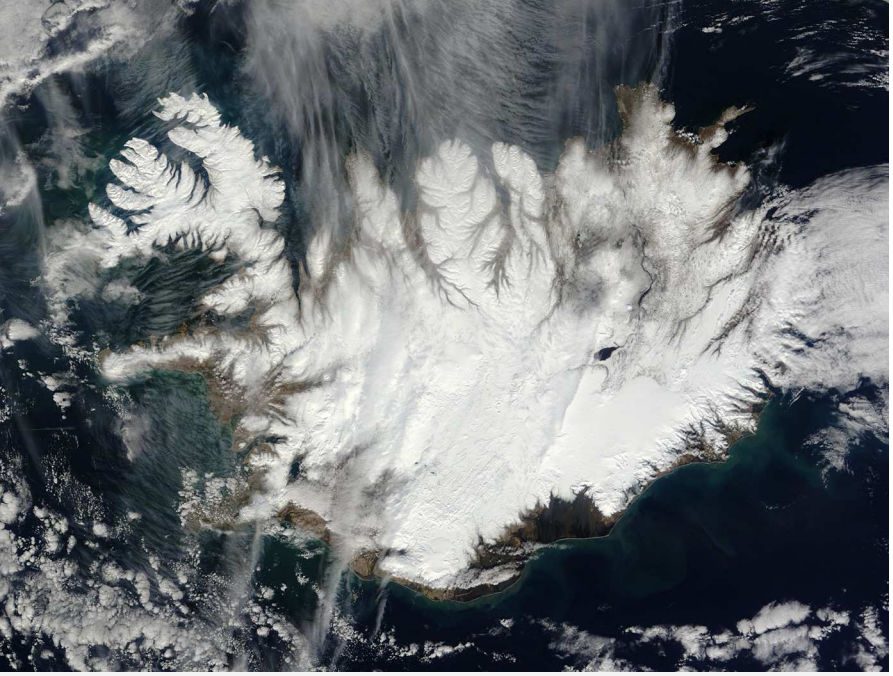

National Aeronautics and
Space Administration

Sensors

Multicolor detectors for ultrasensitive long-wave imaging cameras

Increases mapping speed and pixel count over state-of-the-art far-infrared sensors

NASA Goddard Space Flight Center has developed ultrasensitive, long-wavelength sensors that increase mapping speed by a factor of ten through simultaneous multicolor terahertz (THz) imaging. Current sensors image each wavelength separately, limiting mapping speeds. On a moving airplane, fast mapping speed is critical for obtaining good spectral data, because of changing atmospheric conditions during flight and the relatively short flight duration. This design also eliminates the need for bulky filters in the focal plane offering a low-loss, high efficiency detector that can be calibrated.

BENEFITS

- Increases mapping speed by a factor of 10
- Simplifies image calibration
- No moving parts for improved reliability

technology solution

THE TECHNOLOGY

This technology addresses the need for Terahertz imaging which is necessary for next generation instruments. The detector involves two innovations: a quasiparticle (QO) filter arrangement that enables a compact multicolor spectrum at the focal plane, and a THz antenna readout by up to three bolometers. This innovation achieves high efficiency by greatly reducing high, frequency-dependent microstrip losses, and pixel compactness is achieved by eliminating the need for bulky filters in the focal plane. The zeptobolometer is a small TES bolometer, on the scale of a few microns, which can be readily coupled through an impedance-matching resistor to a metal or dielectric antenna. The bolometer is voltage-biased in its superconducting transition, allowing the use of superconducting RF multiplexers to read out large arrays. The antenna is geometrically tapped at three locations so as to efficiently couple radiation of three distinct wavelengths to the individual TESs.

APPLICATIONS

The technology has several potential applications:

- Short range optical communication in the THz band
- Thermal Imaging

PUBLICATIONS

Patent No: 8912494

More Information

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