

The Rapidly Evolving Landscape of Human Spaceflight

Implications from the Economic Revolution on the Final Frontier



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March, 2024



THUNDERBIRD

SCHOOL OF GLOBAL MANAGEMENT

A unit of the Arizona State University Knowledge Enterprise

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Query

Is computing important to your research?

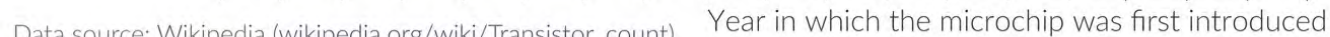
1980



Our World
in Data

This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.

50,000,000,000

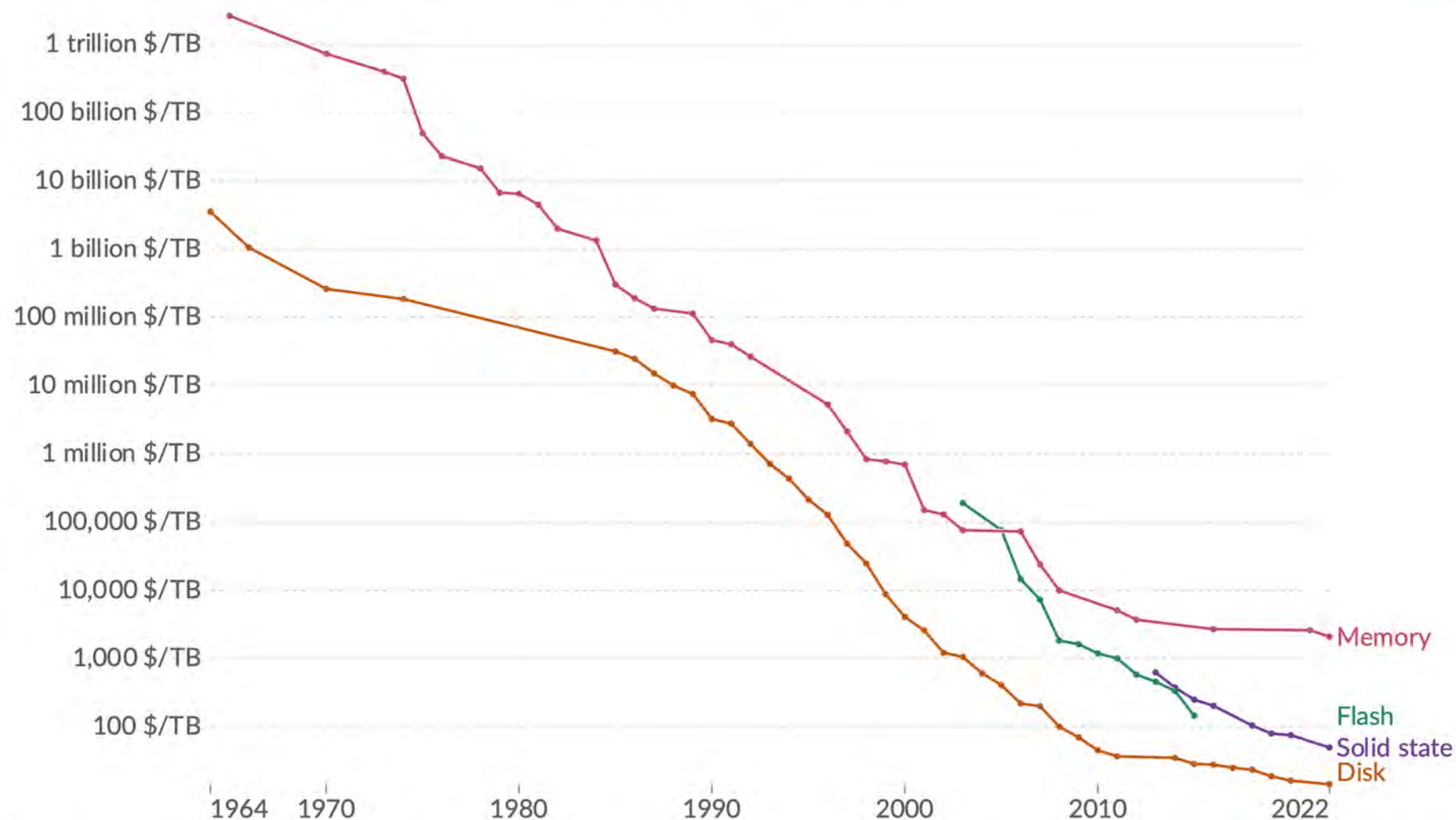


OurWorldinData.org – Research and data to make progress against the world's largest problems.

Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

Historical cost of computer memory and storage

This data is expressed in US dollars per terabyte (TB). It is not adjusted for inflation.

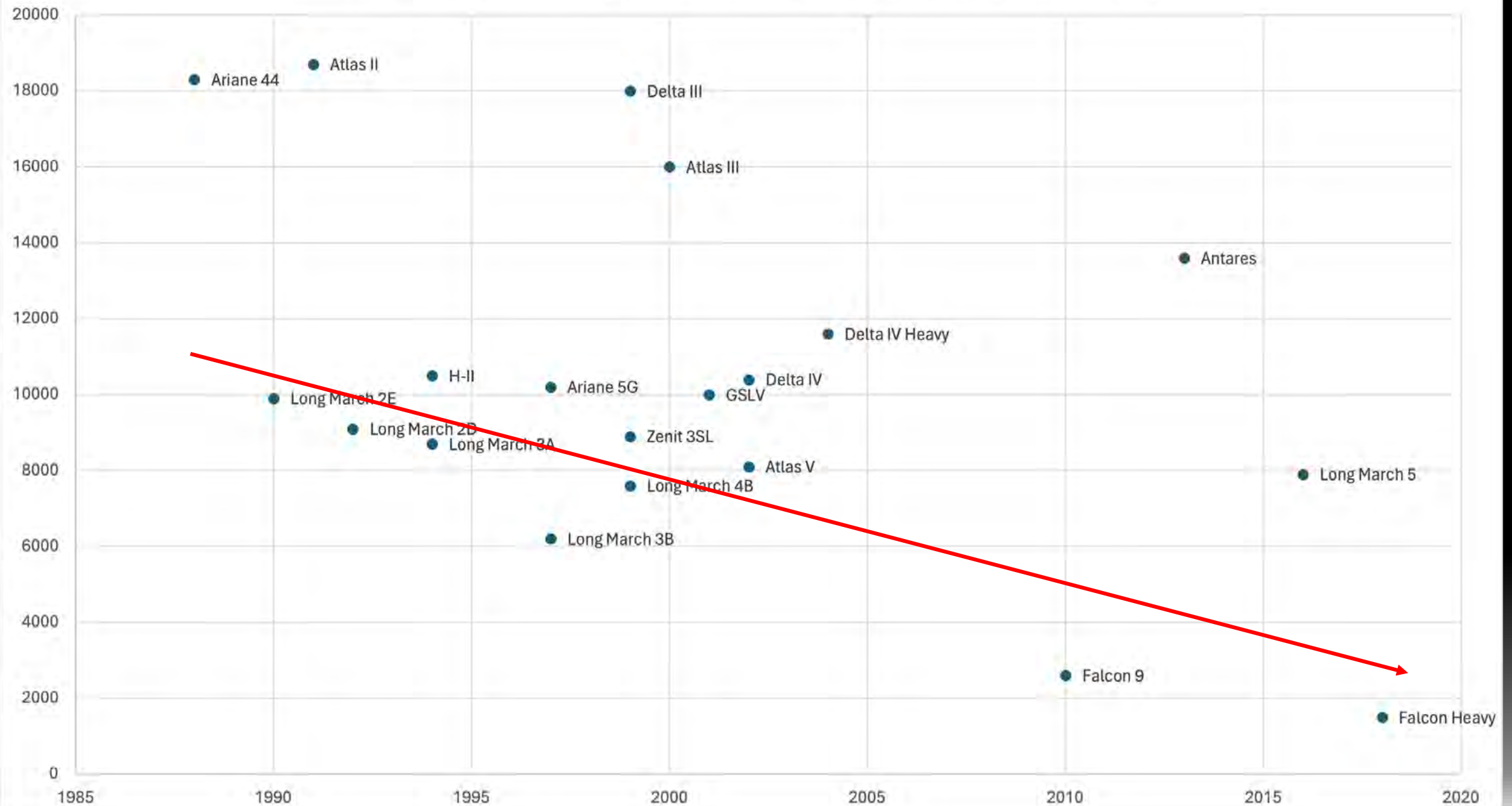


Data source: John C. McCallum (2022)

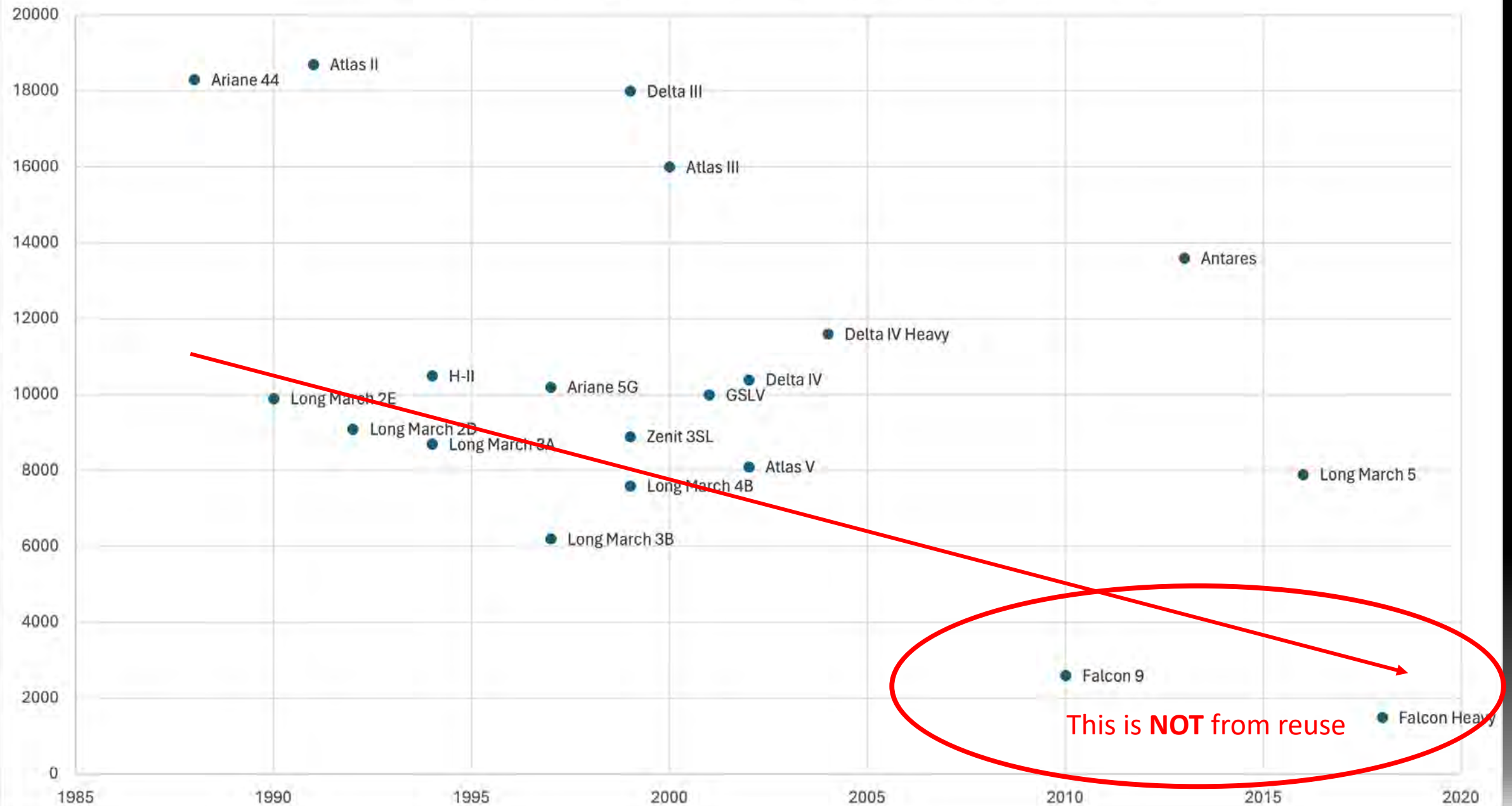
OurWorldInData.org/technological-change | CC BY

