

# MOONSTRUCK: HOW REALISTIC IS THE MOON DEPICTED IN CLASSIC SCIENCE FICTION FILMS?

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**Abstract.** Classical science fiction films have been depicting space voyages, aliens, trips to the moon, the sun, Mars, and other planets, known and unknown. While it is difficult to critique the depiction of fantastic places, or planets about which little was known at the time, the situation is different for the moon, about which a lot of facts were known from astronomical observations even at the turn of the century. Here we discuss the grade of realism with which the lunar surface has been depicted in a number of movies, beginning with George Méliès' 1902 classic *Le Voyage dans la lune* and ending, just before the first manned landing on the moon, with Stanley Kubrick's *2001: A Space Odyssey*. Many of the movies present thoughtful details regarding the actual space travel (rockets), but none of the movies discussed here is entirely realistic in its portrayal of the lunar surface. The blunders range from obvious mistakes, such as the presence of a breathable atmosphere, or spiders and other lunar creatures, to the persistent vertical exaggeration of the height and roughness of lunar mountains. This is surprising, as the lunar topography was already well understood even early in the 20th century.

## 1. Introduction

Since the early days of silent movies, the moon has often figured prominently in films, but mainly as a backdrop for a variety of more or (most often) less well thought-out plots. While the realism of rockets and other gadgets shown in science fiction (SciFi) movies has been described before, it is interesting to discuss how realistic the moon in general, and, specifically, the various lunar landscapes, have been depicted in a variety of these films over the decades. We will discuss only movies in which an actual landing on the moon occurs. The title for our paper was inspired by a short, hand-colored French silent movie (*Moonstruck*, 1909, 220 meters; Charles Parthé production company), which describes a sleeping drunkard, who dreams of a frightening *visit with evil* lunar inhabitants (not by the much later Hollywood movie of the same title).

The question of how the surface of the moon looks, and what kind of inhabitants there might be, has been the subject of many stories for centuries, as is exhaustively discussed by Nicolson (1948). It is interesting to note that one of the more fantastic tales about a lunar trip is the *Somnium (Dream)* by Johannes Kepler (published only in 1634, after his death). Kepler notes that mortals can reach the moon only with the help of demons, and, in his description of the trip, anticipates the effects



of gravitation. Despite being accurate in his portrayal of the length of the lunar day and night and surface temperature extremes, Kepler thought that topographically everything is at a much more exaggerated scale compared to the earth, and that there exist strange creatures of monstrous size. The moon has also been shown on the stage, and here we have to mention Joseph Haydn (1732–1809) and his little-known opera *Il Mondo della Luna* (*The World on the Moon*), after a libretto by Carlo Goldoni, which was first performed on August 3, 1777. It is an opera buffa that contains flying machines, gardens on the moon, a court and an emperor of the moon, all held together by a love story.

From opera the development of moon myths led to the early movies. Almost since the first movies were shown in a cinema (the first commercial projections are usually ascribed to the Lumière brothers in 1895; e.g., Gregor and Patalas, 1976), science fiction themes were depicted (Strick, 1976; Benson, 1985). The first movie to deal with a trip to the moon was most likely the 14-minute classic *Le Voyage dans la lune* (1902) by George Méliès. This movie gives a far from realistic view of space travel and the moon, with fairies and selenites (lunar inhabitants) populating our celestial neighbor. A subsequent highlight was *The Woman in the Moon* (1929) by Fritz Lang, which included a more realistic treatment of rocket flight, but failed in the depiction of the lunar surface. Somewhat more effort towards space realism went into *Destination Moon* (1950), which had science fiction author Robert Heinlein as a technical advisor. The 1950s and 1960s also had their share of bad SciFi movies (e.g., *Catwomen on the Moon*, *Nude on the Moon*), mostly shot on a minimal budget, in which the moon is only the backdrop for a more or less absurd love story. In the late 1960s, just before the first manned lunar landing, two very different movies that deal with the moon were released: *Countdown* (1967), and *2001: A Space Odyssey* (1968). While *Countdown* fails catastrophically in its depiction of the lunar surface, *2001* gets it about right, with almost correct aspect ratios and roughness.

All plot descriptions given below are based on our own observations. Only movies for which we were able to obtain a video or DVD copy are included, which (unfortunately) meant that some potentially interesting movies, such as *The First Men in the Moon* (UK, 1919) and *From the Earth to the Moon* (USA, 1958), had to be excluded. Also, we decided to discuss only movies that were made before the first manned landing on the moon, as afterwards abundant still photographs and films from the surface of the moon were available and widely enough distributed (which, of course, did not prevent later movies from having a lack of realism). We first give a summary of the plot and follow with a discussion about scientific aspects of the movie in general, and the lunar surface in particular.



Figure 1. The moon takes a direct hit from the space capsule, which was launched by a cannon, in George Méliès' *A Trip to the Moon* (1902).

## 2. Plots and Discussion of Movies

### 2.1. LE VOYAGE DANS LA LUNE/A TRIP TO THE MOON (1902)

Credits: Georges Méliès (director, screenplay, and lead actor); b&w; 260 meters (ca. 14 minutes).

Plot: The movie begins with a “scientific” meeting of astronomers, all white-bearded old men with pointed wizard hats. It is decided to fly to the moon, so a projectile space capsule and a cannon (*a la* Jules Verne) are built. A group of young dancers in hot pants sees the old astronomers off, the cannon is fired towards the moon, which takes a direct hit, resulting in the famous image of the projectile stuck in an eye of the face of the man in the moon (Figure 1). The astronomers crawl out of their spaceship, and, tired from the long journey, fall asleep. During their slumber, a variety of fairies, representing stars and planets, give a performance, and a comet whizzes by. Snow falls, the cold astronomers wake up, and take refuge in a large cave with giant mushrooms. Suddenly lunar creatures (selenites) appear, which, when struck by the astronomer’s umbrellas, explode into smoke. The astronomers are overpowered by the large number of selenites, are captured and dragged to the king of the moon. One of the astronomers attacks the king,

