# Space odyssey

**There's a wealth of stunning 3D images on the web. Benjamin Woolley tells you where to find them.**

Nothing in life is free – except on the internet. It remains (though probably for not much longer) an important resource for the 3D enthusiast with more imagination than money. Web sites offer not only free clip libraries but, perhaps more precious still, a range of textures and in particular displacement maps.

## Black and white

These are images, usually in greyscale, that 3D authoring software can use to calculate the degree to which a flat plane should be displaced. This is done by mapping the image onto the plane and then calculating the height of each vertex by looking at the luminosity of the corresponding pixel on the image: white means it is displaced (that is, elevated,



▲**Fig 1** The satellite image of the Grand Canyon as it appears on the TerraServer

assuming the orientation of the plane is flat and the displacement is upwards); black means it stays where it is.

**Displacement maps** are ideal for creating terrains. The problem is finding ones that are detailed enough and have contours that produce a natural-looking result. Fortunately, there are a few sites on the internet with an extraordinary range of images that are ideal for this sort of job. One of them, called the TerraServer, is at www.terraserver.microsoft.com. It is currently hosted by
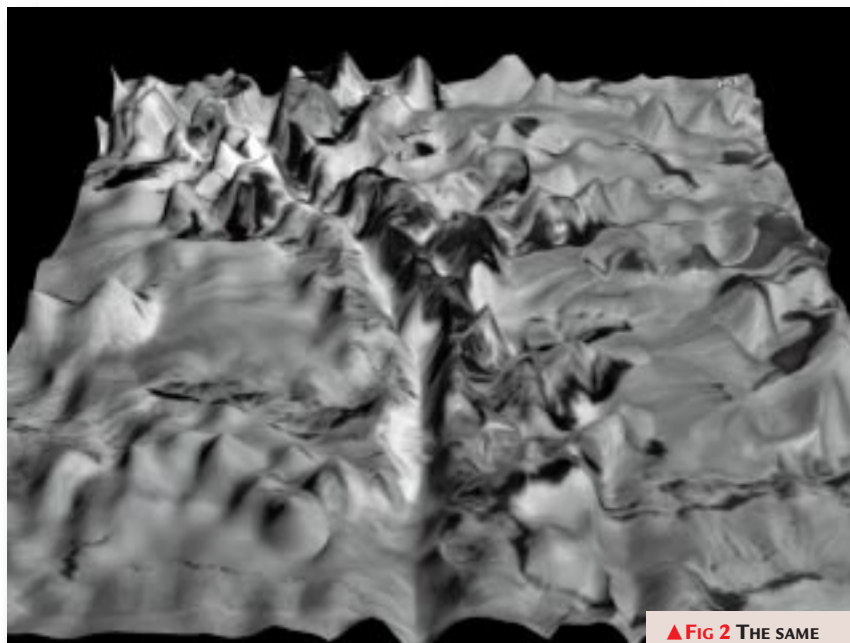


▲**Fig 2** The same image used with a displacement map to recreate a **3D** model of the canyon. the image has also been used as a texture map

Microsoft, which is using it to show off its database software. The TerraServer is described as the largest online database in the world. amounting to an astronomical 3.5 terabytes, a terabyte being a thousand gigabytes. It contains satellite and other remote sensing images of Earth, many from the US Geological Survey (USGS). Since this is a public body, it cannot profit from its work, so the enormous array of images it has

## The TerraServer contains satellite and other remote sensing images of Earth

produced and which are now finding their way onto the TerraServer, are available for free. There are also images supplied by SPIN-2, a joint venture between American and Russian space agencies, which boasts the highest resolution of any commercially available satellite images in the world, down to just two meters. The SPIN-2 images are not free, although you can download low-

