increased and the ratio of propellant material to the entire rocket were also increased, a tremendous increase in range would result...With a special type of steel chamber and nozzle, an efficiency has been obtained with smokeless powder of over 64 percent (higher than that of any heat engine ever before tested); and a velocity of nearly 8000 ft/sec, which is the highest velocity so far obtained in any way except in electrical discharge work.

Experiments were repeated with the same chambers in (vacuum), which demonstrated that the high velocity of ejected gases was a real velocity and not merely and effect of reaction against the air. In fact, experiments performed at pressures such as probably exist at an altitude of 30 miles gave velocities even higher than those obtained in air at atmospheric pressure...

A calculation based upon the theory, involving data that is in part that obtained from experiments, and in part what is considered realizable in practice, indicates that the initial mass required to raise recording instruments of the order of one pound, even to the extreme upper atmosphere, is moderate. The initial mass is likewise not excessive, even if the effective velocity is reduced by half...

The recovery of the apparatus, on its return, need not be a difficult matter, from the fact that the time of ascent even to great altitudes in the atmosphere will be comparatively short, owing to the high speed of the rocket throughout the greater part of its course. The time of descent will also be short; but free fall can be satisfactorily prevented by a suitable parachute. A parachute will be operative for the reason that high velocities and small atmospheric densities are essentially the same as low velocities and ordinary density.

Even if a mass of the order of a pound were propelled by the apparatus under consideration until it possessed sufficient velocity to escape the earth’s attraction, the initial mass need not be unreasonably large, for an effective velocity of ejection which is without doubt attainable. A method is suggested whereby the passage of a body to such an extreme altitude could be demonstrated.

Although the present paper is not the description of a working model, it is believed, nevertheless, that the theory and experiments, herein described, together settle all points that could seriously be questioned, and that it remains only to perform certain necessary preliminary experiments before an apparatus can be constructed that will carry recording instruments to any desired altitude.[v][v]

Narrator:

While Goddard, von Braun, and others demonstrated it was possible to go to the Moon, it took a visionary leader to show us why it was necessary to do so. That is why we would never have gone to the Moon without the visionary leadership of John F. Kennedy. His greatest gift to the American people was his ability to inspire us to see the potential in ourselves and strive to realize it. Although many argue that the lunar project was simply a cynical extension of U.S. – Soviet rivalry, Kennedy, from the start, cast it in different terms. As Kennedy sets forth in this speech to the faculty and students of Rice University in 1962, voyaging to the Moon was to be an expression of our best selves – a people committed to establishing peace, freedom, reason, and humanity on Earth, on the Moon and planets, and among the stars.

Reader 2:

We meet at a college noted for knowledge, in a city noted for progress, in a state noted for strength, and we stand in need of all three, for we meet in an hour of change and challenge, in a decade of hope and fear, in an age of both knowledge and ignorance. The greater our knowledge increases, the greater our ignorance unfolds.

Despite the striking fact that most of the scientists that the world has ever known are alive and working today, despite the fact that this Nation's own scientific manpower is doubling every 12 years in a rate of growth more than three times that of our population as a whole, despite that, the vast stretches of the unknown and the unanswered and the unfinished still far outstrip our collective comprehension.

No man can fully grasp how far and how fast we have come, but condense, if you will, the 50,000 years of man's recorded history in a time span of but a half-century. Stated in these terms, we know very little about the first 40 years, except at the end of them advanced man had learned

to use the skins of animals to cover them. Then about 10 years ago, under this standard, man emerged from his caves to construct other kinds of shelter. Only five years ago man learned to write and use a cart with wheels. Christianity began less than two years ago. The printing press came this year, and then less than two months ago, during this whole 50-year span of human history, the steam engine provided a new source of power. Newton explored the meaning of gravity. Last month electric lights and telephones and automobiles and airplanes became available. Only last week did we develop penicillin and television and nuclear power, and now if America's new spacecraft succeeds in reaching Venus, we will have literally reached the stars before midnight tonight.

This is a breathtaking pace, and such a pace cannot help but create new ills as it dispels old, new ignorance, new problems, new dangers. Surely the opening vistas of space promise high costs and hardships, as well as high reward.

So it is not surprising that some would have us stay where we are a little longer to rest, to wait. But this city of Houston, this state of Texas, this country of the United States was not built by those who waited and rested and wished to look behind them. This country was conquered by those who moved forward--and so will space.