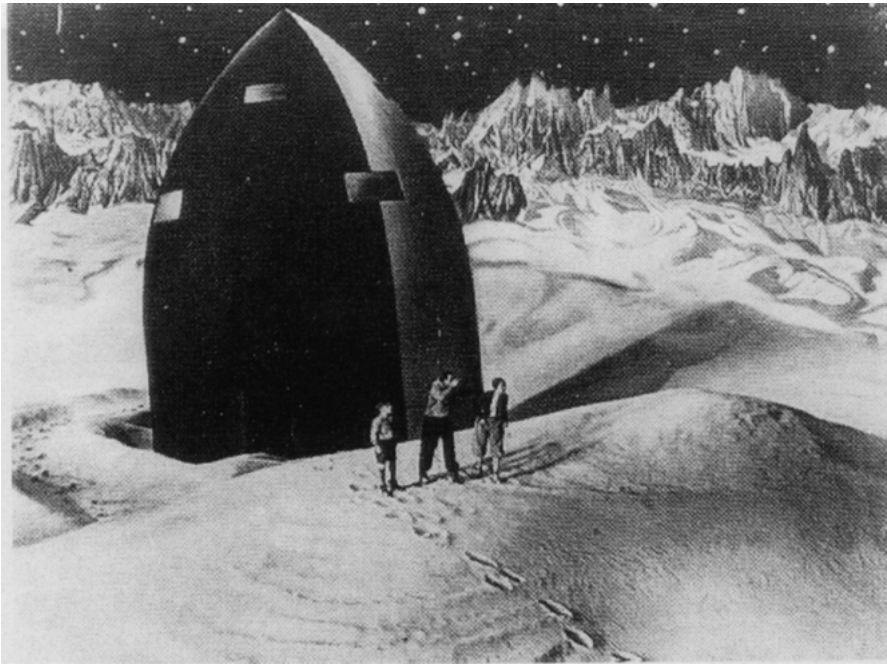


Figure 2. *The Woman in the Moon*, in Fritz Lang's 1929 film, finds sandy surfaces and an atmosphere, with bizarre mountains as a backdrop.

who turns to smoke, and in the ensuing chaos, the scientists race back to the space capsule, push it off a cliff, and fall back to the earth, where they plunge into the ocean.

Discussion: It can be safely said that the director does not seem to have consulted any astronomers, lunar maps, or photographs to create his backdrop. Neither the spaceflight, nor the surface of the moon has any proximity to scientific fact. Gravitation, well known since the late 1600s, is wrongly depicted (the fall of the capsule from the moon to the earth). Bizarre rock formations and caves with mushrooms are used for theatrical effect. As such, the movie qualifies as a fantastic film, not necessarily as science fiction. Information on the making of this film, together with a detailed analysis of Méliès movies and their importance for the development of the cinema, is given by Ezra (2000).

## 2.2. DIE FRAU IM MOND/THE WOMAN IN THE MOON (1929)

Credits: Fritz Lang (director); Thea von Harbou and Fritz Lang (book/screenplay); Hermann Oberth and Willy Ley (technical advisors); silent, b&w, 156 minute (German) – 97/104 minutes (US version).

Plot: Just as Méliés *Trip to the Moon*, this movie begins with a scientific meeting, at which Professor Manfeldt gives a lecture on his discovery of huge gold deposits on the moon. He is laughed off the podium, and is not taken serious for many more decades, until a young rocket engineer, Wolf Helius, builds a rocket to go to the moon to check on Manfeldt's hypothesis. A large international cartel of financial backers sends a representative, a Mr. Turner, along, who, in case gold is found, should take it over for the cartel, which wants to control all the gold trade in the world and beyond. Helius is also joined by his assistant, the engineer Hans Windegger, who brings his fiancée, Friede Velten, along, and by the old professor. The rocket is built and, in a grand display, rolled out of a large assembly building, and, with thousands watching, lifts off towards the moon. After takeoff, a stowaway, a young boy, is discovered. The trip to the moon is depicted fairly realistically, with attempts to show the weightless conditions. It quickly turns out that Turner is a nasty person and Windegger is paranoid. Friede begins to doubt her decision to marry Windegger. After the successful landing on the moon, everybody except the old professor is quarreling in the spaceship. In the meantime, the professor takes off alone to explore the surface of the moon. In a cave he indeed discovers large gold deposits. Turner, who sneaked out after Manfeldt, wants to grab the gold nuggets from him, but the professor tries to flee and has a fatal accident. Helius and the boy, who were searching for the professor, find the place of his accident, and sadly make their way back to the spaceship. However, Turner already arrived back at the ship with the gold, and tries to steal the rocket from Friede, who remained behind in the capsule, and Windegger, who is shoveling sand around the base of the rocket. Helius and the boy arrive back just in time. In the ensuing fight, shots are fired that kill Turner, but also damage the oxygen supply of the spaceship, which means that now there is not enough oxygen for everybody to get back to earth, and one person has to stay behind. Windegger at first refuses but then agrees to draw straws with Helius. The latter wins, but Windegger puts on such a show of despair that Helius decides to sacrifice himself and stay behind. He gives Windegger and Friede a sleeping pill in a drink, and asks the boy Gustav to start the rocket back to earth. After takeoff, which Helius watches from a distance, he is surprised to suddenly see Friede. After she realizes that she really loves Helius and not the immature Windegger, she has decided to remain behind with him, thus becoming the "woman on the moon".

Discussion: In an attempt to depict the flight to another world in a scientifically accurate way, Fritz Lang (1890–1976), the Vienna-born director, worked with Hermann Oberth, the German rocket pioneer (who later worked with a young Wernher von Braun on the German rocket program; Eisfeld, 1989). Many details are correct and well thought-out: for example, this movie seems to be the first time in history in which the countdown to zero was used for rocket start; the rocket assembly building looks like a predecessor to the Saturn V assembly building at Cape Canaveral; liquid is shown to form floating drops in zero gravity. It is said that the rocket was

so similar to the later wartime designs (e.g., V2) that the movie was banned in the Third Reich (cf. Geser, 1999). Some things went wrong: the rocket does not lift off slowly, but shoots off as if shot from a cannon. While the rocket design was trying to be realistic, the lunar science was not. The moon in the movie is dominated by sandy, desert-like surfaces, with bizarre mountains and a beautiful starry sky, and people are able to breathe effortlessly on the surface of the moon (Figure 2). Lang claims that he was aware that the moon does not have an atmosphere, but that in the 1920s there was a theory from some professor in Jena that claimed that the far side of the moon could have an atmosphere, and this is why he picked the far side as a landing spot for his spaceship (Geser, 1999). The set for the craggy lunar surface followed designs by the German landscape painter Gustav Wolff and the Viennese illustrator Joseph Danilowatz. The first showing of this movie took place at the Ufa-Palast in Berlin on October 15, 1929, after a significant advertising campaign (the space pioneer Oberth was even commissioned to build a real rocket, which was supposed to lift off for the premiere, but a fuel tank explosion during a test prevented this ultimate promotion item). Reviews of the movie (e.g., Arnheim, 1929; Brentano, 1929; Ihering, 1929) were mostly negative, and most reviewers were especially harsh on the screenplay by Thea von Harbou (1888–1954), who was previously married to Lang, but the marriage broke up because of an affair Lang had with the actress playing Friede in the movie. The screenplay was based on an earlier book by Harbou (1928). Despite this, and the emergence of sound films, *The Woman in the Moon* became the highest-grossing German movie of the 1929/30 season.

### 2.3. DESTINATION MOON (1950)

Credits: Irving Pichel (director); George Pal (producer); Lee Zavitz (special effects); Robert A. Heinlein (technical advisor); Chesley Bonestell (technical advisor of astronomical art); Walter Lantz (cartoon sequences); Technicolor, 91 minutes.

