



How Supercomputing Supports NASA's Mission

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<http://www.nas.nasa.gov/hecc>

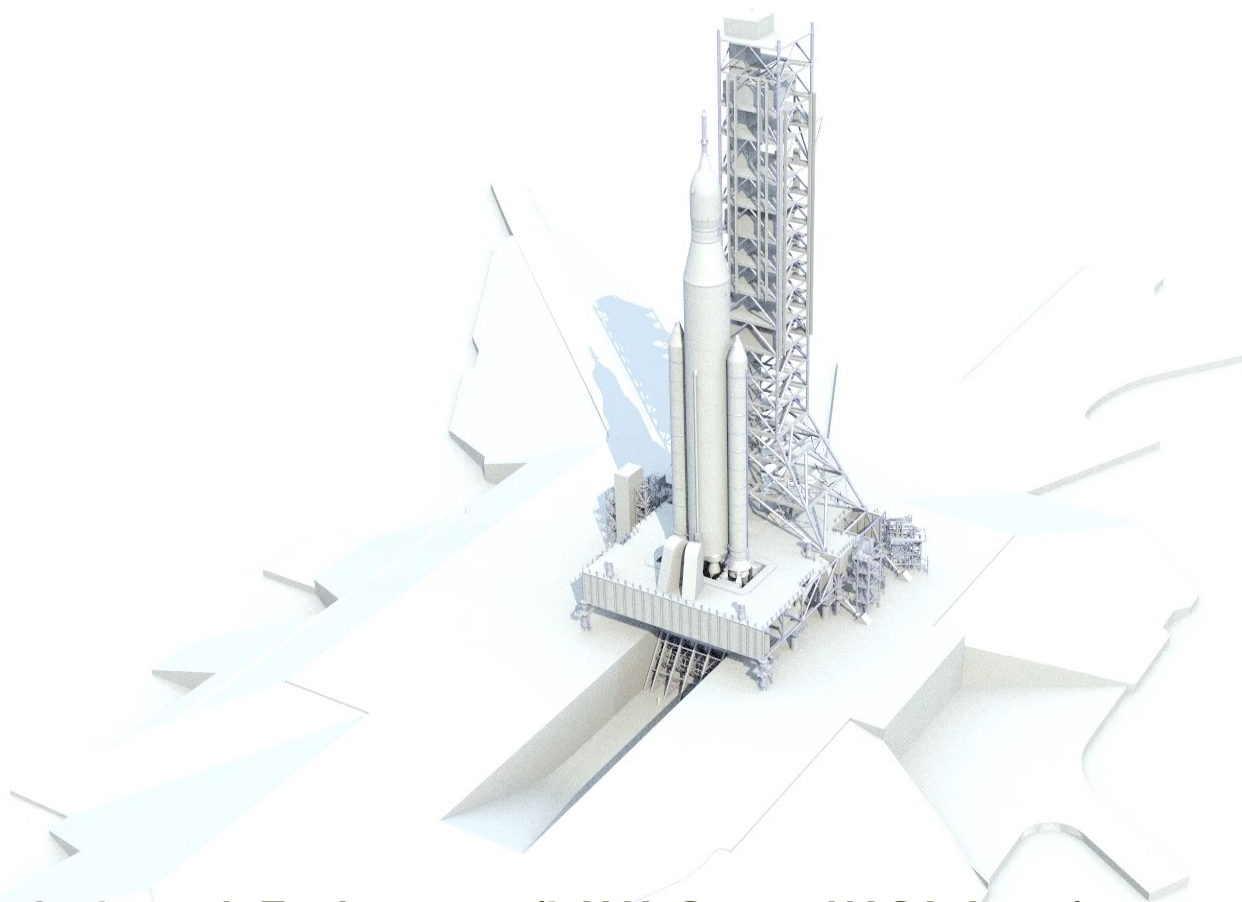
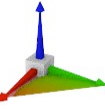
December 13, 2022



