

First Landing: Southern edge of Meridiani Planum

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Exploration Zone/Landing site Location: Longitude 4°31'2.33"W, Latitude 3°10'26.25"S

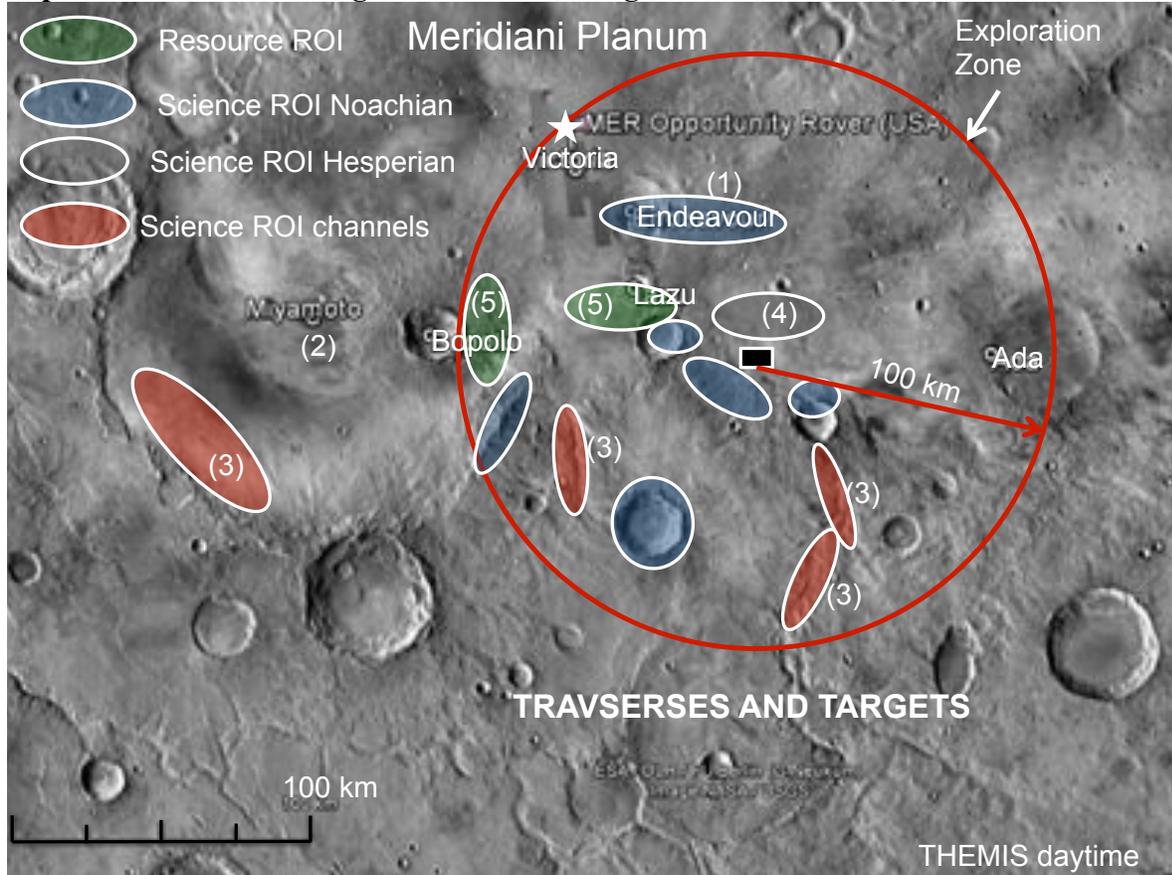


Fig 1: The Southern edge of Meridiani Planum region. Refer to text for numbered location descriptions.



Fig 2: (Left) The Southern edge of Meridiani Planum region. (Middle) A natural hardened landing pad. (Right) Endeavour Crater, a Noachian bedrock example providing water and magma history hydrothermal processes and potential past habitats.

Introduction

The Endeavour Crater Region is well characterized by the Opportunity rover with good attributes for a first landing site, access to water and mineral resources for long term human habitation, and

has Noachian, Hesperian and Amazonian units for science investigation providing water & magma history, and potential past habitable locations.

Landing site features

The landing site is located at a low elevation (-1.5 km below datum) on the equator providing high atmosphere density enabling good vehicle drag during descent, thus maximizing the vehicle landed payload mass. The equatorial location enables lowest DeltaV for Earth returning rockets. It has large craters to assist pilot navigation during landing and the landing site has large naturally hard flat surfaces for landing pads with minimal dust and only thin patch sand cover that can resist rocket blast and provide a stable foundation for large crewed landers. The equatorial location also allows maximum solar irradiance for photo-electric power generation.

Resource potential for Long term human habitation

The exploration zone provides: a) Optimum insolation for solar power generation; b) Access to hydrated evaporitic sulfates for water & Mg extraction (zones 3); c) Possible past or present sub-surface ice in pedestal crater ejecta (zone 5); d) Surficial hematite-rich eolian deposits (blueberries) for Fe extraction (zone 1); and d) Potential resource extraction of Cu, Zn, Pb, As, and Se from sulfide mineralized bedrock (zone 1).

Science Regions of Interest

The science ROIs include: a) Middle Noachian bedrock, clay altered (zone 1), providing hydro-thermal, water and magma history, and potential past habitats; b) Late Noachian dendritic channels (zone 2) and Hesperian inverted channels (zone 3) on a long range mission; c) Early Hesperian depositional environments (zone 4); and, d) Amazonian pedestal craters providing past and present ice and habitability potential (zone 5).

Potential objections

Some might consider Meridiani Planum to be flat and comparatively boring, much like Australia, based on the traverse of the *Opportunity* rover. We would counter this perception in three ways. First, the landing site is centered on the margin of the plain, where it abuts against higher relief Noachian uplands to the south. The “flat and boring” description is less applicable to these areas. Second, the landscape is eminently trafficable, especially by crewed rovers which could cover the distance that *Opportunity* needed a decade to cross in a few hours. Thirdly, while widely scattered, there are a sufficient number of accessible regions of interests to justify a crewed mission.

Access to historic hardware

An additional bonus to the region is that it will allow visits to historic hardware on the martian surface, the *Opportunity* rover and descent hardware, the *Schiaparelli* lander may also be in reach. Visiting these assets will enable assessment of the effects of long duration (decades in the case of *Opportunity*) martian exposure on spacecraft materials and systems.