William Bradford, speaking in 1630 of the founding of the Plymouth Bay Colony, said that all great and honorable actions are accompanied with great difficulties, and both must be enterprised and overcome with answerable courage.

If this capsule history of our progress teaches us anything, it is that man, in his quest for knowledge and progress, is determined and cannot be deterred. The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in this race for space...

For the eyes of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace. We have vowed that we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding.

Yet the vows of this Nation can only be fulfilled if we in this Nation are first, and, therefore, we intend to be first. In short, our leadership in science and industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading space-faring nation.

We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war. I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without feeding the fires of war, without repeating the mistakes that man has made in extending his writ around this globe of ours.

There is no strife, no prejudice, no national conflict in outer space as yet. Its hazards are hostile to us all. Its conquest deserves the best of all mankind, and its opportunity for peaceful cooperation many never come again...

We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win...[vi] [vi]

Narrator:

President Kennedy's vision of a lunar voyage inspired all Americans to come together to achieve it by the end of the decade. During Christmas Week, 1968, Frank Borman, James Lovell, and William Anders made the first successful voyage to and orbit of the Moon in Apollo 8. In the following excerpt from their mission report, Borman, Lovell, and Anders, describe the first successful manned orbit of another world in the low-key terms of the professional scientist and military officer. What are left for us to infer are the challenges they faced. As they

approached the Moon, no one knew whether it was possible to insert a manned spacecraft into a safe orbit, no one knew if it was possible to return that spacecraft safely to Earth again.

Reader 3:

Lunar orbit insertion was initiated at 69:08:20 with a 2997 – ft/sec service propulsion maneuver resulting in a 60 – by 168.5 nautical mile orbit. After 4 hours of navigation checks and ground orbit determination, a lunar orbit circularization maneuver of 135 ft/sec resulted in an orbit of 60.7 by 59.7 nautical miles.

The next 12 hours of crew activity in lunar orbit involved near- and far-side photography, landing area sightings, and television transmissions. The final 4 hours in lunar orbit included a second television broadcast, but most of the remaining non-critical flight-plan activities were deleted because of crew fatigue, and this period was devoted to rest periods and preparation for the transearth injection maneuver. This maneuver was initiated at 89:19:17, lasted for 303 seconds, and resulted in a velocity change of 3517 ft/sec.[vii][vii]

Narrator:

Anne Morrow Lindbergh, herself a visionary aviation pioneer, met the astronauts and witnessed the launch of Apollo 8. Soon after the voyage, she wrote an essay, "Earth Shine" which set forth her observations, her feelings, and her reflections on the historic trip to the Moon. Better than most, she captures the significance of the dream and its realization. In her conclusion to the essay, Lindbergh goes beyond the science, beyond the adventure, and speculates on the spiritual implications for all mankind of this first voyage to the Moon.

Reader 1:

This overwhelming ovation, not only from the United States but from the world – what does it mean? The emotions aroused may be still too complex and profound to reach the surface of words. Centuries may pass before man can judge the significance of the Apollo Program and the new perspective on man and his planet – a view as revolutionary as the one Galileo illumined with his telescope.

Acclaim for the stupendous effort and achievement of the program, the perfection of the flight, the gallantry of the performers, is justified and understandable. But does it explain such a wave of enthusiasm and hope? The witnessing of sheer power is not enough to cause our elation. The cataclysmic explosion of the first atom bomb inspired feelings of awe, but not a wave of hope; on the contrary, it engendered more of a sense of foreboding and fear...

The first step in the conquest of space, the material or scientific discoveries that will follow, the cracking open of a new electronic, computerized age – are these what mankind is cheering? The expanded horizons of science hardly explain the intensity of the response. Deeper springs, one suspects, lie beneath our reaction.

What lifts our hearts today seems to be more in the realm of the human, the psychological, and the spiritual. Perhaps...space exploration safely absorbs man's aggressive and competitive instincts, and in applauding the astronauts' exploits, we are grasping at a hope of preserving peace on earth. Those noble qualities of man – heroism, self-sacrifice, dedication, comradeship in a common cause – which are tragically brought out in war, are evoked in many places of the space development. And these qualities must continue to be aroused in some fashion, or man will cease to be all that man can be...