Note: For each year, the time series shows the cheapest historical price recorded until that year.

Competitive Med-Heavy Luanch Cost: \$ per kg 1985-2020 (sans outliers)

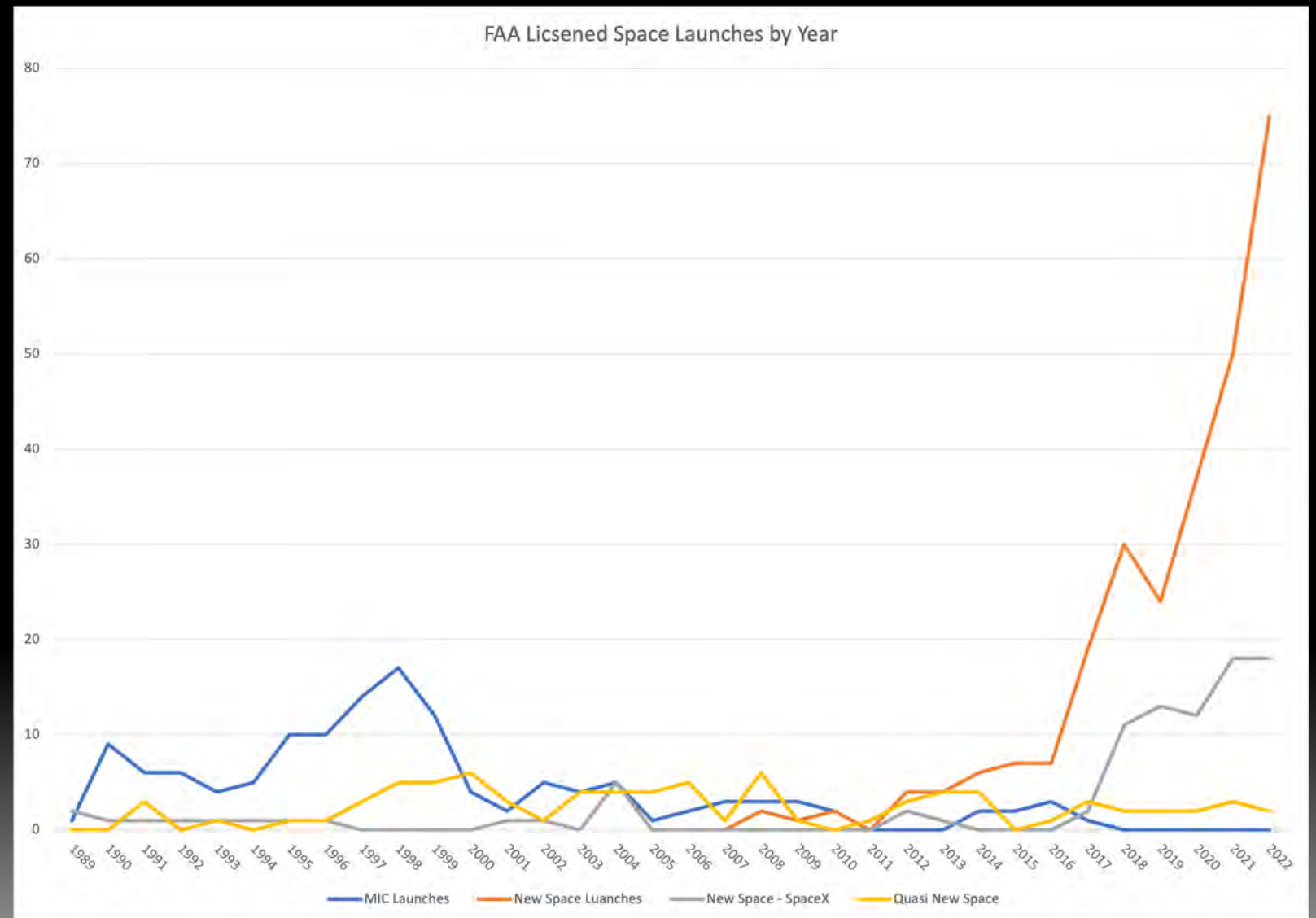


Competitive Med-Heavy Luanch Cost: \$ per kg 1985-2020 (sans outliers)