Plot: Beginning with rocket testing in the White Sands desert, this movie, for the most part, embraces the concept of the free enterprise, “can-do” spirit as it is pitted against a bureaucratic government. A retired general approaches an airplane designer-manufacturer in the private sector to build a rocket capable of going to the moon and back. Excited by the challenge, he musters financial backing from other businessmen (after they are won over by a cute, animated explanation of rocketry delivered by Woody Woodpecker!). As the rocket nears completion, there are attempts from local authorities to prohibit the launch due to unknown effects of radioactive fallout on the local inhabitants. The team, consisting of the rocket scientist, the general, the entrepreneur, and a skeptical mechanic, alters the launch date and takes off in the night literally with the local police in chase. On board the spacecraft, Pichel delivers some rather thoughtful and realistic occurrences in light of space travel, such as weightlessness and space sickness. There is also a



Figure 3. Colorful, craggy mountains emerge from unusually smooth planes with flattened craters in Irving Pichel's 1950 movie *Destination Moon*.

believable space walk episode to repair radar. With a bit of difficulty, they land the rocket in the crater Harpalus. Much activity takes place, such as collecting samples and taking photographs. There is drama near the end when they discover that the ship is too heavy to lift off for the return trip. After discarding every dispensable piece on board (the mechanic even volunteers himself), they manage to pull free of the moon's gravity, and head safely back to Earth.

Discussion: The movie deals with the first manned spaceflight to the Moon on a fairly scientific level, with an atomic-powered spaceship (named "Luna"), and a fairly accurate display of weightlessness. The plot does not involve lunar creatures, atmosphere, abundant gold or diamonds, or a love triangle. Instead, serious exploration takes place. Chesley Bonestell, the well-known American space artist, was responsible for the astronomical art in the movie, including views of Earth and moon from space and panoramic views of the lunar surface surrounding the spaceship Luna. Robert Heinlein, the author of "Rocketship Galileo", on which the movie was rather loosely based, had selected the crater Aristarchus for the landing site, but Bonestell did not like Aristarchus. Rather, he opted for the crater Harpalus, at a high northern latitude, facing the Earth, so that the Earth would appear near the horizon where the camera could capture it along with the lunar landscape. Bonestell created an almost 5-meter-wide painting of the interior of the crater Harpalus, which was turned into a "cyclorama" by studio scenic artists for the backdrop of the movie. Despite fairly realistic images of the moon from

space, the lunar surface scenes were characterized by the usual, romanticized and vertically exaggerated craggy, Alpine scenes that Bonestell (and others) had been painting for decades (see, e.g., Bonestell and Ley, 1949), and which appeared in so many movies. Figure 3 shows how sharp mountains emerge from unrealistically flat (almost shiny) plains that are marked by the occasional small and sharp crater (even complex craters appear to be only a few hundred meters apart). The craters, in contrast to the mountain ranges, are very shallow and have a low, sharp-bordered rim - all of which seems quite out of proportion. Maybe the most unusual aspect is the fact that the lunar surface (at least near the spaceship) is covered by what appears to be giant mudcracks, which is out of place for a waterless body. Despite this criticism, *Destination Moon* is (with the exception of *2001*) the most scientific of all the movies discussed here, and made a successful attempt to show realistic lunar surface conditions.

#### 2.4. RADAR MEN FROM THE MOON (1951)

Credits: Fred C. Brannon (director); Howard and Theodore Lydecker (special effects); Republic Pictures serial, b&w, 12 × ca.12 minutes.

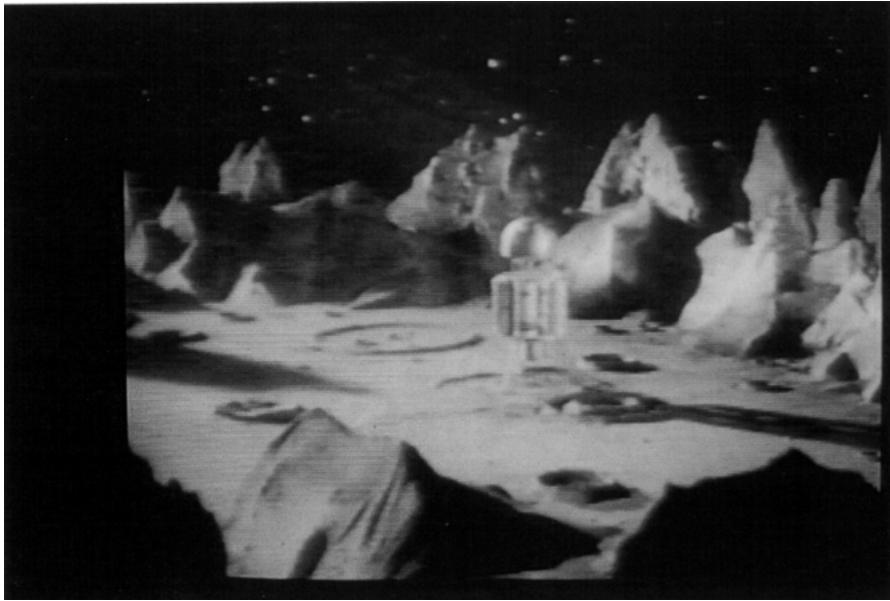
Plot and Discussion: This title is somewhat different from the others in our list, in that it is a serial (consisting of 12 parts, each about 12 minutes long), and not a single movie. Also, the moon plays a very small role; thus, we are combining the plot description and the discussion. The plot is fairly intricate, but basically that of a typical adventure-type movie. In the beginning, power lines, trains, and other infrastructure in the US are sabotaged, as it turns out, by gangsters who are employed by would-be invaders from the moon, and who use atomic ray guns. A casual rocket flight to the moon confirms this. A city is discovered in which the (English-speaking) ruler of the moon, Retic, tells the astronauts of his plan to invade the Earth, because the lunar atmosphere is getting thin. The astronauts manage to escape back to the earth, where the protagonists, over the next parts of the serial, engage in numerous car chases, shoot-outs, and fist fights. The “lunar surface” was shot in the southwest USA, and no attempt is made to show a dark sky – normal eroded sediments and canyons with a blue sky are shown. Compared to most other movies, the depiction of the moon is superficial and unrealistic, similar to that in the later *Missile to the Moon*.

#### 2.5. PROJECT MOON BASE (1953)

Credits: Richard Talmadge (director), Robert Heinlein and Jack Seaman (screenplay); Jaques Fresco (special effects); b&w, 63 minutes.

