



SCIENCE

# Outer Planets Program Status

Curt Niebur

Outer Planets Program Scientist, NASA Headquarters

OPAG Meeting

January 13, 2014



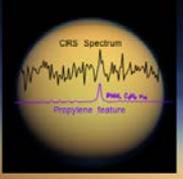
# “Sharing the Cool”

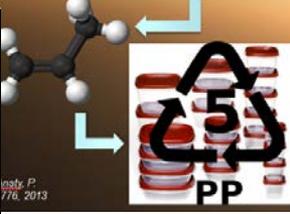


- Outer Planets has the privilege of encompassing an extremely broad span of disciplines, and communicating our excitement only helps
  - Papers: Shockingly few PIs share their papers with HQ management
  - Nuggets: Science nuggets are single slide, layman descriptions of fascinating science results that are shared weekly with senior management inside and outside NASA
  - Public Talks: If you are giving a public talk of sufficient size and venue let HQ know
  - NASA media events: You may not realize, but your paper may warrant attention from NASA public affairs
  - Social Media Attention: Be prepared for others (reporters, bloggers, enthusiasts) to highlight and follow unexpected stories

### Cassini discovers Tupperware on Titan!

- Cassini's Composite Infrared Spectrometer (CIRS) Team detected a new molecule, propylene (propene), in Titan's upper atmosphere.
- First definitive identification of propylene gas in a planetary atmosphere outside Earth.
- Propylene is an important raw material for our chemical industry. When strung together in



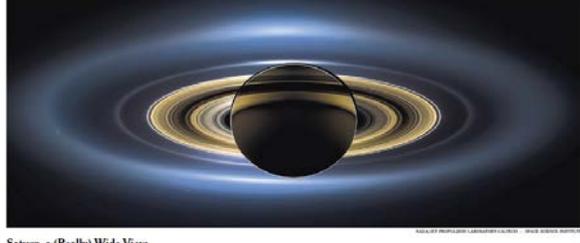


Propylene

"All the News That's Fit to Print"

## The New York Times

Late Edition  
Friday, November 13, 2013  
VOL. CLXIII, No. 56,319  
NEW YORK, WEDNESDAY, NOVEMBER 13, 2013  
\$2.50



### EXPERTS RESHAPE TREATMENT GUIDE FOR CHOLESTEROL

#### CHANGE IN STATINS' USE

#### 2 Groups See No Need to Drop to a Specific Level of LDL

By GINA KOLATA

The nation's leading heart organizations released new guidelines on Tuesday that will fundamentally reshape the use of cholesterol-lowering statin medications, which are now prescribed for a quarter of Americans over 40. Patients on statins will no longer need to lower their cholesterol levels to specific numerical targets measured by regular blood tests, as has been recommended for decades. Simply making the right dose of a statin will be sufficient, the guidelines say.

The new approach divides people needing treatment into two broad risk categories. Those at high risk because, for example, they have diabetes or have had a heart attack should take a statin except in rare cases. People with extremely high levels of the harmful cholesterol known as LDL — 190 or higher — should also be prescribed statins. In the rest, people in these categories

### Saturn, a (Really) Wide View

NASA's Cassini spacecraft looked back from the shadow of Saturn to a picture that sweeps 405,000 miles across the planet and the inner solar system. Cassini captured 323 wide-angle images on July 19, and this mosaic, released on Tuesday, used 141 of them. For some galactic perspective, Earth is 988 million miles away.

