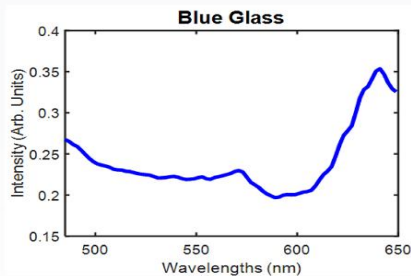
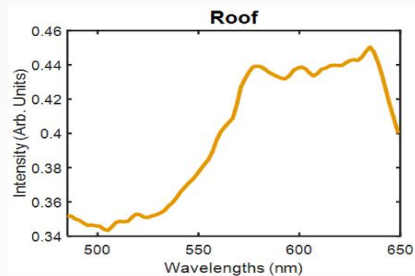
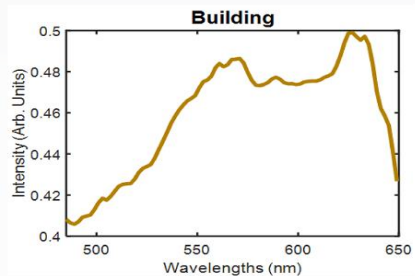
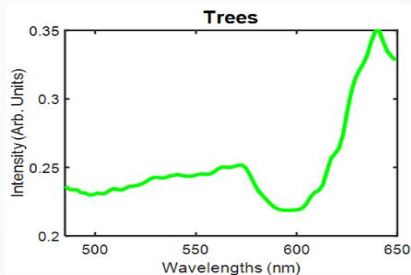
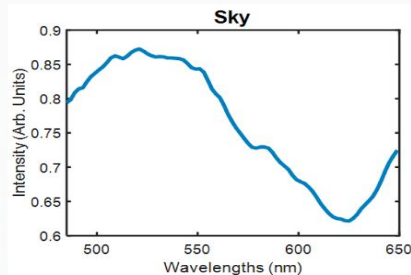


Multi-Platform Hyperspectral Imaging for Post-Disaster Situational Awareness

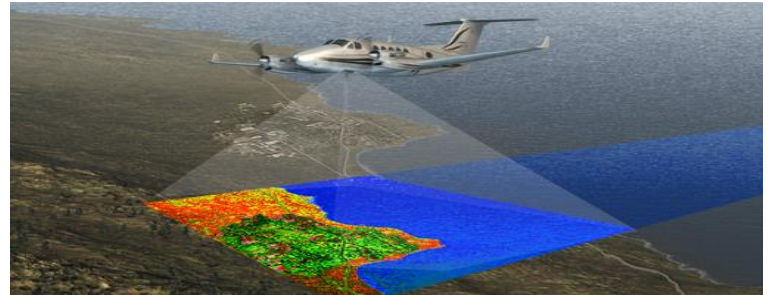


Dr. David Alexander
Rice Space Institute

Spectral view from the BRC
with the SNAP-IMS

Platforms

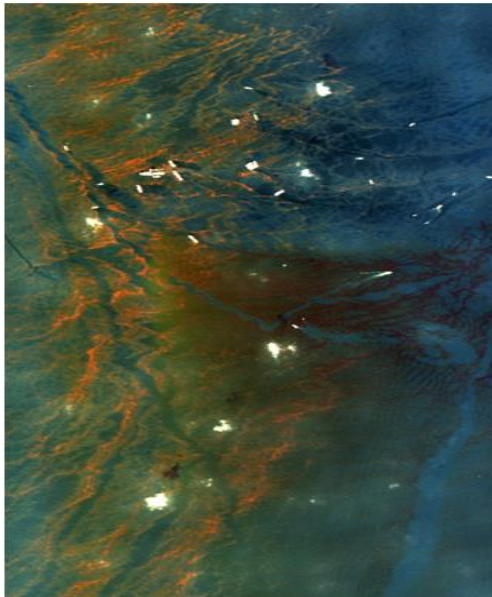
- ◆ Unmanned Aerial Vehicles (UAVs, ROVs??)
 - ◆ Aircraft
 - ◆ Balloons – *Stratolite* (Worldview)
 - ◆ ISS and Cubesats
 - ◆ Smallsats
-
- ◆ *Hand-held device??*
 - ◆ Dedicated EO mission – *TuLIPSS* (NASA-funded prototype)



