How Supercomputing Supports NASA's Mission

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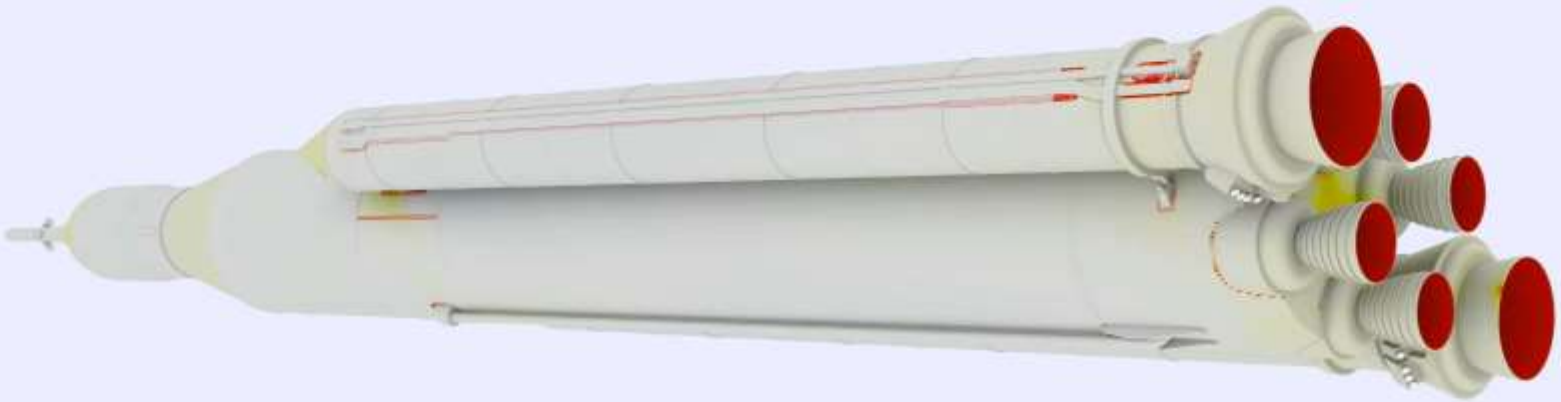
Artemis launch:
November 16, 2022

Modeling the Launch Environment (LAVA Group, NASA Ames)

Space Launch System – Stage Separation (CFD-SLS Group, NASA Ames)



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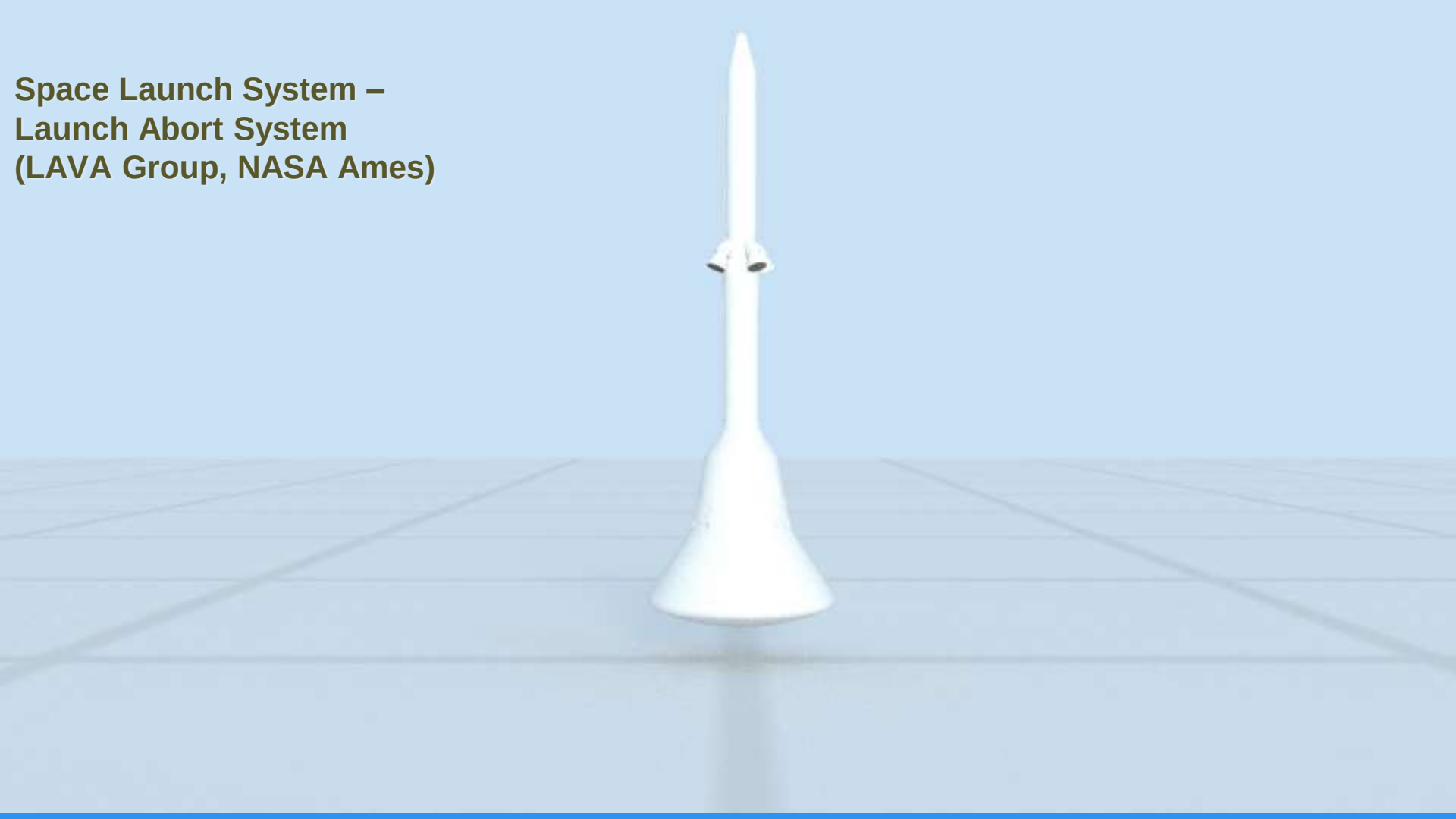
Space Launch System –
Launch Abort System
(LAVA Group, NASA Ames)



