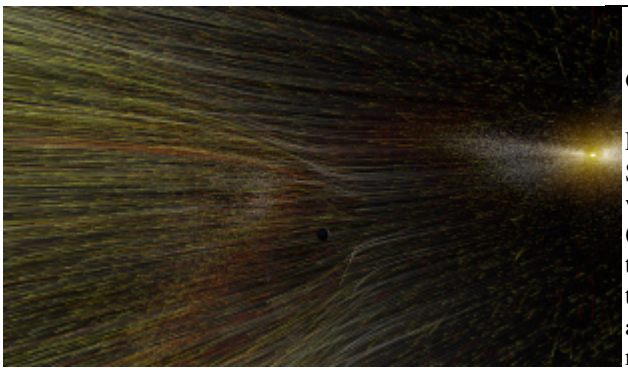
1

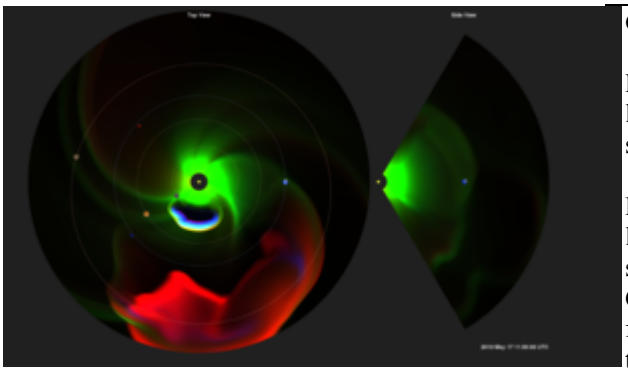


http://svs.gsfc.nasa.gov/goto?3902

CME strikes the Earth!

Energetic events on the Sun have impacts throughout the Solar System. This visualization utilizes data from space weather models based on a real coronal mass ejection (CME) event from mid-December 2003. Particles are used to represent the flow of solar material from the Sun around the Earth. The flowing material of the CME are actually ions and electrons far too small to see. This visualization tries to represent the motions of these tiny particles in a form large enough for us to see.

2



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CME Research Model

Mid-May 2013 marked a series of active solar events, the likes of which have not been seen since near the peak of solar cycle 23 in October-November of 2003.

Five distinct coronal mass ejections, or CMEs, were launched from the sun from Active Regions AR 1748 starting May 13, 2013, through May 20, 2013. Some of the CMEs were associated with preceding M- and X-class flares. The CMEs were not a major threat to Earth technologies as most of them missed Earth, but they did impact various NASA satellites around the solar system. The last of the series of CMEs brushed by Earth.

3

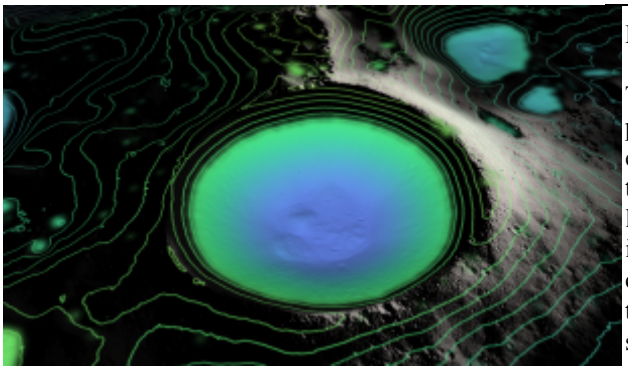
http://svs.gsfc.nasa.gov/goto?4118

Moon's Phase and Libration

The animation archived on this page shows the geocentric phase, libration, position angle of the axis, and apparent diameter of the Moon throughout the year 2014, at hourly intervals.

The Moon always keeps the same face to us, but not *exactly* the same face. Because of the tilt and shape of its orbit, we see the Moon from slightly different angles over the course of a month. When a month is compressed into 24 seconds, as it is in this animation, our changing view of the Moon makes it look like it's wobbling. This wobble is called **libration**.

4



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Moon's Permanently Shadowed Regions

The Moon's permanently shadowed regions, or PSRs, are places on the Moon that haven't seen the Sun in millions, or even billions, of years. The Earth's tilted axis allows sunlight to fall everywhere on its surface, even at the poles, for at least part of the year. But the Moon's tilt relative to the Sun is only 1.6°, not enough to get sunlight into some deep craters near the lunar north and south poles. PSRs are therefore some of the coldest, darkest places in the solar system.

Because of that, PSRs are expected to be excellent traps for volatiles, chemicals that would normally vaporize and escape into space, and this includes water. Lunar Reconnaissance Orbiter (LRO) includes several instruments designed to peer into the PSR darkness and measure temperature, reflectivity, and neutron absorption, all of which are clues to what chemicals might be hiding there. This animation shows where the PSRs are and in what ways LRO can see inside them.