Plot: “In 1948, the US Secretary of Defense proposed that the US build a military guardian of the sky. By 1954 atom bombs and inter-continental rockets made it necessary. In 1960 the first orbit flight was made. By 1970 the Space Station had





*Figure 4.* The landed spaceship in *Project Moonbase* (1953) sits on a polished surface amidst cartoon-like mountains.

been built and free men were reaching for the Moon to consolidate the safety of the Free World". After this introductory statement, a rather simplistic plot shows just how easily a spy from the "evil other" replaces himself with the scientific consultant on a US flight to the space station. His main mission – to destroy the space facility. The captain in charge of the flight to the space station happens to be a woman. As one can imagine from a film of this era, it is teeming with overt "sexism". The co-pilot has a schoolboy crush on the captain, but also harbors resentment for her position over him. The rocket ship, which lifts off from a base near San Francisco, also carries the transplanted evil scientist. The crew of 3 lies in hammock-like lounge chairs while over dramatizing the effects of G-force. After a short stopover on the space station, they depart for the (first) flight to the moon. Shortly afterwards, the evil scientist extracts vital information from the captain. The co-pilot at this time suspects that he is a planted spy and a scuffle ensues. In the struggle, the space ship is deflected off course and for some unexplained reason, must now land on the lunar surface. It just so happens there is not enough fuel to leave the moon, and, to make matters worse, the rocket has landed out of reach of radio communications. The co-pilot volunteers himself and the now repenting spy to set out for a near-by mountain peak, where they attempt to set up a radio transmitter. After the transmitter is successfully placed on what appears to be a giant stalagmite, one of the two "moonwalkers" loses his footing and falls to his death. The identity of the survivor is revealed back at the rocket (none other than the handsome co-pilot). Radio communication is established with the space station,



Figure 5. The usual bizarre mountains and pancake-like impact craters are supplemented with stalagmite-like pinnacles that emerge from the lunar surface in *Catwomen of the Moon* (1953).

where upon the two remaining crew (the reproductively “perfect couple”) learn that they are to remain on the moon as project “Moon Base 1”. However, before they can get on with securing the future of the human race, they are properly married via video connection and even receive a personal blessing from the President of the US, who happens to be a woman!

Discussion: While there are obvious misconceptions about science, space and the lunar surface, the movie does offer some forward looking moments, such as that of an orbital space station, a moon rocket that isn’t too far off from the one that landed there in 1969, and, not least of all, a woman president. However, the depiction of the lunar landscape suffers from the usual problems – a cartoon-like, surface with unnaturally flat grounds, from which sheer and ragged rocks and mountains protrude (Figure 4). Despite the involvement of Robert Heinlein, who was the technical advisor for *Destination Moon*, the aspects of space science fall short here. In contrast to the earlier movie, science is not of importance in the present (low-budget) film.

## 2.6. CATWOMEN OF THE MOON (1953)

Credits: Arthur Hilton (director); Al Zimbalist and Jack Rabin (special effects); 3D, b&w, 64 minutes.

Plot: One of the more peculiar offerings, filmed in 3D (but only for maybe half of the movie at irregular intervals), which leads to strange blue-red double images, as no positioning of the 3D glasses yielded a 3D effect. The movie starts with a rocket blasting off to the moon, once again the first such undertaking. Four men and a woman navigator are on board. The navigator seems to know precisely where to go – some place just on the “dark side” of the moon (what is probably meant is the back side), even though no maps or surveying instruments are ever presented. The trip to the moon, characterized by bantering between the slick captain, smitten by the woman, his down-to-earth second in command, an engineer, a radio-operator, and the navigator, is rudely interrupted by a meteor shower, which damages the atomic reactor. No problem, a fire extinguisher takes care of it. After the successful landing, everybody rushes out to explore the bizarre mountains that stick out of the flat plains. The all-knowing navigator woman leads the others to a large cave (which she just knows to be there, causing some suspicion from the co-pilot). Just inside the cave they find that suddenly there is an atmosphere, and what does the good crew do? Quickly they peel off the space suits, stash them behind some stalagmites, and on they go. An encounter with two huge hairy black spiders is ended by the rational co-pilot, who just shoots them. The other end of the cave reveals a large expanse, with clouds, blue sky, and a palace that looks remotely like the Potala in Tibet. In the palace the crew is suddenly attacked by women in black tights, but the navigator is somehow under telepathic control from the moon-women (which explains her earlier actions). It turns out that the lunar civilization has lost not only all their men, but also most of the atmosphere, and so three of them want to go back to Earth with the navigator and take over the planet. The male crew (to be left behind) is wined and dined and smitten by the “beautiful” women. The greedy engineer finds out that there are huge gold deposits in the caves, but, after shown the deposits, and, shortly afterwards, is killed by one of the cat-women. Back at the palace, the plan unravels, the remaining crew rushes back through the cave towards the spaceship, two super-power cat-women are after them, but the co-pilot just shoots the two, and the crew, minus the goldhound engineer, take off towards Earth and a happy end.

Discussion: The rocket flight shows the usual stereotypes, with hurtling meteorites threatening the ship, and a crew that seems little affected from weightless conditions, and, as usual, the trip to the moon takes only a few hours. The views of the moon from a distance are fairly realistic, suggesting that telescopic images had been used by the set designers. There is an interesting sequence of close-up images of the lunar surface just before landing that gives a fair impression of a mountainous region near the terminator. However, once landed, the astronauts move about between pinnacles and sheer cliffs (Figure 5). Once they enter the cave, which looks like an active limestone cave, and encounter an atmosphere, all realism is lost. The discovery of gold nuggets and veins is just as unrealistic as it was in 1929 when Fritz Lang made *The Woman in the Moon*. Gold is actually very

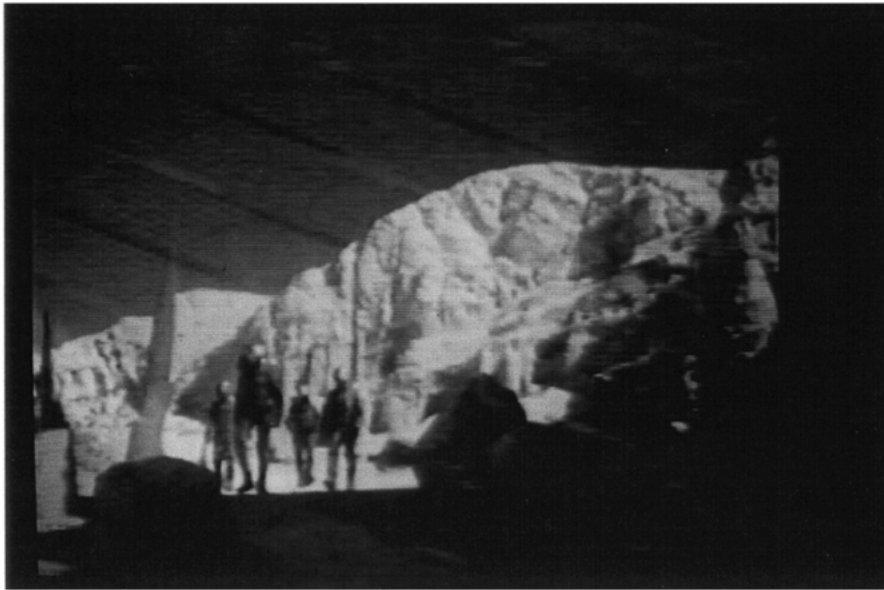


Figure 6. The 1959 *Missile to the Moon* shows bright skies and a landscape that could be in Utah or Arizona, with sedimentary and erosional formations, and a few pinnacles added for good measure.

rare on the moon; for example, the mare basalts contain only 0.005 to 0.11 ppb Au (Taylor, 1982).

