

NSS North Houston Space Society

Space News

September 5, 2020



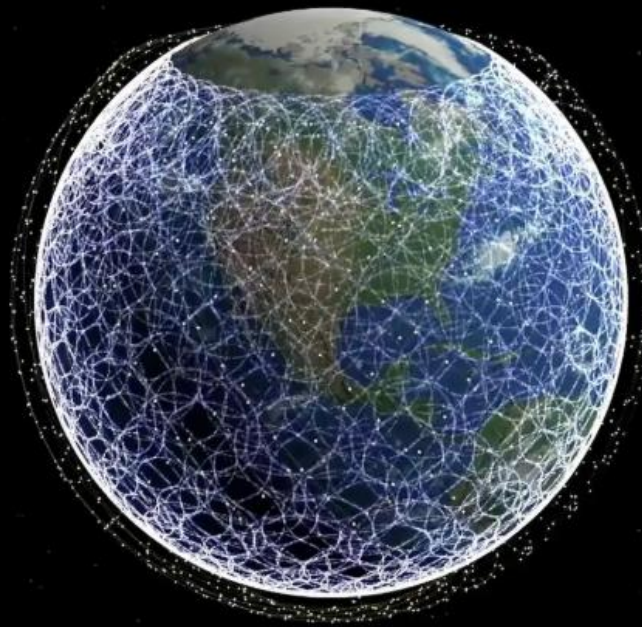
Greg Stanley





3 SpaceX Starlink launches

- 175 Starlink satellites + 5 “rideshares”
 - (Rideshares are as cheap as \$1M)
- “Constellation”: 713 satellites launched
- Want 1440 satellites for global 24/7 coverage
- FCC approved: 12,000+ satellites for worldwide internet service
- Applied for: another 30,000 satellites
- Factory churning out 6 satellites/day



- Reusability: first stage now flown record 6 times
- 2 “drone ships” for recovery
 - 300 ft x 170 ft barges
 - Towed by tug to landing area
 - Autonomous!



“Barges? We don’t need no stinkin’ barges”



Treasure of the Sierra Madre (1948 movie)

- Aug 30 Falcon 9 launch from Florida
 - Earth observation satellite for Argentina, 2 small “rideshares”, into polar orbit
 - Last polar orbit launch from Florida: 1969
 - Booster landed back at Cape Canaveral
 - Barge only if booster goes too far downrange



Credit: SpaceX

- Polar orbits launch north or south
 - Avoid flying over populated areas in case of failure
 - Normally launched south from west coast (Vandenberg AFB)
 - US and Cuban land is north or south from Cape Canaveral
 - East coast launches usually fly easterly (direction of earth’s 914 mph rotation, Atlantic)
- We got Cuban approval for this launch because...

Rufina: the most expensive cow in history (Cuban cows are no longer sacred)



- A 1960 launch south failed (second spy satellite)
- Debris was strewn over 200 sq. miles of Cuba – an intelligence bonanza
 - Thor rocket engine sold to Soviets, Chinese were given useful intelligence
- Rufina the cow was killed by debris, prompting protests
- US awarded Cuba \$2 million compensation
- Falcon-9 launch got Cuban approval, because of Flight Termination System
 - (unique autonomous self destruct even during blackouts due to rocket plumes)

“You murdered one of my sisters”
“The Yankees are killing us without mercy”

