

Exploring space with Google Sky

# NIGHT SKY

Google has maps and photos of nearly all of the earth's surface. Now, Google Sky lets you explore space, with the Moon and Mars enjoying a special status. **BY CARSTEN SCHNOBER**

**E**verybody knows Google Maps. The project by the search engine giant Google has caused much ado in recent years because it maps the whole of the earth with varying degrees of accuracy. But Google wouldn't be Google if it were happy with what it had achieved. And it only makes sense for Google to push its mapping project's limits into space.

## Next Generation

Google Maps' [1] less well known sibling is Google Sky [2] (see Figure 1). To access Google Sky, surf to [http://www.](http://www.google.com/sky/)

[google.com/sky/](http://www.google.com/sky/) in your browser and your journey into space can begin.

Google Sky is controlled much the way you do Maps: To navigate, either click with the left mouse button and drag or use the arrows in the navigation bar at the top left of your screen. The vertical bar just below lets you scale the current view, or you can use the mouse wheel for this. If you are looking for a specific astronomical object, you can type its name in the search bar. It can be a single heavenly body such as *Neptune*, a whole constellation like *Libra*, or a whole galaxy like the *Milky Way*.

At the bottom edge of the screen is a list of ready-to-take tours. For example, if you click *Hubble Showcase*, you are treated to a selection of particularly impressive shots from the telescope in earth orbit [3], such as the Carina Nebula, including a description of its region in space.

*Earth & Sky Podcasts* takes you to a collection of spoken word contributions explaining individual space phenomena in greater detail. For example, you can discover how water first appeared on the earth, how lunar eclipses occur, and whether or not Neptune might have oceans in about eight billion years.

## Time Issues

The enormous distances in space cause virtually unsolvable problems in this kind of cartography. For example, images showing a galaxy that is a million light years away can only show you what the heavenly body looked like a million years ago.

Physical obstacles make it impossible to map space just in visible light. For this reason, modern telescopes also record waves from other frequency bands. Google Sky will show you infrared and microwave radiation from space if you click the *Infrared* and *Microwave* buttons, respectively, at the top right of the screen. Infrared images are provided by the Infrared Astronomical Satellite (IRAS) [4] space telescope, which has been in orbit since 1983. It was the first satellite to record mid-distance to far infrared waves from space.

Microwave images are provided by the Wilkinson Microwave Anisotropy Probe (WMAP) [5]. It left earth in 2001 and is still broadcasting data home. Mainly, its data is used to investigate cosmic background radiation, and irregularities in the data have been interpreted in the microwave map of space.

It has already provided mankind with some significant knowledge in the field of astronomy concerning matters such as the material composition of the universe and its age and geometric properties.

On top of this, Google Sky will superimpose a star chart on the images of space if you press the *Historical* button. The original was created by painter Giovanni Maria Cassini back in 1792.

For the three views *Infrared*, *Microwave*, and *Historical*, you can set the

transparency of the region in question with the sliders below the buttons. Pushing the slider to the right causes the historical chart to cover the photographic material; pushing it to the left sends the chart to the background.

## Moon Travel

In recent years, science has made considerable progress in exploring the heavenly bodies closest to the earth, with the most detail available for the moon, it being our next door neighbor. If you click *Moon* at the top left in the Google Sky interface, you are beamed to a Google Sky subpage, Google Moon [6] (Figure 2).

Google Moon uses the same controls as Google Maps. Of course, the quality of these images can't compete with images of the earth; despite the relative proximity of the moon, most images do not give scientifically perfect results.

Google Moon has three independent levels: *Apollo*, *Visible* and *Elevation*. The first level marks the places on the moon where US astronauts landed on the surface of the moon during the Apollo missions between 1969 and 1972. The bottom part of the window has the entries *Apollo 11* through *Apollo 17*, which take you directly to the moon landing marks. *Apollo 13* is missing from this series because the mission in 1970 was prevented by an accident from making the planned moon landing.

If you click one of the landing sites, an information window gives you an overview of the data for the mission in question, such as the landing and return dates, and the names of the astronauts on board.