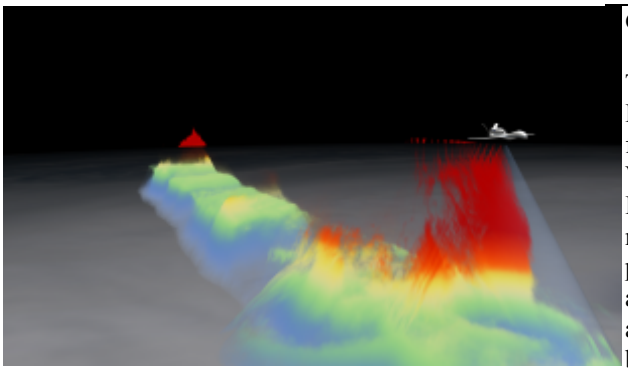
5

http://svs.gsfc.nasa.gov/goto?10929

Lunar Topography

Although the moon has remained largely unchanged during human history, our understanding of it and how it has evolved over time has evolved dramatically. Thanks to new measurements, we have new and unprecedented views of its surface, along with new insight into how it and other rocky planets in our solar system came to look the way they do.

6



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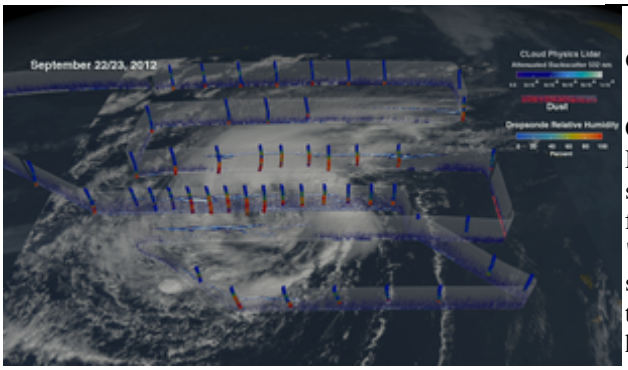
Global Hawk Measures Convection in "Hot Tower"

The dual-wavelength (Ku and Ka band) High-Altitude Imaging Wind and Rain Airborne Profiler (HIWRAP) flew for the first time on the Global Hawk Unmanned Aerial Vehicle (UAV) during the 2010 Genesis and Rapid Intensification Processes (GRIP).The HIWRAP is able to measure line-of-sight and ocean surface winds for a longer period of time than obtained by current satellites and lower-altitude instrumented aircraft. HIWRAP is conical scanning, and winds and reflectivity can be mapped within the swath below the Global Hawk. This visual will highlight the UAV measuring Hurricane Karl's HIWRAP KU observations on September 16, 2010.

7



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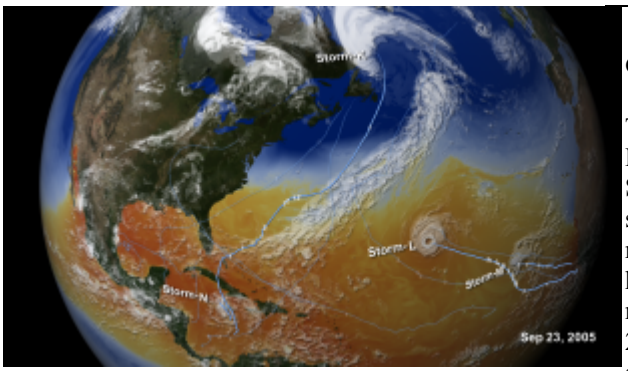
Global Hawk Observes the Saharan Air Layer

On Sept. 11 and 12, during the 2012 HS3 mission, the NASA Global Hawk aircraft covered more than one million square kilometers (386,100 square miles) going back and forth over the storm in a gridded fashion in what's called a "lawnmower pattern." Dropsonde data from HS3's flights show temperature and humidity conditions in the storm. In this movie, the dropsondes are colored with the relative humidity data where blue represents dry air and red represents moist air.

8



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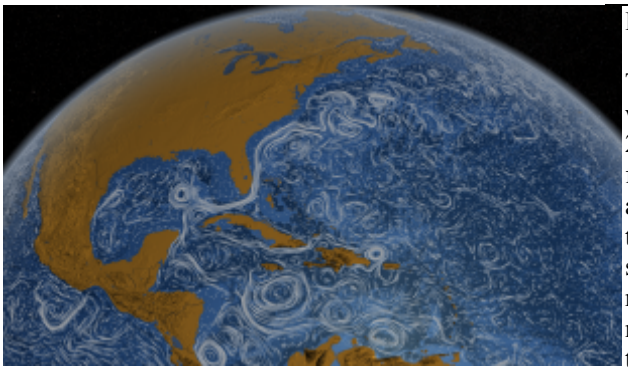
GEOS-5 Hurricane Simulation

This visualization shows a Goddard Earth Observing System Model, Version 5 (GEOS-5) run of the 2005 Hurricane Season driven by Sea Surface Temperatures (SST). The simulation was seeded at the beginning of the run and then ran on its own to create the 6 months of output visualized here. What's interesting is that even though the model did not perfectly duplicate all 27 storms from that very active 2005 hurricane season, it does show 23 storms during that same period.

