Lecture 2 The Apollo Project

[Handout: LM landing timeline]

Today we'll talk about the Apollo project, and about a couple of ways to approach the project.

7 projects: 7 flights:
(12/68: Apollo 8)
7/69: Apollo 11: first one, scientific goal was mostly to prove they could do it at all
11/69: Apollo 12: **precise** landing
4/70: Apollo 13
1/71: Apollo 14
7/71: Apollo 15
4/72: Apollo 16
12/72: Apollo 17

The earlier missions are called H-missions, while the last 3 are called J-missions: these had a heavier LM, which carried a lunar rover, and used a different kind of fuel; they were outfitted for a longer stay. The terrain of the latter missions' landing sites were much more difficult, and the approach was from a steeper trajectory than the earlier ones (also, the change in terrain is due to landing near sites of higher geological interest). There were more scientists on A17, rather than just test pilots, and this was very controversial.

Now let's talk about the bigger picture:

NAA built Apollo; they also built planes for WWII. McDonald-Douglas built the Mercury and Gemini spacecraft. So, NASA didn't really use the resource available to them that had experience with building spacecraft.

Mercury had no computer systems; all analog.
Gemini had digital computer programs. Computer doesn't fly craft in orbit, but does take over for re-entry.

Timeline:

1955
1956
1957: 10/4/57 Sputnik; first human in space
1958: July, National Aeronautics and Space Act creates NASA
1959: starting in 59 and continuing through 60, NAA develops F-1 rocket
1960:

- March: Von Braun (working on F-1) transferred to NASA. Feasibility studies about going to the moon. July: "Apollo" becomes internal NASA name for moon project.

- Fall: Kennedy elected

1961:
- May: Alan Sheppard flies Mercury 7
- 5/25/61: Kennedy's speech about landing a man on the moon in this decade. August: contract out to MIT to build computers for Apollo (they do so for about 10 years).
- Oct: 1st Saturn stage flight-tested.
- Nov: Grissom (capsule opened too soon; NASA lost the capsule) – Grissom takes more interest in showing astronauts as not being as in–control of the spacecraft as is thought.

1962:
- Feb: Glen's flight; made a huge impact due to multiple things: Sheppard's flight seen as a "me-too" from America, since Russia had already done it, but by the time Glen came around, the media was ready for him; also, he was a better showman than Sheppard.
- June: LOR (lunar orbit rendezvous) decision.
- Sept: "New 9" – second group of astronauts selected (as opposed to the Mercury 7). Significantly more qualified than the first; possibly the most qualified set of NASA pilots ever chosen. These were chosen to be sophisticated test-flight researchers rather than simple "test pilots".

1963: May: final Mercury mission
1964: April: AS-202. May: orbital flight with re-entry test of capsule.
1965: March: first Gemini flight. June: scientist-astronauts chosen.
1966: November: final Gemini flight (10 total).
1967: Jan: Apollo 1 fire. (spanning Feb or Mar, thru about Aug/68, are A's 4, 5, 6).
1968: Oct: Apollo 7
1969
1970

It was in '68 or '69 that Nixon committed to doing the final Apollo missions.

Johnson had to battle a lot of pressures through the '60s, and the program was very costly. Often, the project rode on the idea that it was a memorial to Kennedy's great vision.

Quote: The other contractors complained about MIT's involvement in the engineering of Apollo systems (because as a university they had some financial benefits), but NASA defended saying that MIT was "doing a job so impossibly hard that no one in industry could do it."