The escapades of the Mars Exploration Rover Spirit have given new meaning to the expression “touch and go.” Spirit landed on the floor of Gusev crater on 4 January 2004 universal time. This special issue presents the research results of the first 90 sols (martian solar days).

Although the entry, descent, and landing of Spirit were perilous, science operations began soon after, when the mast of the rover popped up and the two instruments on the mast, the panoramic camera (Pancam) and the miniature Thermal Emission Spectrometer (mini-TES) scoped out the morphology and gross mineralogy of the landing site. Pancam and mini-TES provided scouting reports and detailed investigations throughout the 90 sols. On sol 12, the fully unfolded and fully loaded rover left its landing shell to begin unprecedented mobile exploration. Besides the mast, with two instruments and a suite of magnets to analyze magnetic particles, Spirit has a robotic arm with a microscopic imager to view textural details, an alpha-particle x-ray spectrometer to measure elemental abundances, a Mössbauer spectrometer to distinguish iron-bearing minerals, and a Rock Abrasion Tool (RAT).

Spirit drove about 600 meters from the Columbia Memorial Station to the rim of Bonneville crater in 90 sols. Along the way, the rover performed quick analyses, called touch-and-go operations, in which the instruments on the arm touched and analyzed a feature, but no brushing or grinding was done. At more interesting features such as the rocks Adirondack, Humphrey, and Mazatzal, Spirit stayed longer, using the RAT and the other instruments to acquire more data.

Exploration has changed since the era of nautical exploration by large sailing vessels, when “touch and go” is thought to have originated to describe a ship’s keel touching the seafloor briefly but not getting stuck. Certainly Spirit’s exploration has been successful, as the following 11 papers describe, taking some of the peril and fear out of touch-and-go operations, although robotic space exploration remains difficult and human space exploration remains distant. Spirit is still going strong, extending its mission to over 200 sols and setting the distance record driven by a rover on another planet to over 3000 meters as of 28 July. There is more to come. You go girl!

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