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Coupled with Delayed HESSI Launch, Will Leave Cap in Solar Studies, Says UNH Scientist

By *[Sharon Keeler](#)*
UNH News Bureau

DURHAM, N.H. -- When University of New Hampshire space scientist Mark McConnell learned last month that NASA would bring down its Compton Gamma Ray Observatory (CGRO), he was disappointed, but not surprised.

The 17-ton satellite, which houses UNH's Compton Imaging Telescope (COMPTEL), had already exceeded its original mission by four years. When one of its three gyroscopes failed last year, NASA made a decision to safely direct the satellite back into Earth's atmosphere this June, where debris that survives reentry will be scattered over the ocean 2,500 miles southeast of Hawaii.

On the same day NASA announced its decision to terminate the Compton Observatory, McConnell also learned that the agency's High Energy Solar Spectroscopic Imager (HESSI) spacecraft had sustained damage during vibration testing. Its launch, originally scheduled for July, would be delayed at least until January 2001.

McConnell, associate research professor in the Space Science Center of UNH's Institute for the Study of Earth, Oceans and Space, had recently won a grant to study data from the HESSI mission.

"It makes the CGRO de-orbiting even more painful," says McConnell, who has worked on COMPTEL for nine years. "Both spacecraft study high energy gamma-ray emissions from solar flares. With the loss of CGRO and the delay in HESSI, it means a substantial gap in the study of high energy emission from the sun -- right at the time of solar maximum."

UNH is a member of the research team that built, and now operates, the COMPTEL experiment on CGRO. McConnell and EOS scientists Jim Ryan, John Macri and Dan Morris have made several important contributions to the study of gamma-ray bursts, black holes and solar flares.

"Gamma-ray bursts, we now believe, based in large part on data returned from CGRO, are some of the most energetic phenomena in the universe and may represent the cataclysmic collision between black holes or between black holes and neutron stars," says McConnell. "My own work has concentrated on studies of accreting black hole sources -- black holes that are sucking in matter from orbiting companion stars and heating that matter to very high temperatures, before it gets lost forever down the black hole."

McConnell adds that COMPTEL has mapped out the distribution of radioactive aluminum in our galaxy, allowing scientists to explore sites, such as supernovae, where heavier elements of the periodic table are synthesized.

UNH studies of solar flares also have provided great insight into how charged particles are accelerated to very high energies.

McConnell's research with HESSI will involve similar studies focused on the polarization of X-rays associated with solar flares.

"This may give us some clues on the physical mechanisms which are responsible for the flare itself -- the way in which huge amounts of energy are released in the solar atmosphere," says McConnell. "Some of these particles eventually make their way to Earth, where they may disrupt communication networks, satellites, power grids, etc."

Between the time of the CGRO de-orbit -- May 26, the last day of science data -- and the launch of HESSI, there will be only limited data on high energy emission from solar flares. The solar cycle peaks later this year during this gap.

"There are some high energy detectors on the Japanese 'Yohkoh' satellite, but those are limited in their

capabilities," says McConnell. "The CGRO and HESSI detectors are more sensitive and offer several capabilities -- studies of energetic neutrons, detailed studies of the spectrum of high energy gamma-rays -- that are simply not available elsewhere. We feel that a lot of very useful solar science will be lost. Personally, I am extremely disappointed."

The Compton Observatory was the second of NASA's "great observatories" and the gamma-ray equivalent of the Hubble Space Telescope and the Chandra X-ray Observatory. It was the largest astrophysical payload ever flown at that time.

McConnell adds that UNH scientists are already looking forward and are working on more advanced technology that could be used in the next-generation COMPTEL experiment.

As McConnell waits for HESSI's launch next year, he and other EOS scientists will continue to analyze data from COMPTEL, which just recently witnessed one of the best solar flares of its mission. They haven't yet had the chance to discuss a "memorial service" for COMPTEL -- a "workhorse" that's helped completely change ideas on the most important unsolved puzzles of astrophysics. McConnell expects "some of us will be huddled around the computers in UNH Morse Hall on May 26 to watch the last of the COMPTEL data displayed on the screens."

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