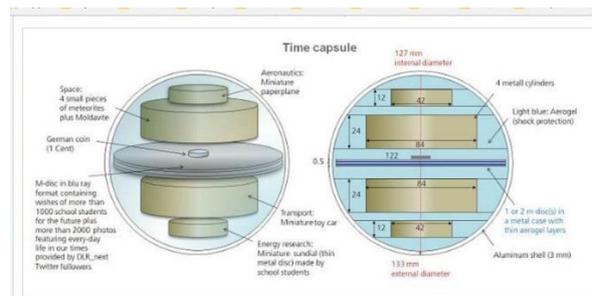
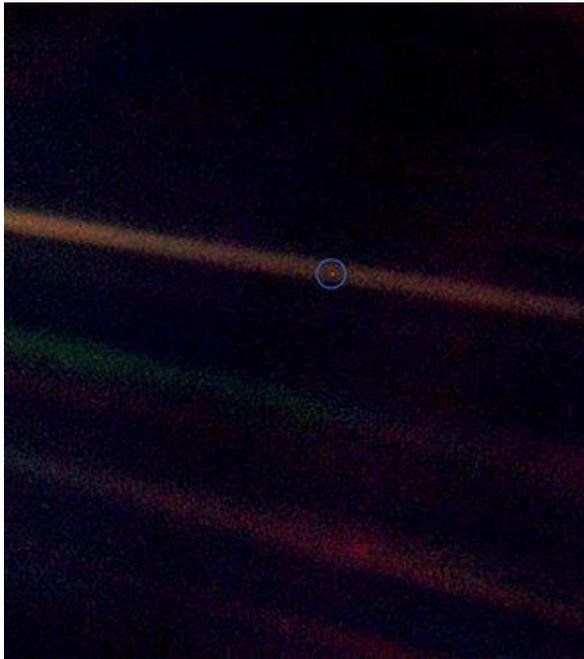


## Carl Sagan, Alexander Gerst and the ISS Project 4D: Traveling through Space and Time



On May 28, 2014, at 21:57, the German ESA astronaut Alexander Gerst lifted off to visit the International Space Station (ISS). He became the third German who lived and worked on-board the ISS for half a year. During his 165-day mission, he was involved in over a 100 different experiments.

Each ISS mission has its own name. The one from Alex was called "Blue Dot – Shaping the Future". This motto refers to the famous Voyager-1 "Pale Blue Dot" photograph.



*Left: The historical "Pale Blue Dot" image. Carl Sagan pointed out that on that dot, "every human being who ever lived, lived out their lives".*

*Right top: Alexander Gerst gets the "Silver Sphere" with the students' wishes from Pascale Ehrenfreund (Head of DLR). In the background Jan Woerner (ESA DG).*

*Right bottom: Cross section of the time capsule ("Silver Sphere"), in the middle the two M-discs and four transport containers embedded in Aerogel for protection.*

"Pale Blue Dot" is a photograph of planet Earth taken on February 14, 1990, by Voyager-1 from a record breaking distance of about 6 billion kilometers (3.7 billion miles, about 40.5 AU), as part of the planetary "Family Portrait" series of images of the Solar System taken at the special request of astronomer and author Carl Sagan.

On the photograph, Earth's apparent size is less than a pixel; the planet appears as a tiny dot against the vastness of space, among bands of sunlight scattered by the camera's optics.

When Voyager-1 was launched to explore the outer solar system in 1977, also a "Golden Record" was attached to the spacecraft - a golden data record with a player containing photos, audios and music pieces. If extraterrestrials exist and would find the "Golden Record," they would experience the way of life and the culture as they were on Earth.

This inspired the German Aerospace Center (DLR) to create a time capsule (the "Silver Sphere") also to carry greetings - to the people living in 50 years from now! The capsule contains among other things wishes, which 8000 students want to send into the future, as well as over 2000 photos, that show everyday life scenes taken in the year 2017. The time capsule will be carried by Alexander Gerst to the ISS during his next mission in May 2018 and circle the Earth for half a year to be returned to Earth by Alex after completion of his mission.

Thereafter the capsule will be sealed and stored in the House of History in Bonn, only to be opened 50 years later in May 2068 to access the stored data on a special data carrier, an M-disc in Blue Ray format, on which the information can still be read 50 years later. Just like the "Golden Record" of the Voyager mission was sent with pictogram-instructions for any aliens, DLR also makes arrangements that the nostalgic greetings can be read in 2068. The House of History receives a duplicate of the M-disc that travels with Alexander Gerst, and a current version of a Blue Ray player, to be conserved as well, explains Dr. Volker Kratzenberg-Annie, DLR's Chief Officer for promoting young researchers. For the Voyager mission, a team of experts was looking for the motifs to fly into space, DLR instead called on the social media for everybody who wanted to participate and document their "everyday life".