907



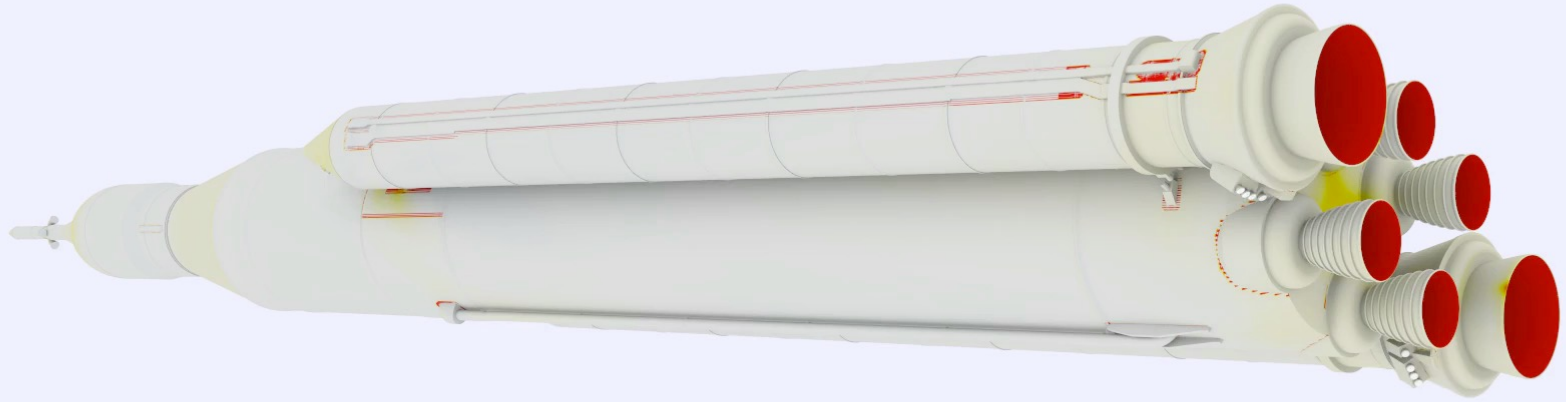
Artemis launch:
November 16, 2022



Modeling the Launch Environment (LAVA Group, NASA Ames)



Space Launch System – Stage Separation (LAVA 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

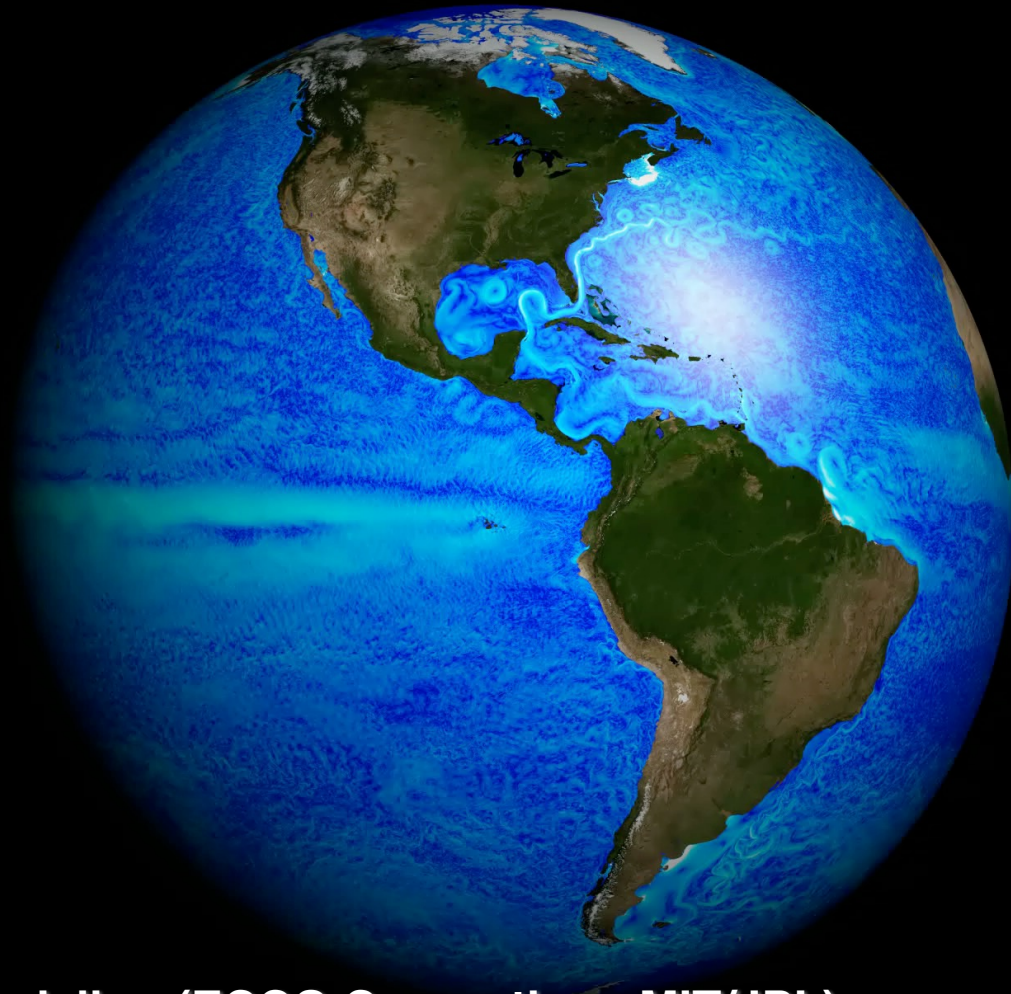
128-screen tiled LCD wall arranged in 8x16 configuration (23-ft. wide by 10-ft. high)

