NASA’s Science Program: Priorities and Issues

National Space Users Council
Users’ Advisory Group

Thomas H. Zurbuchen, PhD

Zurbuchen@gmail.com, thomaszurbuchen.com
Three Priorities

1) Major progress is needed in Climate Science – towards regional forecast and including predictive analytics. This forces a closer integration of science and application domains. Commercial partnerships are a must.

2) Science is critical element of Artemis and international leadership, especially in presence of international competition. Must balance human and robotics approaches, do not put on collision course against each other.

3) Innovation both in technology and in overall approach is and remains critical for US leadership. Every mission needs to enhance what is possible in space.
Mars Perseverance: 2 Yrs on Mars
Pandora’s Cluster
Water: Surface and Below Surface

[Images of Lake Oroville on November 19, 2022 and January 30, 2023]

[Graph showing California Cumulative Water Change (km$^3$) from 2004 to 2020]
Commercial Data Buys: Hurricane Ian
Challenges, Issues

• Strategy is in trouble, threatening continuity of key data-sets in late 20s, and reducing likelihood that system can be studied as such.

• Lack of funding due to
  • Performance issues (CV19, suppliers, technical, other) with NISAR, and GeoCarb
    • Lack of ability to gain support on Capital Hill for proposed strategy

• Roles of all gov players remains unclear reducing speed to benefit user. Role of commercial data is increasing.

• As speed matters, we need to adapt more to new environment. (E.g. “Spacecraft as a service”, standardized buses., or SDA-like approaches)
How Important are Climate Tipping Points

- Tipping points may be important
- What does it mean?
  - Urgency of research?
  - Translation scale and speed?

Armstrong McKay et al. 2022
Pathways to Discovery in Astronomy and Astrophysics for the 2020s
Driving Towards Tech/Programmatic Success

- Clipper with LRD 2024
- Roman with LRD 2026/7
- Mars Sample Return, LRDs: 2027, 2028
Key Ingredients to Leadership

• Consistency of purpose with alignment, bi-partisan support
• Focus on entire stakeholder communities – not just within NASA, but focused on commercial, international partners and eventually the science and application communities
• Drive towards new technologies and approaches – each mission should enhance the space new missions are conceived in
• Keep learning from mistakes. We will make mistakes, but please (!) not the same ones
• Bring the World along for the ride to inspire the next generation of explorers
Habitable Worlds Observatory
Three Priorities

1) Major progress is needed in Climate Science – towards regional forecast and including predictive analytics. This forces a closer integration of science and application domains. Commercial partnerships are a must.

2) Science is critical element of Artemis and international leadership, especially in presence of international competition. Must balance human and robotics approaches, do not put on collision course against each other.

3) Innovation both in technology and in overall approach is and remains critical for US leadership. Every mission needs to enhance what is possible in space.