To discover more detail about the mission in question, zoom in to each of these marks. This includes photos taken by the astronauts, as well as descriptions of the rocks they found and of objects the moon travelers left behind on the surface.

## Visible

If you switch to *Visible* mode, you will see images taken by the space probe *Clementine* in 1994. It orbited the moon and recorded almost all the moon's surface before it crashed because of a computer error.

These images also form the underpinnings for the *Apollo* view; switching

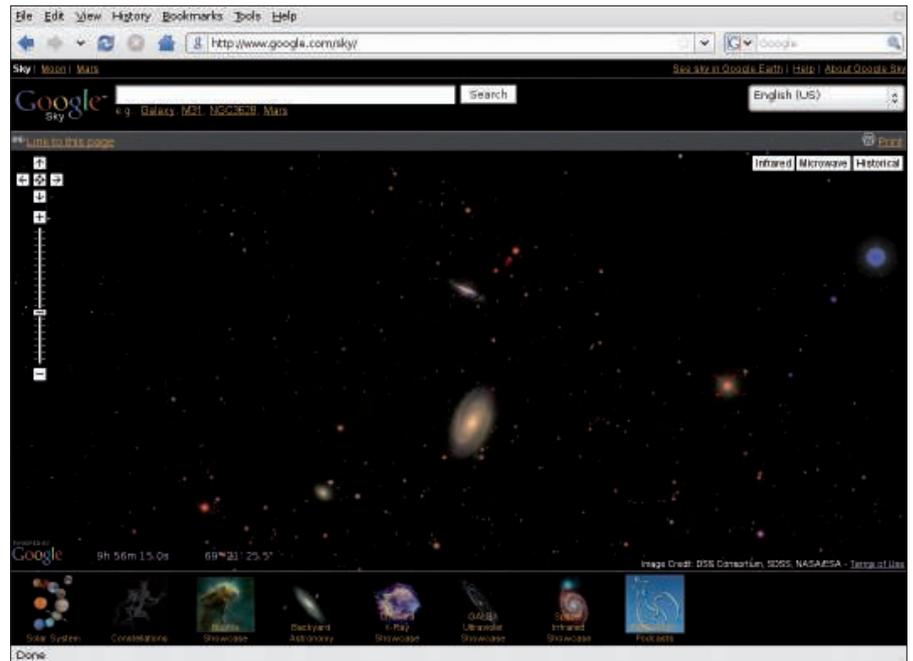


Figure 1: Google is reaching for the stars with its Sky project. Following the same principle as Google Maps, Google Sky lets you explore the heavens in your web browser.

mode simply hides the landing marks. This just leaves the *Elevation* mode, a view that colors the moon's surface according to topography. A legend on the left maps the colors to elevations.

If you are interested in the moon's geology and topography, you can press the *Charts* button in each mode to view charts to map.

To accomplish this, Google Sky shows the maps that NASA drew in the 1960s

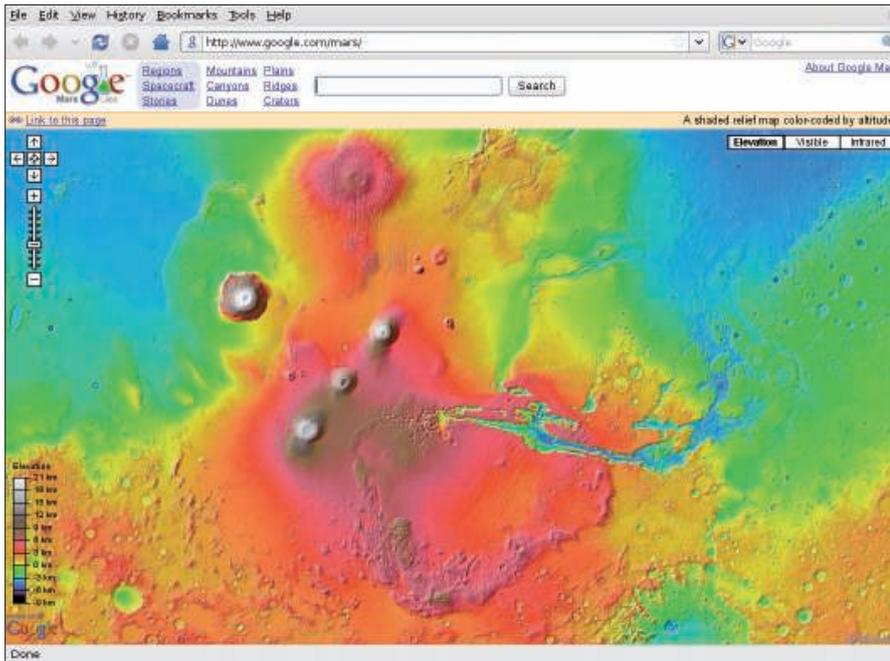
when they were planning the first moon landing.

