

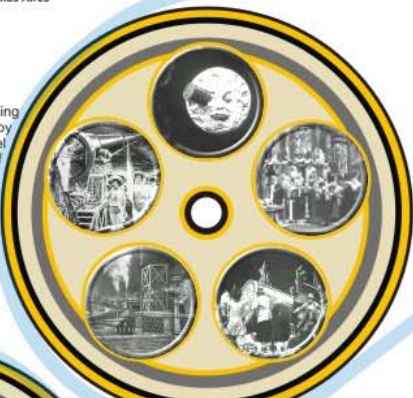
Astronomical Facts in movies: riguroosity, speculation and fiction

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THE BEGINNINGS

Astronomy was at the movies since the beginning of the 7th art. "Voyage dans la Lune" (1902), by Georges Méliès, was the first film where a travel beyond the Earth is presented. Many scenes of this great movie are icons remembered by all of us: the face of the Moon, the rocket and the impact in that face, the eccentric astronomers, and the Selenite! The cinema was used, in addition, as a technological resource to film the transit of Venus in 1882. This is probably the first scientific movie in history [1][2].



HOW TO PORTRAIT AN ASTRONOMER

There was an evolution between the stereotyped, wizard-like astronomer of "Voyage dans la Lune" to the astrophysicists that appear in modern films. In an episode of the TV show "Rawhide" ("Incident of the Stargazer", 1960), one of the characters has to pretend to be an astronomer to solve a crime, and he has difficulties in deciding an appropriate astronomer disguise: finally, he uses a suit and glasses. In contrast, the main character of "Contact", Ellie, confesses not to know how to dress up for an important social event. "Contact" also shows the efforts of an observational astronomer to get telescope time and financial support, and the relationship with other colleagues and with power. Real astronomers are also presented in "Das Versprechen" and "Casa de arena".

BIOGRAPHIES AND FACTUAL EVENTS
We note that biographical films based on astronomical celebrities are rare, being Galileo the most visited biography [3], although none of the versions (1969, 1975, 1998) became popular. The most named biographical film is probably "Giordano Bruno" (1973), mainly because of the tragedy involving this monk's life. The most important astronomer in history, Johannes Kepler, has only one not very well known movie (Germany, 1974). In Margarethe von Trotta's "Das Versprechen" ("The Promise", 1995), the main character is a successful astrophysicist who, in trying to meet his family who lives beyond the Iron Curtain, takes advantage of scientific meetings that really took place in the times and venues reported in the film. The main character of "Contact" is a leader of the SETI project.



ECLIPSES

Many situations in movies are resolved by a total eclipse of the Sun, like avoiding death sentences ("Apocalypse", "Tintin et le temple du Soleil"), explaining the sudden appearance of a killer plant ("Little shop of horrors") or committing a perfect murder ("Dolores Claiborne"). In "Apocalypse", however, the nearly-full moon is shown the first night after the solar eclipse. In the drama "Casa de arena" ("The house of sand", 2005), a group of scientists launch at the deep interior of Brazil to photograph the eclipse of 1919; one of the characters explains carefully but in an affordable language how they intend to prove Einstein's theories by measuring the deflection of the light of a star.



OBSERVATORIES IN MOVIES

Many observatories were chosen as film locations. The most visited one is the Griffith Observatory, in Los Angeles (e.g. "Rebel without a cause", "Rocketeer", "Bowfinger", etc), but Arcicibo ("Goldeneye", "Contact") and the VLA ("Contact", 2010) are special places, probably because they are usually associated with communication with aliens. The 64-m Parkes antenna was the "main star" of the Australian movie "The Dish" [4] [5]. The antennae of the Argentine Institute for Radioastronomy gave a background for "Pequeños milagros" ("Little miracles", 1997). As part of the last James Bond movie, "Quantum of Solace", the VLT was a great location for the 007 adventures, and the opening is a perfect example of positional astronomy.

ASTRONOMICAL COMEDIES

Astronomy is not always taken seriously. Astronomical facts met its funny side in movies like "Way... way out" (1966), with Jerry Lewis, or the more recent "Space cowboys" (2000). Earlier, in 1960, another J. Lewis' comedy entitled "Visit to a small planet" received a nomination for an Oscar award. Other comedians like Louis de Funès, Lando Buzzanca or Bud Abbott and Lou Costello, traveled to another planet or had to deal with aliens. In "Addicted to love", Matthew Broderick plays an astronomer who uses his telescope to spy on his ex-girlfriend. Even an alien invasion to the Earth can have several funny aspects, as shown in "Mars attacks!". Astronomy is also present in cartoons: in the episode "Scuse me while I miss the sky", Lisa Simpson decides to study astronomy but crashes into the problem of light pollution. Also, everyone remembers the astronomer who was tormented by the Pink Panther in the episode "Twinkle twinkle little pink", and his extending telescope. We believe that the most comprehensive incursion of astronomy into a comedy appears in Monty Python's "The meaning of life", in which a trip through the universe is scored with the "Galaxy Song" as background, a rigorous compendium of astronomical facts adjusted to the rhythm and metrics of a song.