### China Leader Gets More Sway On the Economy and Security

By CHRIS BUCKLEY

HONG KONG — President Xi Jinping of China emerged from a Communist Party leadership conference Thursday with a mandate that he aims to strengthen through a raft of economic overhauls. The review agencies suggest that Mr. Xi aims to strengthen

### Obama in Bind Trying to Keep Health Law Vow

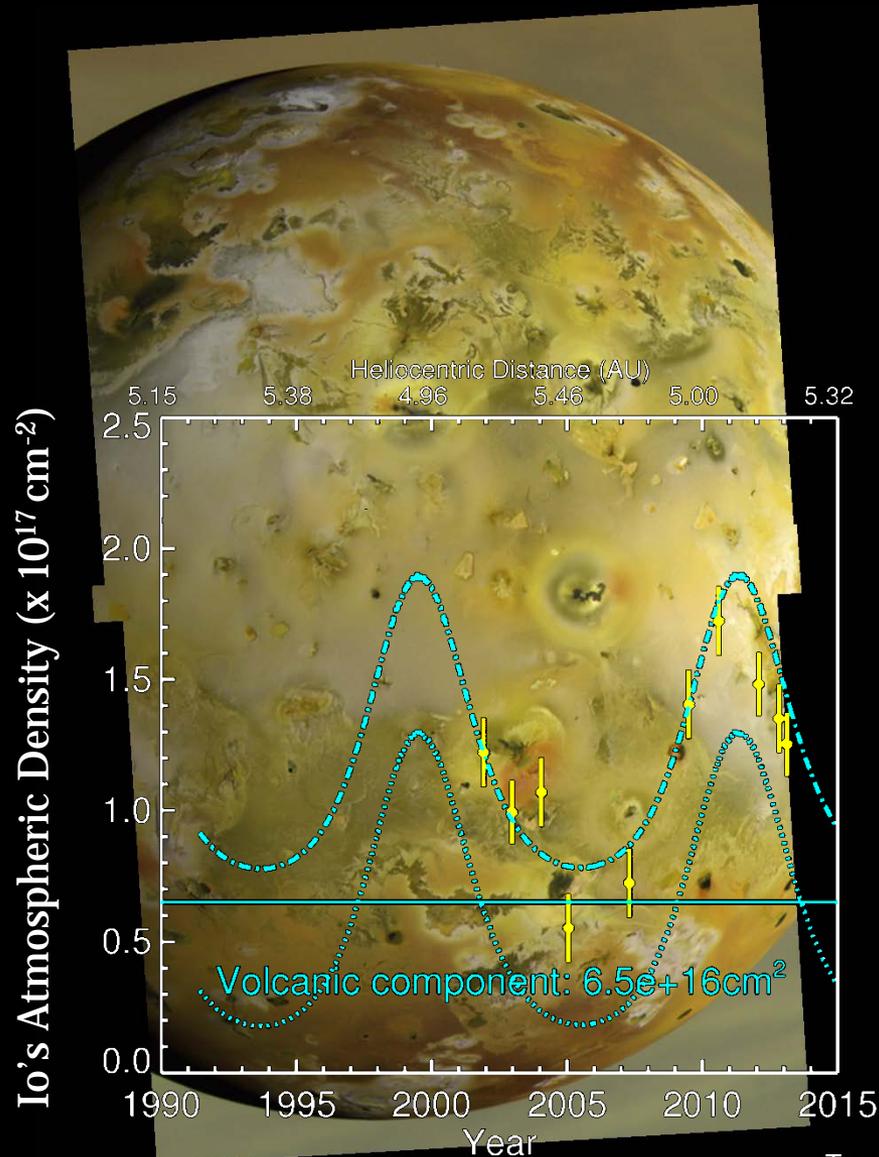
By MICHAEL D. SHEAR and ROBERT PEASE

WASHINGTON — Under intense bipartisan pressure to improve existing consumer complaints about the health care industry, White House officials yesterday with less cooperative coverage were not stuck

mer President Bill Clinton — to support bipartisan legislation that would allow people to keep their current insurance plans even after provisions of the Affordable Care Act go into effect next year.