2,560 Intel Xeon Ivy Bridge processor cores

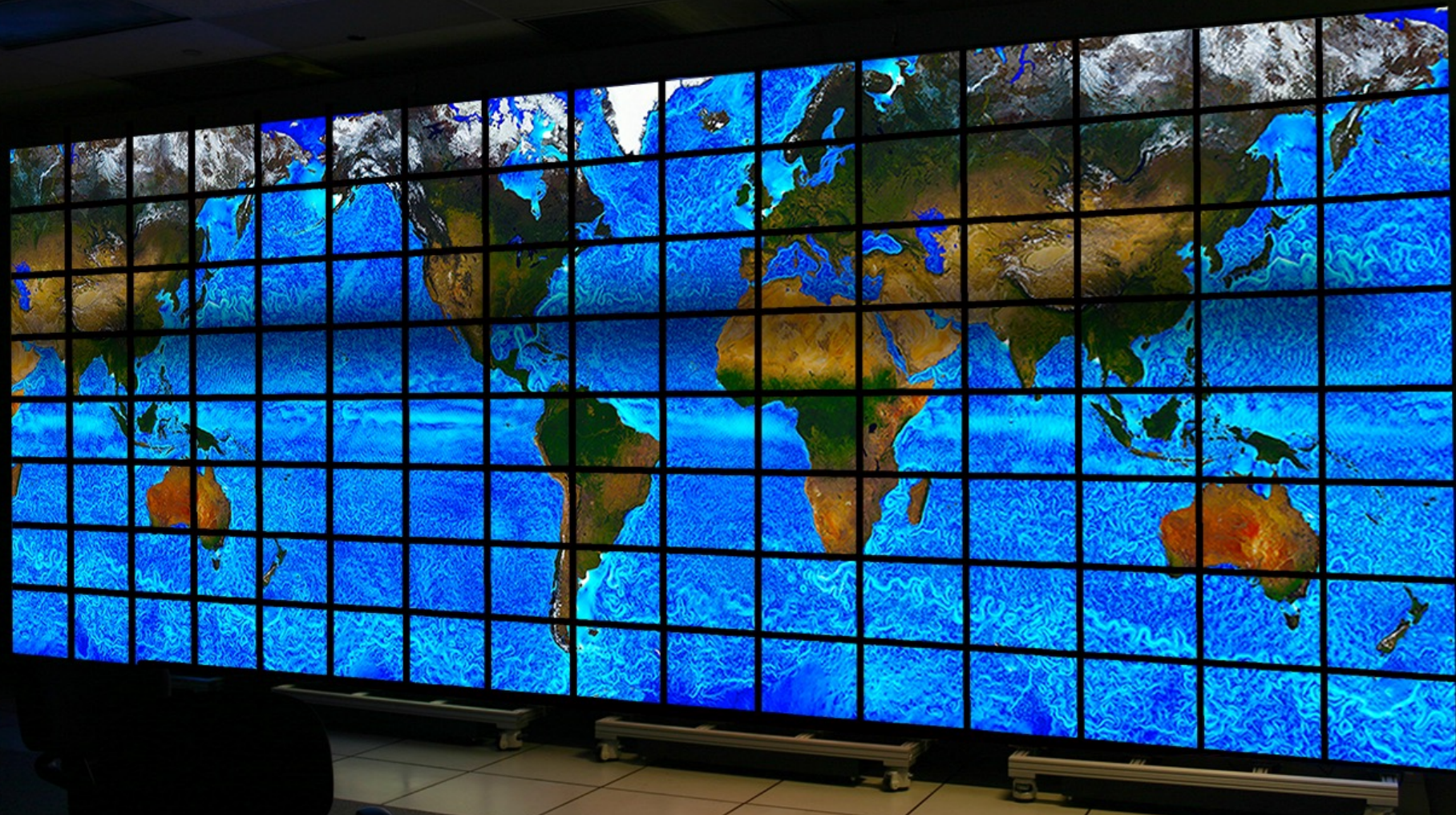
128 Nvidia GeForce GTX 780 Ti graphics processing units