Rufina was given a state funeral with full honors

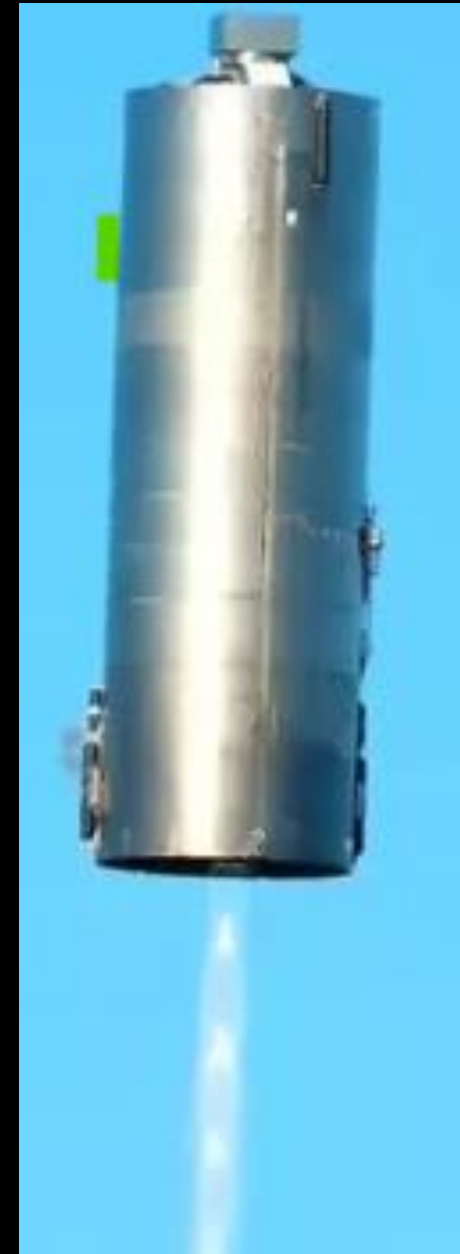
We now have insurance for space debris risks



SpaceX Starship development

“Flying grain silo”

- Successful 500 foot “hop” test by 5th SpaceX Starship full-sized prototype (“SN5”) at Boca Chica, TX, Aug. 4
 - 30 feet diameter, would be 164 feet high with nose cone
 - Testing guidance, strength of full-size fuel tanks, basic functions
 - Single (raptor) engine only, not 6 needed for orbital missions
 - Fuel: methane/LOX
 - No nose cone, fins, heat shield, etc
 - First test of many to increasing heights, more complete versions
 - SN8 in construction at Boca Chica will have 3 engines, reach 20,000 feet and back
- Test repeated Sept 3 with SN6 prototype as well
- Eventual starship configuration:
 - On top of a Falcon Super Heavy first stage which would have >30 raptor engines, total height of 394 feet
 - Could carry 220,000 pounds to low earth orbit



US Dept of Defense selected 2 primary companies for rocket launches for 2022-2027

- Worth expected \$1B / year, up to 34 launches
 - 60%: ULA (United Launch Alliance = Boeing + Lockheed Martin)
 - 40%: SpaceX
- Beat Blue Origin & Northrop Grumman (*probably the end of Omega*)
- Future ULA Vulcan will replace Atlas V rocket (still using a Centaur 2nd stage)
- Losers don't lose everything
 - Vulcan replaces Russian main engine with 2 Blue Origin BE-4 engines
 - Vulcan uses Northrop Grumman solid rocket boosters (as do NASA SLS, USAF ICBMs)
- Elon Musk "sore winner" tweets:
 - *"Because their rockets are not reusable, it will become obvious over time that ULA is a complete waste of taxpayer money"*
 - *"Nobody would suggest buying airplanes that only fly once & then crash into the ocean. That would be absurd"*
- ULA's CEO response:
 - *"I congratulate SpaceX on their USAF NSS Phase 2 award"*
 - (ULA has talked about recovering spent rockets in the air with helicopters)



Vulcan system (artist rendering). Credit: ULA

China wants foreign partners for a lunar base

- International Lunar Research Station (ILRS) at lunar south pole region
- Will develop through robotic missions in 2020's and expanded in 2030's
- Long term robotic presence, some short term human presence in 2030's
- Long term human presence 2036-2045
- Likely partners include Russia, maybe ESA (European Space Agency)
- Shift in policy: little previous cooperation in space



How many launches since the last meeting (Aug 1)?

This includes failed launches only if they lift off the launch pad and only includes launches that attempt going into orbit













ULA Delta IV Heavy:
Aborted 3 seconds
before launch
(not counted)

