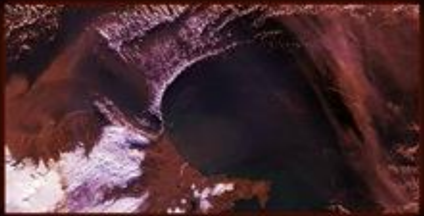
National Aeronautics and Space Administration

NASA Science

Weekly Highlights
November 15, 2013


EARTH SCIENCE


HELIOPHYSICS

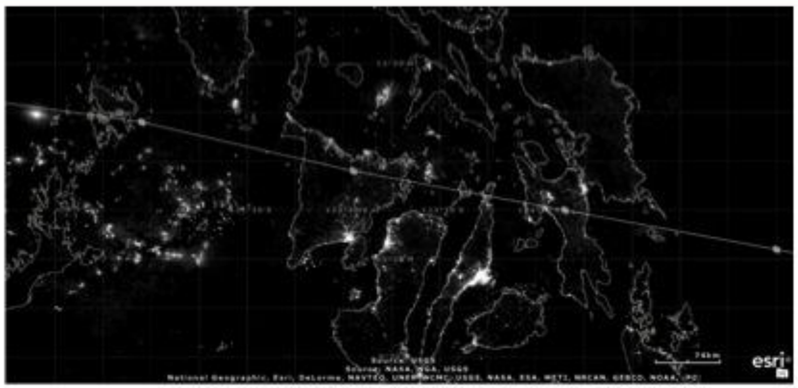

PLANETARY SCIENCE

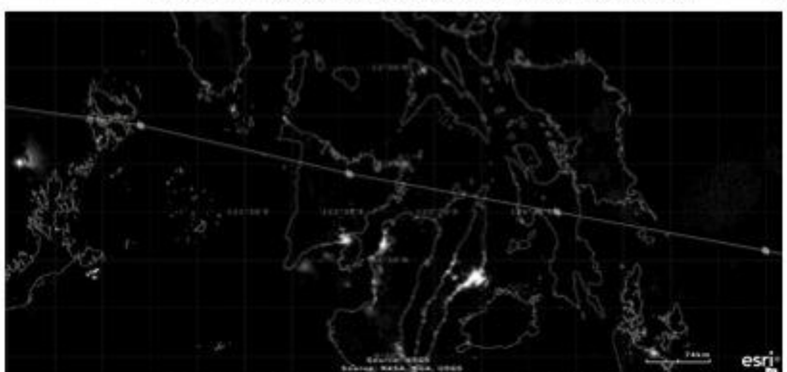

ASTROPHYSICS

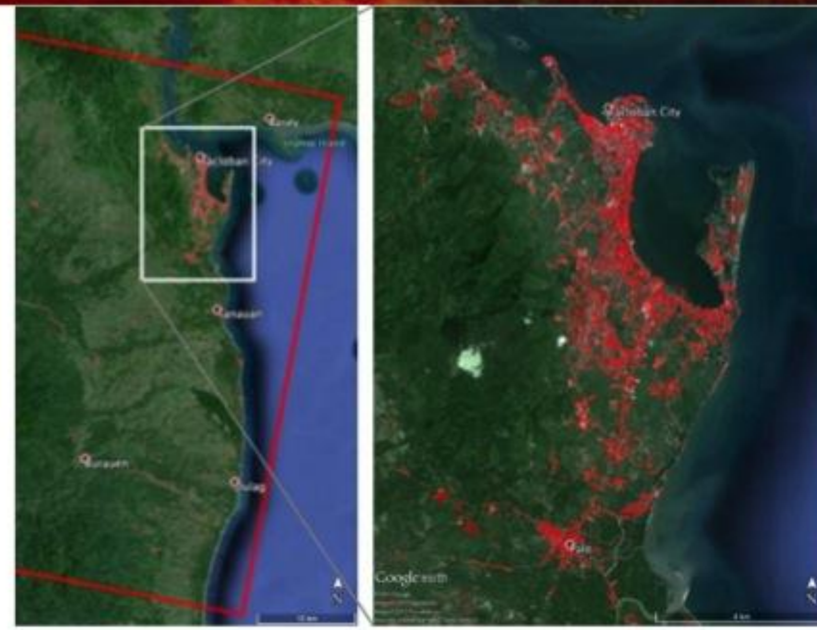
NASA Damage Map Helps in Typhoon Disaster Response

NASA data provided to the Disaster Response Coordinator at USGS EROS, and made publicly available through the Hazards Data Distribution System (HDDS)

Haiyan will be known as a historic storm, making landfall in the central Philippines November 8 as perhaps the most powerful tropical cyclone to ever make landfall with sustained winds estimated at 195 mph. So far, over 2300 people are confirmed to have been killed by the storm, and the number is likely to climb higher with many still missing and not all areas unaccounted for. The most deadly flooding from Super Typhoon Haiyan was caused by the storm surge, which was reported to be up to ~17 feet in Tacloban. The images below identify regions post-landfall (bottom) that are suffering power outages, using the highly sensitive day/night band on the Suomi-NPP VIIRS instrument.







