

An Historic Encounter: Reviewing the Outreach around ESA's *Rosetta* Mission

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Keywords

Rosetta, Philae, OSIRIS, NavCam, ESA, DLR, communication strategy

The *Rosetta* mission is a milestone in terms of science and public outreach. The European Space Agency and the Deutsches Zentrum für Luft- und Raumfahrt in particular did a marvellous job of sparking global public interest, driven by various events throughout the mission. In contrast, the actions of the Max Planck Society research group in charge of the high resolution Optical, Spectroscopic, and Infrared Remote Imaging System¹ were, in my opinion, the cause of some concern and bring to light an important debate in the relationship between outreach and science. This article seeks to review the outreach that surrounded the *Rosetta* mission and to highlight both the best practice that made it a success and the bad practice that set some aspects behind.²



Figure 1. The comet is very active, as seen in this rare OSIRIS image from November 2014.
Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

The mission: Europe's Moon landing

What a mission! Launched in 2004, *Rosetta* has kept us busy for more than a decade as it has made its way to the outer Solar System. After a year-long hibernation *Rosetta* woke on 20 January 2014 and approached Comet 67P/Churyumov-Gerasimenko. As the comet began to dominate *Rosetta*'s field of view it was anxiously observed by both scientists and the general public. On 6 August 2014 *Rosetta* finally arrived at the comet. Three months later the *Philae* lander was released from the orbiter and touched down on the surface of the comet's nucleus after seven tense hours. *Rosetta* is still orbiting the comet now, giving more and more insights into the changes taking place as it moves through the Solar System. The orbiter itself will touch down on the surface of the comet in around September 2016 and might stay there until the comet disintegrates in a couple of thousand years.

This mission really is a drama. It is a story about a very long and complicated journey to uncover fundamental scientific questions about the origins of the Solar System and life on Earth. The billion-euro spacecraft was sent from Earth to a remote snowball and has managed not only to catch up with it, but to transmit breathtaking views and exciting data. Moreover, it did so without any possibility for a pitstop. In the end, we were met with a moving finale. *Rosetta*, an historic European mission, has had an almost comparable impact for the

European space agencies as the *Apollo* landing on the Moon had for NASA.

This is true not only because of the great scientific achievements of the mission, but also because of how this mission was, and is being communicated. The European Space Agency (ESA) and the Deutsches Zentrum für Luft- und Raumfahrt (DLR) where the Philae control centre is based, did, and are still doing, a marvellous job, and I say that as someone who is not at all reluctant to give critical feedback to scientists or outreach officers, when it is appropriate to do so. *Rosetta* was a real feat in terms of the communication of European space flight activities.

First of all, scientists and communicators realised that this mission would connect to a very broad audience, and even reach out to people who do not usually relate to scientific issues or read the science sections in newspapers or websites. This realisation is not always easy to come by. Very often scientists — and sometimes even outreach professionals — miss an opportunity to engage the public with what could be very popular events. Alternatively scientists can be reluctant to communicate when the public wants to get the news. At ESA and the DLR they avoided these problems; the outreach and communication teams teamed up with the scientists, and the scientists themselves wanted to cooperate in a timely fashion, and not weeks, months or even years later.

Science and outreach in parallel

The communication teams from ESA and the DLR worked almost perfectly in parallel — on the science and for the public. I really admire — a term a journalist uses very rarely — Stephan Ulamec, *Philae* lander manager at DLR, and his team for their openness with media contacts. The team wanted to talk about this mission, even when the technical workload for them was almost unbearable and when they were having a hard time with their spacecraft. The very moment when we wanted to know everything that there was to know about the mission was probably also the most critical moment in their careers. Nevertheless, they were enthusiastic about communicating and answered many questions with patience and endurance.



Figure 2. Neil Armstrong was the first man on the Moon. Stephan Ulamec is the first man to land a robot on a comet. In terms of communication, he is even better than Neil. Credit: DLR/ESA/A. Morellon

The overall communication strategy was very well chosen. It was driven by the events taking place at any one time and followed closely the various acts of the scientific drama. This may sound like an obvious way of doing things but, until a few years ago, strategies like this often went awry. This was not because outreach departments were less savvy about Twitter and Facebook, but more often because scientists and project managers did not understand the importance of communicating at the right time. Many outreach departments have faced, and still do, strong constraints from mission management.

Here are two examples.