White House officials refused to discuss in detail what method

# Io's Atmosphere Expands and Contracts



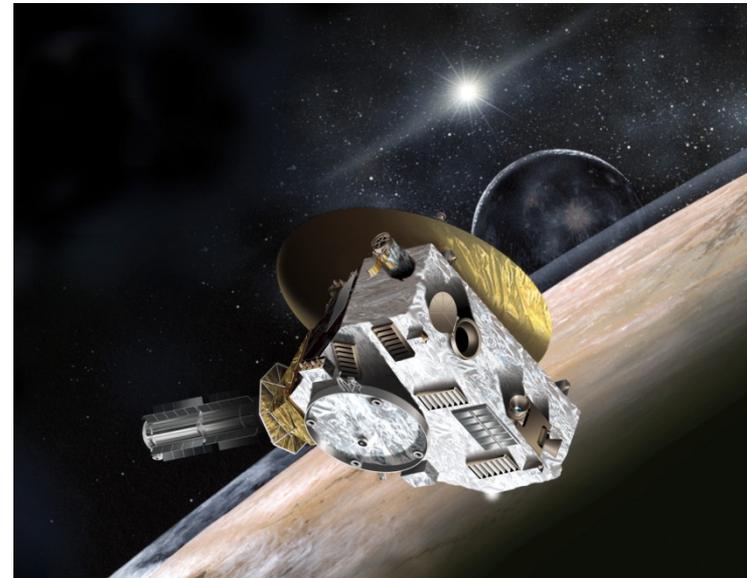
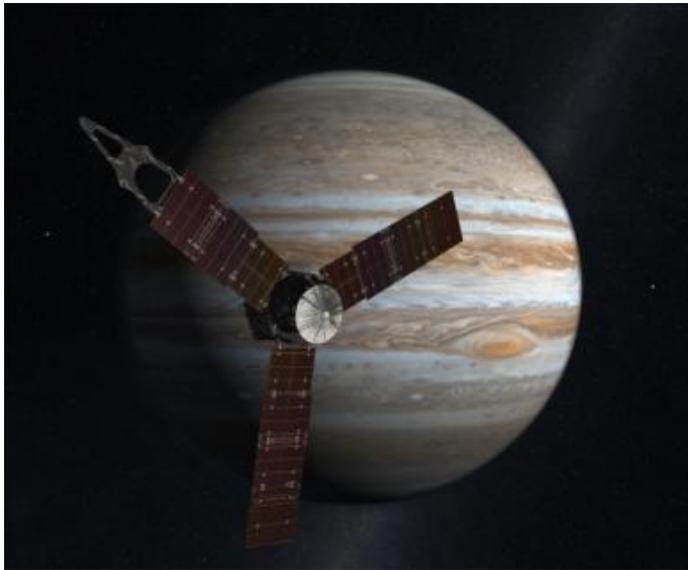
- Io has an atmosphere of sulfur dioxide from volcanic eruptions. This atmosphere condenses on the surface to form a layer of sulfur dioxide frost.
- Over a period of many years, the slightly eccentric orbit of Jupiter around the Sun changes the amount of sunlight falling on Io. As Jupiter approaches the Sun, sunlight evaporates (sublimates) the frost off the surface and increases the density of the atmosphere by a factor of three.
- Observations with NASA's Infrared Telescope Facility in the mid-infrared of Io's atmosphere over a Jupiter year show the atmosphere of Io expanding and then contracting with its distance from the Sun. In essence, Io's atmosphere has "seasons"!



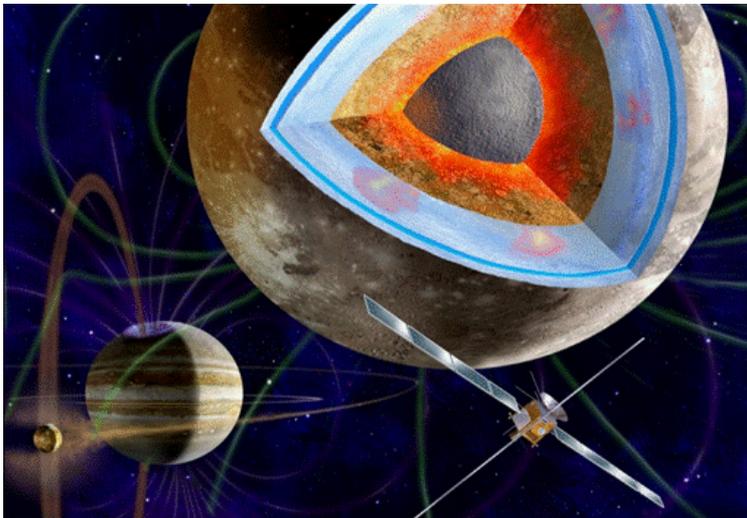
# Mission Status – Juno and New Horizons



