AEROSPACE
AMERICA

One very bad day

Russia allegedly wants to station a nuclear weapon in space as an anti-satellite weapon. Here's what science and history tell us about that idea. PAGE 24

Quantum and you PAGE 34

The coming applications

JULY/AUGUST 2024 | A publication of the American Institute of Aeronautics and Astronautics | aerospaceamerica.aiaa.org

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A SpaceX Falcon 9 booster touches down on a drone ship in 2016 after sending a Cargo Dragon capsule toward the International Space Station. SpaceX

Mystery rumble

Q: Assume you're an expert in sonic shockwaves who's been asked to improve the plausibility of a scenario described in a draft screenplay: The setting is the beach at Cape Canaveral north of the launch pads. It's an unusually cold, clear and dry morning, with a stout breeze blowing from the west. Our protagonist is looking out to the sea expectantly. We hear a rumble that's described as the shockwave created by a Falcon rocket stage as it descended toward a droneship beyond the horizon. What changes would you make to the screenplay to make it more plausible, and why?

Research scientist Sinan Demir of Argonne National Laboratory helped develop this question.

SEND A RESPONSE OF UP TO 250 WORDS to aeropuzzler@aerospaceamerica.org. By responding, you are committing that the thoughts and words are your own and were not created with the aid of artificial intelligence. DEADLINE: noon Eastern Aug. 12

Scan to get a head start on the September puzzler

FROM THE JUNE ISSUE

SIGNS OF LIFE:

We asked you if ancient features on Mars would be buried under meters of material, similar to what happened with ancient cities on Earth.

WINNER Mars has many aeolian (wind-blown) features. Material does indeed move around on the surface. Very small particles can be lofted and carried planet-wide (global dust storms); larger particles migrate much more slowly via saltation (dunes). Both are monitored in real time from orbit. Mars' surface pressure only averages ~6 millibars: it takes much higher wind velocity to move material than on Earth. Thus, transport is slower than on Earth. The carbon cycle has absolutely nothing to do with this (although vegetation on Earth does slow down wind erosion substantially). Erosion by liquid water is a much more efficient process. Mars has substantial subsurface water in the form of ice, but that tends to "glue" the surface, making it more resistant to wind erosion. In the Noachian epoch (~4.5-3.5 billion years ago) Mars had enough atmosphere to support liquid water. Many surface features (stream beds, dry lake beds, outflow channels) from this epoch are seen today. Which says that all subsequent aeolian erosion was relatively minor compared to hydrologic erosion. There are relatively few sources and sinks for windblown material, and prevailing winds dictate what goes where. Over the eons, Mars' obliquity has varied substantially, which changes up weather patterns and material migration. Most material will "circulate" rather than form thick deposits over a substantial fraction of the surface. Remember, if something is blown in from somewhere, it is removed from somewhere else. Example: rover solar panels building up a layer of dust, and occasionally cleared by a passing dust devil.

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