Christmas 2003. We all waited for the signal from *Beagle-2* — the UK-led Mars lander — to land on the surface of the red planet. At the same time, *Mars Express*, the orbiter, was shot into a stable orbit. All this excitement, and yet it took almost a month before the general public saw the first picture from the high-resolution camera on board *Mars Express*. The image popped up on the internet without any context or any supporting special presentation event, to find a public fed up with waiting for Europe's first Mars image. An official event with high-level representatives from the agency and politics followed four days later. Even worse, whilst we waited for the ESA data to emerge, NASA landed the first of its two Mars exploration rovers, with surface pictures from the *Spirit* rover shown in real time. Something that was virtually unimaginable for European missions.

Next, in 2005, I attended the orbit insertion event for *Venus Express* at the European Space Operations Centre (ESOC). Whilst eagerly awaiting the crucial telemetry signal to arrive so that I could report on the mission for the morning news shows of various radio stations, I was met with a long and boring speech by a high-level representative of the DLR. The press were informed much later that the spacecraft had performed a perfect orbit insertion. Worst case communication!

Rosetta festival

In 2014 the story was completely different. The *Rosetta* festival, as I used to call it, started in January. The spacecraft was about to end its hibernation phase, during which there had been no contact with Earth. *Rosetta*'s wake-up was celebrated with a big media event at ESOC, where representatives from ESA and various national space agencies, scientists, engineers and media from all around the world gathered in the same room to wait for the first data link to *Rosetta* in more than two years. After nail-biting minutes of uncertainty the carrier signal popped up on the screen. The audience burst into applause, accompanied by cheering and hugging. Nobody who was on site or witnessed the livestream, will ever forget this historic moment. *Rosetta*'s wake-up ranked as a top news item in all the major news outlets throughout Europe and even worldwide; from television, to radio, newspapers and, of course, through all kinds of online media.

In the following months, the first pictures were published, showing the strange, duck-shaped comet nucleus. ESA and the DLR communicated through blogs, social media and classical press conferences. Finally, the spacecraft arrived at the comet. Again, folks gathered at ESOC in Darmstadt to follow the final manoeuvre that would put the spacecraft in the right position next to the comet. Of course, it is impossible to allow hundreds of journalists into the control room, but there was live coverage of all the important steps shown by ESA television, with experts explaining what was going to happen and making themselves available for interviews in the press area.

***Philae* has landed!**

One of the highlights of my career — and I have been in the job for more than two decades — followed the landing of *Philae*. There were two major events. At the bigger event at ESOC in Darmstadt, more than a thousand journalists from all over the world covered the historic landing on the comet. At the *Philae* control centre on the DLR premises in Cologne a few hundred journalists assembled to be even closer to the action than in Darmstadt. There was such a high demand from the media that ESA and the DLR set up an application procedure for journalist access to one of these events. That is very unusual for spaceflight events, but it is a wonderful problem to have. It proves that the landing on the comet was as appealing to the media as a big sports event or a high-level international meeting of politicians.

Again, the news was communicated in nearly real time. Once the flight teams got the data, it took only seconds or minutes at most, to present it to the public. I know experts hate to do instant science, to comment on new and unexpected data, but they did so very well. Unfortunately, *Philae* landed in a position that left its solar panels with insufficient illumination. So, it fell asleep sixty hours after touch-down. But the public and press were so well connected with the mission that *Philae* was back in the headlines — even those of tabloid newspapers — roughly half a year later, when it got more sunlight and was able to have at least some communication with the *Rosetta* orbiter. People across Europe, and the world, were crossing their

fingers for the *Philae* team to re-establish the science programme on the icy surface. What a reward for the scientists! Their work was not done in some remote ivory tower, but was made immediately relevant to many interested people who had no professional connection to science.

On the day of the *Philae* landing an interesting incident occurred. A British physicist appeared at a press conference wearing a shirt plastered with depictions of semi-naked women. I do not wish to comment on the appropriateness of this, or on the fashion sense of this individual, but what I can comment on is the extensive protest and debate that it caused on social media. Without dwelling on the content of the debate the event proves, if nothing else, that the *Rosetta* mission was followed intensely by the public at large.

OSIRIS, the unknown camera

So far, so good. But there was one major let-down for me in the outreach from the *Rosetta* mission — the public saw very few images from the Optical, Spectroscopic, and Infrared Remote Imaging System (OSIRIS). This instrument was built under the leadership of the Max-Planck-Institut für Sonnensystemforschung (MPS) in Göttingen, Germany. It is a masterpiece, one that the taxpayer paid for, but there was a perceived reluctance to allow public and press access to the camera's images. This issue was highlighted for me in August 2015 when, to my great disappointment, I saw OSIRIS images presented at the General Assembly of the International Astronomical Union that had never been shared with the public.

