American Geophysical Union
NEWS

Public Information Office, 2000 Florida Avenue, N.W., Washington, D.C. 20009 / (202) 462-6900 / FAX 202-328-0566

October 5, 1999
AGU RELEASE NO. 99-31
For Immediate Release
Joint AGU-NASA Release

Contact: Harvey Leifert
(202) 777-7507
hleifert@agu.org

NASA contacts:
David E. Steitz
Headquarters, Washington, DC
Phone: (202) 358-1730

Allen Kenitzer
Goddard Space Flight Center, Greenbelt, MD
Phone: (301) 286-2806

Spacecraft provides first direct evidence: Smoke in the atmosphere inhibits rainfall

WASHINGTON -- For the first time, researchers have proven that smoke from forest fires inhibits rainfall. The findings, to be published in the October 15 issue of Geophysical Research Letters, are based on an extensive analysis of data taken from NASA's Tropical Rainfall Measuring Mission (TRMM) spacecraft.

The study shows that the "warm rain" processes that often create rain in tropical clouds are practically shut off when the clouds are polluted with heavy smoke from forest fires. In these clouds, scientists found, the cloud tops must grow considerably above the freezing level (16,000 feet or 5,000 meters) in order for them to start producing rain by an alternative mechanism.

"We've seen evidence of decreased precipitation in clouds contaminated by smoke, but it wasn't until now that we had direct evidence showing that smoke actually suppresses precipitation completely from certain clouds," said Dr. Daniel Rosenfeld, the paper's author and a TRMM scientist at the Institute of Earth Sciences, Hebrew University of Jerusalem.

Scientists have a keen interest in how changes in global precipitation affect human activities, such as crop production, and the global rainfall weather pattern. More precise information about rainfall and its variability is crucial to understanding the global climate and predicting climate change.

In his paper, Rosenfeld highlights one specific area: Kalimantan, Indonesia. During the satellite's overpass on March 1, 1998, the southeastern portion of the island was engulfed in smoke, while the northwestern portion was relatively smoke free. The spacecraft's radar detected precipitation in smoke-free clouds, but almost none in the smoke-plagued clouds, showing the impact of smoke from fires on precipitation over the rainforest.

> "It's important to note that this is not a unique case," said Rosenfeld. "We observed and documented several other cases that showed similar behavior. In some instances, even

less severe smoke concentration was found to have comparable impacts on clouds."

This research further validates earlier studies on urban air pollution showing that pollution in Manila, the Philippines, has an effect similar to forest fires, according to Rosenfeld.

"Findings such as these are making the first inroads into the difficult problem of understanding humanity's impacts on global precipitation," said Dr. Christian Kummerow, TRMM project scientist at NASA's Goddard Space Flight Center, Greenbelt, Maryland.

Raindrops in the atmosphere grow by two means. In the first, called the "warm rain" process, a few cloud drops get large enough to start falling. As they fall, they pick up other cloud drops until they become big enough to fall to Earth as raindrops.

The second process requires ice particles and water colder than 32 degrees Fahrenheit (zero Celsius). Ice particles surrounded by this "supercooled" water may grow extremely rapidly as water freezes onto the ice core. As these large ice particles fall, they eventually melt and become raindrops.

Scientists have known for some time that smoke from burning vegetation suppresses rainfall, but did not know to what extent until now. Thanks to TRMM observations, scientists are able to see both precipitation and cloud droplets over large areas, including clouds in and out of smoke plumes.

TRMM has produced continuous data since December 1997. Tropical rainfall, which falls between 35 degrees north latitude and 35 degrees south latitude, comprises more than two-thirds of the rainfall on Earth.

TRMM is a U.S.-Japanese mission and part of NASA's Earth Science Enterprise, a long-term research program designed to study the Earth's land, oceans, air, ice and life as a total system. Information and images from the TRMM mission are available on the Internet at URL: [http://trmm.gsfc.nasa.gov/].

****

Note to science writers:

You may obtain a copy of Daniel Rosenfeld, “TRMM Observed First direct Evidence of Forest Fires Inhibiting Rainfall” (from Geophysical Research Letters, October 15, 1999) upon request to Harvey Leifert <hleifert@agu.org>. It is not under embargo.

For further information on the science in this paper, you may contact Dr. Rosenfeld.

Email <daniel@vms.huji.ac.il>

Office phone: +972-2-658-5821

From 08:30-17:00 local time in Israel (=GMT +2 or EDT +6)

[0630-1700 GMT; 2:30 A.M.-11:00 A.M. EDT]

Home phone: +972-2-679-9015

From 18:00-23:00 local time in Israel (=GMT +2 or EDT +6)

[1600-2100 GMT; 12:00 noon-5:00 P.M. EDT]

Please verify the time before calling home number!

###

Return to Services for the Media
Return to Starting Point