U.S. Space Entrepreneurship is revolutionizing space launch

SpaceX
Firefly
Rocket Lab
Orbital / NG
Relativity

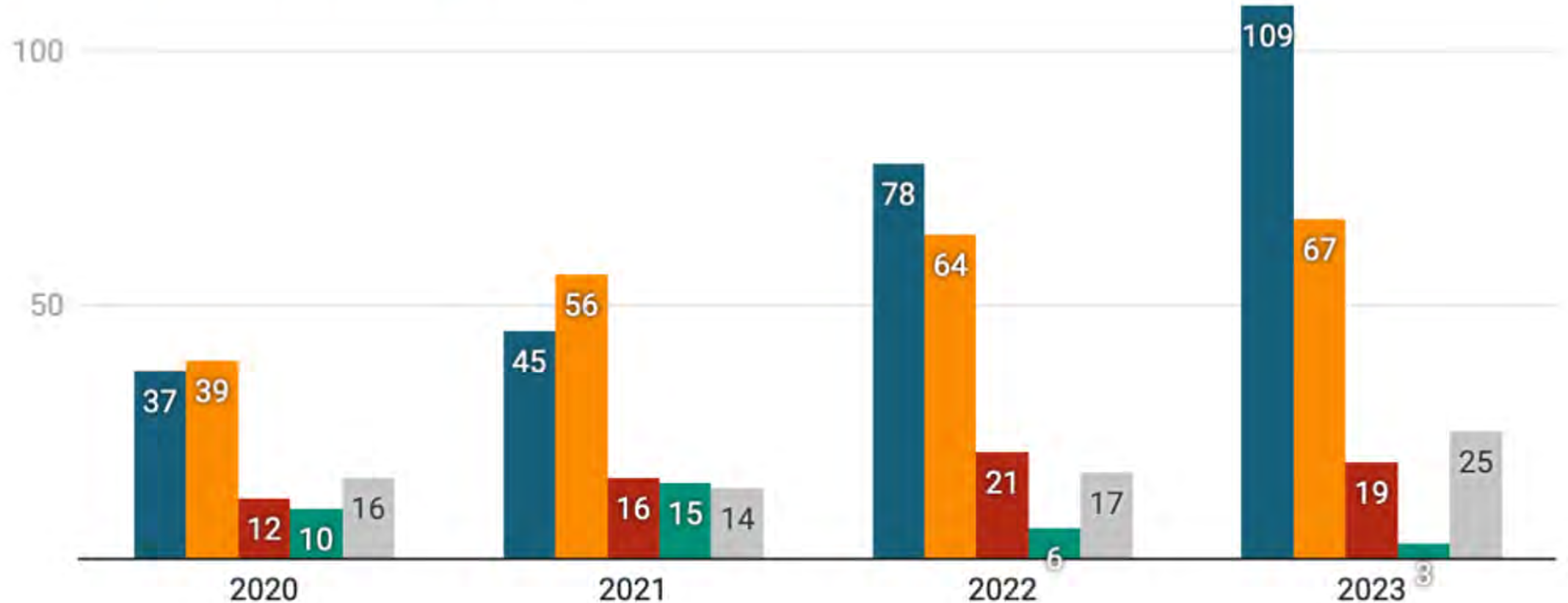


U.S. recaptures global launch market

2023 Orbital Launch Attempts by Country

223 orbital launches were attempted last year. 212 reached orbit.

