

# How was this image created?

The human brain is the very best image processor known. To take advantage of this great human ability, researchers at NASA's Goddard Space Flight Center (GSFC) have designed tools to make images of complex datasets. These images help scientists (and you!) better understand natural processes. The image of Hurricane Fran on the front of this poster was created using data collected from a NOAA-GOES satellite (National Oceanic and Atmospheric Administration's Geostationary Operational Environmental Satellite). The colors and 3-dimensional "look" of this image are the end result of a lot of computer processing done in the Mesoscale Atmospheric Processes Branch at GSFC. Making images like this one helps us use satellite data to understand the processes occurring in our ever-changing atmosphere.

The GOES satellite actually collects five separate images whenever it collects data. Each of the five images (called *channels*) is collected by a sensor that is sensitive to a different wavelength of light. Only one channel is sensitive to light that we humans can see with our eyes. That channel is called the *visible channel*. Another channel is sensitive to light energy in the infra-red (IR) range, specifically a wavelength of 7.6  $\mu\text{m}$  (that's 7.6 millionths of a meter). IR data can be used to calculate the temperature of surfaces in the image. Since colder clouds are higher clouds and warmer clouds are lower clouds, the temperature data can be used to estimate the height of the clouds. This height estimate is used by computer programs to make a model of the heights of the clouds in the image. Then the data from the IR channel is combined with two other channels to make a color image. This color image is just like your TV or computer screen which has one beam that makes red dots, one that makes green dots, and one that makes blue dots. Red, blue, and green can combine to make millions of different colors. (Look closely at your computer screen with a magnifying glass—you'll be able to see individual red, blue, and green dots).

A different computer program takes the color image and "drapes" it over the model of the cloud heights. Still another computer program accepts the image-covered model of cloud heights as input, and allows us to pick a "vantage point" for looking at the model of cloud heights. For this image, we chose a vantage point which is several hundred kilometers east and south of the center of the storm and way up in space. The computer program then calculated what the storm would look like from there, and displayed the image on a computer screen. The final step in creating this image was to load the "vantage-point image" into a commercial graphics program for personal computers. This program allowed us to make artistic changes to the image, such as making the land appear greener, the water appear bluer, and clouds appear white. These are not "real" colors, because the NOAA-GOES satellite isn't sensitive to red, green, and blue light like our eyes. But with a little help from computers, and a lot of talent from the artists, this hurricane image takes on colors similar to those that we would expect to see if we could look at a hurricane from way out in space. Many other hurricane images and movies can be found online in the image catalog at <http://rsd.gsfc.nasa.gov/rsd/>