9



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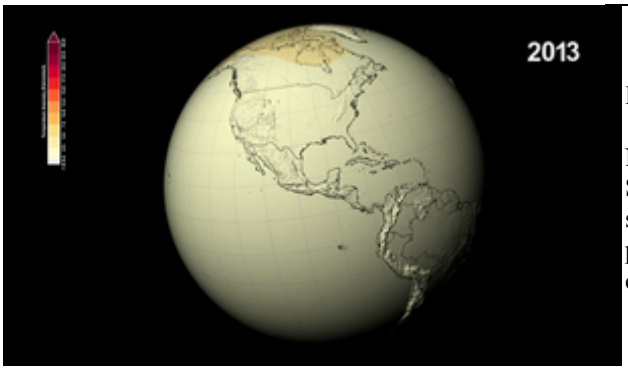
Perpetual Ocean

This visualization shows ocean surface currents around the world during the period from June 2005 through December 2007. This visualization was produced using model output from the joint MIT/JPL project: Estimating the Circulation and Climate of the Ocean, Phase II or ECCO2. ECCO2 uses the MIT general circulation model (MITgcm) to synthesize satellite and in-situ data of the global ocean and sea-ice at resolutions that begin to resolve ocean eddies and other narrow current systems, which transport heat and carbon in the oceans. ECCO2 provides ocean flows at all depths, but only surface flows are used in this visualization.

10



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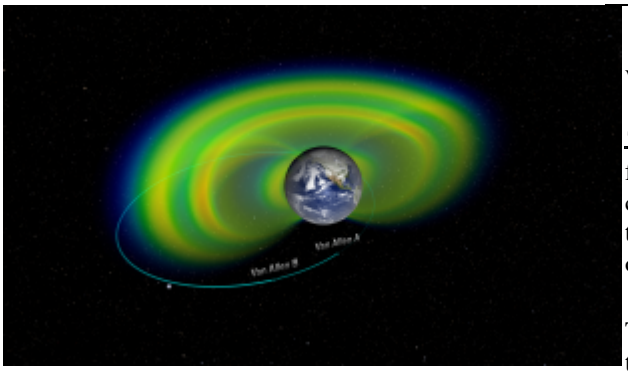
IPCC Temperature Projection

New data visualizations from the NASA Center for Climate Simulation and NASA's Scientific Visualization Studio show how climate models estimate how temperature and precipitation patterns could change throughout the 21st century.

11



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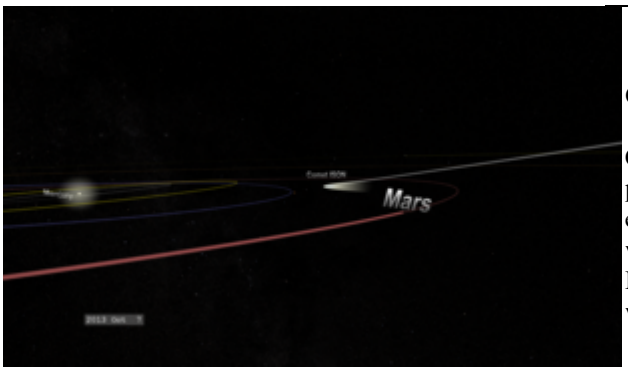
Van Allen Probes View Radiation Belts

.This visualization is constructed from some of the first data from the Van Allen Probes (formerly RBSP). The belts are constructed from particle samples by the probes as they pass through the belt, so each 3-D snapshot corresponds to the outward or inward portion of the probes' orbit.

The major result from this early data is the recognition of a third radiation belt (the outer belt appears to actually be two belts).

12



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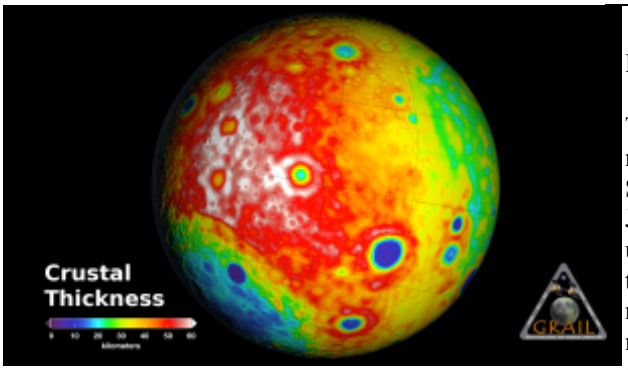
Comet ISON

Comet ISON approaches the inner solar system having just passed the orbit of Jupiter. It passes very close to Mars in early October 2013 before dipping below the ecliptic on its way towards perihelion on November 28, 2013. Comet ISON will make its closest pass to the Earth in January 2014 when it should be visible in the northern hemisphere.

