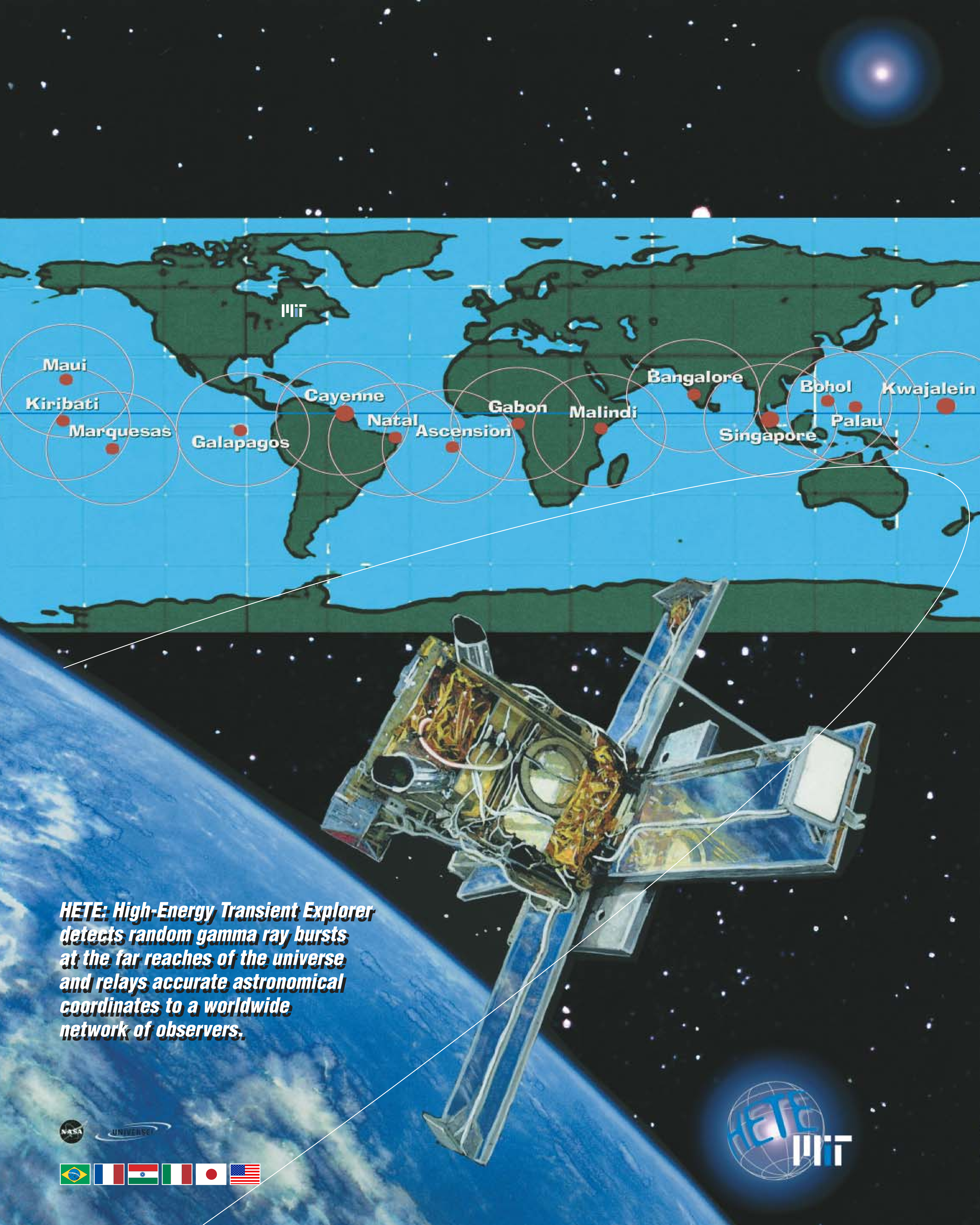

Maui
Kiribati
Marquesas
Galapagos
Cayenne
Natal
Ascension
Gabon
Malindi
Bangalore
Singapore
Bohol
Palau
Kwajalein
HETE: High-Energy Transient Explorer detects random gamma ray bursts at the far reaches of the universe and relays accurate astronomical coordinates to a worldwide network of observers.
NASA
HETE
MIT

We think of infrared radiation as heat. More energy than radio but less than visible light, infrared radiation is emitted by warm clouds of dust and gas heated by nearby stars. Cool red stars, by far the most numerous type of star, emit most of their light in the infrared. In fact, almost everything in the universe, including people, is a source of infrared radiation.

Luc St-Martin, a French-Canadian student doing some work in the University of Masuku in Gabon.

Richard and Mike in front of the Bohol antenna they set up.

Antenna of the HETE burst alert station in Bangalore - India.

Atsu holding a coconut in front of the equipment of the HETE burst alert station in Palau.

Staff member of the Charles Darwin Research Foundation standing by the antenna of the HETE burst alert station at the Galapagos - Equador.

