Moon 101

by Karen Abruzzo, Delina Levine, and Pragati Muthukumar

IMAGE 1

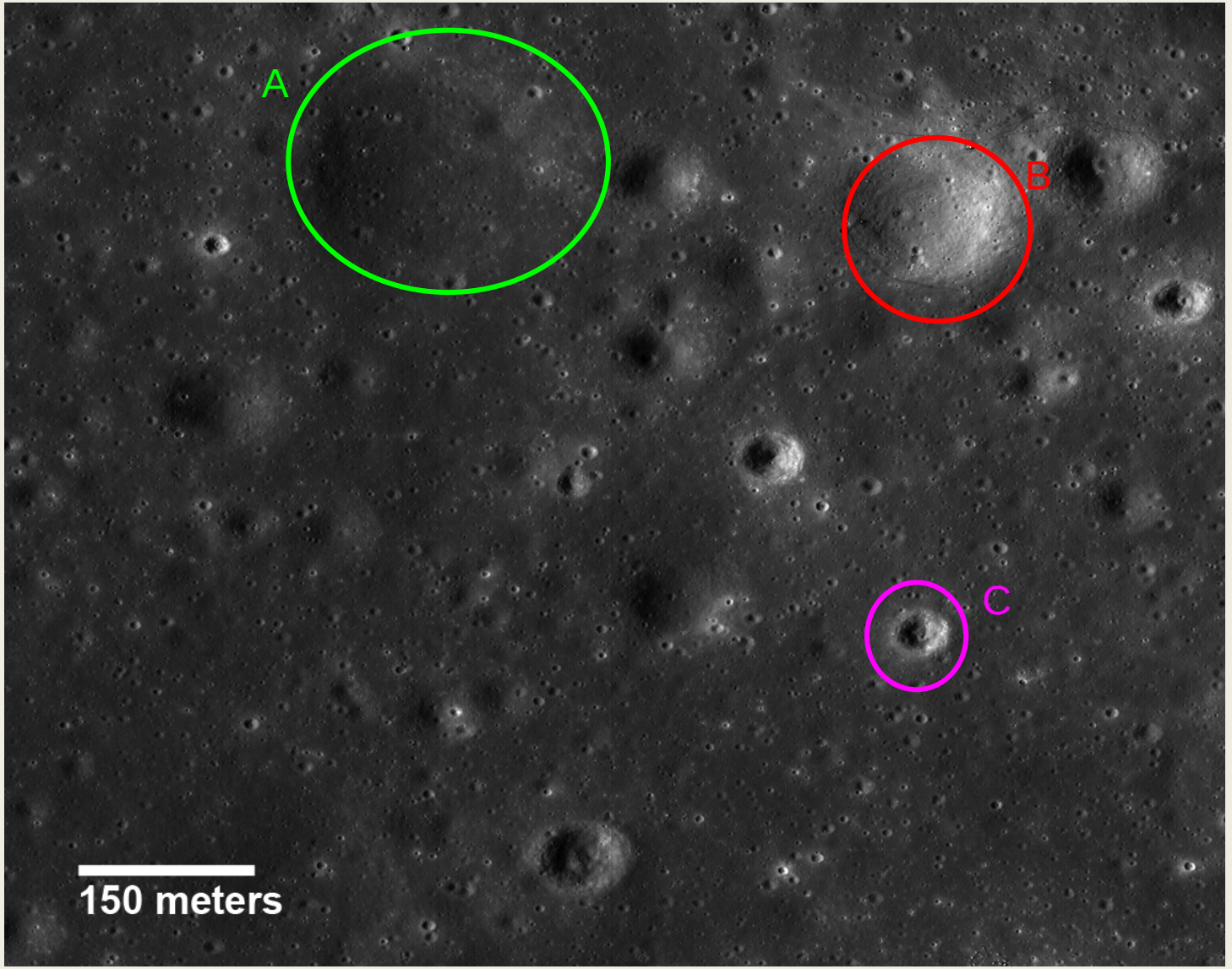


Image 1
Features

- Domes – evidenced by shadows
- Cones – evidenced by shadows
- Mare materials

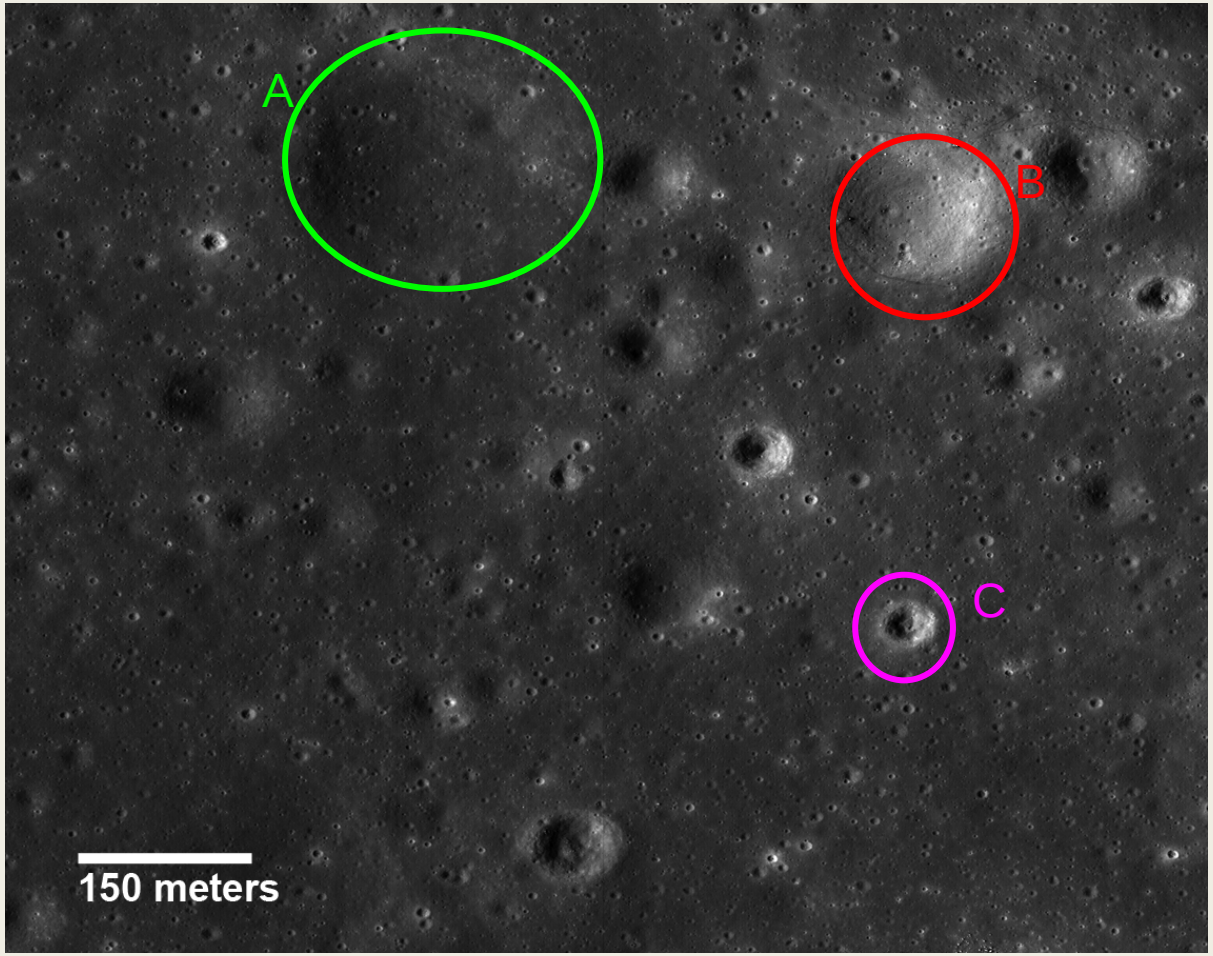


Image 1
Domes

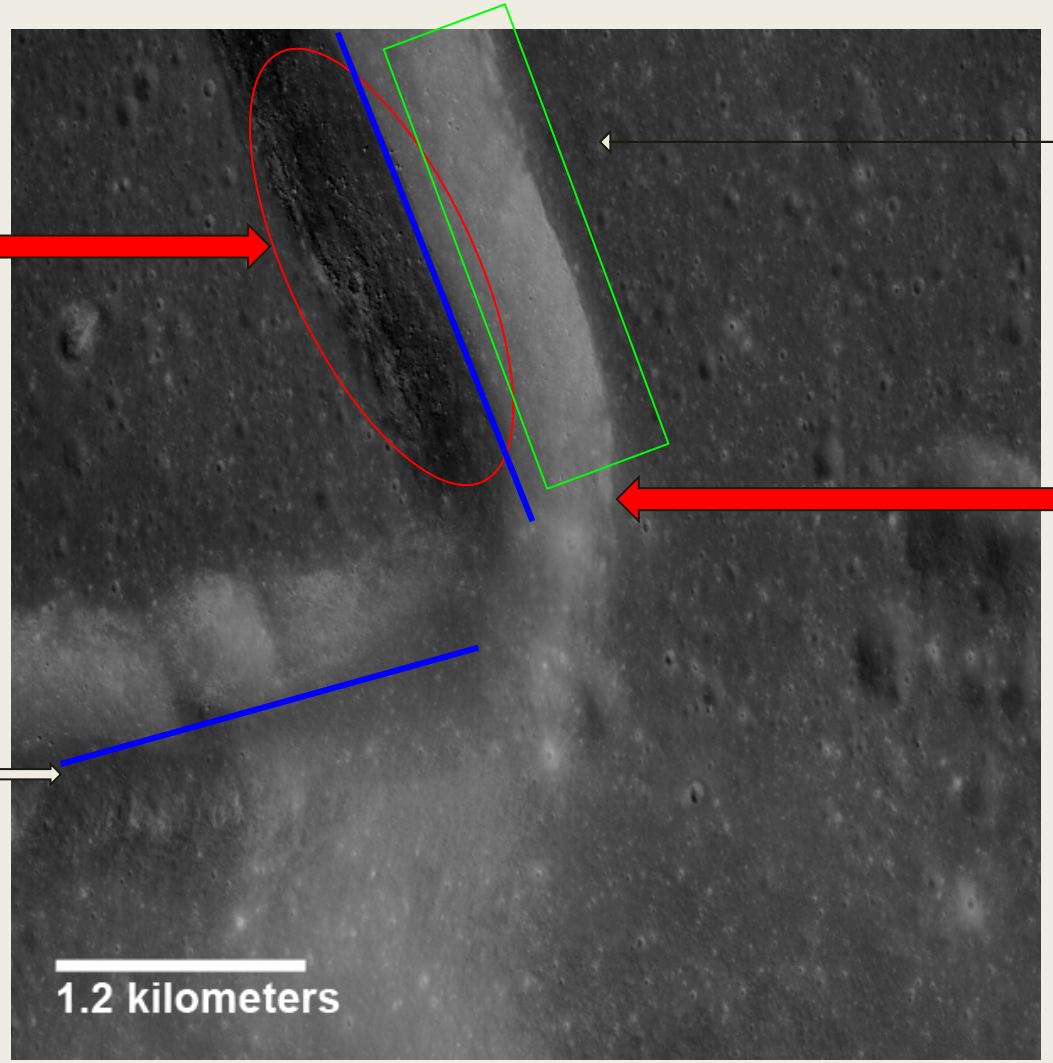
- Domes formed at an early time geographically, when the magma ocean was still active
- Domes formed by silica- rich lava that came from localized vents, and cooled very slowly
- One can see how certain domes (A) are older because they have been covered by layers of rock, rather than others (B)
- Younger domes are noticeable and prominent because the bump and clear dome shape can be seen (B)
- Dome A is about 200m wide, Dome B is about 112m wide

Image 1

Mare Materials and Cones

- Cones form from lava erupting from a central vent
- Cone C is about 50m wide
- The domes and cones have formed on a layer of rock called lunar maria
- Some maria were formed from volcanic lava flows, others from pyroclastic flow - however, all mare materials were formed from some type of volcanic activity
- The maria formed before the domes, and is made of mostly basalt, an igneous volcanic rock.