13



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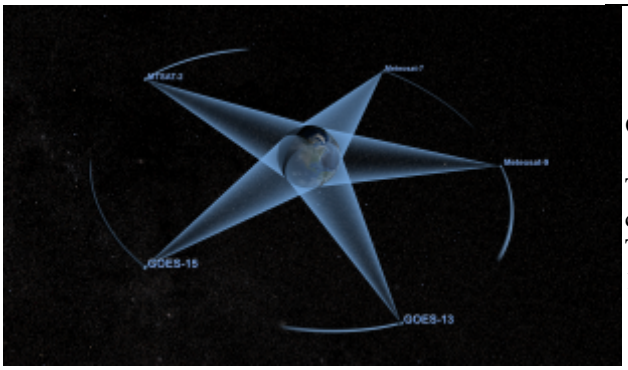
Lunar Maps

The Gravity Recovery and Interior Laboratory (GRAIL) mission comprises a pair of satellites launched in September, 2011 and placed in orbit around the Moon in January, 2012. The two satellites, named Ebb and Flow, used radio signals to precisely measure their separation as they flew in formation, one following the other in the same nearly circular polar orbit. These measurements allowed mission scientists to build up an accurate and detailed gravity map of the Moon..

14



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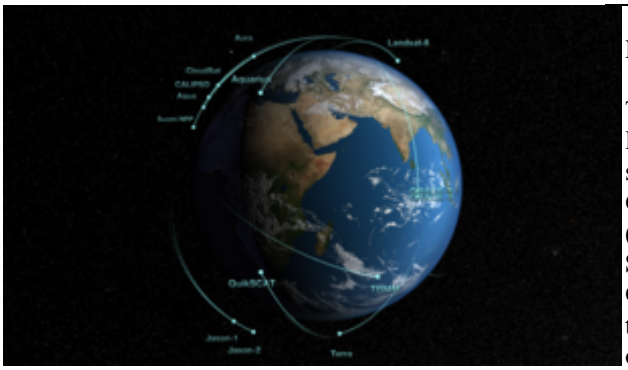
Orbits of Weather Satellites

This visualization showcases the five weather satellites that create NOAA's Climate Prediction Center (CPC) products. The five geosynchronous satellites are: GOES-13, GOES-15, Meteosat-7, Meteosat-9 and MTSAT-2.

15



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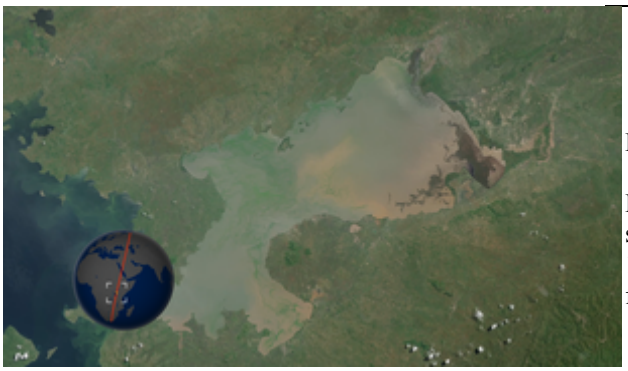
NASA Earth Observing Fleet

This animation shows the orbits of NASA's current (as of May 2013) fleet of Earth remote sensing observatories. The satellites include components of the A-Train (**Aqua**, **Aura**, **CloudSat**, **CALIPSO**), two satellites launched in 2011 (**Aquarius**, **Suomi NPP**), and nine others (**ACRIMSAT**, **SORCE**, **GRACE**, **Jason 1** and **2**, **Landsat 7**, **Landsat 8**, **QuikSCAT**, **TRMM**, and **EO-1**). These satellites measure tropical rainfall, solar irradiance, clouds, sea surface height, ocean salinity, and other aspects of the global environment. Together, they provide a picture of the Earth as a system.