TRAVELS THROUGH SPACE AND TIME

ASTRONAUTICS

We notice the influence on cinematography of the progress achieved in astronautics in the second half of the past century, and how interplanetary travels have become a recurrent issue, either from fictional approaches (e.g. "Marooned", 1969) or reporting true stories like the voyage to the Moon (e.g. "The Dish") or the frustrated mission Apollo 13, in two versions: a TV movie entitled "Houston, we have a problem" (1974) and Ron Howard's production for the big screen "Apollo 13" (1995). In the early eighties, a shadow of doubt was cast on the lunar landing, and Hollywood released "Capricorn 1".

ADVENTURES

The most exciting adventure in astronomy, astrophysics and astronautics is "2001: A space odyssey". The film is a compendium of evolution, not only about the place where aliens came from.

Man's changes with age, but also the progress in science and in astronautics. It represents a complete travel through different ages, scenarios, dreams, goals and destiny of mankind, and sets a link between fantasy and reality, when the conquest of space was at its dawn. But from a pure fictional viewpoint, "Star Wars" is probably the icon of the adventures in space. The list continues with "Star Trek", "Lost in Space", "Zathura: a space adventure" (this latter, with children as main characters), and also very successful TV shows: the first version of "Star Trek", "Babyton V", "Firefly", "Cosmos 1999", "Battleship Galactica", and many others.

In general, planets were the most visited destinations in movies. Mars (the main objective for most sci-fi films) was presented as a possible world to live in or the place where aliens came from.

Some examples are: "Mission to Mars" (1999), "Red Planet" (an exciting story with nano-machines acting on Mars biosphere), or "Total Recall" (based on the text by Philip Dick). Mars is also the place from where the first Earth invaders come: "Mars attacks!", "The War of the Worlds" (a naive 1953 and a dramatic 2005 versions, adapted to the times).

The Moon ("Apollo 13"), Venus ("The illustrated Man"), Jupiter ("2001: A space odyssey"), the satellite Europe ("2010: the year we make contact"), Uranus ("Event Horizon"), the Sun ("Sunshine", 2007), and the star Vega ("Contact") are good objectives for a Hollywood return trip. "Contact" introduces wormholes for the first time as a means to travel distances for which even the speed of light would be insufficient. The same principle is later used, for instance, in "Event horizon". Before this concept, the only way to overcome astronomical distances, and hence astronomical times, was by successive generations growing in the spaceships (e.g. "Battleship Galactica", "Lost in space"). Astronomical adventures were also adopted as part of movies in another frequency: those with the famous agent James Bond, as in "Moonraker" (1979) or, more recently, in "Quantum of Solace", although in this latter case only the location and the opening are related to astronomy.



DISASTERS

Many movies show the outer space as a source of threats against mankind, either by mass invasions of aliens ("The war of the worlds", "Starship troopers", "It came from the outer space", "Lifeform", and a long etc.), or by the impact of a comet or meteorite ("Meteor", "Deep impact", "Armageddon", "Asteroid" or even collisions between planets ("When worlds collide"). Fires out of control, earthquakes and tsunamis, all at the same time, are the underlying ingredients of all these films, mainly the second group. Although the popular idea is that the best way to survive a menacing meteorite is its disintegration, "Asteroid" shows that the many pieces impacting the Earth are even worse than the damage that a single big rock could produce.

PSYCHOLOGICAL TERROR

In 1979, Ridley Scott established a landmark with "Alien". It tells the story of an exploration vessel with seven crew members that launches on an unknown planet, and a predator that inadvertently enters the house will remove one by one all its passengers. The psychological factor was also addressed by the film "Event Horizon". This psychological horror movie shows obvious influences from a classic in the genre: "Solaris" (1972) by Andrei Tarkovsky, which marks a turning point in the tale of speculative fiction. A Hollywood remake of this classic, "Solaris", was released in 2002.



CONCLUSION

Due to the interest that cinema produces on society, it can be used as a tool to teach astronomy showing what is real and what is only fantasy or speculative fiction. Using this resource, it is possible to bring science contents closer to people's common life. There is a clear evolution in the way that astronomy is perceived along the years. We find that, despite the hypothetical travel through space and time and the use of headsets to detect radio waves, "Contact" is the movie that most realistically describes the life and activities of an observational astronomer. The Australian comedy "The Dish", although not tightly correlated with the real events, also pictures the activities in an isolated observatory and the impact on the neighboring community's life. Spread scenes in even non-scientific movies, like "Casa de arena" ("The house of sand"), can be useful to teach with simplicity astronomical facts. One of the most representative scenes related with astronomy appears in the "Galaxy song", as part of Monty Python's comedy "The Meaning of Life". It summarizes in a comprehensive manner and with scientific precision what astronomy is, and places the man in the vast universe. A perspective that leads us to believe that each of us plays a role in the machinery of the cosmos and at the same time nothing is too important, perhaps everything works well despite ourselves, and the power of humer and why not of science can show it clearly to us.

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