- Juno is in excellent health and operating nominally
- Spacecraft has covered ~66% of the 19-AU-long trajectory (19% further since last OPAG meeting)
- JOI in 2.5 years, and Earth flyby completed on Oct. 9, 2013
- New Horizons is in excellent health and operating nominally
- Spacecraft is 29.3 AU from the sun and 4.4 AU from Pluto system (3 AU closer than last OPAG meeting)
- The encounter begins in 1 year
  - Yes, that's right. One year.



- JUICE development is proceeding, the next major milestones are:
  - Instrument PRR (over the next two months)
  - System Requirements Review (Fall 2014)
  - Formal Mission Adoption (Nov. 2014)
- Balloon Rapid Response for Comet ISON (BRRISON) was a demo of balloon-based planetary astronomy
  - The flight occurred just prior to the government shutdown and experience payload anomalies
  - NASA is completing the anomaly report and considering future plans





# Cassini



**THE YEAR IN SCIENCE**  
SCIENCE FOR THE CURIOUS

# Discover

January/February 2014

## 100 top stories of 2013

**VOYAGER HEADS FOR THE STARS** p. 18  
**KILLER VIRUS SCARE** p. 20  
**EARTH'S BIGGEST VOLCANO** p. 23  
**QUANTUM COMPUTING GETS REAL** p. 26  
**GENE EDITING BREAKTHROUGHS** p. 30  
**HUMAN-POWERED FLIGHT** p. 43

**PLUS**  
Cannibal skull p. 44  
Food disaster p. 45  
Tiger deaths p. 46  
New alien discovery p. 47

**Saturn**  
The image that has astronomers buzzing! p. 56

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### 10 Awesome Things We Learned About Saturn in 2013

BY BETSY MASON 01.04.14 6:30 AM  
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## Amazing photo of Saturn and Earth

**NASA gives us a new treat**

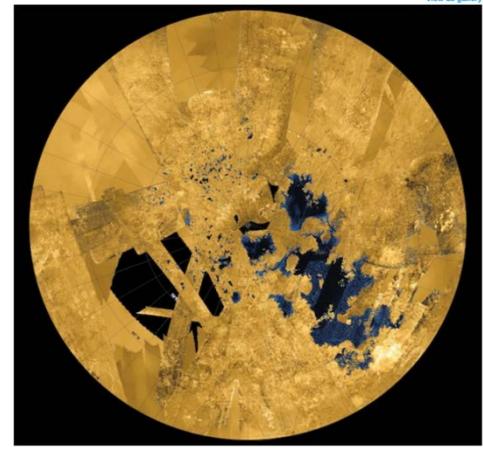
The Cassini spacecraft took a panorama of 141 wide-angle pictures that show not only Saturn, but the Earth as a tiny dot in the background. The image covers 404,880 miles across Saturn and its ring system. **FULL STORY**

- Saturn in a different light
- Did you 'wave' at Saturn?

**THE LATEST**  
Neo-Nazi learns he's part African

**LATEST ON TYPHOON HAIYAN**

**LIVE TV**  
[Watch CNN](#)





# Europa Flagship Mission



- NASA continues work on the Europa Clipper formulation effort using congressionally-provided funds carried forward from FY13
  - As discussed at the last OPAG meeting, we need to wait and see what the President's FY15 budget says about Europa Clipper (~February 2014) and how Congress reacts (~spring 2014)
  - The SDT remains in place and is also considering how the recent plume discovery may affect the mission concept
- Europa Clipper continues to make valuable forward progress and remains shovel ready!
  - Details will be presented this afternoon

