

Mars Science Lab (MSL) *Curiosity's* Mars Entry, Descent, & Landing (EDL)

As of this writing, the best publicly available planned trajectory data for *Curiosity's* EDL (reference object code -76) is a posting made 23 July 2012 to JPL's *Horizons* ephemeris server at <http://ssd.jpl.nasa.gov/?horizons>. This ephemeris reflects post-launch reconstruction through 19 July and predictions thereafter. It is the trajectory data source for the following table and figures. All EDL times provided are MSL-sensed UTC. To compute Earth-received UTC (assuming real time telemetry is possible), add 13.8 min. Parameters cited in Table 1 are defined as follows.

H \equiv height above a Mars reference radius of 3387.2 km

γ \equiv inertial flight path angle with respect to the local Mars-centered horizontal plane

v_R \equiv speed with respect to a Mars-fixed coordinate system rotating at 7.0882181e-5 rad/s

Table 1. This sequence of events contains approximate UTC epochs correlated between trajectory parameter values computed from *Horizons* data and a parametric cue associated with an event. Correlating values from *Horizons* are underlined.

6 Aug UTC	Event
05:00:47	Cruise stage jettison: entry interface (EI) -10 min
05:10:47	EI: $H = \underline{+135.8}$ km, $\gamma = \underline{-15.521}^\circ$
05:11:37	Begin range control: $H = \underline{+62.5}$ km
05:12:14	Peak heating: $H = \underline{+26.9}$ km
05:13:04	Begin heading alignment: $v_R = \underline{1104}$ m/s
05:14:19	Initiate parachute deploy: $v_R = \underline{541}$ m/s
05:17:31	Initiate sky crane cable lowering: $v_R = \underline{0.750}$ m/s
05:17:55	Landing: $v_R = \underline{0.000}$ m/s

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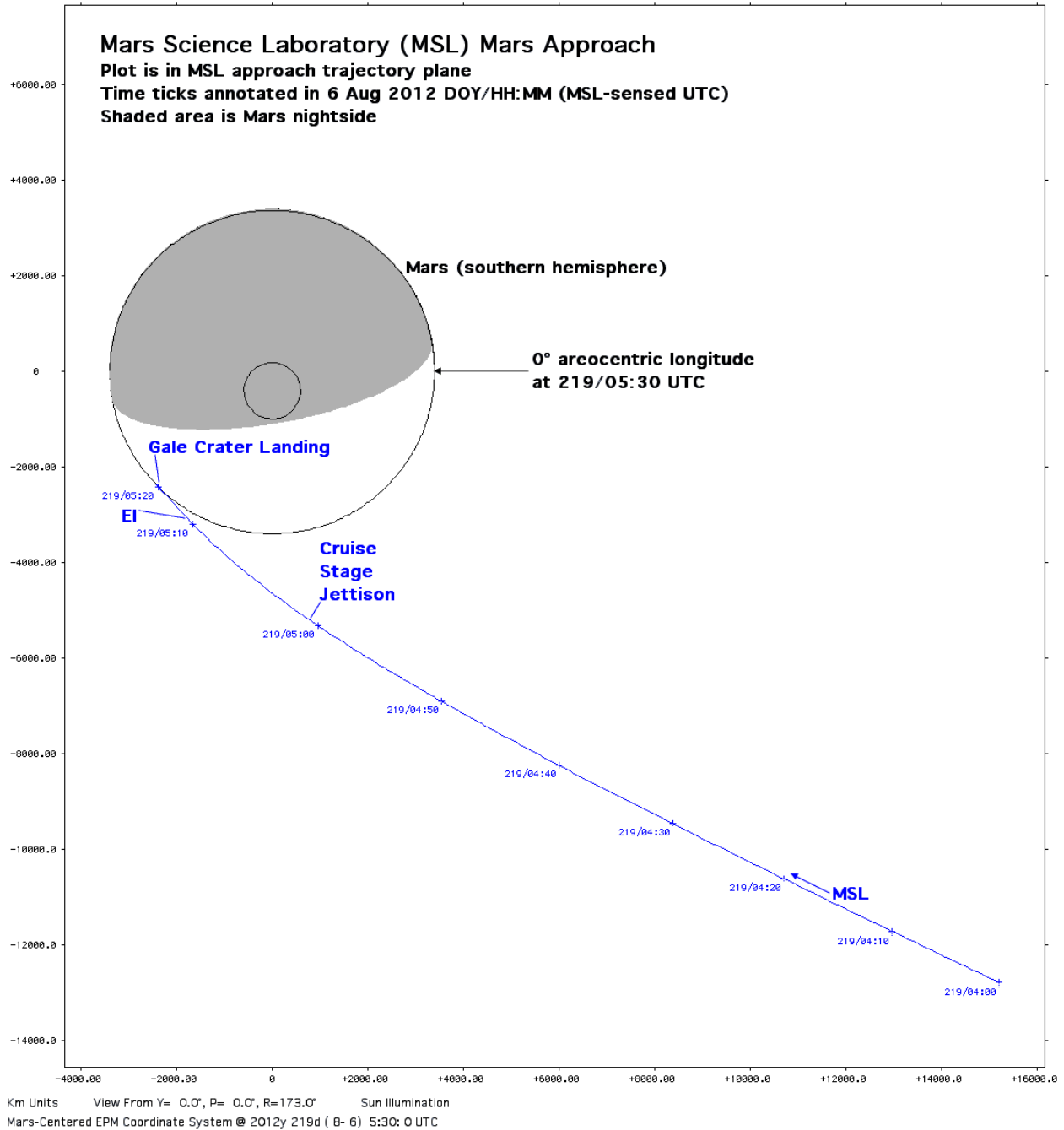