16



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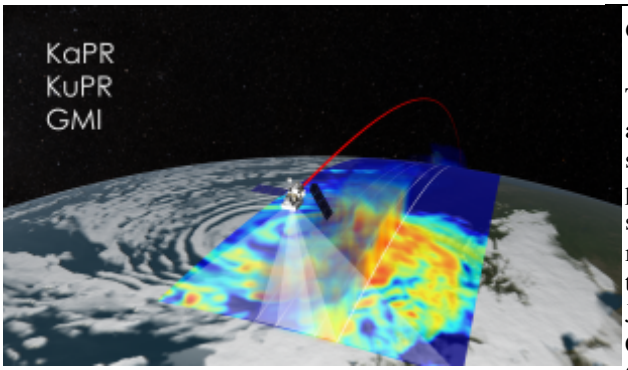
Landsat-8 Long Swath

Landsat-8 launched February 11th, 2013. This visualization shows one of the first full swaths of data taken on April 19th, 2013, only one week after Landsat-8 ascended to its final altitude of 438 miles (705 km).

17



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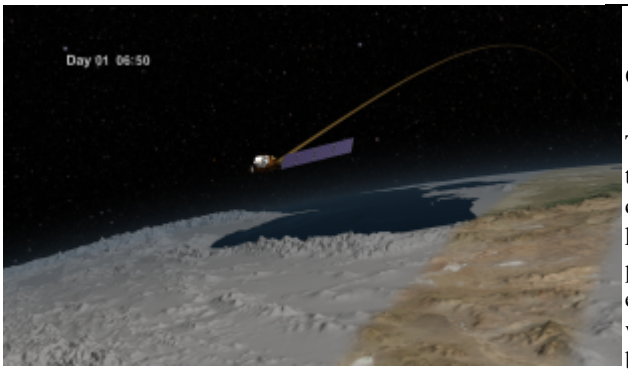
GPM Instruments

This animation shows the scanning capabilities of the GMI and DPR onboard the GPM Core satellite. Heavy rainfall is shown in red and light rainfall in blue. The DPR shows 3D precipitation in a midlatitude storm from two overlapping swaths. The Ka-band frequency scans across a region of 78 miles (125 kilometers) and is nested within the wider scan of the Ku-band frequency of 147 miles (245 kilometers). JAXA and Japan's National Institute of Information and Communications Technology (NICT) built the DPR. The GMI, shown as the flat precipitation values,constantly scans a region 550 miles (885 kilometers) across.

18



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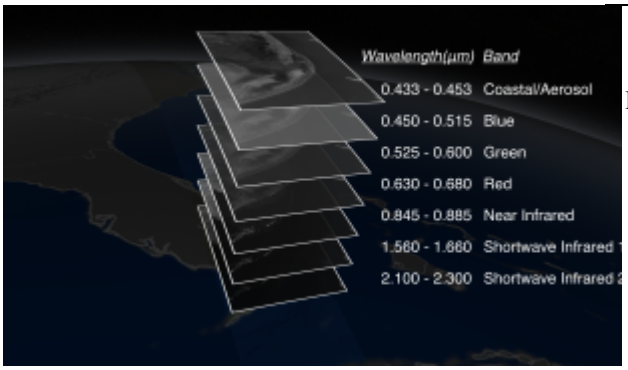
Orbits of Landsat-8

This animation portrays how the Landsat-8 satellite orbits the Earth 13 times per day at an altitude of 705 km collecting landcover data. With a cross-track width of 185 km, the satellite completely covers the globe in a 16 day period compiling a total of 233 orbits. A day number and the elapsed time are shown to clearly depict the passage of time which starts slowly in the beginning and increases to day-by-day steps at the end of the animation.

19



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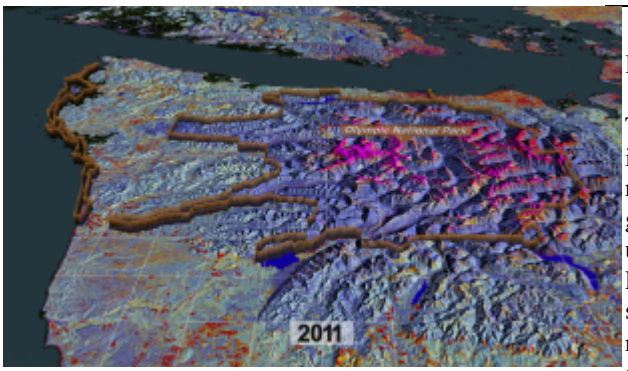
Landsat-8 Band Remix

Landsat satellites view the Earth through a number of different bands, each band capturing imagery in different spectral wavelengths. Scientists can combine these bands in a number of ways to obtain information about the satellite imagery. This visualization shows several different band combinations over the Florida Everglades.