## 2.7. MISSILE TO THE MOON (1959)

Credits: Richard Cunha (director); Howard Woolzy (special effects); b&w, 78 minutes.

Plot: This remake of the campy *Cat Women of the Moon* begins with scientists arguing the differences between private and government initiated missile launches. Frustrated when his missile is grounded, a rebel scientist coerces two escaped convicts hiding out in the rocket, to be his crew to the moon. While investigating the strange events on the launch pad, another scientist, along with his fiancée, find themselves passengers on board the rocket as it lifts off. In the course of the flight there is a meteor shower in which the rebel scientist dies of his injuries. This leaves two ex-cons and a pair of lovebirds to land on the moon. As they explore the lunar landscape, rock monsters break free from the rock formations and chase them into a cave. There they find torches burning and, realizing that they can breathe unaided, decide to take off their space suits. They are soon overcome by strange smoke, and awaken to find themselves captive by scantily clad women (ex-beauty queens), in a palace. To perpetuate their race on earth, the moon women intend to marry off the scientist to one of their own. However, this idea is met with protests from his fiancée. Meanwhile, one of the convicts is following his greed to a stash of

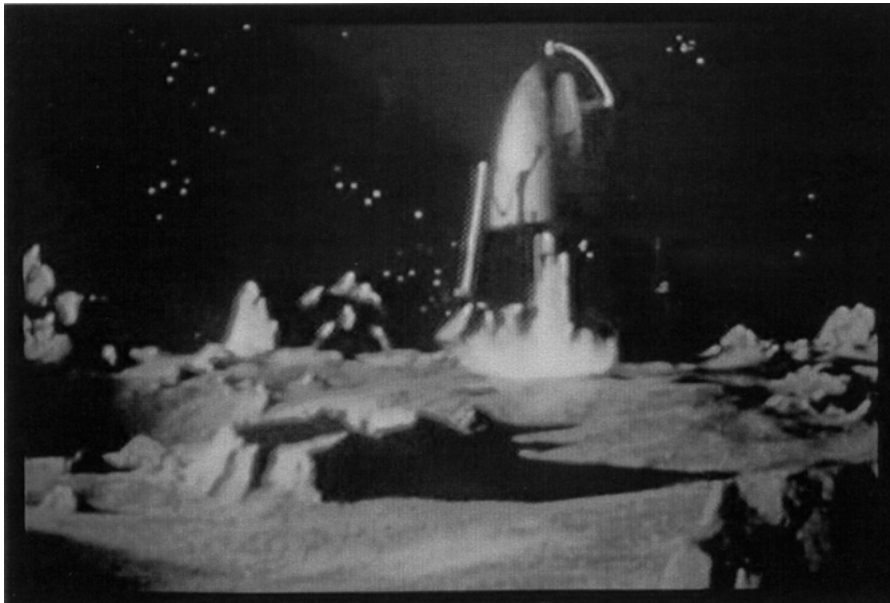


Figure 7. The forgettable 1960 *Nude on the Moon*, in the few minutes that show something resembling a lunar surface, feature a green, cartoon-like moon.

diamonds in the cave. As soon as the scientist breaks free from the spell of his alien bride-to-be, they all make a run back to the space ship. The diamond-laden ex-con tries to catch up with the others, but while trying to outrun one of the rock monsters, he steps out of the shadow and is incinerated by the sun's heat. The others, however, make it back just in time for the usual "Happy Ending".

Discussion: It probably was not an easy achievement, but this sequel is much worse in all aspects than the original *Catwomen*. The rocket is amazingly amateurish, and the "lunar" landscape must have been filmed somewhere in the southwest US, maybe Arizona or Utah. The astronauts stumble through sand next to low plants, and, in contrast to some of the other cheap SciFi movies, this one did not even pretend that there is a black sky. We see a normal light sky with atmosphere and some "mesas" in the distance (Figure 6). Again, once inside the cave (with atmosphere), even the little bit of reality is left behind. The rock-creatures add a novel touch, but the heat of the direct sunlight on the moon is exaggerated – none of the Apollo astronauts ended up spontaneously combusting.

## 2.8. NUDE ON THE MOON (1960)

Doris Wishman (director); O. O. Miller (screenplay); color, 70 minutes.

Plot: It is hard to determine whether the director was trying to parody past SciFi films, or if this was a misguided attempt at serious film making. We can only hope

it was the former! But in either case, “Nude on the Moon” defies all credibility. A young stud-looking scientist takes his professor friend on a trip to the moon where they encounter a colony of topless aliens (mostly women). The leader of this semi-nudist camp happens to resemble his secretary back on earth whose advances he has been ignoring. Not only is the storyline and dialogue hilariously cornball, but the special effects are embarrassing. The moon, a lime green neon ball, appears to be barren and desert-like during landing and takeoff. But, when the two astronauts leave the rocket to explore, the lunar landscape is suddenly filled with tropical plants, waterfalls and a bright blue sky with clouds. The summary of this film could not possibly be complete without mentioning the elevator/lounge music sound track!

Discussion: There is not much to discuss in terms of lunar landscape or rocketry. Two amateurs cooking rocket fuel in flasks in a chemical laboratory, a green moon (although not obviously made of cheese), which, the moment the “astronauts” leave the ship, turns into a tropical garden with palm trees and topless women (with antennas on their heads). This is easily the worst one in the list of movies examined for the present study.

## 2.9. THE FIRST MEN IN THE MOON (1964)

Credits: Nathan Juran (director); Nigel Kneale and Jan Read (screenplay); Ray Harryhausen (special effects); color (“LunaCOLOR”!!), 103 minutes.

