Radical. In addition to converting CO to carbon dioxide (CO2), a prominent greenhouse gas, the OH radical is also a key participant in the destruction and removal of the greenhouse gas methane (CH4). CH4 itself is important in the chemical cycle of stratospheric ozone.

As the amount of carbon monoxide in the atmosphere increases, its reaction with the OH radical may increase accordingly. This may leave less OH available to break down and remove greenhouse gases from the atmosphere. Therefore, increases in carbon monoxide levels may cause subsequent decreases in OH levels, which can have long-term consequences on stratospheric ozone and the levels of various greenhouse gases, potentially influencing the Earth’s climate.

The average lifetime of a CO molecule is quite variable, but on average is on the order of a few weeks. Since it takes much longer than that for a chemical to completely mix throughout the lower atmosphere, the distribution of CO concentrations show the locations of the sources. The major sink is weak and very widespread, and has no distinctive pattern. Thus, using advanced mathematical models it is possible not only to locate the sources of CO, but also to estimate their distribution. In addition, by monitoring how the patterns of CO concentration change with time, scientists can build up an understanding of how the atmosphere transports this and other chemicals from one area of the planet to another.

About MOPITT
The new global air pollution monitor onboard Terra is the innovative Measurements of Pollution in the Troposphere (MOPITT) experiment, which was contributed to the Terra mission by the Canadian Space Agency. The instrument was developed by Canadian scientists at the University of Toronto and built by COM DEV International of Cambridge, Ontario. A team at the U.S. National Center for Atmospheric Research (NCAR) processed the data. MOPITT is an infrared gas correlation radiometer that is making the first long-term global observations of carbon monoxide and methane as Terra circles the Earth from pole to pole, 14.4 times every day. From these measurements the sources, motions and sinks of CO can be determined.

For the Classroom
Human Impact
Carbon monoxide is a gaseous byproduct from the burning of fossil fuels, in industry and automobiles, as well as burning of forests and grasslands. Notice in the March 23, 2000 image that levels of carbon monoxide are much higher in the Northern Hemisphere as compared to the Southern Hemisphere. speculate on why such a large difference exists. Answer: Human population and industry is much greater than in the Southern Hemisphere. However, in the October 3, 2000 image notice the immense plumes of the gas in the areas around South America and Southern Africa. Speculate on why these high-concentration plumes exist. Answer: CO is being emitted from forest and grassland fires burning in the rain forests.

Resources
Terra Website: http://terra.nasa.gov
NASA’s Earth Observatory: http://earthobservatory.nasa.gov

Image Credit: MOPITT Science Team, National Center for Atmospheric Research, Boulder, Colorado.