20



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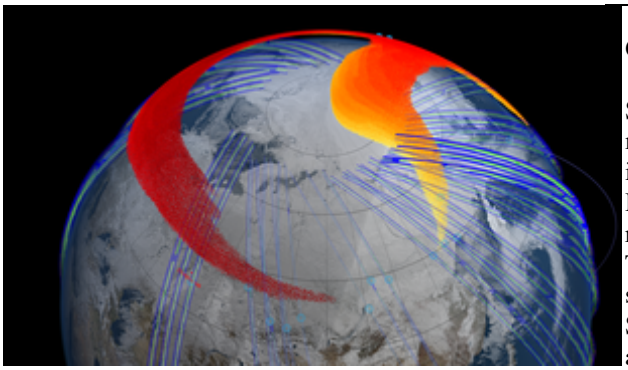
Landsat Land Use Change: 25 Years

This visualization shows a sequence of Landsat-based data in the Pacific Northwest. There is one data set for each year representing an aggregate of the approximate peak of the growing season (around August). The data was created using a sophisticated algorithm called LandTrendr. LandTrendr analyzes 'stacks' of Landsat scenes, looking for statistical trends in the data and filtering out noise. The resulting trends identify periods of stability and change that are displayed as colors.

21



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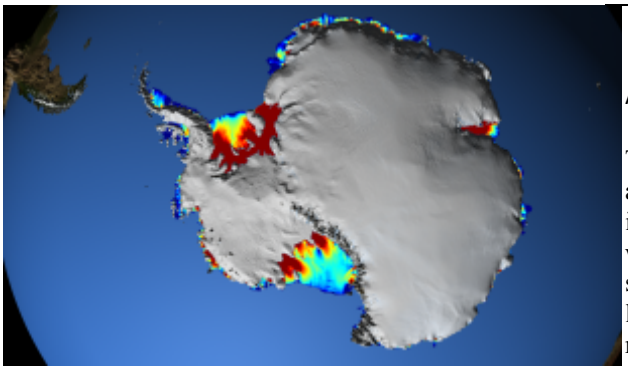
Chelyabinsk Bolide Plume

Shortly after dawn on Feb. 15, 2013, a bolide measuring 18 meters across and weighing 11,000 metric tons, screamed into Earth's atmosphere at 18.6 kilometers per second. Burning from the friction with Earth's thin air, the space rock exploded 23.3 kilometers above Chelyabinsk, Russia. The event led to the formation of a new dust belt in Earth's stratosphere. Scientists used data from the NASA-NOAA Suomi NPP satellite along with the GEOS-5 computational atmospheric model to achieve the first space-based observation the long-term evolution of a bolide plume.

22



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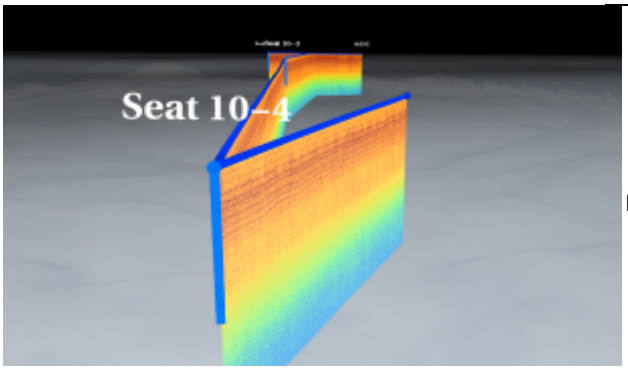
Antarctic Ocean Flows

This animation shows the circulation of ocean currents around the western Antarctic ice shelves. The shelves are indicated by the rainbow color; red is thicker (>550m), while blue is thinner (<200m). The ocean flow runs from the surface to 900 m, colored white at the surface and fading to light blue at depth, and is based on the ECCO2 model over a representative two-month period.

23



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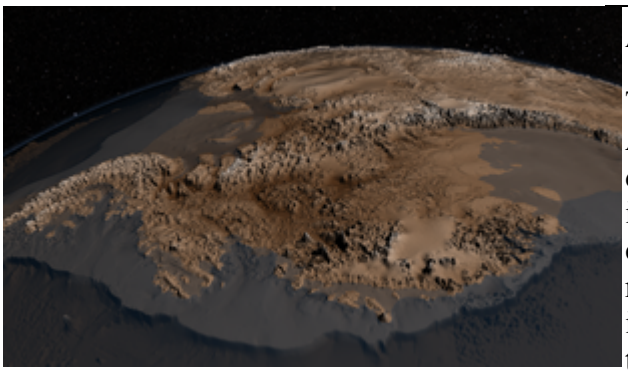
Ice-Penetrating Radar

24



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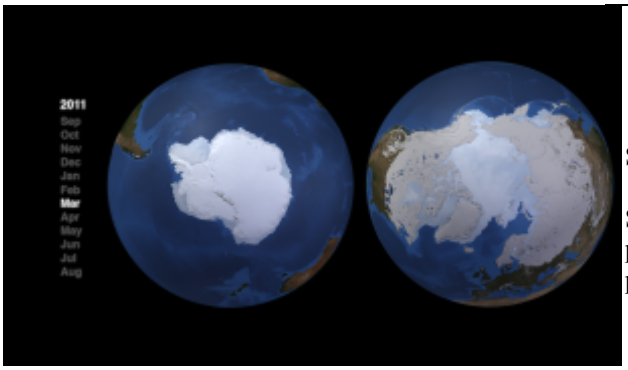
Antarctic Bedrock

The topography of the bedrock under the Antarctic Ice Sheet is critical to understanding the dynamic motion of the ice sheet, its thickness and its influence on the surrounding ocean and global climate. The British Antarctic Survey (BAS) released an update of the topographic dataset that incorporates twenty-five million measurements taken over the past two decades from the ground, air and space.

