MAVEN (Mars Atmosphere and Volatile EvolutioN Mission)

J. M. Grebowsky¹, B. M. Jakosky², and D. F. Mitchell³

¹Code 695, NASA Goddard Spaceflight Center, Greenbelt, MD 20771
²LASP, U. Colorado, Boulder
³NASA Goddard Space Flight Center
joseph.m.grebowsky@nasa.gov, 301-286-6853

Abstract. MAVEN, one of NASA’s Scout missions, will launch in the 2013 Mars-accessible launch window, aiming for a 75 degree inclination, 4.5 hour period, and ~150 km periapsis altitude, science orbit about Mars. Its objectives will be to provide the first comprehensive exploration of the upper atmosphere and ionosphere of Mars in order to understand the processes controlling them and to determine how loss of volatiles to outer space in the present epoch varies with changing solar conditions. Knowing how these processes respond to variations in the Sun’s energy inputs to Mars’ upper atmosphere will enable scientists, for the first time, to reliably project processes backward in time through the history of the Sun to determine atmosphere and volatile evolution. MAVEN will achieve these objectives by measuring the global structure, composition, and variability of the Martian upper atmosphere, and it will separate the roles of different loss mechanisms for both neutrals and ions from the termination of the well-mixed portion of the atmosphere (the “homopause”), through the diffusive region and main ionosphere layer, up into the collisionless exosphere, and out into the solar wind. MAVEN will carry well-proven instrumentation to measure details of the upper atmosphere, ionosphere, planetary corona, solar wind, interplanetary/Mars magnetic fields, solar EUV and solar energetic particles (SEPs), thus providing comprehensive sampling of the prime interactions between the Sun and Mars. MAVEN will explore down to the homopause during a series of five 5-day “deep dip” campaigns at judicious locations about the planet. The mission is managed by NASA’s Goddard Space Flight Center; Mars-experienced Lockheed Martin is providing the spacecraft; and instruments are provided from U. California Berkeley, U. Colorado Boulder and GSFC.