It is likely that the Max Planck scientists wanted to keep the data from public view in order to write scientific papers that could be published in peer-reviewed journals such as *Nature* or *Science*. These journals usually require data and pictures that have not been shown before, and this puts scientists in a difficult position. But, in my opinion, it is not good practice for this to be considered more important than sharing the data with the people who paid for it.

This example raises an important and difficult debate in outreach. Are there in fact any instances where a competing researcher has used press jpeg-pictures to write a

paper before the involved scientists themselves? I am not personally aware of any, although I would be interested to hear from anyone who is. In my view, the perceived danger of the theft of scientific research is exaggerated and to my mind, unless there is a real risk to the research outcomes, it should not be an excuse to withhold the best pictures from the public. The OSIRIS team, and other teams who have taken the opposing view, are rarely criticised for this behaviour, because many journalists, and indeed the public, just do not realise that there are more high-resolution pictures to be had.

Show us the comet, please!

Most images from the comet are taken by the navigation camera (NavCam) on the *Rosetta* spacecraft, which is run by ESA. The ESA team likes to share the images on very short timescales to maintain the momentum in public interest. We really have to thank the engineers for having built such marvellous navigation cameras. My concern is that if ESA and DLR had done as other agencies and science institutes have done, and put caution ahead of sharing data, then we could have ended up with just a handful of images released in a timely fashion from this iconic mission. If we had to wait until the data had been analysed and papers prepared, when would the first surface pictures have been published? In November 2014? Christmas? Spring 2015?

The principal investigators of instruments flying on European satellites are in a very strong position. In many cases, they virtually own the data. They decide whether specific data are used for public outreach and when. Is it right, given the great deal of money spent on space that the scientists responsible for the projects are the only ones to decide how much the public should get to see of it? There are different views on this across both the science and outreach communities, mine being that the public should get what they have paid for and see the images as they come. Thankfully though there are instances like *Rosetta* where parties work together and we end up with successful missions shared in real-time with the public. But, had OSIRIS been the only camera I am not sure we could say the same.



Figure 3. Thank you NavCam. A typical view of the comet as seen by the navigation camera on the Rosetta spacecraft. Credit: ESA/Rosetta/NavCam – CC BY-SA IGO 3.0

Although compromises have to be made to make data public instantly, it is in the scientists' interest as much as the public's to make their science public. If science does not matter to the public, the public will lose interest in it and in the long term this might lead to a decrease in funding. While this might pose a severe problem for research that is important, but unappealing to the public, it presents a great opportunity for spaceflight activities. They are easy to communicate, especially if they have a strong connection to fundamental astronomical questions. Space missions fire the imagination, they have the appeal of extreme conditions and extreme numbers and they produce beautiful images that almost everybody will be fascinated by.

Cassini, the perfect example

The team of *Cassini*, the spacecraft in orbit around Saturn for more than a decade now, has an imaging diary. We get to see new views of the planet and its rings and moons on an almost daily basis. Why is there no imaging diary of the *Rosetta* mission, with the great views from OSIRIS? Such a tool would help to foster the public interest in the mission even more. Despite this, and

especially as far as the outreach teams at ESA and the DLR are concerned, there is no need to complain. Maybe the OSIRIS team will catch up in the future and realise that it is missing a huge opportunity.

Conclusion

By training, I am an astrophysicist who is used to dealing with objects that are billions of light-years away, so until a few years ago I considered comets to be more or less irrelevant dirt in space. They were nice to have, but not really important. Now, I have to say, this wonderfully designed, built and flown spacecraft has changed my view completely. I owe to it a few of the best moments of my professional life and the outreach campaign that supported it has no doubt brought the same realisation to professionals and members of the public around the world.

To finish, I have an anecdote to share, which for me highlights the success of the *Rosetta* communication story. When I arrived in Seattle in January 2015 I was asked by the immigration officer why I was visiting the USA. I answered that I was attending the annual meeting of

the American Astronomical Society. He replied, "Oh, great. For sure you will discuss the landing of this spacecraft from Europe on the comet. I enjoyed that!" I was astonished. Not only did this officer know about the mission, he knew that it was a European one. Well done, ESA!

Notes

- ¹ Images from OSIRIS are now available at <http://www.esa.int/spaceinimages/Missions/Rosetta>
- ² Article received 30 October 2015 and all content correct at that time.

Biography

Dirk Lorenzen trained as an astrophysicist at Hamburg University, Germany. After graduating he joined German Public Radio, and for more than 20 years has covered astronomy and space flight for various radio stations. Lorenzen has also authored several books. Since the International Year of Astronomy 2009 Lorenzen has also written the daily space column *Sternzeit*, a very popular 100-second programme on the radio station Deutschlandfunk.