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ARM Facilities Newsletter

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Atmospheric Radiation Measurement Program

ARM

MOPITT Revisited

The February 1998 issue of this newsletter discussed the Measurement of Pollution in the Troposphere (MOPITT) instrument that was to be tested at the SGP CART site before being launched aboard a NASA satellite to make precise, detailed measurements of tropospheric carbon monoxide and methane from space. The instrument was successfully launched on NASA's Terra satellite on December 18, 1999, by an Atlas IIAS rocket from Vandenberg Air Force Base in California and began collecting data at the end of February 2000. The instrument was designed by Dr. Jim Drummond, a physicist at the University of Toronto.

The MOPITT Validation Exercise (MOVE) Campaign is schedule to take place at the SGP site from April 30 to May 18, 2001. Researchers will measure carbon monoxide by using instruments onboard the DOE Cessna Citation aircraft and other instruments located at the SGP CART. The data gathered will be compared with those collected by the MOPITT instrument to validate its performance thus far. MOPITT, which is scheduled for a five-year mission, will provide the first long-term global measurements of carbon monoxide and methane gas levels in roughly the lowest 10 miles of the atmosphere.

Carbon monoxide and methane and their roles as greenhouse gases in global warming are of great interest. Greenhouse gases can trap escaping heat from Earth's surface, potentially increasing atmospheric temperatures.

Carbon monoxide is a by-product of combustion, resulting primarily from industrial processing or biomass burning. Carbon monoxide levels in the atmosphere have been rising, indicating a problem. Normally, carbon monoxide is removed from the atmosphere by the hydroxyl radical, which can react with and remove many pollutants from the air.

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The hydroxyl radical is produced from ozone, whose depletion is of concern itself. The increase in carbon monoxide is using up available hydroxyl radical, decreasing the atmosphere's natural ability to cleanse itself.

Methane is a gas that is naturally produced by living sources such as rice paddies or cows. It can also be produced by human-related means such as fossil fuel extraction and landfills. Methane creation and consumption are poorly understood. Levels of methane in the atmosphere had been increasing in the past, but recently they have begun to stabilize. Although it is an important greenhouse gas, no global measurements of methane were available before the Terra launch.

MOPITT is providing a much-needed data set to our research community. Determination of sources and sinks for the important greenhouse gases MOPITT measures will be invaluable. ARM SGP is pleased to be assisting with this research. For more information on MOPITT and the Terra satellite, please see the web page http://pao.gsfc.nasa.gov/gsfc/Earth/Terra/Terra.htm.

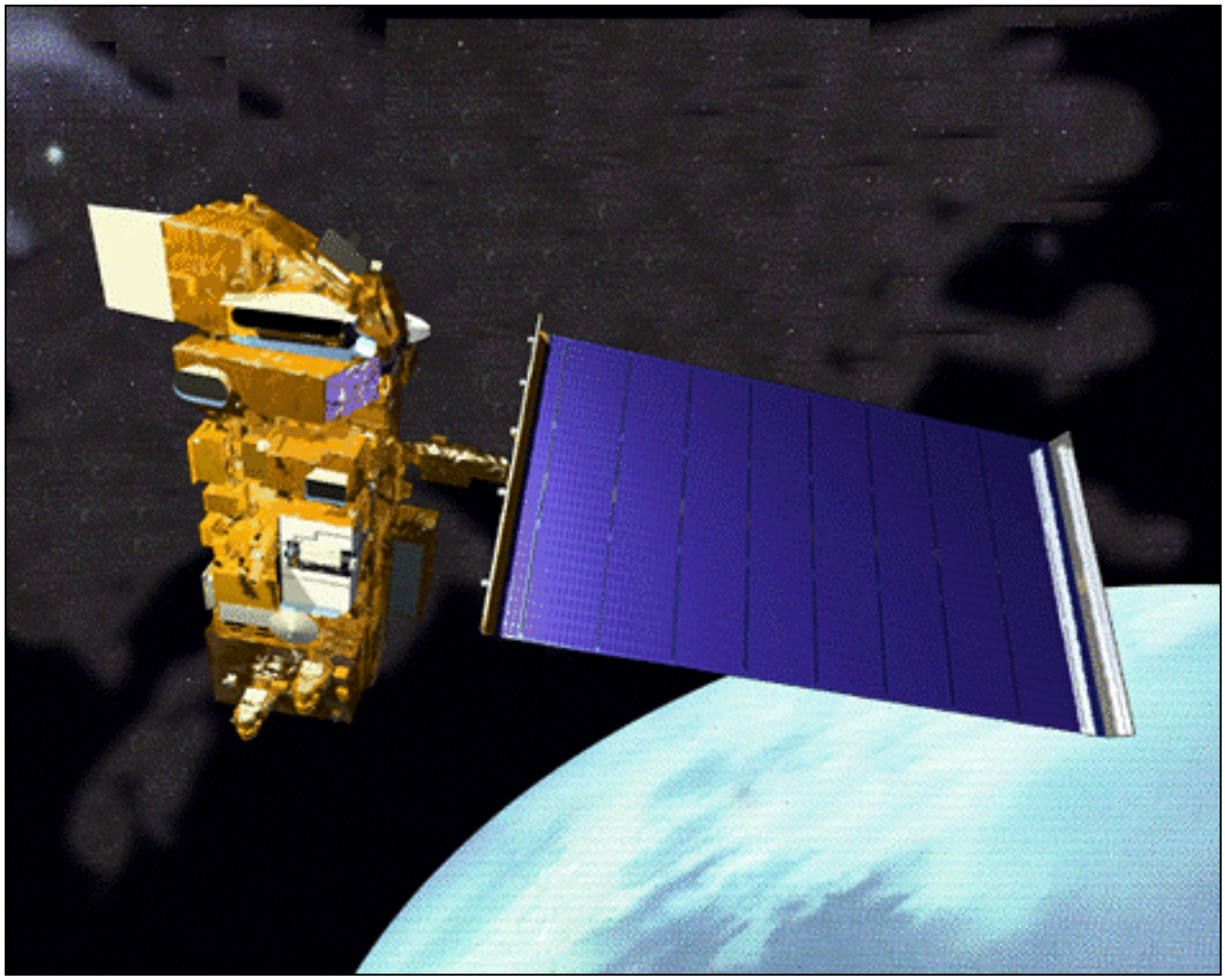


Figure 1. A schematic diagram of NASA's Terra satellite, carrying the MOPITT instrument (NASA image).