

Curiosity On Mars: Mars Streambed

Hello, my name is Sanjeev Gupta and I am a longterm planner for the Mars Curiosity rover. This is your Curiosity rover update.

We've now been on Mars for almost 2 months and we have been witnessing the amazing new vistas of the never-before-seen Gale landscape taken with our wonderful cameras. However, much of the science team have had their eyes and the rover's eyes firmly focused on the ground.

On the drive from the Bradbury landing site to our current location we have been analyzing three really interesting outcrops that we have called Goulbourn, Link, and Hottah.

If we look at the Hottah outcrop, we can see a distinct layer that has been tilted and eroded and this allows us to look at a cross-section through the layer.

When we looked at the layer with our high-resolution Mastcam camera we found that it was comprised of sand grains and small pebbles that had become cemented to form a hard layer. Here you can see a pebble that is 3 cm in diameter; so smaller than a ping pong ball. This suggests that this layer is an ancient gravel deposit.

The surprising thing is that when we looked at the pebbles closely, we discovered that many of them were quite well rounded. This is very different to the many angular clasts that litter the surface.

Here, you can see a rounded pebble from a riverbed on Earth. On Earth rounded pebbles are a common tell tale sign of rocks that have been transported by water. For example, in a river or stream, as water flows over a riverbed, if the flow strength is great enough, the pebbles are lifted up into the flow or rolled

along the riverbed and they become pounded and battered against each other and this causes them to become rounded through time.

So what we think we might be seeing here on Mars is an ancient riverbed with the pebble beds representing old stream deposits.

The size of the pebbles tells us that these rocks could not have been transported by wind, so it seems clear they must have been transported by water.

So how does a pebble deposit get to be here? If we look more broadly in Gale Crater, we can see that there is a prominent feature that geologists call an alluvial fan.

Alluvial fans are cone-shaped deposits of gravel and sand that accumulate where streams exit mountains. In Gale crater, there is a 10 km long fan formed at the mouth of 30 m deep canyon that is derived from the crater rim. On the fan itself we can see evidence for multiple channels suggesting that the streambed direction changed through time.

When we look at the location of the Curiosity landing site with respect to the alluvial fan we can see that the rover landed downstream of the fan. The rounded pebbles likely represent long distance transport down the alluvial fan.

So this is really exciting news for the science team because this is the first time we're seeing gravel transported by water on the surface of Mars.

This has been another exhilarating week for Curiosity on Mars and for the science team here in Pasadena.

This has been your Curiosity rover report. Check back for more updates.