IMAGE 2



Layers of rock and rocky terrain on ridge tells us that the ridge itself is old.

arch

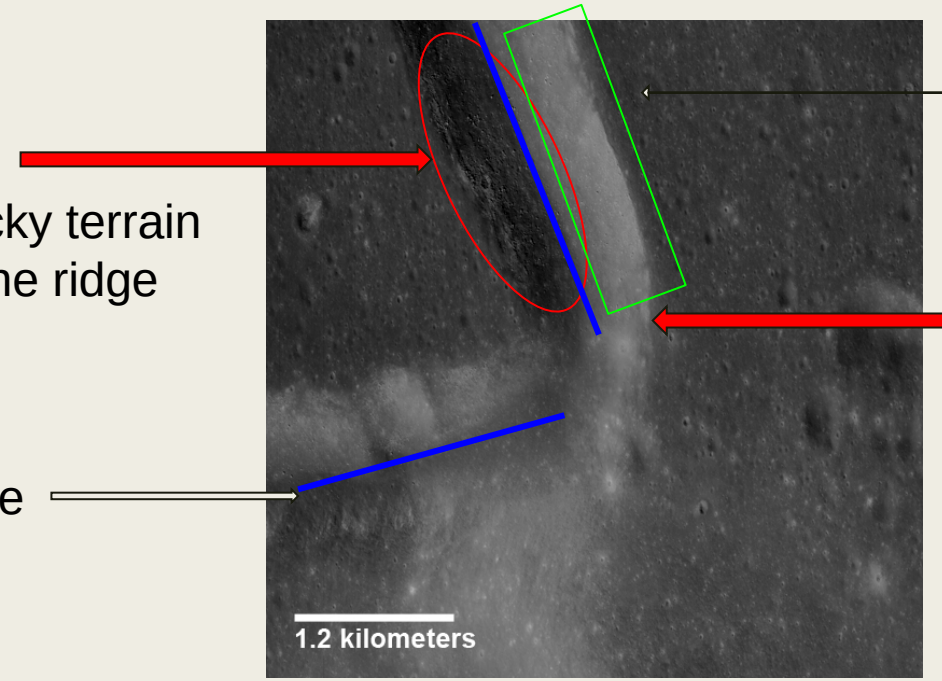
The rille is younger than the rock around it because it cuts through the rock.

spine

Image 2
Features

- Ridge
- Maria

Layers of rock and rocky terrain on ridge tells us that the ridge itself is old.



The rille is younger than the rock around it because it cuts through the rock.

Image 2

Ridge

- Ridges have two parts: the arch (in green) and the spine (in blue)
- Most ridges are on the nearside of the moon and are made from mare materials as well
- The ridge is about 5.8km in length