### Refrigerators, Washers and Concerts

The result: the Germans love their pets - photos from the late cat Peppi, dog Rocky - lazing in the sun or also dwarf hamster Mephi were sent to DLR and will travel in file format within the time capsule into weightlessness. Many thought about how the world could be in 50 years: is there still the lighthouse on the coast or have wind and sea made it disappear? Will there still be bees and have the glaciers long since melted? The corresponding photos are included also. There are many motifs which sure will be gone by then: like the candy machine, the advertising-column and the postage stamp. The time capsule also provides space for some passengers - for example, two "high-eager aunts", 92 and 82 years old posing on a photo, who want to fly into space, according to their twitter message. Also Marie-Luise Marjan - or rather "Mutter Beimer" from the Lindenstraße, a popular German TV show - was photographed for the flight into space by her TV team. Hands waving to the future, a view into a wash-saloon, an intensive care unit in the hospital, a moving train, the contents of a refrigerator, or a simple family photo can be studied when the time capsule will be opened in 2068. The people will then also learn that we have celebrated Iggy Pop or Depeche Mode 50 years before in concerts.



See all "Time Capsule" images at [https://www.flickr.com/photos/dlr\\_de/sets/72157687160081905](https://www.flickr.com/photos/dlr_de/sets/72157687160081905)

### A Paper Airplane and Extraterrestrial Matter

Inside the Silver Sphere is not only the data carrier containing the files, but also some symbolic objects

that are carried along in four metal containers.

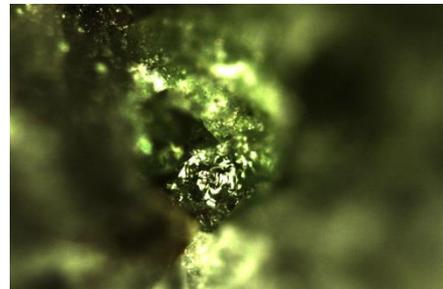
This includes a tiny paper airplane folded by a ten-year-old girl. It measures less than an inch of span. The type of the mini-plane (called swallow) is exactly the same, as Alexander Gerst (of course in original size) had on-board during his first ISS mission in 2014 ([see Flying Classroom](#)).

While the paper airplane stands for aviation, the theme of space travel or space is symbolized by meteorite fragments: the time capsule contains several small pieces of extraterrestrial matter - also extremely rare pieces.

When the meteorite expert Stefan Ralew learned about the project, he found it so fascinating that he added a very special gift: a small piece of the most mysterious stone in the world! This strange stone, covered with a green crust (below right), was found in Morocco in 2012. It is known under the designation NWA 7325 - and is still hotly discussed in the professional world today. Thorough analyzes in various laboratories showed that it did not come from Earth, and due to its chemical composition, it couldn't have come from Moon or Mars either, nor from an asteroid – not from any of the usual "sources". Only recent data sent by the NASA interplanetary probe MESSENGER, which examined Mercury, revealed high chemical correspondence between the meridian crust and NWA 7325. Therefore, it is thought the material to be the only known Mercury meteorite yet, but that is not sure either. If the stone were not from Mercury, however, the matter would even be more mysterious, it even would be conceivable that it came from another planet!



*These fragments of extraterrestrial and terrestrial matter are in the capsule. Left to right: NWA 7325 (detail see right), a piece of Moldavite, a thin of moonstone, a small stone from Mars, and a piece of an asteroid that has been later cut and polished so that the cut surface is blank.*



*NWA 7325-the most mysterious stone in the world under the microscope: A piece of the mysterious Meteorite NWA 7325, perhaps coming from Mercury or another planet.*

### **... and the Promotion of Young Scientists**

Education is also an integral part of Alexander Gerst's 2018 Horizons mission. In addition to the school competition [Earth Guardian 2](#) and the student competition [High-Flyers](#), the mission will include other educational activities. For instance, a number of interactive experiments (Flying Classroom 2) are foreseen, and of course the Project 4D – the “Silver Sphere” time capsule, described above.

Project 4D was organized by the youth portal [DLR\\_next](#) and the [German Reading Foundation](#): Schoolchildren in Germany were asked to express their hopes and aspirations for the future – hopefully to have become true by 2068, when the Time Capsule will have completed its mission through space and time and will be ceremoniously opened with the participation of all or most of the well-wishers from 50 years ago.

### **References**

[1] DLR\_Next: Project Time Capsule [http://www.dlr.de/next/desktopdefault.aspx/tabid-12040/21176\\_read-49314/#container](http://www.dlr.de/next/desktopdefault.aspx/tabid-12040/21176_read-49314/#container)

[2] DLR Mobile Information (German) [http://www.dlr.de/dlr/mobil/desktopdefault.aspx/tabid-10527/912\\_read-23573/](http://www.dlr.de/dlr/mobil/desktopdefault.aspx/tabid-10527/912_read-23573/)

[3] All Pictures “Time Capsule” [https://www.flickr.com/photos/dlr\\_de/sets/72157687160081905](https://www.flickr.com/photos/dlr_de/sets/72157687160081905)