25



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Sea Ice

Snow and sea ice in the Northern and Southern Hemispheres pulse at exact opposite times of year, constantly out of phase.

26

http://svs.gsfc.nasa.gov/goto?4055

Snow Cover

To determine the density of green on a patch of land, researchers must observe the wavelenths of visible and near-infrared sunlight reflected by the plants. The pigment in plant leaves, chlorophyll, strongly absorbs visible light (from 0.4 um - 0.7 um). Vegetation strongly reflects near-infrared light (from 0.7 -1.0 um). The more healthy leaves a plant has, the more the the visible light will be absorbed and the near-infrared will be reflected. In this animation, dark green indicates dense, healthy vegetation, whereas beige areas represent bare soil. Snow from the MODIS instruments is overlaid on top.

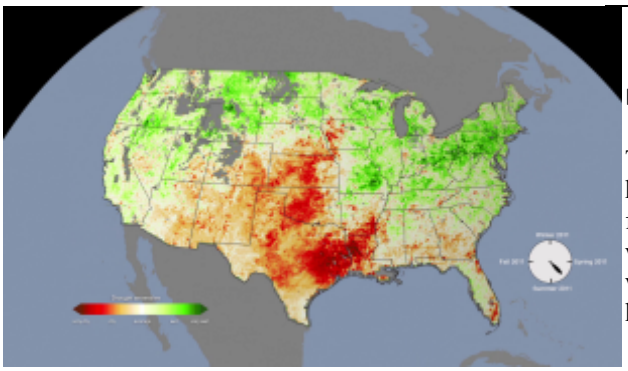
27

http://svs.gsfc.nasa.gov/goto?4011

Active Fires

The visualizations depict fires that burned between January 1 and October 31, 2012, as detected by the MODIS instruments. The fires are displayed over MODIS' vegetation and snow cover data. Yellow and orange indicates fires that were more intense and had a larger area of active burning. Most of these intense fires occurred in the western United States, where lightning and human activity often sparks blazes that firefighters cannot contain. Many of the lower intensity fires shown in red were prescribed fires, lit for either agricultural or ecosystem management purposes.

28



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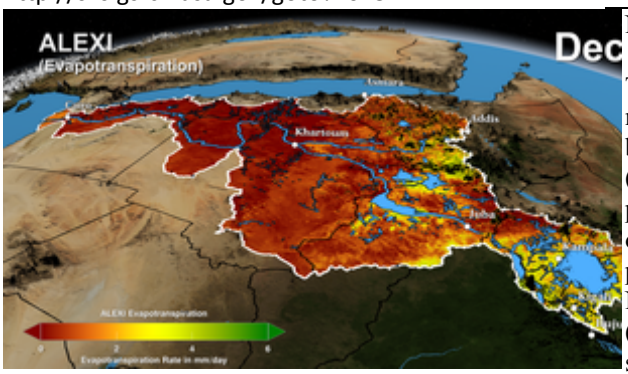
Drought

The Evaporative Stress Index (ESI) provides objective, high-resolution information about the evaporation of water from land surface. The ESI model combines satellite data with other meteorological factors to determine how much water is used by crops and vegetation. The resulting data helps to detect drought.

29



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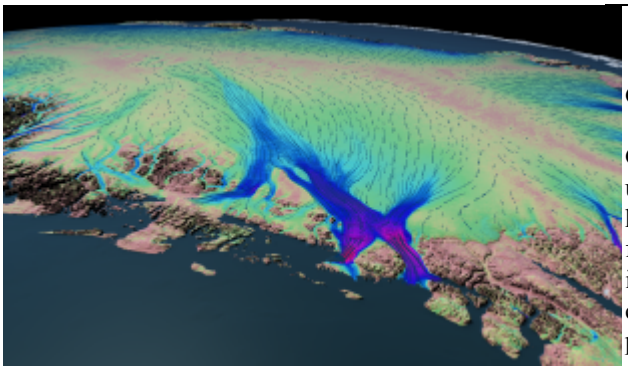
Nile Basin Water Balance

This visualization shows how satellite data and NASA models are being applied to study the hydrology of the Nile basin. The Tropical Rainfall Measurement Mission (TRMM) Multisensor Precipitation Analysis (TMPA) provides three-hourly estimates of rainfall rate across much of the globe. Here we see the seasonal cycle of monthly precipitation derived from TMPA for Africa, including the Nile Basin. The Atmosphere Land Exchange Inverse (ALEXI) evapotranspiration product, developed by USDA scientists, uses satellite data to map daily evapotranspiration across the entire Nile basin, providing unprecedented information on water consumption.