Hyperspectral Airborne Terrestrial Imager - Northrop Grumman

HD Imaging → Hyperspectral Augmentation

HD Image



Images from AVIRIS

Hyperspectral Information

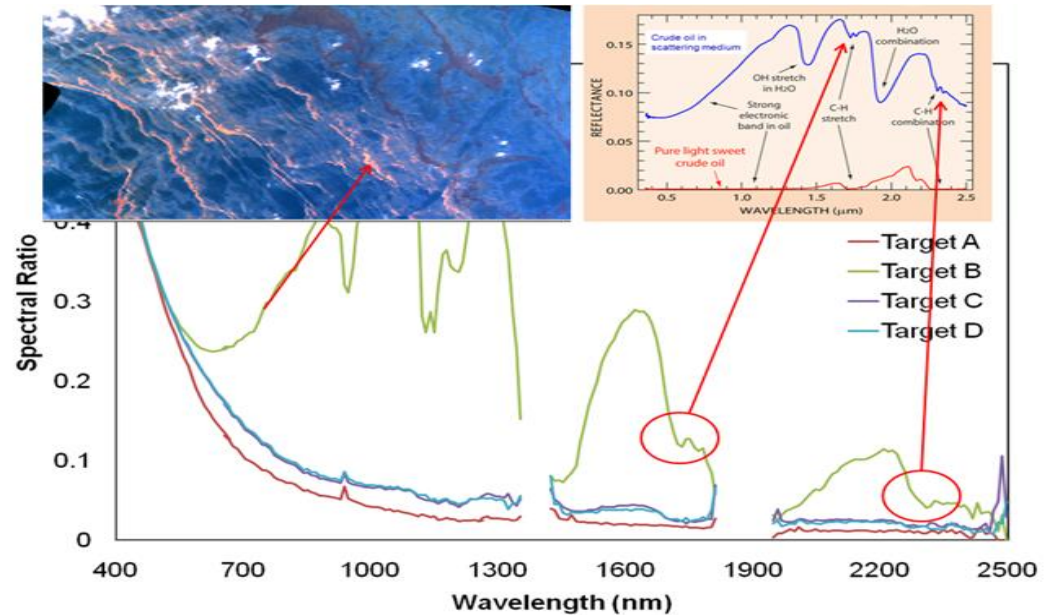


Image credits: NASA/JPL-Caltech/Dryden/USGS/UC Santa Barbara

SNAP-IMS

Compact snapshot image mapping spectrometer (SNAP-IMS) for unmanned aerial vehicle (UAV) hyperspectral imaging

Jason G. Dwight,^a **Tomasz S. Tkaczyk**,^{a,*} David Alexander,^b Michal E. Pawlowski,^a Jeffrey C. Luvall,^c Paul F. Tatum,^c and Gary J. Jedlovec^c

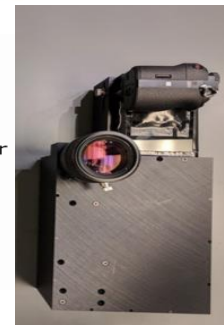
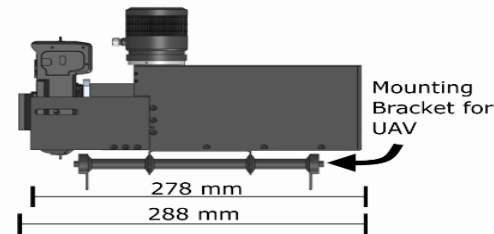
^a Dept. of Bioengineering, Rice University

^b Dept. of Physics and Astronomy, Rice University

^c Marshall Space Flight Center

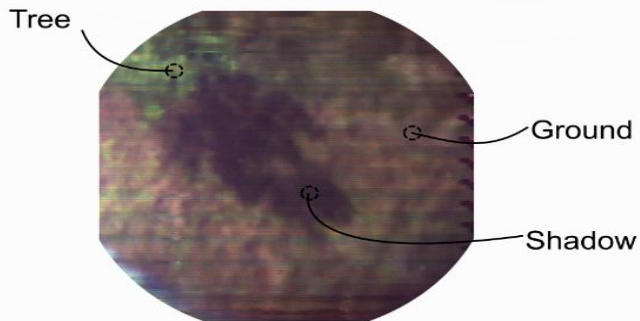
SNAP-IMS Specifications

Dimensions	288x 163 x 153 mm (w/ camera and lens) 278x96x138 mm (w/o camera and lens)
Mass	3.6 kg (w/ camera and lens)
FOV	10.6°
IFOV	0.03°
Spectral range	470 – 670 nm (UAV imaging) 485 nm – 650 nm (tripod/handheld imaging)
Spectral channels	55 (UAV imaging)
Spatial samples	350x400