NASA's Jet Propulsion Laboratory in collaboration with the Italian Space Agency, generated the above image of the storm's hardest-hit regions, depicting its destruction. The 40-by-50 kilometer damage proxy map, near Tacloban City, where the massive storm made landfall, was processed by JPL's Advanced Rapid Imaging and Analysis (ARIA) team using X-band interferometric synthetic aperture radar data from the Italian Space Agency's COSMO-SkyMed satellite constellation. The technique uses a prototype algorithm to rapidly detect surface changes caused by natural or human-produced damage. The assessment technique is most sensitive to destruction of the built environment. When the radar images areas with little to no destruction, its image pixels are transparent. Increased opacity of the radar image pixels reflects damage, with areas in red reflecting the heaviest damage to cities and towns in the storm's path. The time span of the data for the change is Aug. 19--Nov. 11, 2013. Each pixel in the damage proxy map is about 30 meters across.

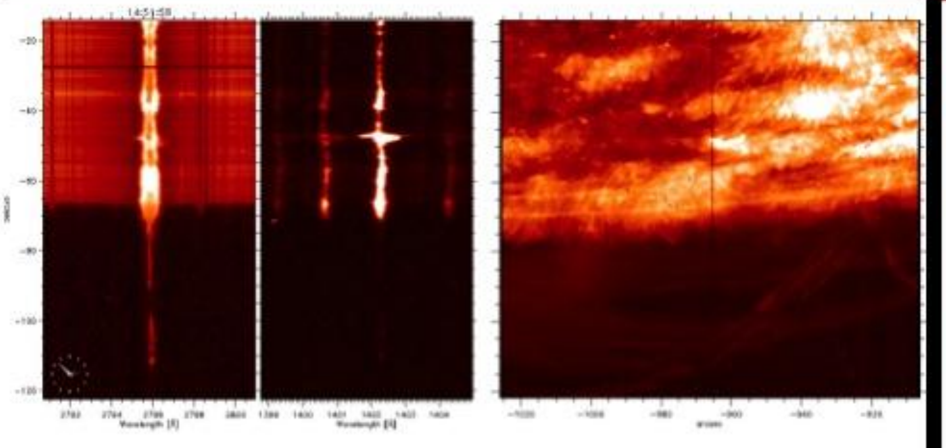
Bubbly Newborn Star

Credit: NASA/JPL-Caltech/ALMA

In the image, the shorter-wavelength light appears blue and longer-wavelength light, red. Blue shows gas energized by the outflowing jets. The green colors trace a combination of hydrogen gas molecules and dust that follows the boundary of the gas cloud cocooning the young star. The reddish-colored areas, created by excited carbon monoxide gas, reveal that the gas in the two lobes blown out by the star's jets.

- It's a bouncing baby . . . star! Combined observations from NASA's Spitzer Space Telescope and the newly completed Atacama Large Millimeter/submillimeter Array (ALMA) in Chile have revealed the throes of stellar birth as never before in the well-studied object known as HH 46/47.
- Herbig-Haro (HH) objects form when jets shot out by newborn stars collide with surrounding material, producing small, bright, nebulous regions. To our eyes, the dynamics within many HH objects are obscured by enveloping gas and dust. But the infrared and submillimeter wavelengths of light seen by Spitzer and ALMA, respectively, pierce the dark cosmic cloud around HH 46/47 to let us in on the action.
- The Spitzer observations show twin supersonic jets emanating from the central star that blast away surrounding gas and set it alight into two bubbly lobes. HH 46/47 happens to sit on the edge of its enveloping cloud in such a way that the jets pass through two differing cosmic environments. The rightward jet, heading into the cloud, is plowing through a "wall" of material, while the leftward jet's path out of the cloud is relatively unobstructed, passing through less material. This orientation serves scientists well by offering a handy compare-and-contrast setup for how the outflows from a developing star interact with their surroundings.
- The views of HH 46/47 by ALMA have revealed that the gas in the lobes is expanding faster than previously thought. This faster expansion has an influence on the overall amount of turbulence in the gaseous cloud that originally spawned the star. In turn, the extra turbulence could have an impact on whether and how other stars might form in this gaseous, dusty, and thus fertile, ground for star-making.