Supercomputing Facility @ NASA Ames

NASA's Premier Supercomputer Center

Resources have broad mission impact across all of NASA's Missions

Over 600 science & engineering projects with more than 1,600 users

AITKEN

Vital Stats

- 3,200-node HPE E-Cell/Apollo 9000 system
- 308,224 cores total
- 13.1 petaflops theoretical peak
- 6.39 petaflops sustained performance (Nov. 2021)
- 1.27 petabytes total memory

ELECTRA

Vital Stats

- 3,456-node HPE ICE X/HPE E-Cell system
- 124,416 cores total
- 8.32 petaflops theoretical peak
- 5.44 petaflops sustained performance (June 2021)
- 589 terabytes total memory

PLEIADES

Vital Stats

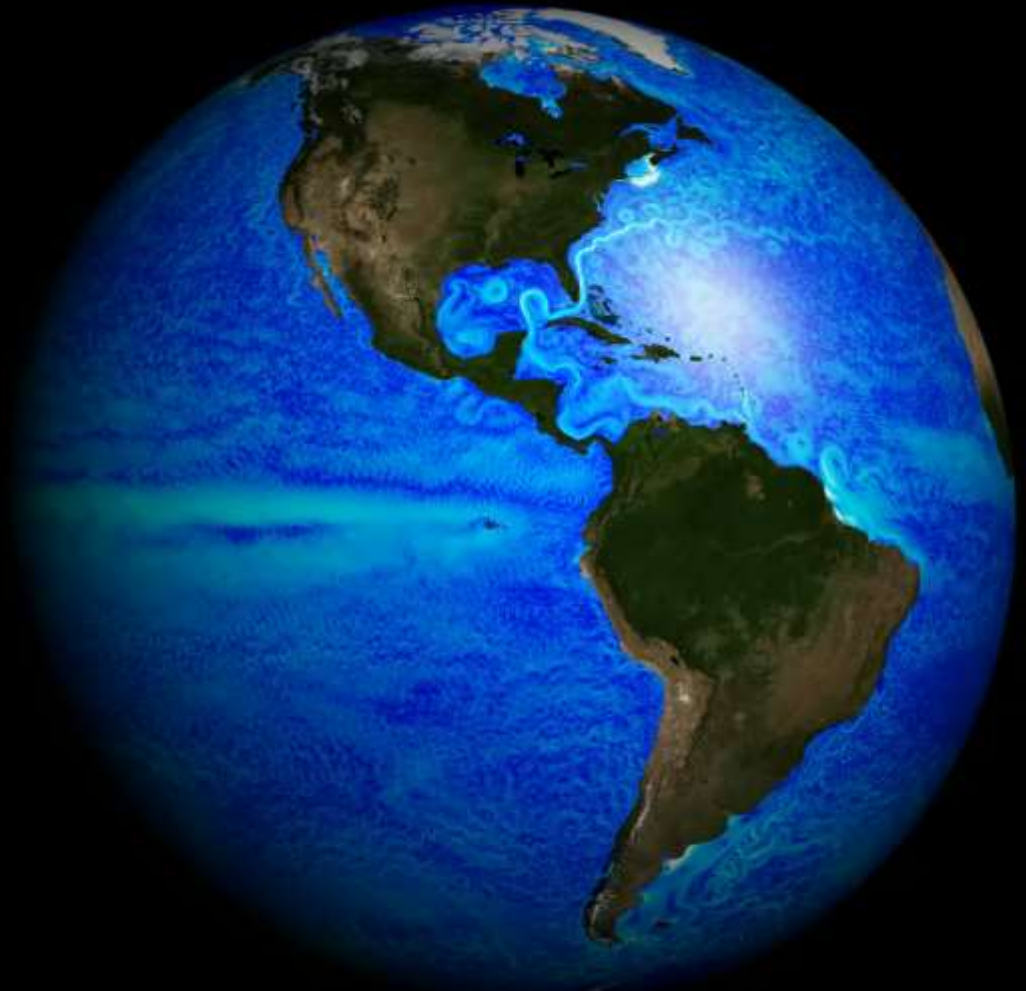
- 11,207-node HPE ICE supercluster
- 241,324 cores total
- 7.09 petaflops theoretical peak
- 5.95 petaflops sustained performance (June 2021)
- 927 terabytes total memory

