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How cockroaches elude you



timeters of something the consistency of wet sand or clay. His most colorful analogy was a *crème brûlée*.

Methane seas may yet turn up, but Titan already would seem to have all the parts of a “methylogical cycle” that is analogous—in sometimes strange ways—to the hydrologic cycles of Earth and ancient Mars. Titan’s atmosphere contains methane and photochemically produced ethane—analogs to Earth’s water vapor—that condense into hydrocarbon clouds. Some clouds must rain onto the surface to erode the channels, although just how hydrocarbons

would erode the highly insoluble water ice remains to be worked out. The rain would presumably also pick up the many meters of dark photochemical goo that settles from the haze layer over the eons. That would explain the dark stain on canyon floors and outwash plains. Once the hydrocarbon rivers spread across the wide, flat plains, they would drop any heavy sediment in fans. If the fluids mostly evaporated away to complete the cycle, they would leave their load of organic goo the way water leaves its dissolved salts on a salt flat. Some fluid would likely soak into the plain to

become “ground hydrocarbons.”

All this sounds to Pappalardo like a desert environment on Earth. It doesn’t rain often in deserts, but when it does, the rain can be torrential. That could well be the case on Titan, notes Jonathan Lunine of UA, a Huygens interdisciplinary scientist. Cassini has found few if any clouds outside the south pole region, but ground-based astronomers have seen one cloud outburst at mid latitudes in recent years. That level of activity could be all that’s needed to shape a familiar-looking world.

—RICHARD A. KERR

DISASTER PREPAREDNESS

Global Tsunami Warning System Takes Shape

The Bush Administration last week announced a new plan to protect American citizens from tsunamis, bolstering efforts both in wave detection and public readiness.

Unveiling of the proposed \$37.5 million effort came a day after Koichiro Matsuura, director-general of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), announced that his organization would build a global tsunami warning system, starting with a \$30 million network in the Indian Ocean. White House science adviser John Marburger, speaking at a press conference on 14 January, said the enlarged U.S. network could be part of the worldwide UNESCO effort.

The Administration is proposing to expand the number of wave detectors in the Pacific from six to about 24 and to deploy another seven in the Atlantic and Caribbean. U.S. Geological Survey seismometers are also set for an upgrade. “It’s [the] initial straw man plan,” said oceanographer Eddie Bernard, director of the National Oceanic and Atmospheric Administration’s (NOAA’s) Pacific Marine Environmental Laboratory in Seattle, Washington. In the coming months, tsunami experts at NOAA will work with volcano and landslide specialists to finalize the proposal.

The current network of six American wave detectors, which measure water pres-

sure on the sea floor, warns officials on the West Coast and Hawaii of long-ranging tsunamis heading south from Alaska. Ringing Pacific coasts on both sides of the ocean with some 18 new detectors will dramatically improve the network’s capabilities. It will also provide crucial early warning to Asian and South American nations.

cial hope to coordinate the placement of wave and seismic gauges in international waters. “We want to work it out with our global partners,” said NOAA administrator Navy Vice Admiral Conrad Lautenbacher.

Even the upgraded network would give little time to alert coastal communities if a massive earthquake were to strike just offshore. To prepare the public for that, the plan calls for an expansion of the Tsunami Ready program, which prepares local communities to seek higher ground after tremors, among other things. “It’s not just a question of putting some buoys out there,” Marburger said.

Bolstering defenses—especially for Atlantic shores—only became a priority after the destruction in South Asia. “Even though we haven’t experienced an earthquake-tsunami off the East Coast doesn’t mean it can’t happen,” said Bernard, noting that although Atlantic coasts face lower risks from earthquakes, tsunamis can be caused by rare events such as landslides above ground or under water, as well as meteor strikes.

The White House is pressing Congress to approve much of the funds for the new program as part of a supplemental tsunami-relief funding measure for this fiscal year. The House science committee will review the new plan in a hearing 26 January.

—ELI KINTISCH



More warning. NOAA’s Conrad Lautenbacher says extending the Pacific tsunami network will make “a significant contribution to a global system.”

The expanded detection system would be part of the American-led Global Earth Observation System of Systems (GEOSS), a linking of existing networks for global studies, which is set for formal approval in Brussels on 16 February. Asked if the proposed U.N. and U.S. systems were connected, Marburger noted that UNESCO’s Intergovernmental Oceanographic Commission has endorsed GEOSS. And offi-