

# Progress in Lunar Science

Topic	1959 View	Early 1969 View	Post-Apollo View 1975	1997 View
Surface Material	Volcanic ash, impact debris, fluffy dust.	Probably impact debris, but other ideas not ruled out.	Impact debris derived from underlying rock layer or bare rock?	Regolith formation now modeled by computer.
Craters	Impact or volcanic?	Majority impact; unknown percentage of volcanic origin.	Almost all impact; many rocks affected by impacts.	More is known about how material is thrown out of a growing crater.
Maria	Impact or volcanic?	Probably volcanic.	Definitely volcanic.	Better understanding of eruption conditions.
Composition of Maria	Unknown	Probably basalt.	Definitely basalt.	Wide variety of basalt types.
Composition of Highlands	Unknown	Probably rocks with more aluminum and less iron than mare basalt.	Rocks high in aluminum with large percentages of feldspar.	Wide variety of rock types, but all containing more aluminum than mare basalt.
Composition of Farside	Unknown	Mare areas less abundant than on the nearside.	Highlands similar to nearside highlands.	Highlands containing rocks rich in aluminum.
Composition of Mantle	Unknown	No progress.	High content of olivine and pyroxene.	Amounts and composition of olivine and pyroxene vary.
Nature of Core	Smaller than Earth's.	No progress.	Smaller than 500 km.	Smaller than 250 km.
Volatiles (such as water) and Organic Compounds	Unknown, though some scientists thought water had flowed on Moon's surface.	No progress.	Moon contains no water or organic compounds, and other volatiles much lower than on Earth.	There might be water brought in by comets and trapped in very cold places at the South Pole.
Rock Ages	Unknown	Uncertain, but probably ancient (more than a few billion years).	Highlands: older than 3.9 billion years. Maria: 3.2 - 3.7 billion years.	Highlands: most igneous rocks older than 4.1 billion years, with anorthosites 4.4 billion years. Maria: some as young as about 2 billion years others as old as 4.3 billion years.
Magma Ocean	Not even conceived.	No progress.	Highlands formed from huge magma system more than 300km deep.	Anorthosites formed from magma ocean; other highland rocks formed after that.
Origin	Captured, derived from Earth, or dual planet?	No progress.	Moon and Earth probably related, so capture idea less likely.	Giant impact on Earth, followed by formation of Moon in Earth orbit.