

The Solar System – Exercise classes

Problem Set 7

Distributed: 25 Nov 2024, Results due: 2 Dec 2024.

Problem 7.1

Assume that a surface segment of 10^4 km^2 is struck by impactors of a certain size once in a million years. Each impact produces a circular crater with a diameter of 1 km, surrounded by a thick, circular ejecta blanket that is three times as wide. How long would it take until (a) 5 %, (b) 10 %, and (c) 20 % of the surface are part of a crater? (2 points)

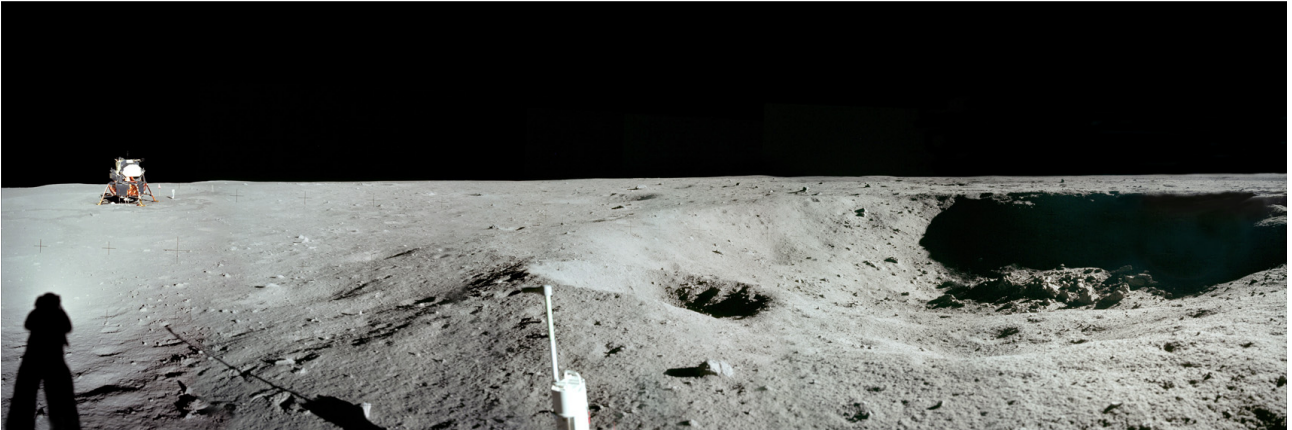


Figure 1: Panorama near the landing site of Apollo 11: Neil Armstrong's shadow, lander, crater "Little West". (NASA; moonpans.com)

Problem 7.2

Calculate the atmospheric pressure scale heights near the surfaces of Venus (CO_2 , $T = 730 \text{ K}$, $M = 4.9 \times 10^{24} \text{ kg}$, $R = 6050 \text{ km}$), Earth ($\sim \text{N}_2$, $T = 288 \text{ K}$), Mars (CO_2 , $T = 225 \text{ K}$, $M = 6.4 \times 10^{23} \text{ kg}$, $R = 3400 \text{ km}$), and Titan (N_2 , $T = 93 \text{ K}$, $M = 1.3 \times 10^{23} \text{ kg}$, $R = 2600 \text{ km}$). (2 points)