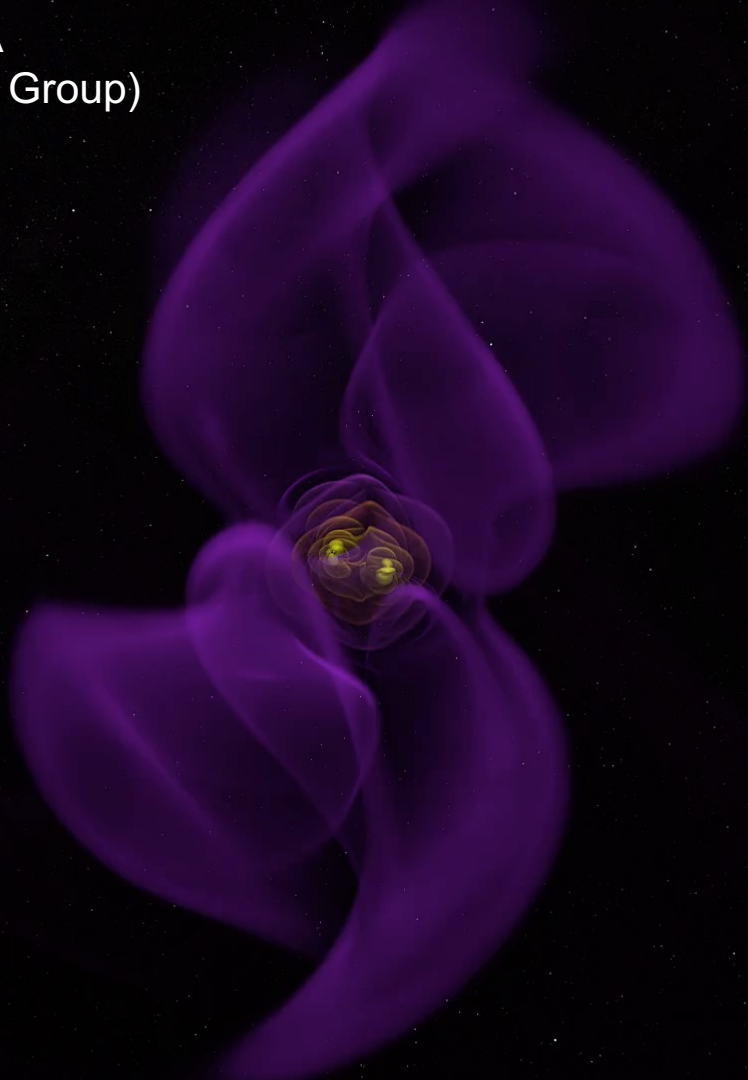
***Computational domains: Human exploration vehicle design, Aerosciences,
Earth science and Space sciences***