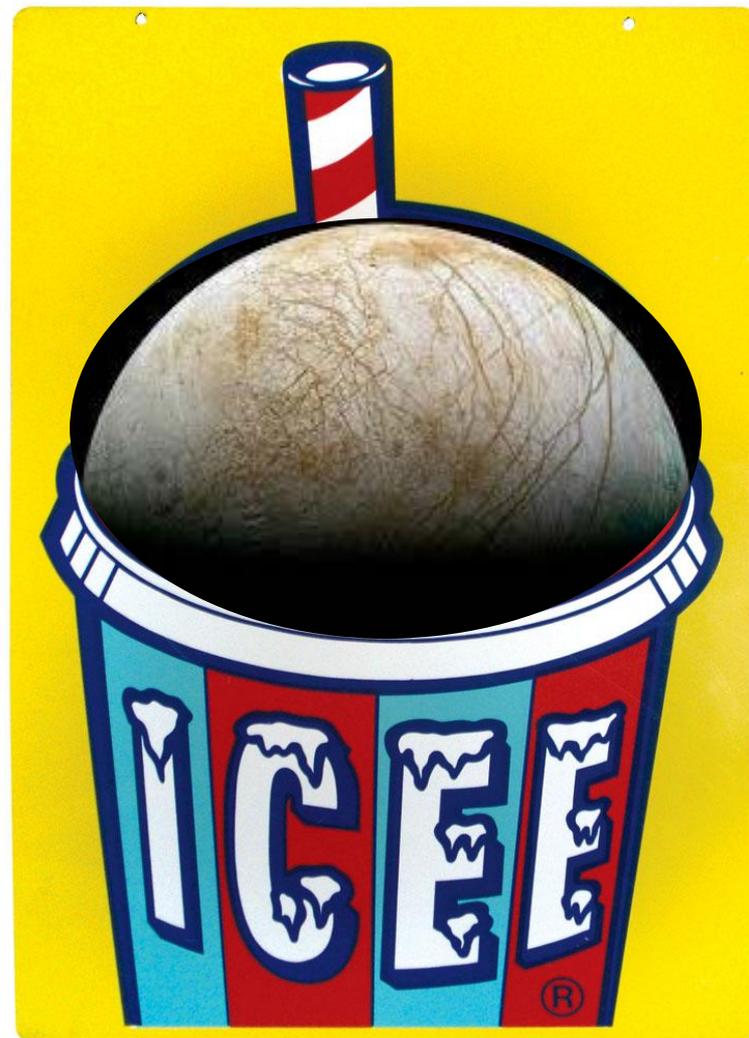




# Instrument Concepts for Europa Exploration



- As part of the FY13 funding for a Europa flagship mission, NASA solicited proposals for instrument development for Europa missions
  - The goal of the ICEE program is to mature and reduce the technical risk of instruments for a potential future Europa mission to the point where they may be proposed in response to a future announcement of flight opportunity (AO) without additional extensive technology development
- 28 compliant proposals were submitted and 15 totaling \$15M were selected for funding