Staff member of the Charles Darwin Research Foundation looking at the antenna before it was raised onto a pedestal.

Hot objects, such as the Sun, radiate ultraviolet light (blocked, for the most part, by our atmosphere). Some of the hottest stars shine more brightly in ultraviolet light than in visible. The centers of many galaxies glow brightly in ultraviolet light; it's a telltale sign of gas heating up as it spirals closer and closer to the central giant black hole.

The Gamma ray burst of October 4, 2002, was first detected by the detectors on board HETE. Within 11 seconds HETE sent out a worldwide message announcing the burst detection and 38 seconds later it sent the burst location. Within nine minutes scientists at the California Institute of Technology made observations of the burst followed by groups in Japan, England and other countries. The image marked BEFORE shows what that region of the sky looked like before the burst (photo credit: Palomar Digital Sky Survey). The image marked AFTER shows the GRB optical afterglow indicated by the arrow (photo credit: NEAT/Palomar 48").

Radio waves are at the low end of the electromagnetic spectrum. They are produced by electrons spiraling around magnetic field lines generated by stars, galaxies and black holes. Their long wavelengths allow radio waves to pass through a lot of the gas and dust in space that blocks shorter wavelength light—hence we can probe deep into the hearts of celestial objects by looking in the radio range.

Members of the HETE team Nat, Geoff, Joel, and the HETE project manager, Bob Dill.

Ravi Manchanda, at the Tata Institute for Fundamental Research. He is responsible for the station in Bangalore, India.

Members of the HETE team inside the HETE trailer preparing for the HETE launch in Kwajalein-Republic of the Marshall Islands.

The folks at Singapore's National University of Singapore flanked by HETE member Atsu and engineer Greg Huffman.

Luc St Martin during a break from his work with HETE in Gabon.

Japanese collaborators and the folks at the Palau National Communication Center posing by the antenna of the HETE burst alert station.

Gamma rays are the very highest energy region of the electromagnetic spectrum. Just as visible light is emitted from atoms when electrons change their orbits, so gamma rays are emitted when the atomic nucleus itself changes, such as in radioactive decay. Supernovae are a main source of gamma radiation, when unstable radioactive elements created in the violence of the explosion later decay. The supernova deaths of the biggest super-giant stars create such extremes of temperature and pressure that they can release a sudden flash of gamma radiation, called a gamma-ray burst.

On October 9, 2000, a satellite roughly the size and shape of a dishwasher was launched into near-Earth orbit to detect the largest known explosions in the universe. These occurrences, called gamma-ray bursts (GRBs), signal the extragalactic release of as much power as a billion trillion suns, but the causes of GRBs are not exactly known. The High Energy Transient Explorer (HETE)– the first satellite dedicated to the study of GRBs– helps scientists understand these incredibly powerful explosions. HETE is the result of an international collaboration of scientists and engineers at the Massachusetts Institute of Technology and other institutions in the United States, France, Japan, Italy, India and Brazil.

Microwaves are the short wavelength end of radio waves. Microwaves radiate from cool gas (cool here is close to absolute zero, -273º C.), such as the giant molecular clouds that become stellar nurseries. We also sail in a sea of microwaves, the cooled radiation that is the afterglow of the Big Bang itself. One percent of television static is from this microwave background.

A very narrow range of electromagnetic radiation is detectable by our eyes as visible light. Not only does the Sun have its peak output in this range, but our oxygen/nitrogen atmosphere is completely transparent at these wavelengths. We see planets in the visible because they reflect sunlight; stars and hot gas emit visible radiation.

August 12, 2003 | Last July 25th Berto Monard of Pretoria, South Africa, became the first amateur astronomer to discover a gamma-ray burst's fading visual afterglow. Monard identified the object from his home observatory, 7.1 hours after the initial burst.

Dubbed GRB 030725, the burst was first spotted by the NASA / Massachusetts Institute of Technology High Energy Transient Explorer spacecraft, which immediately relayed its approximate coordinates to astronomers worldwide. The American Association of Variable Star Observers (AAVSO) sent the coordinates to its own worldwide army of amateur astronomers via the organization's International High Energy Network. More than 170 amateurs in 22 countries are currently signed up to receive AAVSO's e-mails, pager beeps, or cell-phone calls whenever a GRB is detected. Hundreds more participate in discussion groups about such high-energy events.

X-rays are very high-energy radiation, with wavelengths no greater than the diameter of an atom. X-rays are only produced in extreme environments where gas temperatures are millions of degrees or particles are traveling at close to the speed of light. Colliding galaxies, supernovae and the intense gravitational fields around neutron stars and black holes are the prime sources of x-rays.


UV
ultraviolet
INFRARED
BEFORE
Digitized Palomar Observatory Sky Survey
NEAT Image
12:15:41 October 4, 2002
Nine minutes after GRB
AFTER
Radio waves
MICROWAVE
Gamma Rays
X-RAY
OPTICAL