Plot: Beginning in modern times (circa 1950s), a United Nations spacecraft has landed on the moon, only to discover a British flag along with a letter dated 1899, proclaiming the moon in the name of Queen Victoria. U.N. investigators back on earth, discover a quaint old man named Bedford in a sanatorium, who claims to have been a member of that expedition. Through one long flashback, we learn of how he and his (what else!) fiancée, Kate, meet professor Cavor, a goofy but earnest scientist living next door to them in the English countryside. Cavor, who’s goal is to fly to the moon, has built a rocket ship in his glass house. Seeking to escape debt collectors, Bedford decides to go along, and in the ensuing chaos of pre-launch, Kate ends up on board as well. (The interior of the ship looks like a Victorian parlor!) After crash landing on the lunar surface, the two men set out to explore. They come across a huge honeycombed dome that opens just in time for them to literally stumble into it. When inside the moon’s interior, they soon learn that they can breath without their “diving” helmets. After a brief and harrowing attack by a giant caterpillar (of the garden variety!), they are confronted by an army of moon creatures called selenites, which look very much like grasshoppers! Cavor wants to communicate with them, while Bedford insists on a more aggressive approach. They soon learn that their spaceship, with Kate inside, has been dragged under ground. As the moon creatures take apart the ship, Kate is x-rayed and interrog-

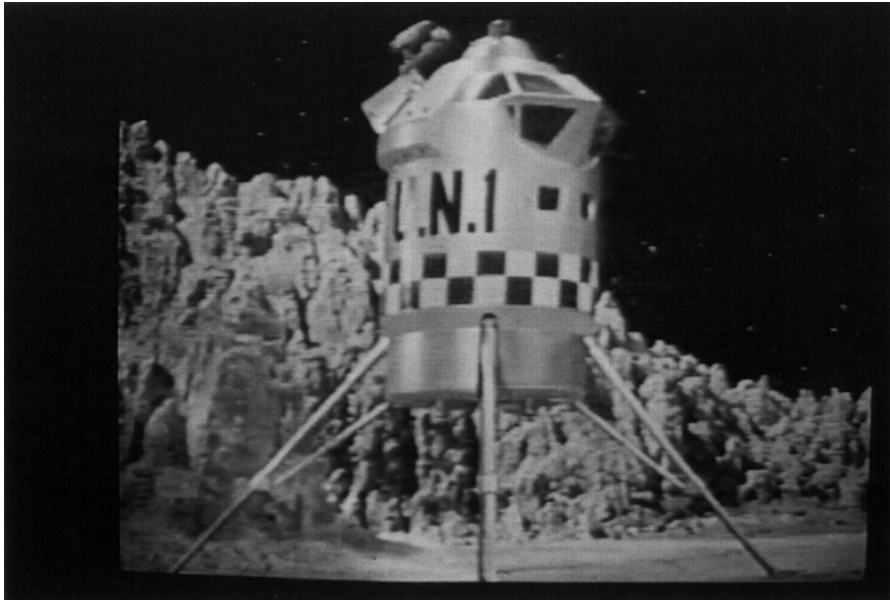


Figure 8. The modern U.N. spaceship in *First Men in the Moon* (1964) against a backdrop of the ubiquitous steep mountains.

ated. There is a giant crystal operated by sunlight, which shuts down during a lunar eclipse, and sends the selenites into hibernation. As Bedford and Kate try to put the spaceship back together for a speedy exit, Cavor is led to the “brain” of the selenites, where he proceeds to explain earth’s civilizations, war etc. Bedford appears, and in an effort to break up this intellectual meeting of the minds, uses his trusty elephant gun to shoot at the brain. With the ship put back together in the nick of time, they blast off for earth leaving behind an army of agitated selenites, and of course professor Cavor, who is determined to sacrifice himself for a more positive image of mankind! Back to present times at the sanatorium, Bedford, the U.N. investigators, and reporters watch on television as the astronauts witness the crumbling of the deserted ruins in the lunar caves. It appears that Cavor had a nasty cold and that earth germs ended all life on the moon!

Discussion: The movie follows the famous novel of the same title by H.G. Wells, which had previously been turned into a film on 1919. The Victorian spaceship travels to the moon with the help of an antigravity paint, but the lunar surface is shown with some attempt at realism – no atmosphere, rock boulders that do not look like sediments, and no mesas and canyons. As with basically all the other movies, the vertical dimension of the mountains is exaggerated. Once inside the moon, realism is replaced by drama, with giant caterpillars, mushrooms, and poppy-seed pods, and selenites that look like humanoid insects. Nevertheless, the depiction of the lunar surface is not among the worst of the movies discussed here.



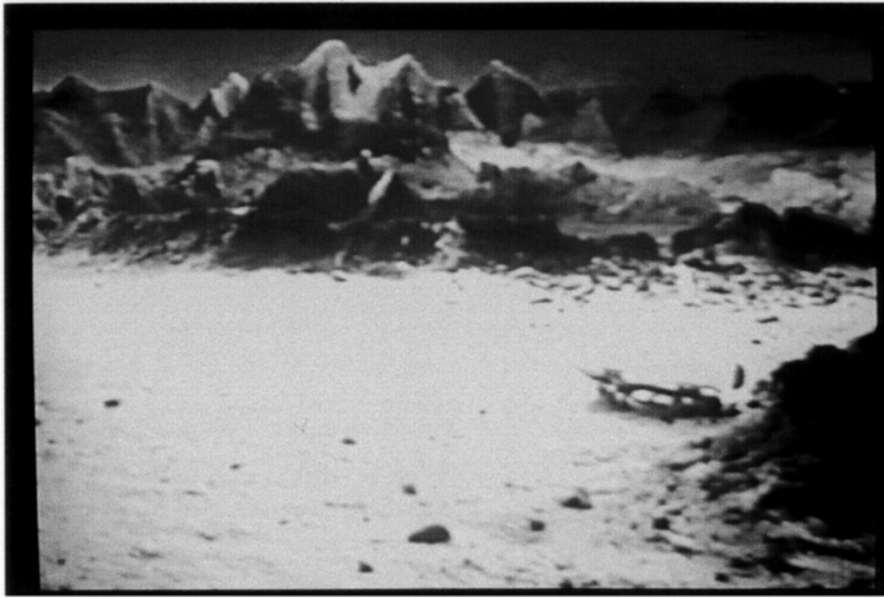
*Figure 9.* The 1967 *Countdown* by Robert Altman gives a disappointingly unrealistic depiction of the lunar surface, probably pasted together from scenes shot in the southwest USA.

## 2.10. COUNTDOWN (1967)

Credits: Robert Altman (director); Loring Mandel (screenplay); color, 102 minutes.

Plot: What starts out as a fairly engaging story, sinks rapidly to an unbelievable ending. With Russia's plans to send geologists to the moon, NASA officials come up with a scheme of their own, code named "Pilgrim". Though the Apollo mission is still a year away, a Gemini capsule is brought in to deliver a civilian to the lunar surface. The only catch is that the astronaut must live in a life support shelter on the moon for up to a year until the Apollo program is finished. Chiz, the obvious choice for the mission, is bumped because of his military background. (The State Department stipulated that to have an astronaut with military credentials land on the moon would send the wrong message to the world.) His friend and colleague Lee, must now undergo intensive training (only 3 weeks worth!) to prepare for the rigours of space travel and lunar habitation. In order to heighten the plot, Altman adds mega-doses of male rivalry and on the home front, terse tensions between spouses. After a successful launch and trip to the moon, Lee lands the ship, even though he was instructed to touch down only if he has sight of the life support shelter that was sent a few days earlier. The lunar landing is not shown in the film, only the pensive shots of the wife and colleagues in mission control. Soon after setting out in search of the life support shelter, Lee happens upon the Soviet space ship, toppled and with dead crew strewn about. He reverently displays their Russian





*Figure 10.* The 1968 *Mission Stardust* features a pink sky and a mixture of realistic rolling hills and distant sheer mountains.

flag along with the US flag, and then sets out once again to find his moon shelter. Miraculously, with less than 6 minutes of air supply left, he casually looks over his shoulder to see the red beacon of the support shelter.