Credit: space.com

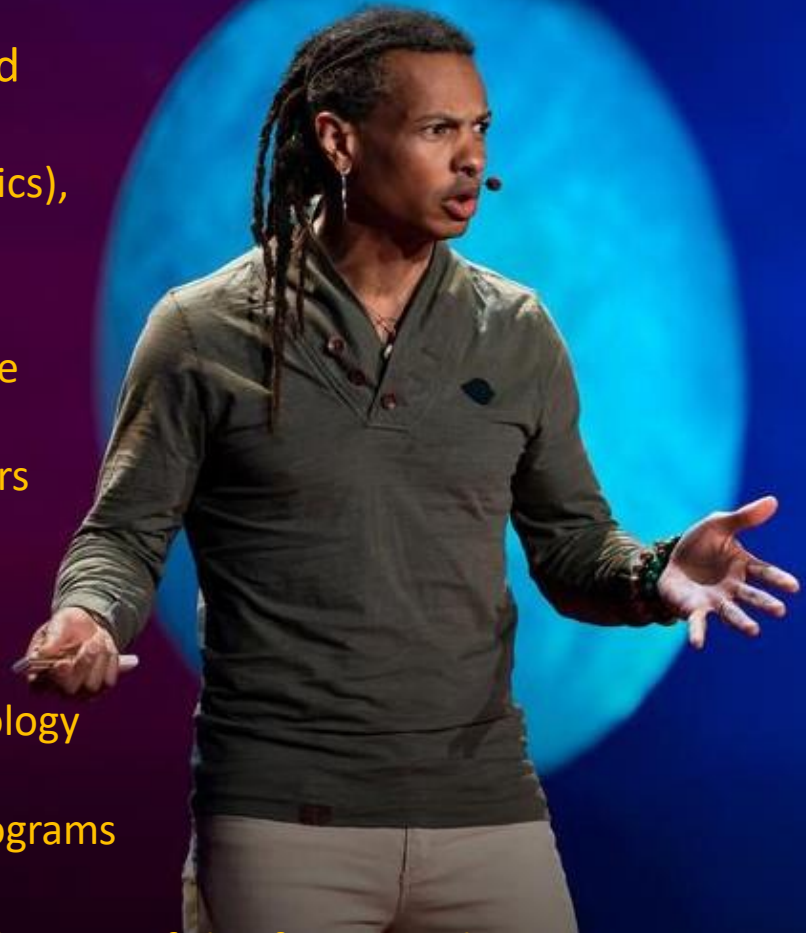
The Heavy is the largest in the Delta IV fleet and is the nation's proven heavy lifter // A Delta IV Heavy rocket carrying NROL-44 is sch

Launches Since Last Meeting (August 1, 2020)

-  Sept 4 – Long March 2F – Experimental reusable spaceplane
-  Sept 3 – Falcon 9 – 12th Starlink launch (60 satellites)
-  Sept 2 – Vega (European) – 53 satellites (46 cubesats) for 21 customers
-  Aug 30 – Electron (Rocket Lab, NZ) – 220 lb remote sensing satellite, and 2nd stage became a satellite – demo for new satellite business
-  Aug 30 – Falcon 9 – Earth observation satellite in polar orbit for Argentina, 2 small “rideshares”
-  Aug 22 – Long March 2D – 5th in series of Earth observation satellites
-  Aug 18 – Falcon 9 – 11th Starlink launch (58 satellites + 3 “rideshares”)
-  Aug 15 – Ariane 5 – 2 Com satellites, 2nd “Mission Extension Vehicle”)
-  Aug 7 – Falcon 9 – 10th Starlink launch (57 satellites + 2 “rideshares”)
-  Aug 6 – Long March 2D – 4th in series of Earth observation satellites

Featured Speaker: Dr. Moriba Jah

- Associate Professor, Aerospace Engineering and Engineering Mechanics, Univ. of Texas (Austin)
Specialties include astrodynamics (orbital mechanics), information fusion for space object tracking
- Numerous awards and publications
 - TED fellow – see TED talk on crowdsourced space traffic monitoring system
 - Author of over 75 peer-reviewed technical papers
- Previously
 - Director, U. of Arizona's Space Object Behavioral Sciences
 - Lead at Air Force's Advance Sciences and Technology Research Institute for Astronautics (ASTRIA)
 - Spacecraft navigator at JPL for multiple Mars programs



“In the absence of this framework to monitor ... activity in space ... we actually risk losing the ability to use space for humanity's benefit.”

TOPIC:

Monitoring, Quantifying, and Assessing the Near-Earth Anthropogenic Space Object Population: The Foundation to Space Traffic Management

(“What’s all that stuff in orbit and where is it going?”)