Computational Reconfigurable Imaging Spectrometer (CRISP)

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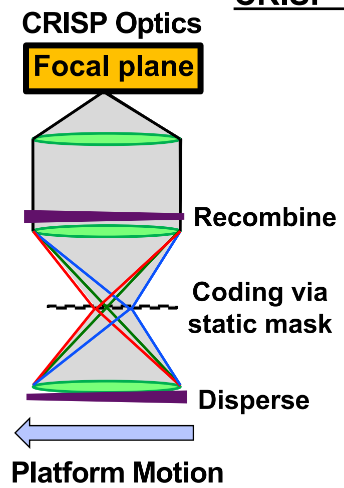
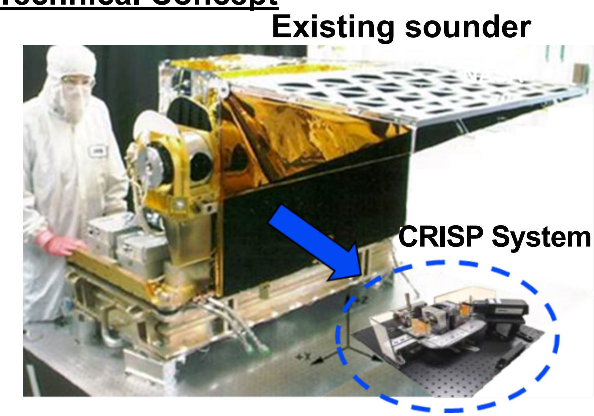
Objective

- Develop a computational imaging spectrometer in 7-13 mm spectral range that exploits platform motion, dispersive elements, and coded sensing techniques to make a time series of encoded measurements of the optical spectrum at each pixel.
    - The design of this system will enable high performance from smaller and less-expensive components such as uncooled microbolometers, and thus be more suitable for small satellites that can be deployed in constellations for thermal infrared (TIR) imaging.
- Demonstrate significant sensitivity and other advantages over existing imaging designs, enabling miniaturization and improved area coverage that may enhance boundary layer observation.
- Demonstrate a system that can be reconfigurable to optimize spatial or spectral resolution through changes in the static mask and related software.

CRISP Technical Concept





Above, computational imaging spectrometer shown for potential size reduction.

Approach

- Design, integrate, and test fully functional breadboard.
- Experimentally confirm predicted sensitivity gains.
- Design and implement advanced reconstruction algorithms.
- Design, integrate, and test fully functional brassboard.
- Perform outdoor functional testing.
- Perform airborne testing.

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Key Milestones

- Spectral recovery algorithms demonstrated 11/18
- Breadboard improvement complete 03/19
- Quantify NEdT and spectrum recovery accuracy 05/19
- Brassboard integration and test complete 10/19
- Outdoor functional test complete 01/20
- Airborne testing complete 05/21

$TRL_{in} = 3$ **$TRL_{current} = 4$**

ESTO Earth Science Technology Office