Discussion: The movie tries to give a technical impression, using all the NASA technical paraphernalia (training facilities, mission control, a real rocket launch), but the story is ludicrous and impossible from an engineering and logical point of view (the trip to the moon is too fast, no safety or return devices, fully automatic landing, an unreasonably long stay on the moon). However, while the first two thirds of the movie remain close to reality, the last part, especially the scenes on the moon, are disjointed and unrealistic. A mixture of obvious set designs (with very sheer, ragged peaks and steep rock towers looking like giant stalagmites) are counter-shot (same scene) with a landscape somewhere in the desert of the southwestern USA, with a bright sky (Figure 9). Considering the date of this movie (just two years before the actual landing of Apollo 11) and the use of more or less proper space technology, the failure to depict a more realistic lunar surface is puzzling. No scientific advisor is listed in the credits, and it shows. What might be understandable in 1950 becomes carelessness in 1967.

#### 2.11. MISSION STARDUST (1968)

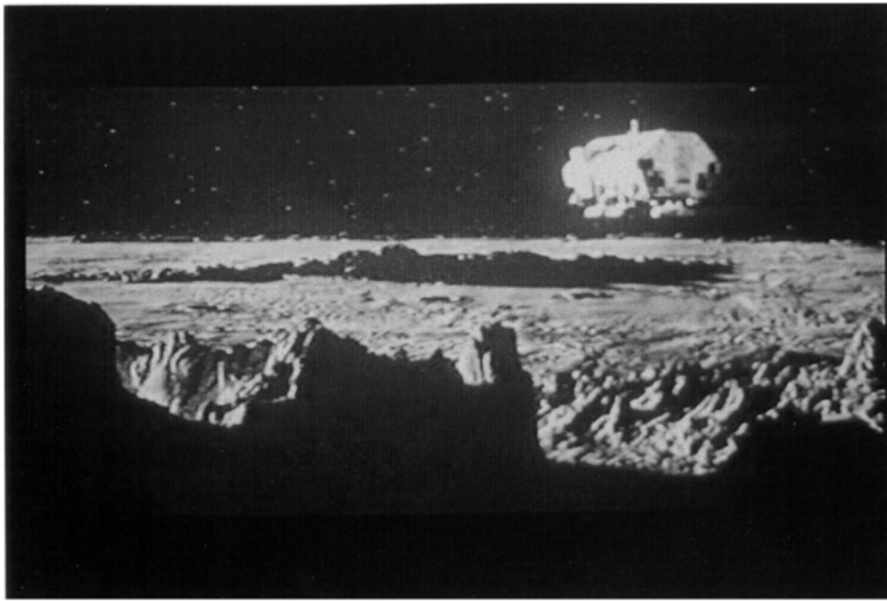
Credits: Primo Zeglio (director); color, 90 minutes.

Plot: Labeled as the “Spaghetti SciFi”, *Mission Stardust* lives up to the genre. In fact, there is so much going on in this movie that you do not notice that the words don’t match the lip movements. A space crew of four men rocket to the moon in search of a valuable metal. Just before it is to land, the space ship is diverted by some mysterious force, to land on the dark side. As Major Rhodan and his copilot (the other two astronauts remain in the rocket) set out with a rover to explore the surroundings, they come across a large space capsule belonging to a small crew of shipwrecked aliens from the planet Arkon (34 million light years away). They soon find themselves exchanging pleasantries with an ailing scientist, his beautiful and blond commander, and a closet full of robots. Due to a breakdown of the mother ship, they are unable to return to their planet. The woman, aggressive and suspicious of earthlings, espouses her superiority at every chance. The ailing scientist, suffering from leukemia, agrees to be treated by a famous doctor practicing in Mombasa, Kenya. The other two astronauts are “beamed over”, and they all make the journey back to earth in the alien’s support pod. Meanwhile, an evil cartel on earth seeks the knowledge of the aliens (and the moon ore) to control the universe. The cartel’s network of spies includes one of the astronauts, the medical doctor (along with his two blond nurses), and a small army of mercenaries. As the space pod lands in the African desert, it is spotted and attacked by the local military. Rhodan and his copilot set out to collect the doctor from Mombasa and bring him to the ailing alien. There are numerous chase scenes, attacking armies, sinister criminals and defensive aliens, in what at times is similar to a James Bond adventure. In the end, the alien scientist is saved by a blood transfusion, the space pod leaves earth for the moon (the cartel leader is bumped off along the way), and Major Rhodan and the blond alien appear to form a more personable relationship.

Discussion: Unfortunately, most of the action in this film takes place in Africa and not on the moon. As is fairly common, the shots showing the moon from a distance are fairly realistic (in an early mission-planning scene, a Lunar Orbiter photograph of Copernicus is used). However, closer up the realism disappears. The surface is, once again, dominated by craggy mountain chains on the horizon, beyond which we see (Figure 10) a dark purple sky that gets pink close to the surface (which implies an atmosphere, but none is apparent, as the astronauts wear full space suits). A scene in which the astronauts explore the area with a lunar rover is maybe the most realistic of the movie, as it shows gentle rolling hills, similar to those seen in the later Apollo missions.

## 2.12. 2001: A SPACE ODYSSEY (1968)

Credits: Stanley Kubrick (director; special effects design); Stanley Kubrick and Arthur C. Clarke (screenplay); Frederick I. Ordway III (scientific consultant); color, 141 minutes.



*Figure 11.* A moon bus flies over the lunar surface on its way from the base at the crater Clavius to the site of the black monolith at Tycho in Stanley Kubrick's *2001: A Space Odyssey* (1968).