The moon maps show the side of the moon that is visible from the earth in great detail. They divide the surface into sectors that you can navigate by double-clicking the overview map on the bottom right of the screen.

In the *Geologic* view, you are told what kinds of rock and minerals exist in each region. To hide this information, change



Figure 2: Google Moon shows information about the moon landings. NASA used existing maps at the time to plan the famous Apollo missions.



**Figure 3:** Google Mars has images of our nearest neighbor in the solar system. The best way of exploring the mountainous planet is by either elevation differences or infrared images.

to the topographic map. All of this material is also available for downloading from the Lunar and Planetary Institute's collection of maps [7].

## Mars

Google Sky also dedicates a subpage to Mars (Figure 3). Google Mars is accessible either directly [8] or by pressing the *Mars* link on the Google Sky main page. Just like Sky and Moon, Google Mars supports three view modes.

The default is *Elevation*, and it works just as for the Moon page: Various colors illustrate the differences in height; elevation differences are much more pro-

nounced on Mars than on the earth or the moon. Mountains that tower 20 kilometers, and valleys that plunge down 10 kilometers keep the *Elevation* view bright and colorful.

To view photographs of the surface of Mars, switch to *Visible*. Even though color images of Mars exist, because the Red Planet lacks color variability, Google space travelers see a monochrome view. Doing without the color information helps the details show up better on the surface.

If you switch to the *Infrared* view, Google Mars shows you images that reflect the varying temperatures on the

planet's surface. The light regions represent the hotter areas, and the darker ones are cooler. In Mars's case this method has the advantage of preventing interference by cloud and atmospheric dust; in fact, it gives you the clearest view of the earth's neighboring planet.

## Not Just in Your Browser

Like Google Maps, Google Sky and company does not require that you install software because you can launch them in your web browser. However, a locally installable version of Google Earth [9] facilitates investigating Google Maps data by providing a couple of extra features. Google Earth version 4.2 now supports space (Figure 4); however, surface images of the moon and Mars are still missing.

To leave the earth for space, select *View | Change to Sky*. The controls remain the same; if you type a search key in the window, such as the name of a heavenly body or a constellation, the program moves the screen view to the location you entered. Navigation also uses the same keyboard shortcuts and mouse movements as you use on the earth view. The *Layers* area adjusts to match the space view so that you are not given the choice of earthly cartographic elements such as streets or borders; instead, you can hide or display entire planets, galaxies, constellations, and historic charts. ■



**Figure 4:** Google Earth also lets you explore the universe. In the space view, the client has direct access to the material from Google Sky.

## Info

- [1] Google Maps: <http://maps.google.com>
- [2] Google Sky: <http://www.google.com/sky/>
- [3] Hubble space telescope: [http://www.nasa.gov/mission\\_pages/hubble](http://www.nasa.gov/mission_pages/hubble)
- [4] Infrared Astronomical Satellite: <http://irsa.ipac.caltech.edu/IRASdocs/iras.html>
- [5] Wilkinson Microwave Anisotropy Probe: <http://map.gsfc.nasa.gov>
- [6] Google Moon: <http://moon.google.com>
- [7] Moon chart catalog by the Lunar and Planetary Institute: <http://www.lpi.usra.edu/resources/mapcatalog>
- [8] Google Mars: <http://mars.google.com>
- [9] Google Earth: <http://earth.google.com>