VISUALIZATION

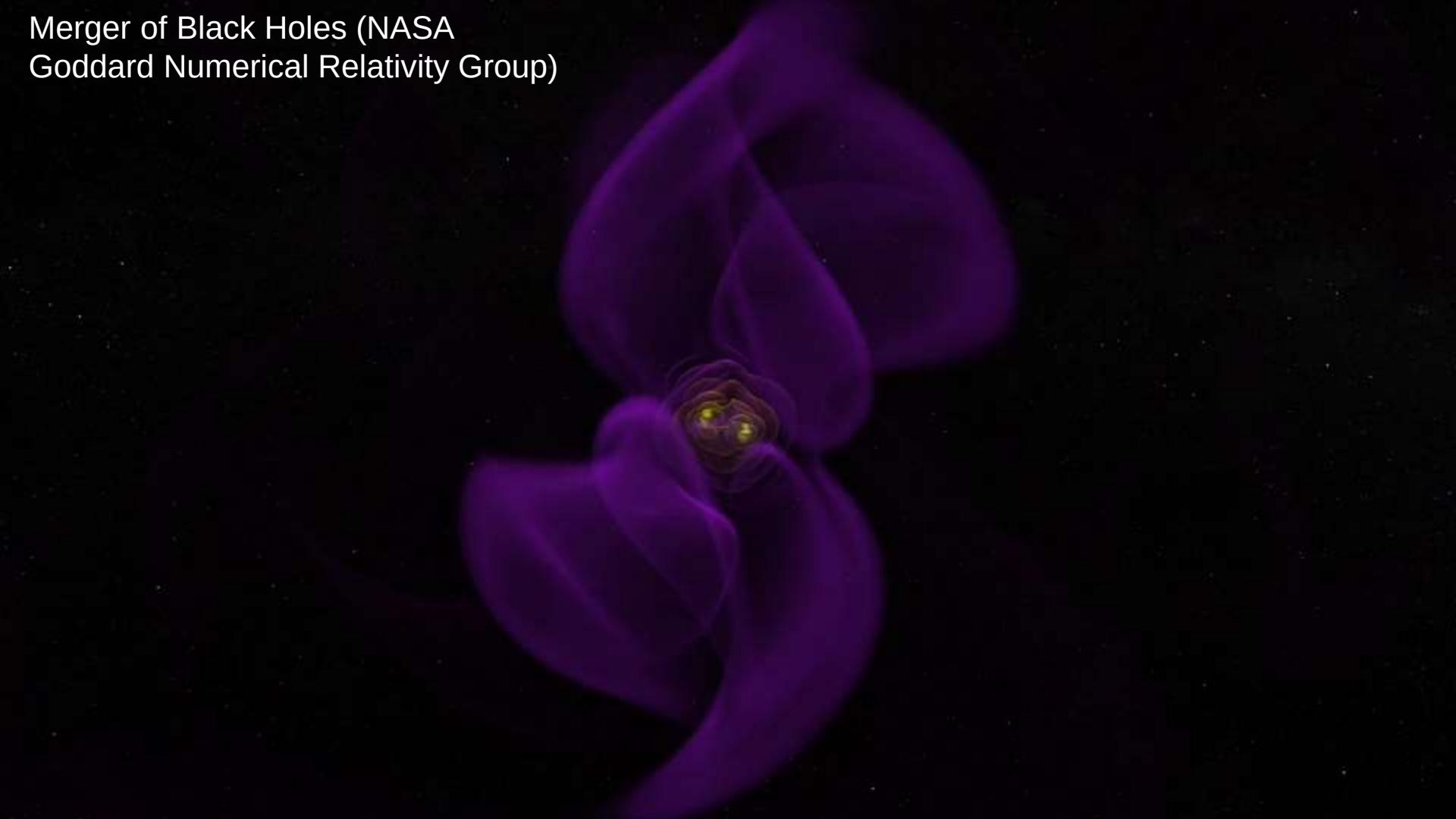
Vital Stats

- 128-screen tiled LCD wall arranged in 8x16 configuration (23-ft. wide by 10-ft. high)
- 2,560 Intel Xeon Ivy Bridge processor cores
