Curiosity on Mars: Curiosity's Cameras

Hi, I'm Justin Maki, the engineering camera team lead and Mastcam deputy P-I, and this is your Curiosity rover report.

One of the things that's so exciting about the Curiosity mission is that the rover takes so many pictures. Well, we've received a lot of questions about the cameras on the rovers and we're here to answer some of those questions.

The Curiosity rover actually has 17 cameras on it, which is the most of any NASA planetary mission ever.

We start with the MARDI, or the Mars Descent Imager, which you may recall took pictures as the rover was landing on Mars.

Then we have the MAHLI instrument, which is the camera mounted on the end of the arm, and that takes close-up, high-resolution color photos.

Down here we have the hazard avoidance cameras, or the HazCams.
There are four of these in the front and four in the back, and they're used to take pictures of the terrain near the wheels and nearby the rover.

Up here on the mast, we have the cameras that take most of the pictures for the mission.

We have the Navigation Cameras, which take pictures that are used to drive the rover. We have the Mast Cameras, which are color imagers, which are used to do geology investigations.
And then finally we have the remote microscopic imager, which is part of the ChemCam laser instrument. And that's used to document the laser spots, that the rover makes on the surface.

Many of the black and white images that come back from the rover are from the engineering cameras, such as the Hazcams or the Navcams, shown here.

The reason that they're black and white, or gray scale as we call it, is because that's all the rover really needs in order to detect rocks and other obstacles.

Other cameras are color, such as the Mastcam imager, and the reason that they're color is because the scientists use the color information to learn about the soil and the rocks.

The rover has 2 different types of cameras. There are 1-megapixel black and white imagers for the engineering cameras and 2-megapixel color imagers for the science cameras.

Yes, in fact we already have taken video. In addition to the video that we took when the rover descending on to the surface,
we've taken movies of the soil being shaken in the scoop.
The reason that we don't see more videos is because the video files are pretty large and because we have a limited downlink each day, the scientists prefer to take still images of new targets.

The rover takes panoramic photos much like you do with your smart phone.

By taking individual pictures and then moving between the frames you can acquire a collection of pictures that you can then stitch together into a single panorama

The rover does the same thing.
We move the cameras between each individual picture and stitch them together on the ground.

The rover is able to take its own picture using its robotic arm. Because the arm is 2 meters long, the rover is able to place the cameras out in front of itself and high above the rover deck.

The self portrait appears as though its been taken from a single wide angle lens camera out in front of the rover but its actually a series of individual images stitched together.

As this animation shows, the rover is imaging the deck while the arm is behind the camera. And then to image the ground, we spin the arm 180 degrees and image the terrain. And again, the arm is behind the camera when taking these pictures. And when we stitch them all together, you don't see the arm in any of the pictures.

We hope this answers some of your questions about cameras and Curiosity, our robotic photographer on Mars.

I'm Justin Maki and this has been your Curiosity rover report.