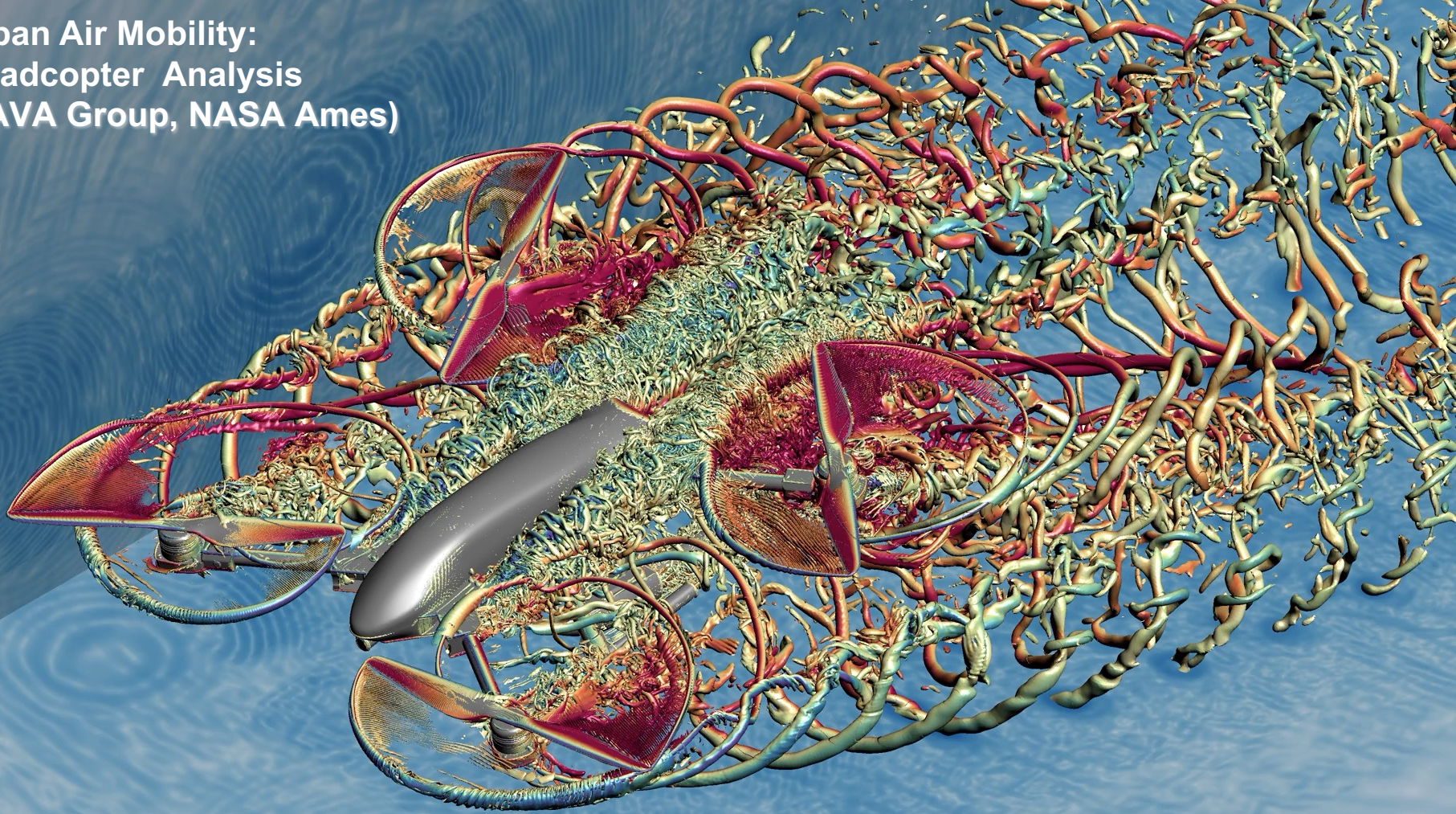
Global Ocean Modeling (ECCO Consortium, MIT/JPL)