- 128 Nvidia GeForce GTX 780 Ti graphics processing units

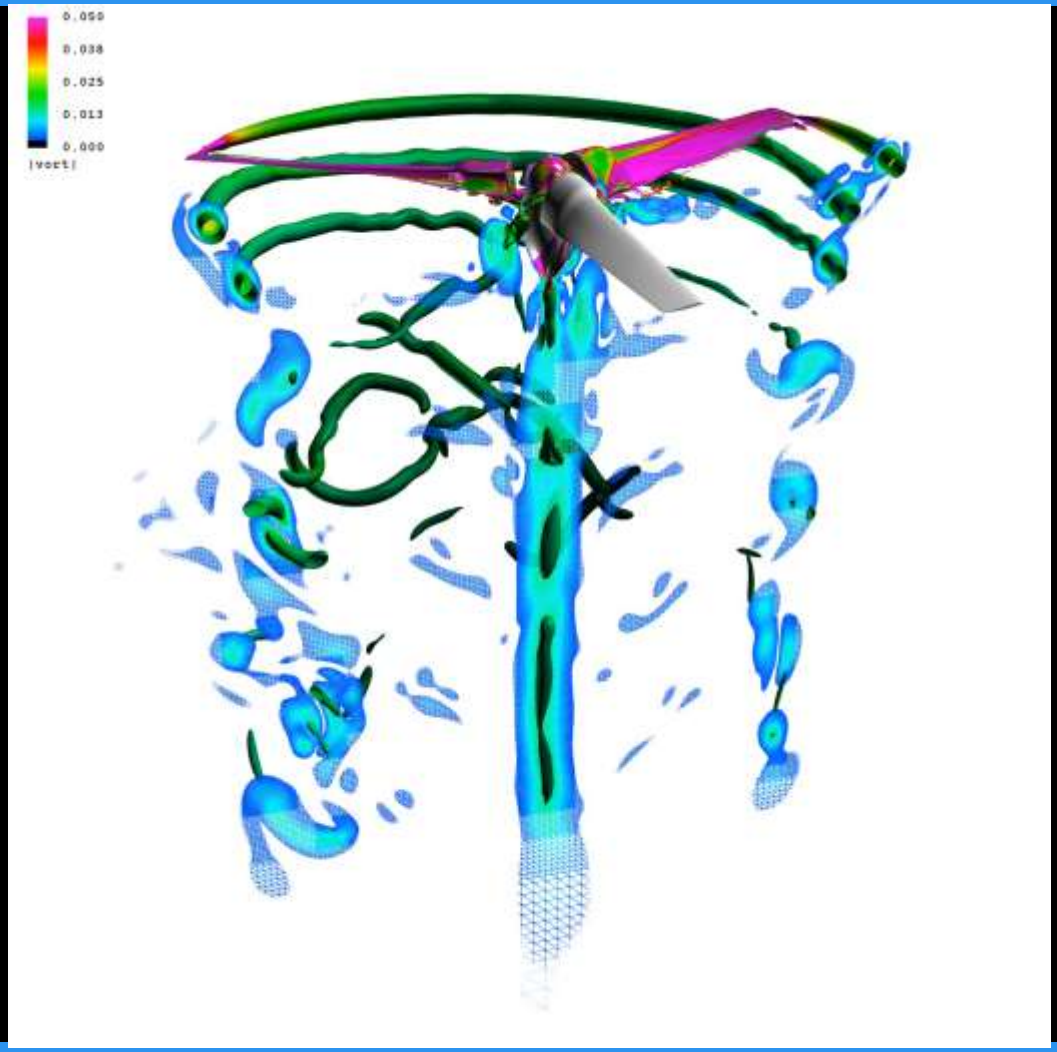
Computational domains: Human exploration vehicle design, Aerosciences, Earth science and Space sciences