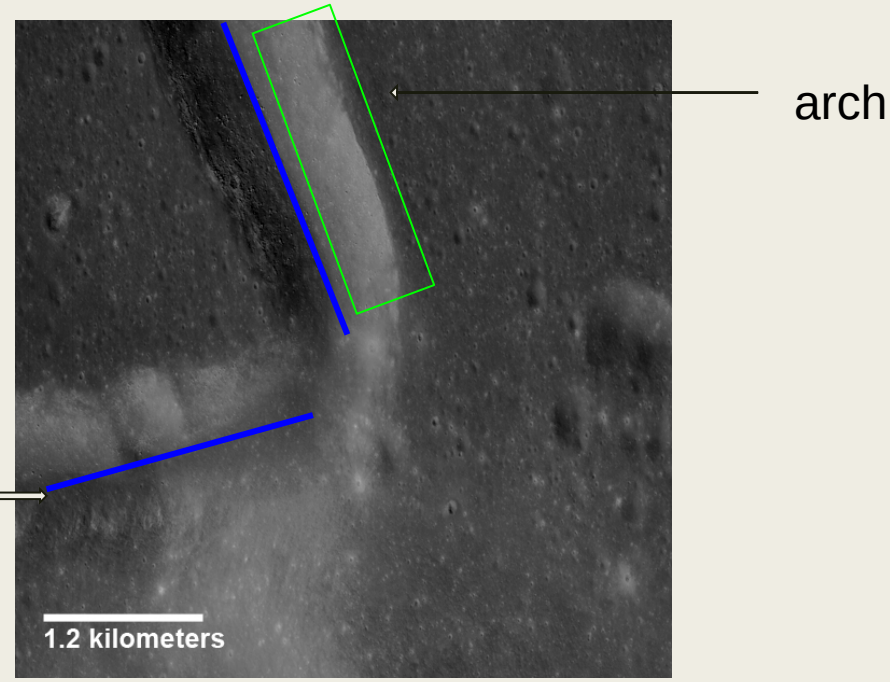


Image 2

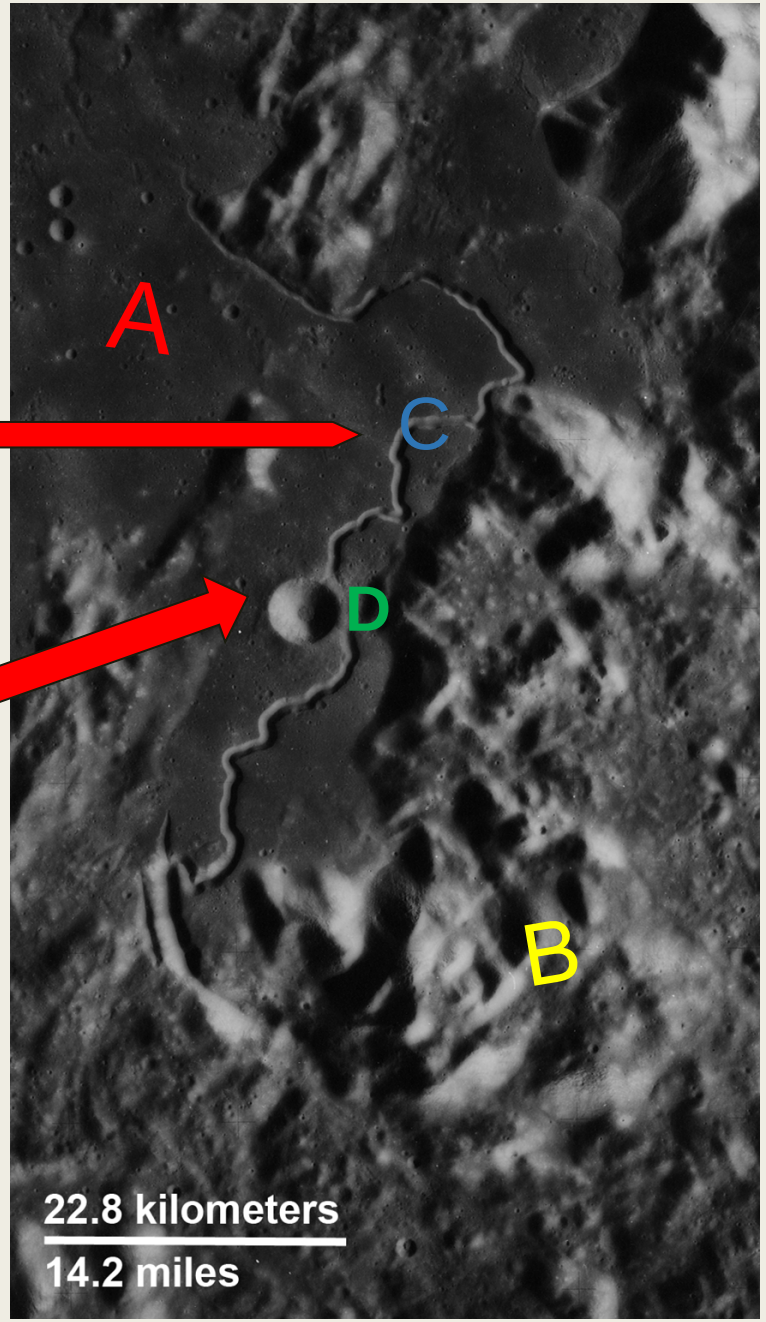
Ridge

There are two interpretations as to how ridges could have been formed:

- volcanic interpretation - the ridge was formed from the intrusion or extrusion of lava
- tectonic interpretation - the surface of the moon crumpled under stress, buckling to form the ridge

- The ridge is younger than the lunar rock because the ridge cuts through and displaces the rock around it

