Transcript

Planet Mercury – The BepiColombo mission

JOHANNES BENKHOFF:

Giuseppe Colombo worked in the '70s together with NASA. And actually, due to his successions and advice and collaboration, the Mariner 10 spacecraft at that time was put in an orbit around the sun, enabled multiple flybys on Mercury. Thanks to him, we got a lot of information already in the '70s about Mercury.

And in honor to that person, we named our mission not Giuseppe Colombo because Giuseppe is too long, but his nickname was Bepi. So it's BepiColumbo. It's not pure ESA or a mission of the European Space Agency. It's a mission done in collaboration with the Japanese Space Agency, or JAXA.

DAVID ROTHERY:

BepiColombo is a multinational mission. They're all the member countries of the European Space Agency responsible for one orbiter, and then there's the Japanese space agency building the Mercury Magnetospheric Orbiter, which has a more eccentric orbit. But will travel together to Mercury and do our independent orbits when we get there.

JOHANNES BENKHOFF:

One craft is looking down, let's just say a planetary orbiter provided by the Europeans, because it's more focused on the planet itself. So it's always [INAUDIBLE] pointing, looking at the planet, taking pictures. So at the end, we will have global coverage, mapping of the planet. We have a global coverage of the temperature distribution and all of these things which you need in order to better understand the planet. And the other spacecraft is a spinning spacecraft. Because if you study the environment, you want to have a 360 degree view.

MASAKI FUJIMOTO:

I'm the project scientist for BepiColombo MMO, the Japanese spacecraft of the BepiColombo mission. MMO stands for Mercury Magnetospheric Orbiter. Magnetosphere is the outer space around the planet, and we try to understand the physics happening in that outer space around Mercury.

JOHANNES BENKHOFF:

Combining both things, having two orbiters at the same time at Mercury gives us a very thorough possibility to investigate everything which we have around Mercury.

ADRIAN MARTINDALE:

The signals that you send it travel at the speed of light to the satellite. Then it does what you've asked it to do, and then it sends the signals back to you. And then you can analyze whether it's done what you expected it to do.

But because of the nature of the orbit that we're going into, there are times where the satellite will be behind the sun. So we have no way of communicating with it within those regions. So it has to be autonomous in that timescale. You have to be able to upload a whole series of things that it needs to do, and then it carries them out whilst it goes through that time period.

ANGELA DIETZ:

You send a command. It has to go to the spacecraft, and then the answer comes back, in total after 25 minutes. So you have to ensure that the spacecraft works very autonomously and can react to failures immediately. Otherwise it would take too long to react. There's no solar shield. The design of BepiColumbo is such that there's a radiator in the back of the spacecraft. So it takes a complete sun from the front and moves the heat to the back, where it's radiated into open space.

The solar arrays to generate the power for the spacecraft operations, they cannot become too hot, because then they don't function anymore. So they're always off pointed a bit. Well, not a bit. It's actually off pointed by 80 degrees. So they're really just very-- yeah, the incident angle is very low.

SARA DE LA FUENTE:

In the cruise phase, we are not expecting to have science operations. But when we arrive to Mercury, we need to execute the science operations. We have limitations, as you know, resource limitations, power and data [INAUDIBLE] limitations. And of course, we cannot point a spacecraft whenever we want. So there are also limitations. So all these things have to be taken into account when we plan the science operations.

ANNA MILILLO:

My role is to have a kind of big picture, collecting the ideas from many instruments that are devoted to environmental science, and to try to coordinate the observations and the science in order to have a big picture of the sun-planet interactions.

ALAIN DORESSOUNDIRAM:

Two such probe will be exploring Mercury. The one in which I am involved, in which I have an instrument on board, is the MPO, Mercury Planetary Orbiter. We'll be looking close to the surface. My instrument will be looking for the surface composition. So we'd like to understand also, like on the Earth, the volcanic history. Because by looking for the volcanoes, you can have some understanding on the interior of the planet.

EMMA BUNCE:

So BepiColombo brings about a whole new opportunity to explore Mercury with two spacecraft, which is a key feature of the mission, and will extend the regions over which Messenger has explored. So Messenger mainly focused in the northern hemisphere. So there's a lot of work still to be done in extending the observations at greater detail with more capable instrumentation into the southern hemisphere as well.

CARSTEN SCHARMBERG:

There are a lot of risk, but we try to minimize the risk by qualifying all the elements that we need in order to achieve this goal. It's true, there's a remaining risk that something can fail which we have not foreseen. But I consider this very low. So I'm not thinking that oh, my god, it will never work. I'm

absolutely convinced it will work. We will fly to Mercury. We will arrive there, and we will have two fascinating, fantastic spacecrafts around Mercury.