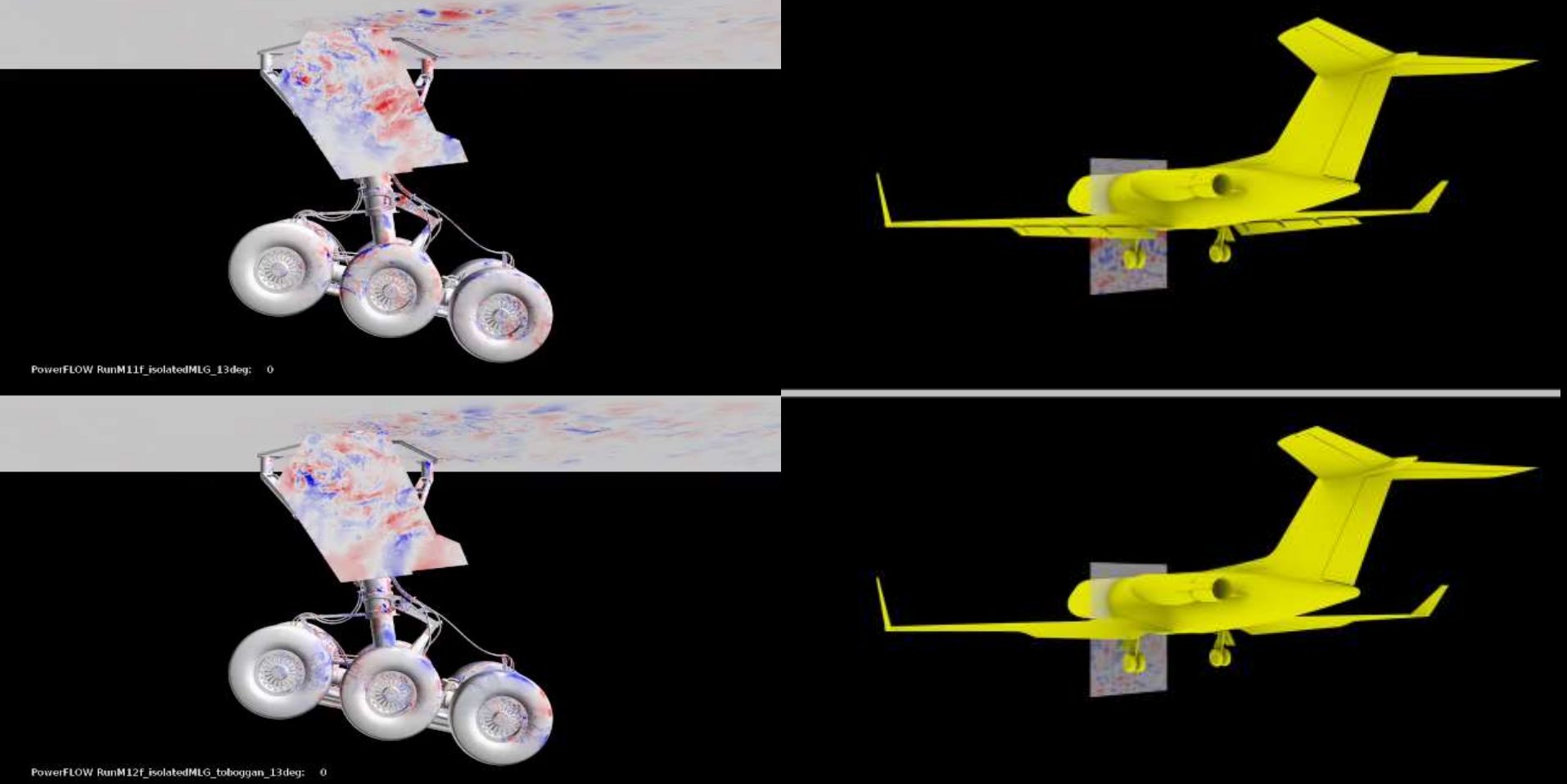


Global Ocean Modeling (ECCO Consortium, MIT/JPL)


Merger of Black Holes (NASA
Goddard Numerical Relativity Group)

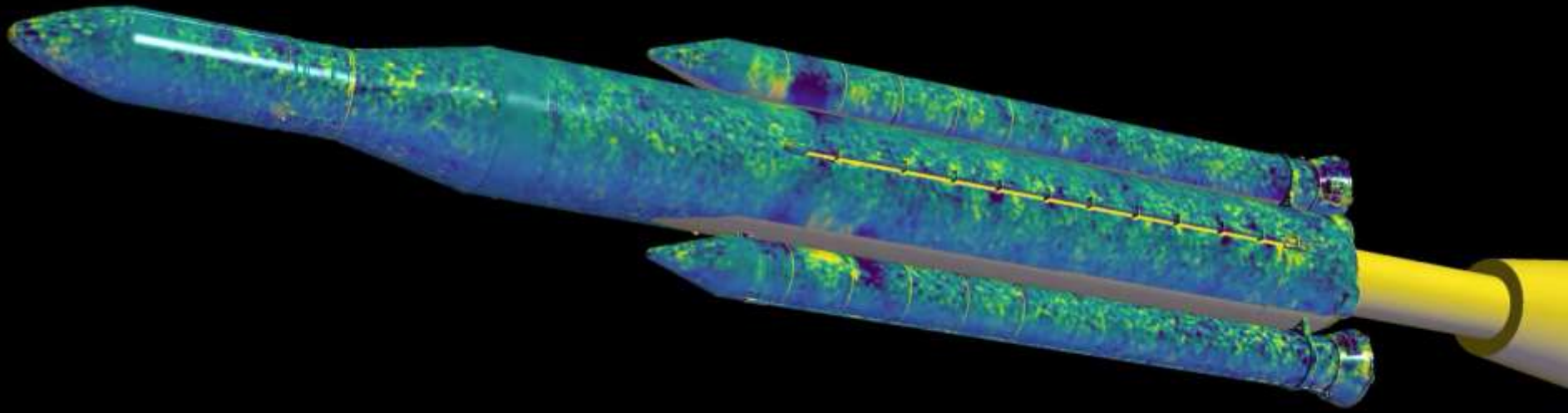
Copter analysis in hover mode (Chaderjian, NASA Ames)





Aerosciences: noise abatement (Khorrami, NASA Langley)

Near real-time analysis of wind tunnel test data using Supercomputer resources with potential for compute-guided data acquisition



Wind tunnel runs of SLS model using pressure sensitive paint to estimate pressure/loads

Near real-time analysis of GOES-ABI Satellite Data (GeoNEX, NASA Ames)

2022 Strategic Plan Overview

NASA's Strategic Plan is organized around 4 themes and their related Strategic Goals.

Vision

Exploring the secrets of the universe for the benefit of all.

Mission

NASA explores the unknown in air and space, innovates for the benefit of humanity, and inspires the world through discovery.

Strategic Goals

- **DISCOVER** — EXPAND HUMAN KNOWLEDGE THROUGH NEW SCIENTIFIC DISCOVERIES.
- **EXPLORE** — EXTEND HUMAN PRESENCE TO THE MOON AND ON TOWARDS MARS FOR SUSTAINABLE LONG-TERM EXPLORATION, DEVELOPMENT, AND UTILIZATION.
- **DEVELOP** — CATALYZE ECONOMIC GROWTH AND DRIVE INNOVATION TO ADDRESS NATIONAL CHALLENGES.
- **ENABLE** — ENHANCE CAPABILITIES AND OPERATIONS TO CATALYZE CURRENT AND FUTURE MISSION SUCCESS.

Questions?

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