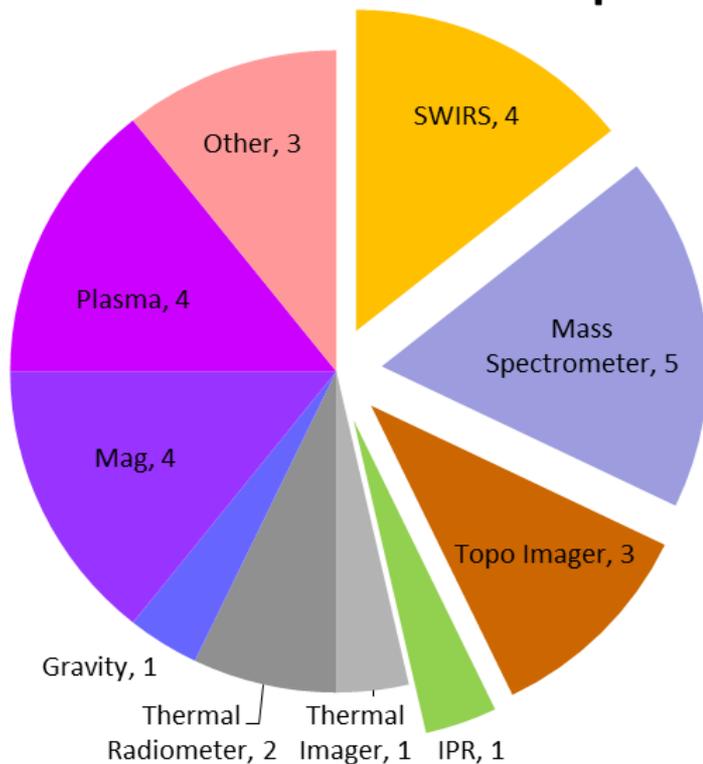




# ICEE Selections and Stats



## Distribution of Instruments Proposed



Instrument	# Props	# Selections
SWIRS	4	3
Mass Spectrmtr	5	3
Topo Imager	3	2
IPR	1	1
Thermal	3	2
Gravity	1	0
Mag	4	2
Plasma	4	1
Other	3	1
<b>Total</b>	<b>28</b>	<b>15</b>



# ICEE Selections and Stats



PI	Inst	Title	Instrument
Bell, James	ASU	Technology Development for a Topographic Imager on the NASA Europa Clipper Mission	Topo Imager
Turtle, Elizabeth	APL	Topographic and Reconnaissance Imaging for Europa Exploration	Topo Imager
Aslam, Shahid	GSFC	Thermal IMager for Europa Reconnaissance (TIMER) - Technology Maturation and Risk Mitigation	Thermal Imager
Kenyon, Matt	JPL	Development of Large Format Rad-Hard Focal Plane Arrays and Readouts for Thermal Radiometer for Europa Clipper Mission	Thermal Rad
Smith, David	MIT	Extended Range Laser Altimeter (ERLA)	Laser Altimeter
Westlake, Joseph	APL	Plasma Instrument for Magnetic Sounding (PIMS)	Faraday Cup
Bagenal, Frances	Univ. CO	A Probe For Europa's Plasma Interaction	Langmuir Probe
Raymond, Carol	JPL	Development and Testing of an Integrated Magnetic Mapping Package for the Europa Clipper Mission	Magnetometer
Moussessian, Alina	JPL	Ice Penetrating Radar (IPR) for Europa Exploration	Radar
Kempf, Sascha	Univ. CO	Maturing the Surface Dust Analyzer (SUDA) for Europa Exploration	Dust Analyzer
Waite, Jack	SWRI	Technical development of the MASPEX instrument for Europa Exploration	Mass Spectrometer
Darrach, Murray	JPL	Mass Analyzer for Real-time Investigation of Neutrals at Europa (MARINE)	NMS
Reuter, Dennis	GSFC	SIRSE: Spectral ImageR/Spectrometer for Europa	SWIRS
Green, Robert	JPL	Europa Short Wavelength InfraRed Spectrometer - Radiation and Planetary protection Maturation ESWIRS-RPM	SWIRS
Hand, Kevin	JPL	CIRIS: A near- and mid-infrared Fourier transform spectrometer for investigations of the surface composition and habitability of Europa.	SWIRS



# Instrument Development and the Clipper Formulation Team



- There is clearly benefit to early collaborations between mission and instrument developers, and the Europa Formulation team has the resources to respond to reasonable requests for assistance and/or technical information
  - Funded ICEE PIs have been invited to collaborate with the Europa Formulation team to exchange information and analyses and discuss issues of concern to instrument and/or mission developers
  - **This invitation is not limited to funded ICEE PIs!** The Europa Formulation team is available to respond to questions and reasonable requests from any instrument developer
- NASA and the Europa Formulation Team are ready to assist and are willing to work with you to protect (to the extent we are able) any information you feel to be sensitive
  - Questions and indications of interest must be coordinated through Curt Niebur