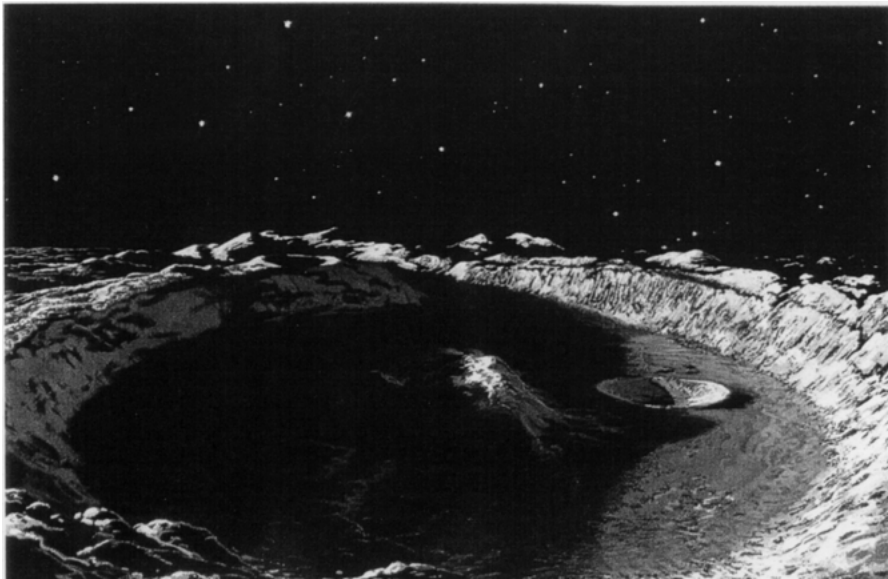
Plot: 2001 can be described either in a few sentences or in a whole book, but, considering the metaphysical contents and the need for interpretation, no short description can do it justice. The movie is divided into four parts. The first, “The Dawn of Man”, obviously set hundreds of thousand or millions of years ago, before “Homo Sapiens” graced the planet, shows apes that go about their daily routines of hunting and gathering. A giant black monolith (with the dimensions  $1 \times 4 \times 9$ ) suddenly appears, and, after initially being frightened, one of the apes touches it to unearthly sounds (György Ligeti's “Requiem”) and an alignment of the moon and the sun above the monolith. This obviously had some kind of subtle effect on the apes, because in their next outing they have discovered how to use bones as weapons and tools – the seed for intelligence has been planted. A cut to the year 2001, the second part, shows a wheel-shaped space station and spacecraft orbiting the earth to the music of the Blue Danube waltz by Johann Strauss. A buried black monolith had been discovered below in the surface of the crater Tycho; it was noted because of its strong magnetic field. A scientist/space official from earth is visiting the moon (the US lunar base in the crater Clavius) and is travelling from the base in a lunar “bus” to Tycho to look at the excavated monolith. While the scientists observe and photograph the monolith, a similar celestial constellation as before (this time the earth and sun) occurs above it, and a strong radio signal is emitted towards Jupiter. This leads to the third part (“Jupiter Mission: 18 months later”, in which the large spaceship “Discovery” is on the way to Jupiter. On board are two on-duty astronauts (Dave Bowman and Frank Poole), three astronaut/scientists in

cryo-hibernation, and an intelligent, talking computer named HAL, who controls the ship and the mission. The astronauts do not know the real cause of the mission (to check out the radio signal from the lunar monolith), but HAL obviously does. A chain of events leads the astronauts to discuss switching HAL off, who, in turn, reacts by killing the astronauts to try and save the mission. Only Bowman survives, shuts down HAL's conscious functions, and is finally told, in a prerecorded messages, as the ship gets close to Jupiter, the real reason for the mission. A large monolith appears between the moons of Jupiter, which Bowman, in a small space pods, explores. This leads to the fourth and final part, "Jupiter and Beyond the Infinite". Bowman, in a dazzling visual display of color and light, seems to fall through space and time and towards distant planets, ending up in an elegant, but sterile-looking and white-furnished hotel room, where he sees himself age, die, and, catalyzed by yet another black monolith, be reborn as a star-child, to watch(?) over the earth and mankind.

Discussion: This is not the place to discuss or interpret the whole movie and its meaning, which goes far beyond a normal science fiction story, and is often quoted to be the ultimate science fiction movie. The perfection and attention to detail with which Kubrick went to work is well documented (Agel, 1970; Geduld, 1973). The movie won an Academy Award ("Oscar") in 1969 for "Special Visual Effects", and three British Film Academy Awards. The space flight is shown with precise attention to scientific accuracy. Spaceships do not suddenly turn in space; the travel time is reasonable; there are no sounds in a vacuum; weightless conditions are shown (down to the instructions for use of a "zero-gravity toilet"). The scenes in which the space transporter Aries approaches the moon are filmed from transparencies of real telescopic lunar pictures. The surface of the moon, over which the moon bus flies to the site of the monolith, was filmed as a composite of small and carefully culpted terrain models and background projection, allowing motion over the surface. The crater Tycho, the location where the monolith was found, is about 300 to 400 km from Clavius (depending from where in Clavius); thus, the travel distance and time depicted is entirely reasonable. The only minor criticism would be that even here some of the lunar mountains are steeper than they would be in reality, but, apart from that, this movie easily "wins" by providing the most realistic depiction of the lunar surface (and of spaceflight) of any of the movies discussed here.

### 3. Conclusions

By the mid-1960s, spacecraft had provided close-up views of the lunar surface, revealing a landscape that was significantly different from the ragged mountains painted by most space artists (e.g., Bonestell) and depicted in most movies. An interesting exception was the Lucien Rudaux, who painted realistic lunar landscapes already in the 1930s (e.g., Rudaux, 1937). Of course every astronomer should have



*Figure 12.* In contrast to most other space artists during the first two thirds of the 20th century, Lucien Rudaux painted realistic lunar landscapes, the dimensions of which he deduced from geometric considerations (from Rudaux, 1937).

been able to point out that the craters and mountains on the moon are smooth, more like rolling hills than ragged mountain peaks, because all one has to do is look through a telescope at the rim of the moon, or translate the known topography of the moon (from measurements as early as Lohrmann, 1824).

The first photos of the lunar surface were beamed back to the earth from a robotic lander in February 1966. The Soviet spacecraft Luna 9 landed safely on Oceanus Procellarum on February 3, 1966. Panoramic images were scanned and sent back in digital form starting on February 4. The Soviets did not immediately release their images, which led to a funny gaffe. Wilhelms (1993) tells the story that the Soviet transmissions from the moon were intercepted at the Jodrell Bank radiotelescope in England, where the data were “recorded directly on a standard wire-service facsimile machine borrowed from a newspaper. These Jodrell Bank pictures quickly hit the streets and showed a jagged and frightening Chesley Bonestell landscape” (Wilhelms, 1993, p. 126). What is more, a comment on the photos by a geologist to a newspaper that the surface looks volcanic and precious metals can occur in such settings led to a report that “came out first in the [*Oakland Tribune*] and then nationally . . . that Luna 9 had found a vein of gold on the moon!” (Wilhelms, p. 127). However, the joy was short, because, “After enjoying the spectacle of Western presumptuousness, the Soviets released their pictures the next day, 6 February. The pinnacles fell flat. Not only was the surface relief enhanced by the very low sun angle ( $7^\circ$ ), but [the] wire-service machine had compressed the pictures laterally by a factor of 2.5” (Wilhelms, p. 127). The lunar hills were gentle,

rolling slopes after all. Several more unmanned spacecraft (e.g., the US Surveyor series, starting with Surveyor 1, which landed safely in Oceanus Procellarum on June 2, 1966) confirmed with close-up images what astronomers had known for some time, but what space artists, special effects designers, and directors either ignored or did not care to know: the lunar surface is not ragged and bizarre, but fairly smooth.

### Acknowledgement

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