dailycampus
news page2 commentary a&e sports classifieds archives feedback staff

Tuesday, September 25, 2001

Professors' project gives NASA a 'FIRST'

Technology: Engineering professors create a new type of radiation sensor

By De'Borah Bankston

Senior Staff Writer

A planet's atmosphere can be mapped in much the same way that photographic images of the Earth are made. A satellite will soon be able to make passes around the planet taking infrared images of the atmosphere due to efforts of SMU electrical engineering professors Don Butler and Zeynep Celik-Butler.

The two have created a new type of ultracooled infrared radiation detector or sensor that works in the far-infrared spectrum.

"This device is the first of its kind and will establish the baseline used by future scientists for measuring chemicals in the Earth's atmosphere," Butler said.

The project is called Far-Infrared Spectroscopy of the Troposphere also known as FIRST.

According to Butler, the Earth requires not only light or solar radiation, but also

DC Photo courtesy of Electrical Engineering Department

SMU professors Don Butler and Zeynep Celik-Butler have created a type of ultracooled radiation detector, a sensor that can detect the far-infrared spectrum.

invisible infrared radiation that is reflected back into space from the surface of the Earth. FIRST is a new sensor designed to measure elements that previously could not be measured in the Earth's atmosphere by further defining the light spectrum.

Celik-Butler said the light spectrum has been traditionally been divided into three bands: the light waves, ultraviolet light waves and far-infrared wavelengths.

The FIRST sensors further define the spectrum in smaller bandwidths.

In the past, scientists could only measure infrared wavelengths up to 20 micrometers. A micrometer is one-millionth of a meter.

FIRST measure values from 15 to 100 micrometers. This portion of the spectrum is referred to as "far-infrared."

"Direct observations of the far-infrared will enable scientists to better understand how the Earth's climate responds to factors such as the buildup of greenhouse gases," said Marty Mlynczak, at NASA's FIRST coordinator.

Butler says that FIRST measures radiation through a series of optical devices that converts radiation to a heat signature with its own unique place in the spectrum.

It then sends the data to other devices and eventually to scientists on Earth for interpretation. The sensors are placed on silicon wafers and placed in a spectrometer.

The spectrometer is being created throught he combined effortsof NASA's Langley Research Center in Hampton,Va., the harvard Smithsonian Astrophysical Observatory, Utah State Univerity's Space Dynamics Laboratory and G&A Software.

New device info: Giving NASA a helping hand

- The Butlers' device detects some biological microoganisms, including Anthrax and toxic gases like Zyclon-B. The detector recognizes the heat signatures the toxins emit.

- It can provide highly accurate measurements of blood content and essential bodily fluids.

- Scientists will now be able to reliably measure the changes in the atmosphere, discerning if the greenhouse effect is true or not.

- It can also help determine the degree of water pollution.

- The sensors can also measure the amount of water in the soil.

- The process can be used in detecting hidden weapons in airports.

NEWS STORIES

Professors' project gives NASA a 'FIRST'

Bountiful butterflies swarm across Texas skies

SMU Short Takes

The spectrometer is then placed in a weather balloon, next on a plane and eventually on a satellite for the purpose of testing the atmosphere.

The gases absorb radiation in different quantities says Butler. FIRST sensors can measure the quantity and quality of gases present in atmospheric environment based on its chemical content.

Some biological micro-organisms such as Anthrax and toxic gases such as Zyclon-B can be detected from the weather balloon or plane based on the heat signature they emit.

Medical personnel could utilize this technology to measure the quality of blood and other essential fluids in a person more accurately than current technology allows. It can also measure quantities of pollutants in the air.

Scientists can use this beneficial information to see if Earth truly has a problem with the greenhouse effect and pollutants made by the earth and human kind.

For many years scientists have debated if the thinning of the Earth's atmosphere commonly known as the greenhouse effect, is naturally occurring or induced by the pollutants contributed by people.

Of the pollutants in the air, people create approximately 10 percent. \The remaining 90 percent occur as a result of volcanoes, tree pollens, rice fields, etc.

Greenhouse gases in the atmosphere can now be accurately quantified and qualified based on the amount of water vapor and other chemicals in the air.

Scientists will now be able to reliably measure the changes in the atmosphere and be able to determine what causes the most major problems in the earth's atmosphere.

"This technology significantly reduces weight, power and volume requirements used by other near absolute zero systems for the simple fact that it does not contain a cryogenic plant to keep everything cool," said Don Butler. "You also increase the lifetime of the experiment because you are not concerned with running out of coolants. You can't just run out and fill 'er up in space."

The Butlers will receive $421,000 over the next two years to develop the sensors for NASA.

At that point, it will take NASA and the other participants approximately two to three years to complete their portion of the project.

This technology is a follow-up for a system that is currently being tested by NASA known as the Cloud and Earth Radiant Energy System or CERES which was also designed by the Butlers.