The homage to heroism, the challenge of adventure, the hope of a more peaceful world – all these have a part in our enthusiasm. But there seems to be another element in our response, a sense of recognition as well as discovery. A quality which we had lost touch with, we dimly feel, has been re-found. Some gap has been bridged, some conflict reconciled. Perhaps the unnatural rupture between man and the universe, which Malraux has ascribed to our machine-dominated civilization, was momentarily healed by the flight of Apollo 8, not alone by the feat but by the presence of the astronauts themselves. The cosmological revolution brought about by modern science was at last given human face. Human eyes saw, human words came down; human gestures were watched. The Word of Einstein, Bohr, and Fermi was made flesh, and the world responded.[viii][viii]

Reflection – Tom Beall

The voyages to the Moon forty years ago were the realization of dreams and culmination of science. I wonder if we truly appreciate that. In an age when we can vicariously travel to the stars with Luke Skywalker or Captain Kirk, a voyage to the Moon seems a mundane experience.

The astronauts didn't help us. They made it seem so easy when, in fact, it was not. Neil Armstrong and Buzz Aldrin were seconds from running out of fuel and crashing onto a rocky lunar surface when Armstrong spotted a smooth patch of ground and set their spacecraft down on the Moon – becoming the first men to do so. Because it seemed so easy, once we had done it, we got bored and moved on.

Yet those voyages to the Moon were humanity's greatest achievement. To land a man on the Moon, a visionary leader – John Kennedy – had to believe it was possible and inspire a people to join him in that belief. To get astronauts there and back safely thousands upon thousands of dedicated scientists, administrators, and technicians had to bring all of their creativity, ingenuity, and skill to bear on an infinite number of challenges. To voyage where no one had gone before, a confident nation had to bring to bear on the problem all of its resources and determination.

Every step of the way, Kennedy's words, "We choose to go to the Moon in this decade," must have been on the minds of all who were involved. Every step of the way, they could have chosen not to go, to take a different path. And yet, every step of the way, they chose to be that great people who would go to the Moon not because it was easy but because it was hard – and doing the great, hard things are what define a great and noble people.

Today we have many challenges. The Beloved Community on Earth, the vision of Dr. Martin Luther King and others, is no nearer to realization. Having gone to the Moon, we have left undone the work of solving many problems on Earth. These challenges are great but no less so than a voyage from the Earth to the Moon. Like those bold women and men of forty years ago, we can choose to take on today's challenges not because they are easy but because they are hard. As a great people, let us choose to do so.

Centering in Silent Meditation and Prayer

This prayer was carried to the Moon by Apollo Astronaut Colonel Buzz Aldrin.

The Light of God surrounds me.

The Love of God enfolds me.

The Power of God protects me.

The Presence of God watches over me.

The Mind of God guides me.

The Life of God flows through me.

The Laws of God direct me.

The Power of God abides within me.

The Joy of God uplifts me.

The Strength of God renews me.

The Beauty of God inspires me.

Wherever I am, God is!

Benediction

Of Man's goal to voyage to the Moon, Neil Armstrong said:

I think we're going to the moon because it's in the nature of the human being to face challenges. It's by the nature of his deep inner soul... we're required to do these things just as salmon swim upstream.[ix][ix]

[i] Kennedy, President John Fitzgerald (1961). Special message to the Congress on urgent national needs, May 25th, 1961. John F. Kennedy Presidential Library website, http://www.jfklibrary.org/Historical+Resources/Archives/Reference+Desk/Speeches/JFK/Urgent+National+Needs+Page+4.htm.

[ii] Clarke, Arthur C. (1968). 2001: a space odyssey. New York, New American Library.

[iii] da Vinci, Leonardo. The notebooks of Leonardo da Vinci. London: The Folio Society, 2009, pp. 235, 248 – 249.

[iv] Verne, Jules. From the Earth to the Moon. Norwalk, CT: Easton Press, 1970.

[v] Goddard, Dr. Robert H. (1919). "A method of reaching extreme altitudes." *Smithsonian Miscellaneous Collections*, 71(2).

[vi] Kennedy, President John Fitzgerald (1962). Speech given at Rice University, Houston, Texas, September 12th, 1962. NASA History Website, http://er.jsc.nasa.gov/seh/ricetalk.htm.

[vii] Borman, Colonel Frank, Lovell, Captain James, Anders, Major William (1969). "Apollo 8 mission report." Houston: Manned Spacecraft Center, National Aeronautics and Space Administration.

[viii] Lindbergh, Anne Morrow (1969). Earth shine. New York: Harcourt, Brace, and World, Inc., pp. 39 – 41.

[ix] http://www.brainyquote.com/quotes/authors/n/neil_armstrong.html.