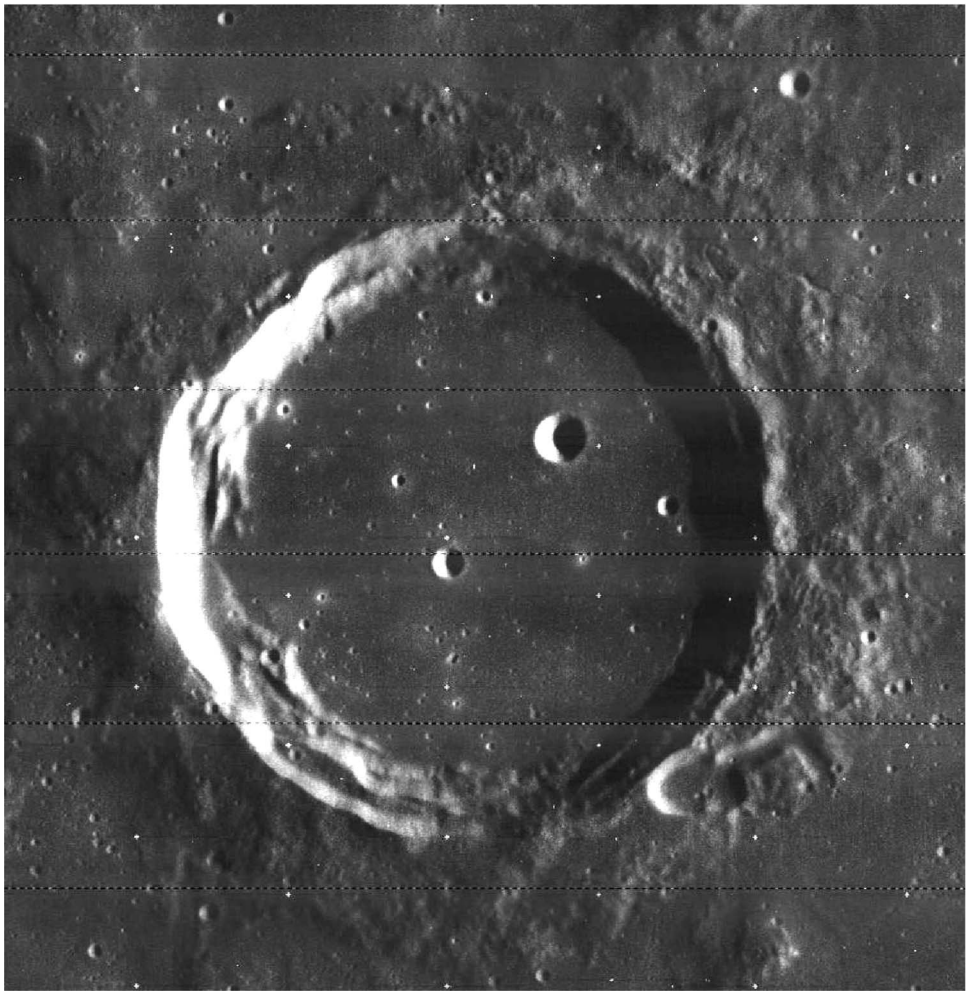

Figure 11. Lunar Orbiter image of Marius crater. No part of the rim appears to be breached.

weaker than in the other flows and particularly different from Marius crater's basalt.

6. Integrated History of the Marius Hills Complex

[43] We have presented the diversity of the spectral signatures found on the MHC and the surrounding Oceanus Procellarum basalts. These different signatures are related to different volcanic episodes and changes in the mafic mineralogy of the magma. The M^3 spectral data, combined with the morphological data of previous Lunar Orbiter mission and the recent Kaguya mission, allow us to propose a stratigraphy of the plateau with different volcanic episodes.

[44] 1. The first volcanic episode of the MHC took place before the emplacement of the youngest basalts of Oceanus Procellarum. This first eruptive phase built the plateau of the MHC. These basalts have a weaker IBD1000 signature and an absorption band that is slightly shifted before 1 μm. The position of the band strongly suggests a high-calcium pyroxene signature. The weaker 1 μm absorption could be the result of a silica-rich composition, an increased abundance of opaque minerals, and/or a low olivine content. Along with the eruptions on surface, the liquid content of the magma diminished allowing changes in the magma composition. It is possible that area 9's different spectral properties (e.g., stronger mafic absorption) are an expression of the variation of the magma with time. Finally, the characteristic high-calcium pyroxene signature of the domes and cones indicates that they also belong to this first volcanic episode.

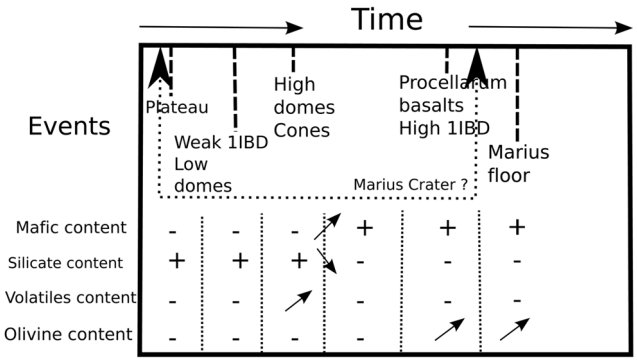

Figure 12. Sketch that summarizes the stratigraphy of the plateau based on the constraints provided by the M^3 observations. Age decreases from left to right; time is not to scale. The content of the different elements is expressed as high (plus) or low (minus); the arrows give the evolution of the content at any given time.