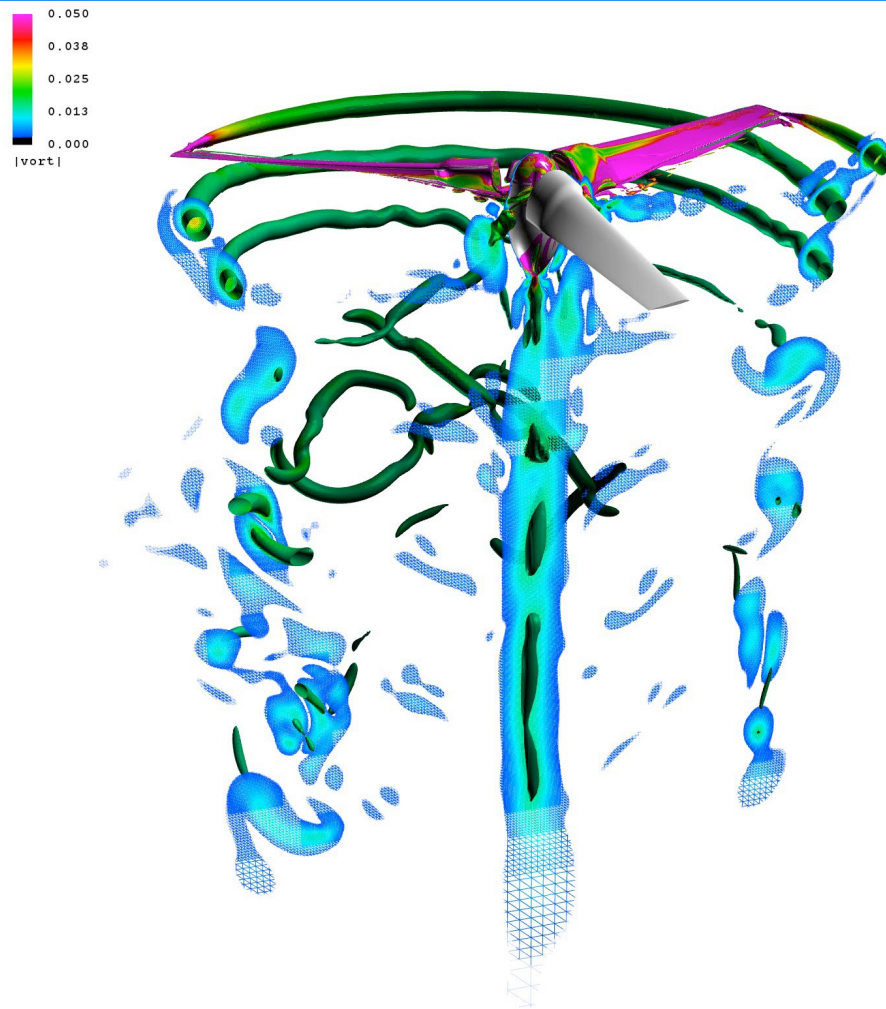


Merger of Black Holes (NASA
Goddard Numerical Relativity Group)

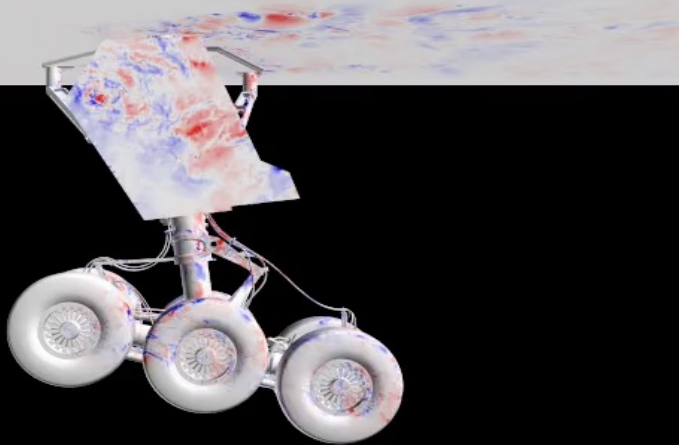


Urban Air Mobility:
Quadcopter Analysis
(LAVA Group, NASA Ames)

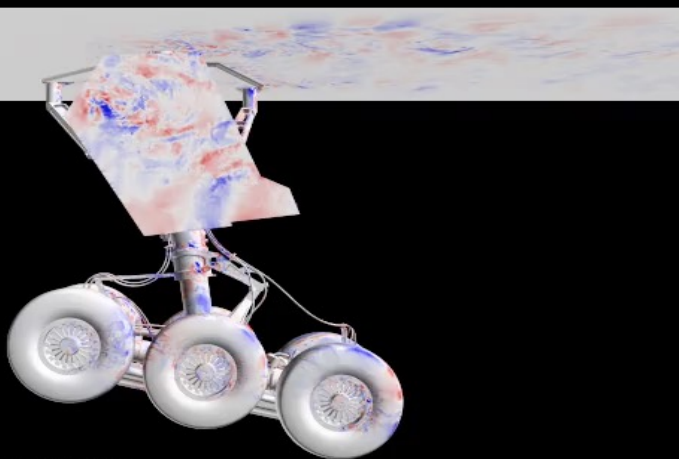
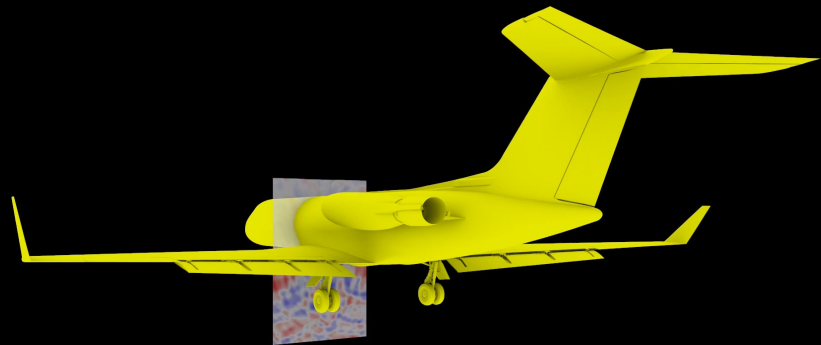




