Comet Tempel 1

DLN: So Tempel 1. What's going on? When will you get there?

K**G:** *Well, we'll get there in February next year, 2011, actually on Valentine's Day. I'm excited about that- I met my wife on Valentine's Day. That's about 5 years after the first mission ended.*

DLN: What did you learn about comets from the Wild 2 flyby?

KG: *You talked about the scientific method, and when we study science, we learn the scientific method because the first part of the process is a hypothesis or a guess. We guess, "What is a comet going to look like?" Then we have to design an experiment and look at the results, and more often than not we have to then revise the guess. We learn something, and that's the science part. We were very surprised at what we found at Wild 2. Scientists expected the surface to be kind of smooth. Here's a model of Tempel 1. You can't see a lot of the details on it, but scientists expected to see a surface that was very smooth. When we got the first images back, the pictures of the comet nucleus were just stunning. It had jets of gas coming off all sides. The craters were huge. There were images of cliffs and towers of rock that they just didn't expect. So something's going on to create these shapes on the nucleus.*

DLN: You hear the dirty snowball analogy for a comet, but I think of a dirty snowball as kind of just lifeless- it's dirt, and it's snow. But there seems to be some other process going on.

KG: *What are the mechanics creating those shapes? One of the main processes is the vaporization of those small particles of ice, the rock that explodes and creates the gas. So real surprised about what that comet looked like.*

DLN: Back to another question I had, that I had to learn the pronunciation of Wild 2- but it's spelled like "Wild," then Tempel is not spelled with an "-L-E" at the end, but an "-E-L" at the end. What's going on there?

KG: *Paul Wild was a Swiss astronomer. He discovered the comet. When you discover a comet, you have the privilege of having it named after you. Tempel, also named after an astronomer.*

DLN: So, these are people job is looking out?

KG: *Some are professional astronomers, some just do it for a hobby. Hale-Bopp was here about 10 or 15 years ago, and Hale was an amateur astronomer in New Mexico that saw the comet first.*

DLN: Just happened to be looking out on that day and saw, "Wait- that's not supposed to be there." So we're going to Tempel 1, so what do you expect? What kinds of things are you looking for?

KG: *Well, we've been by with the Deep Impact Spacecraft. We've been by once. As we're talking about science and hypothesis and tests and experiments. Well, experiments have to be repeatable, and this is a great opportunity. We've been by the comet once with one spacecraft, so now with Stardust we fly by again and we'll get another set of images of that spacecraft.*

DLN: So we have an image.

KG: *The impact, when Deep Impact went by, created a crater. They were trying to get to see what was through the top layer of crust. It also created such a huge cloud of dust. That explosion obscured the surface so much that we'd like to get another look at it.*

DLN: So we've got some…

KG: *Now this is an animation that showed what Stardust looked like as it was near Wild 2. This is a really good illustration of how close we are, and the kind of activity you see in the jets and dust. The particles, again, are just incredibly fast. When we go by Tempel 1, we'll be as close but the particles of Tempel 1 are coming at us even faster- more than 20,000 miles per hour. Again, the spacecraft's protected for that, but it will be pretty exciting getting that close.*

DLN: One of the things I was thinking about with these comets, and they're spewing off particles, then another one when you're actually bombarding them, I'm thinking, "Why aren't they just breaking apart and disappearing?"

KG: *That's a good question. They are small. Some of the comets are just 5, 10, maybe 20 miles in size, and it creates that huge tail millions of miles long. That's composed of very, very small particles, so the amount of material in that compared to even a 5-mile wide nucleus- there's plenty of material there for a long tail for many times around the sun.*

DLN: It only loses particles when it's coming closer to the sun?

KG: *Right, the closer to the sun, the more activity, the bigger the jets, the more dust. The nucleus is fragile. There was a comet about 15 years ago that- as it was flying through our solar system- went by Jupiter. Just the gravity of Jupiter, which is so much larger than the gravity of Earth, the gravity of Jupiter pulled the comet apart, and it broke up into a chain of 9 pieces. They eventually went around Jupiter and smashed into the surface of Jupiter.*

DLN: So this had been going through the solar system for millions of years, but on this particular pass, it was able to be captured by Jupiter's orbit?

KG: *Yes. They come from outside the solar system, so they're just kind of visitors to the solar system. Some stay in, or end by crashing into Jupiter, and some go back out, but the fact that they come from outside the solar system- the nucleus has particles on it that we aren't going to find on Earth, on Mars, or any other planet in the solar system.*