NASA's IRIS Mission Data Now Publicly Available



IRIS images of the solar interface region taken on October 2, 2013. Far right: an image of the sun's east limb (rotated) in CII (chromosphere with a temperature of 20,000K). Left and center: images of spectra taken along the position of the slit (dark line in the right image). The left panel shows the spectrum near Mg II (chromosphere, ~10,000K) and the middle panel shows the spectrum near Si IV and O IV lines (transition region, ~65,000K and 150,000K respectively). Credit: NASA/IRIS.

- On Oct. 31, 2013, the Interface Region Imaging Spectrograph, or IRIS, mission began sharing its data with the world. Launched on June 27, 2013 to join a network of solar spacecraft and ground-based observatories, IRIS is now providing unprecedented insight into a little understood region of the sun called the interface region.

- Tracing the flow of energy through this region, which is located between the sun's surface and the higher atmosphere, the corona, has long-term implications for understanding what feeds so much heat into the corona and what drives the solar wind.

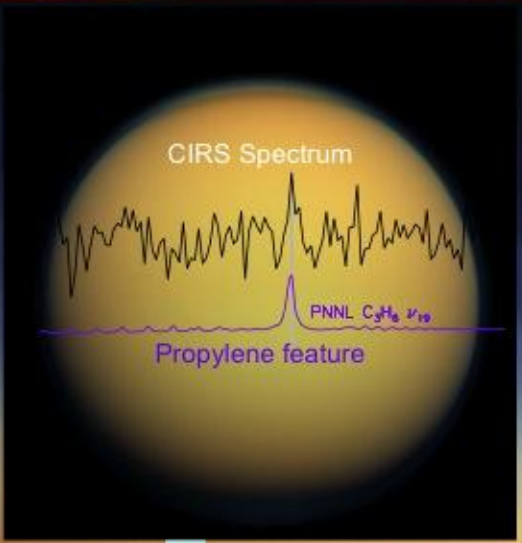
- Understanding the interface region is crucial as it is believed to power much of what happens in the rest of the sun's atmosphere, and it also generates most of the ultraviolet light that impacts Earth. The region is a violently dynamic layer in which different temperatures of hot solar material are mixed over a range of heights, stretching from the sun's surface to many thousands of miles up. In addition, certain areas are up to a million times more dense than others.

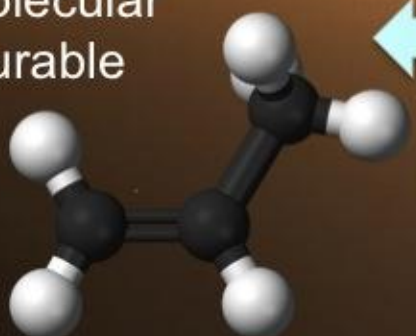
- With its state-of-the-art instrumentation, IRIS is mapping out how heat and energy moves through the region for the first time. Such measurements dovetail with other solar observatories – including NASA's Solar Dynamics Observatory, NASA's Solar Terrestrial Relations Observatory, the ESA/NASA Solar and Heliospheric Observatory, and the JAXA/NASA Hinode mission -- to help scientists create a robust, collaborative investigation into understanding the mysteries of the sun.

- Making simultaneous observations with IRIS and other observatories, provides a unique opportunity to discover significant missing pieces in our understanding of energy transport on the sun. Studying the region is also important for a better understanding of what triggers solar flares and coronal mass ejections, or CMEs. Flares are giant bursts of light and radiation that can disrupt radio communications near Earth. CMEs are massive clouds of solar particles that can cause aurora near Earth, or at their worst, power surges in utility grids.

Cassini Discovers Familiar Hydrocarbon on Titan!

- Cassini's Composite Infrared Spectrometer (CIRS) Team detected a new molecule, propylene (propene), in Titan's upper atmosphere.
- This is the first definitive identification of propylene gas in a planetary atmosphere outside Earth, as this molecule was notably absent from the measurements of the atmosphere made during the Voyager flyby.
- Propylene is an important raw material in the chemical industry. When linked together in long molecular chains called polypropylene, it forms a durable plastic that can be molded into food storage containers, like Tupperware.
- Flybys of Titan continue to reveal subtleties of the complex chemical factory in Titan's atmosphere.





Detection of Propene [Propylene] in Titan's Stratosphere
C. Nixon, D. Jennings, B. Bézard, S. Vinatier, N. Teanby, K. Sung, T. Ansty, P. Irwin, N. Gorius, V. Cottini, A. Coustenis, F. M. Flasar. Astroph.J.Lett. 776, 2013

GPM Teaches Tots at GSFC's Childcare Center

September 16, 2013

Over sixty little people became cloud experts as they learned about the water cycle and how scientists classify clouds at their childcare center.

We read stories, sang songs, acted out the water cycle, and talked about the different kinds of clouds.