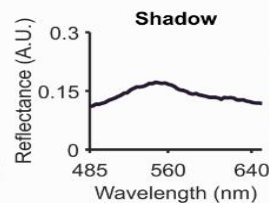
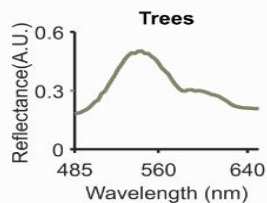
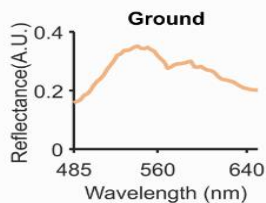


SNAP-IMS Test Flight

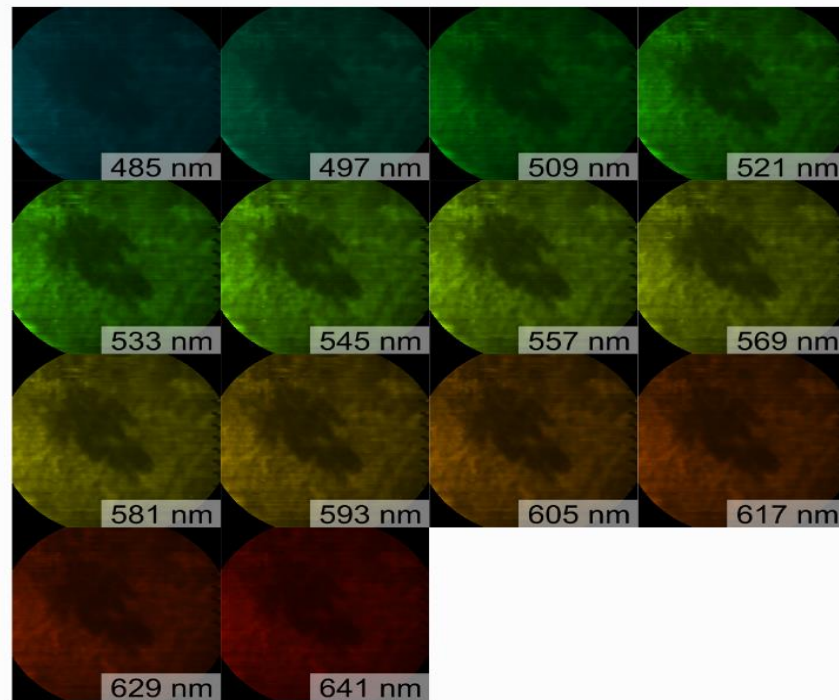
Frame 162 of Flight #4
(1/100 s exposure, ISO 1000)



RGB Gain: (1,,5,1)
R channel: 650 nm
G channel: 550 nm
B channel: 485 nm

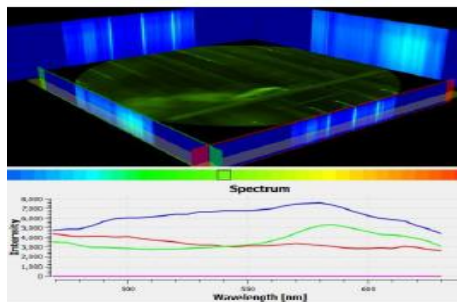


14 of 55 Spectral Channels

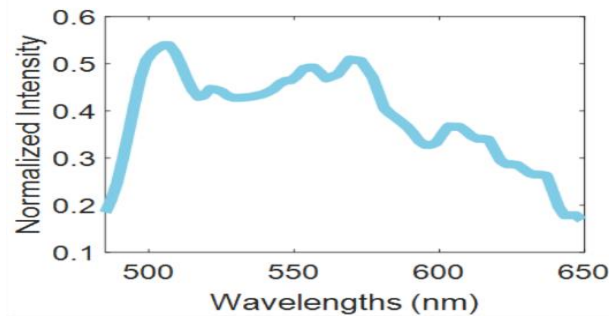
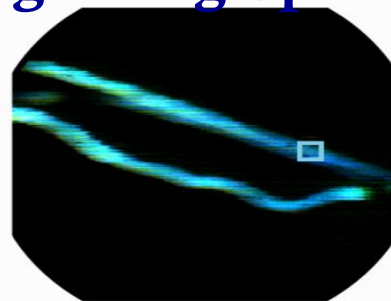


Range of Applications

Gas Detection and Identification



Lightning Spectra



Worldview *Stratolite* Concept

Humanitarian response and post disaster situational awareness

Concept: UNESCO rapid response: Stratolite + **N** SNAP-IMS imagers

Station-Keeping Flight

Persistence over specified areas for weeks and months



*Model based on real flight data



Other possible ER applications

- ◆ Hand-held “sniffers” for petrochemical plant operations or accident investigation
 - ◆ Leak detection
 - ◆ Toxin detection – air/standing water
- ◆ Drone-based site inspection
 - ◆ Hyperspectral scanning
 - ◆ Leak detection