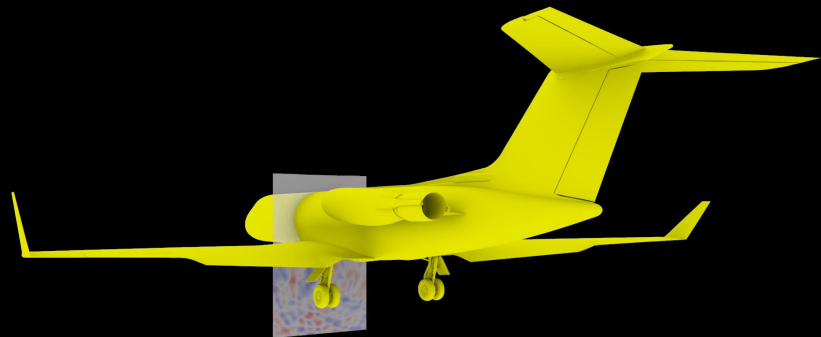
Copter analysis in
hover mode
(Chaderjian, NASA
Ames)



PowerFLOW RunM11F_isolatedMLG_13deg: 0

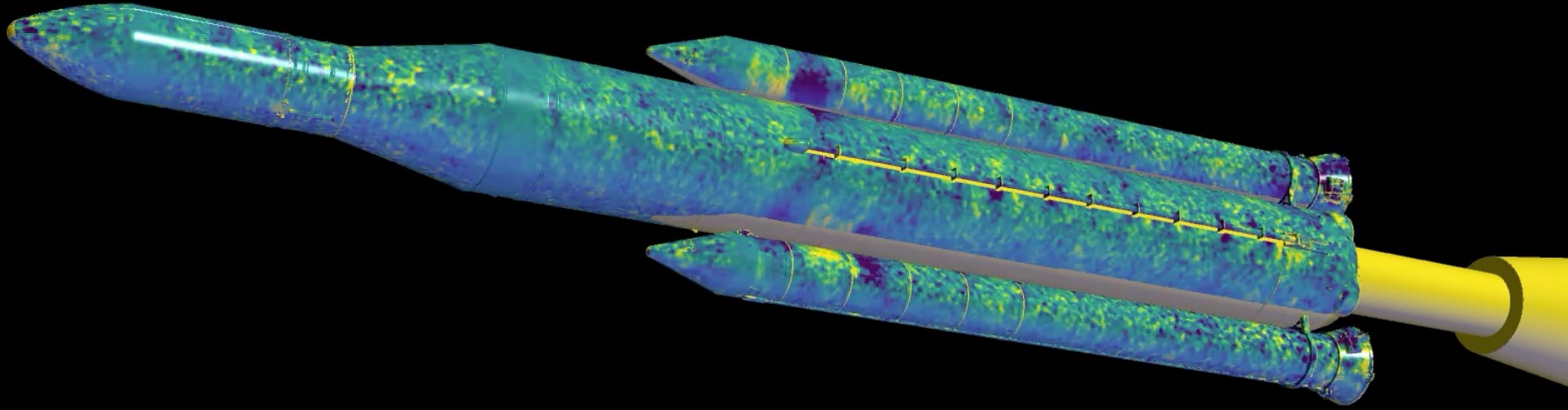


PowerFLOW RunM12F_isolatedMLG_toboggan_13deg: 0

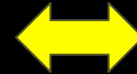


Aerosciences: noise abatement (Khorrami, NASA Langley)

**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**





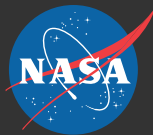
**Near real-time analysis of GOES-ABI
Satellite Data (GeoNEX, NASA Ames)**

National Aeronautics and Space Administration



ENHANCE CAPABILITIES AND OPERATIONS TO CATALYZE CURRENT AND FUTURE MISSION SUCCESS.

Questions?



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<http://www.nas.nasa.gov/hecc>