



GRAPHICS BY NASA/GISS

CLOUD



WATER



ICE/SNOW



LAND





World Cloud Cover Pattern

This illustration, produced by the Goddard Institute for Space Studies New York, NY, as a part of NASA's program of Earth-science research, show the world's cloud cover pattern on October 15, 1983, assembled from weather satellite images made at infrared wavelengths. Although a single image of Earth's cloud cover had been assembled from multiple satellite images before, this picture is the first time that an image had been collected for such a small time period, in this case only about one hour. This kind of information enables scientists to study global cloudiness to improve our understanding of how clouds affect climate.

The images were taken from two National Oceanic and Atmospheric Administration (NOAA) polar orbiting satellites and the geostationary satellites: METEOSTAT, operated by the European Space Agency; GMS, operated by the Japanese Meteorological Agency; and Geostationary Operational Environmental Satellite (GOES)-EAST and GOES-WEST operated by NOAA. The colors show the temperature at each location depending on whether clouds are present or not. Areas not covered by clouds are either oceans or land depending upon their location or ice or snow covered according to other data sets. They are represented by an aqua color scale for ice or snow, a blue color scale for water, and a yellow color scale for land. For cloudy locations, colder

temperatures are indicated by brighter grey shades. Thus, the same temperature value may have four different colors depending on its classification. All temperatures scales are expressed in degrees Kelvin.

The data illustrated in this picture have been collected by the International Satellite Cloud Climatology Project of the World Climate Research Program since July 1983. Analysis of these data provides an unprecedented view of the world's cloud formations. Although scientific study of clouds has been carried out with both ground and aircraft instruments for many decades, only with the use of satellites in the last 15-20 years have scientists been able to see the larger scale and global view of cloud structures.

This study is part of NASA's multiyear global research program called Mission to Planet Earth that will use ground-based, airborne and space-based instruments to study Earth as a complete environmental system. Mission to Planet Earth is NASA's contribution to the U.S. Global Change Research Program, a multi-agency effort to understand, analyze, and better predict the effect of human activity on Earth's environment. Goddard Space Flight Center's projects for Mission to Planet Earth include: the Upper Atmosphere Research Satellite Mission; Earth Probes, such as the Tropical Rainfall Measuring Mission; the Total Ozone Mapping Spectrometer; and the Earth Observing System, the most ambitious science mission ever undertaken.

For The Classroom

Research topics:

- Cloud formation
 - Latent heat
 - Satellite orbits
1. Have students keep a daily log in which they measure and record the temperature and observe percent cloud cover the same time each day. Continue this for one month and then graph the results. Do the students see any trends or relationships?
 2. Have students research the different types of satellite orbits. Why are two different orbits (polar orbiting and geostationary) used to get images like the one on this lithograph.
 3. After discussing the characteristics of low pressure systems, have students find a major low pressure system on the lithograph.
 4. How many different colors can be used to represent 295 degrees Kelvin on this lithograph?