resolution copies for just a few dollars and pay for them with a credit card via a secure server. The TerraServer has some great black-and-white images. It also has a useful set of search tools for finding particular spots, either using a map or by name. I used USGS's picture of the Grand Canyon [Fig 1] to create the terrain in Fig 2. The result is not, it has to be said, an accurate 3D model of the Canyon, as the way the original terrain was lit by the sun produces anomalies. Shadows, for example, are translated by the displacement software as hollows. Furthermore, I had to invert the image because the sun had illuminated one wall of the canyon, producing a bright peak at the point where the canyon plunges down. These are problems you are bound to find in images lit from a single source, but with patient work using your 2D graphics package you should be able to overcome many of them.
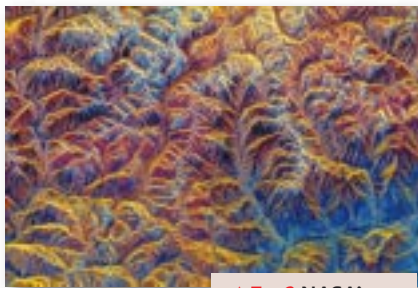
▲ **FIG 3 NASA'S IMAGE OF TIBET'S MOUNTAINOUS LANDSCAPE**

**An even better source** of satellite imagery than the TerraServer, at least from a 3D artist's perspective, is NASA. Its Multimedia Gallery at www.nasa.gov/gallery/index.html has a huge array of images, many of them in colour. For example, there are various pictures of the planets, perfect astronomical material for creating texture maps for spheres. There is also a wide choice of images of the Earth's surface, such as the one in Fig 3 which shows the uplands of Tibet. As you can see in Fig 4, you need not use such images merely to create displacement maps and terrain textures. They can be used for stunning textures for other objects too. Here I have used a greyscale version of the same image to create an opacity map, giving a glassy look to the material.

**All the images** on the NASA web site are free. You will no doubt find other images elsewhere that seem to be just as freely available, but remember that unless it is explicitly stated that images can be used without charge, they are likely to be copyrighted. If you use them as part of a texture, there is a remote chance of litigation if the resulting image is widely distributed. To be on the safe side, it is best to stick to public institutions. The US government boasts plenty of them, many offering interesting material that is yours for the taking. God Bless America.

## New wave

This summer, 4th Wave www.fourthwave.com, which publishes a regular newsletter for the graphics industry, announced the passing of a milestone in the history of 3D graphics. A large majority of PCs now being sold — the company estimates as many as 60 percent — are 3D enabled. In other words, they have some sort of hardware acceleration. Just a couple of years ago,



▲ **FIG 4 TIBET'S LANDSCAPE MAPPED ON TO A VASE**

it was just a tiny minority of workstations that could boast this capability. Now, it comes as standard with even the cheapest home PC.

**Among the many** developments that have helped achieve this, the chief one must be the emergence of a new industry standard. In the old days, each game that used 3D hardware had to be written for a particular chip's instruction set. If you did not have that chip in your graphics card, tough luck; the game could not run, or even manage a brisk walk. Direct3D, Microsoft's 3D API for Windows 95 and NT, has changed all that. It comes as standard with Windows 98 and will

### *All the images on the NASA web site are free*

have found its way onto just about every Windows 95 that has run a popular game. Direct3D means there is a single, standard interface between the software — not just games, but also 3D authoring software — and whatever hardware acceleration is installed in the system.

**The other main component** to open up 3D to a wider audience is of course the proliferation of 3D chips. These chips often cost less than $30 and are all but standard components in modern graphics cards. The infrastructure is in place for 3D to become as commonplace as 2D graphics. An extra dimension has

been added to the desktop. Unfortunately, no one yet seems to know what to do with it other than to play Quake-style action games.

**About a year ago**, Caligari and Yahoo! announced an ambitious project to develop a 3D interface for the Yahoo! web site. The idea was that, using your browser, you would enter a VRML version of Yahoo!, with buildings representing each Yahoo! category (arts, sciences, recreation, sports) and objects within those buildings representing subcategories: a ballerina for dance, a storm cloud for weather, and so on. The site contained a total of 450 such objects and promised to provide a new means of navigating the information it contained. But since the initial test period, the scheme seems to have disappeared. The URL advertised in the original press release, 3d.yahoo.com/3d/, is no longer valid, and there is no mention of it on the main Yahoo! site. Clearly, this was an idea ahead of its time. Perhaps with Direct3D-accelerated systems opening up a new space on people's PCs, time is about to catch up.

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