30



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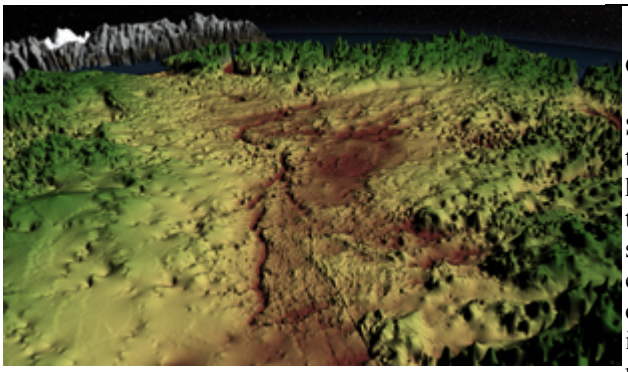
Greenland Ice Sheet Flow

Greenland looks like a big pile of snow seen from space using a regular camera., but satellite radar interferometry helps us detect the motion of ice beneath the snow. Ice starts flowing from the flanks of topographic divides in the interior of the island, and increases in speed toward the coastline where it is channelized along a set of narrow, powerful outlet glaciers.

31

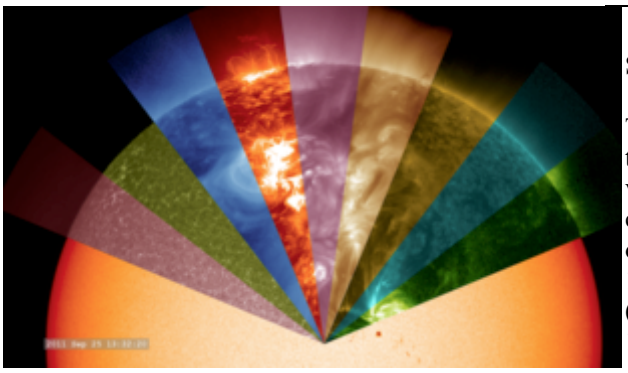


http://svs.gsfc.nasa.gov/goto?4097

Greenland's Mega-Canyon

Subglacial topography plays an important role in modulating the distribution and flow of meltwater beneath the ice known as basal water flow. This animation portrays topographic data of the bedrock under the Greenland ice sheet derived from ice-penetrating radar data. Clearly evident in the topography is a 750-km-long subglacial canyon in northern Greenland that is likely to have influenced basal water flow from the ice sheet interior to the margin.

32

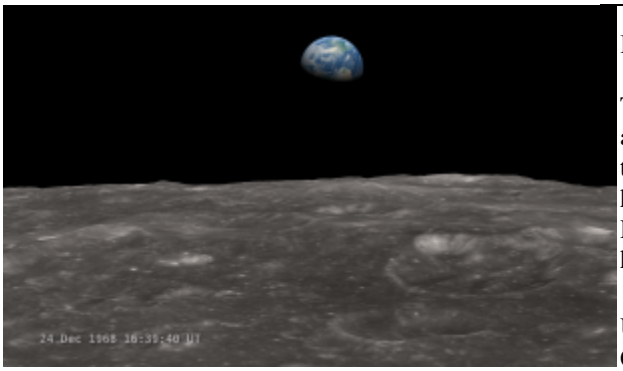


http://svs.gsfc.nasa.gov/goto?4117

Solar Dynamics Observatory

The Solar Dynamics Observatory (SDO) sees connections in the solar atmosphere through the many filters of SDO. This visualization illustrates a mechanism for highlighting these connections. The wavelengths presented are: 617.3nm optical light from SDO/HMI. From SDO/AIA we have 170nm (pink), then 160nm (green), 33.5nm (blue), 30.4nm (orange), 21.1nm (violet), 19.3nm (bronze), 17.1nm (gold), 13.1nm (aqua) and 9.4nm (green).

33



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Earthrise

The famous color photograph known as Earthrise, as well as a black-and-white image taken a minute earlier, document the moment when Earth was seen for the first time by human eyes from behind the Moon. They were taken on December 24, 1968 by the crew of Apollo 8, the first humans to leave low Earth orbit.

Using the latest elevation data from Lunar Reconnaissance Orbiter, this visualization attempts to recreate what the astronauts saw.