



The adventures of the Curiosity rover at Gale crater, Mars

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The search for rocks with potential to contain evidence for past life on Mars is dependent on reconstructing the palaeoenvironmental context of sedimentary rock strata and identifying those rocks that record ancient habitable environments. We have been using NASA's Mars Science Laboratory rover, Curiosity, to explore the sedimentary archive preserved in the $\sim 3.7 \pm 0.1$ Ga crater, Gale, for ~ 7 Earth years and have documented a rich array of clastic sedimentary rocks in lower Aeolis Mons (Mt. Sharp) and Aeolis Palus (the valley between the north wall of Gale and Aeolis Mons). Aeolis Mons is a 5-km-high mountain of stratified rock. Through detailed sedimentary, stratigraphic, and geochemical investigations using the rover and its tools and instruments, we have been able to derive a robust model for sedimentary evolution of potentially habitable environments in Gale at a time chrono-correlative with Earth's early Archean. The sedimentary rock record in Gale indicates a climate with sufficient warmth and humidity to sustain river systems and long-lived lakes in the crater. A current debate is how Mars' climate system could have achieved these conditions early in Mars' geological evolution. Finally, the talk will discuss two upcoming exciting missions to Mars launching in 2020 – the ESA ExoMars 2020 rover mission and the NASA Mars 2020 mission that will collect samples for future return to Earth.

Sanjeev Gupta is a geologist, planetary scientist, and professor at the Imperial College London. Trained as a field geologist, he is interested in reconstructing processes and environments from the ancient rock record. He is a Long-Term Member of NASA's Mars Science Laboratory Curiosity rover mission, with a role to analyze ancient sedimentary rocks on Mars to determine if the Red Planet could ever have been habitable for life. He is also involved in the European ExoMars rover mission planned for 2020 and on the science team of the NASA Mars 2020 mission.