Figure 1. This Mars-centered inertial plot of *Curiosity's* final 80 minutes of flight shows landing at Gale Crater (areocentric latitude 4.5° S; longitude 137.4° E) will be in the late afternoon local solar time.

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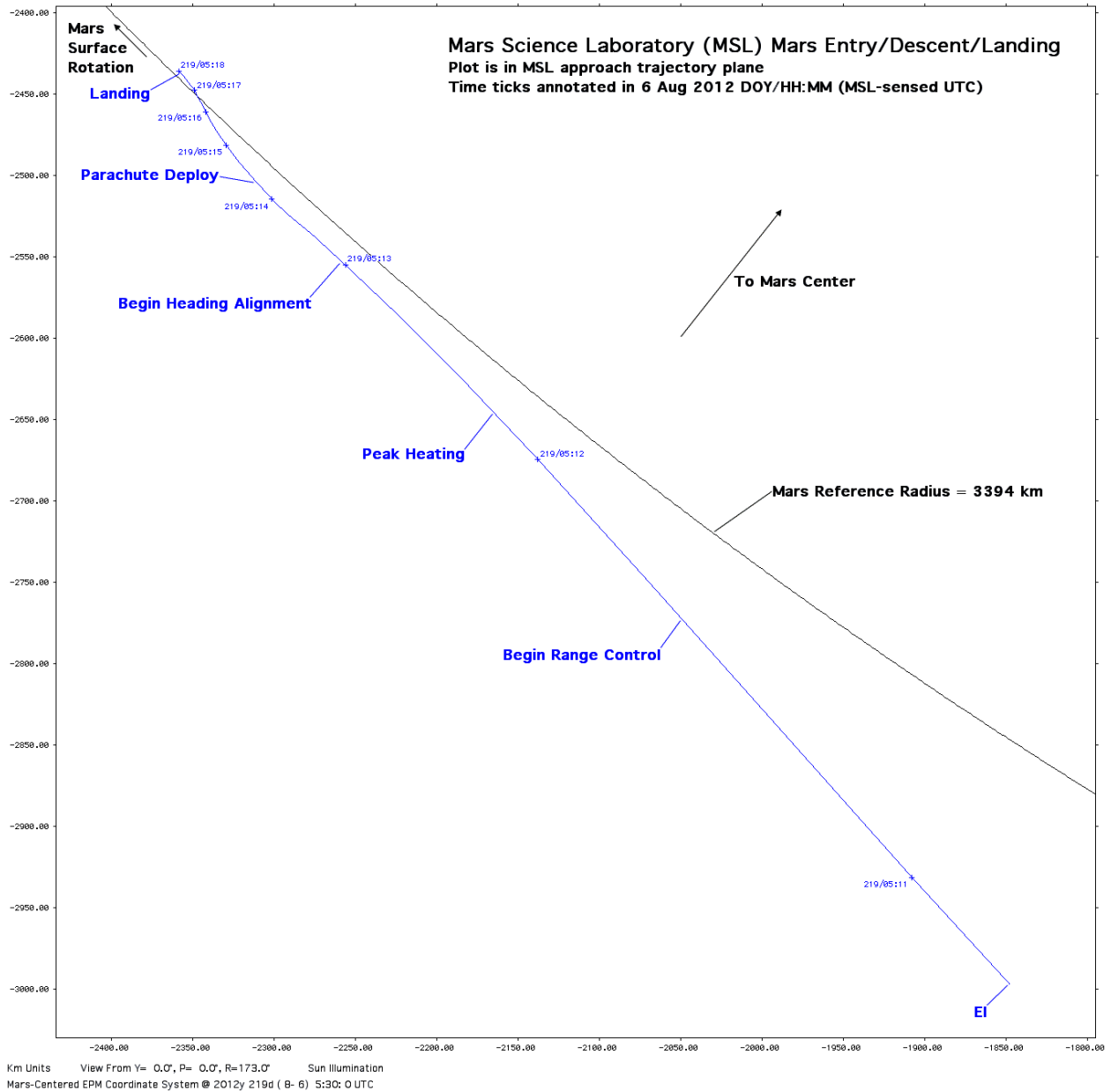


Figure 2. Although viewed from the same perspective as Figure 1, this Mars-centered inertial trajectory plot of *Curiosity's* EDL is at a scale 40 times smaller. Landing on the floor of Gale crater is at an areocentric radius of 3391.149 km, causing the terminal trajectory to fall below the plotted limb of Mars. Post-touchdown inertial motion is entirely due to Mars rotation.