IMAGE 3



Sinuous rille

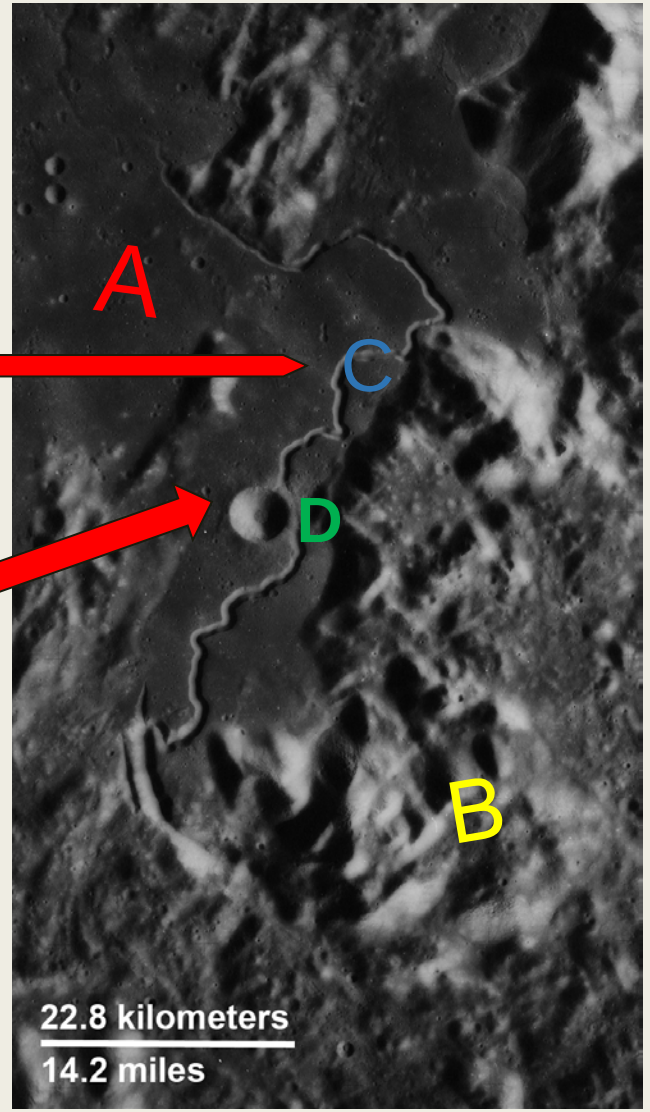
Simple crater smooth, bowl shape

Image 3
Background

- Hadley Rille and Hadley Crater
- Landing site for Apollo 15 (1971)
- Hadley Rille – 100km long, 1.5km wide, 400m deep
- Hadley Crater- 5.7km diameter

Image 3
Features

- Sinuous rille (C)
- Impact crater (D)
- Mare materials (A)
- Lunar highlands (B)



Sinuous rille

Simple crater smooth, bowl shape

Image 3

Sinuous Rille and Lunar Highlands

- Formed through lava flows, similar to lava channels or tubes
- Interior is “U” or “V” shaped (picture a mountain valley)
- Highlands formed when magma erupted from the moon’s surface, and as the lava cooled, large rocks floated to the surface and the impact craters resulted in these fragments of rock
- The relief shown in the highlands are a result of seismic activity

Image 3
Impact Craters

- The crater seen is a simple impact crater (D)
- Simple impact craters form in three phases:
  - *compression phase* - energy from impactor is transferred to the surface, impactor explodes
  - *excavation phase* - material ejected from impact moves radially outwards with shock waves, crater is formed
  - *modification phase* - final crater is formed, fallback occurs

- This crater is a simple impact crater because it has a smooth, bowl-shaped interior. This means it formed from a relatively low-energy impact.

Image 3
Relative Ages

- The sinuous rille formed after the rock around it, as evidenced by the fact that it overlays the maria
- The simple impact crater is younger than the rille because the ejecta from the crater is overlaying the rille in spots
- The maria and highlands formed around the same time: both formed as a result of the magma ocean, and seem to overlap each other in spots
- Most of the maria in this picture, however, likely formed after the highlands as a result of volcanic activity