USA China Russia Europe Other



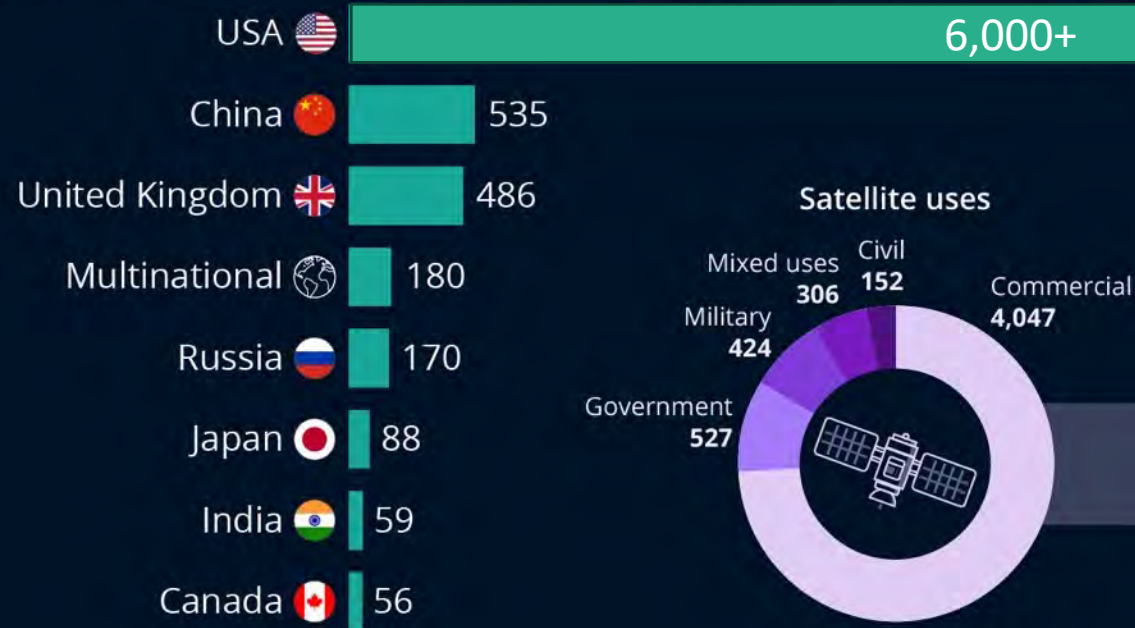
An Embarrassment of Riches



U.S. entrepreneurial firms recapture global leadership in satellite production and then some...

The Countries With the Most Satellites in Space

Satellites currently orbiting Earth by country* (as of May 2022)



* Country of operator/owner

Source: Union of Concerned Scientists Satellite Database



US Dominates Human spaceflight

FREEDOM SPLASHES DOWN —

Since Crew Dragon's debut, SpaceX has flown more astronauts than anyone

"Thank you for an incredible ride up to orbit and an incredible ride home."

ERIC BERGER - 10/14/2022, 5:57 PM



[Enlarge](#) / Crew Dragon splashes down in the Atlantic Ocean on Friday afternoon.

SPACEX

Since May 2020

13 Flights

30 Astronauts



Since May 2020

8 Flights

24 Cosmonauts



Since 2003

9 Flights

20 Taikonauts

*Plan for access to space to being
ubiquitous & affordable,
like access to computing*

Competition vs. Cooperation



NEW YORK
Herald Tribune
European Edition
PARIS, MONDAY, OCTOBER 7, 1957
Established in 1867

U.S. Views Satellite as Russian Victory

In Warsaw for Fourth Night
By William J. Humphrey

Braves Nip Yanks, 7-5, In Tenth
Series Made 2-2
By Tommy Holmes

New One It May Get Down With Instruments
By R. J. Custer

23-In. Sphere Looping World at 18,000 M.P.H.

Sever Satellite's Predation Orbital

North Pole

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13 Years



Competition vs. Cooperation

