NEW SOIL AND VEGETATION MAPPING SENSORS FOR FIELD AND AIRBORNE APPLICATIONS

Petri Nygrén, SPECIM Oy

GEO CRADLE Limassol 16.11.2016

CONTENT

- SPECIM Oy in few words
- New sensor family
- Some hyperspectral imaging application examples

SPECIM, Spectral Imaging Ltd.

Since 1995, world leading
manufacturer and supplier for
hyperspectral imaging sensors

Distributor and integrator network covers more than 40 countries

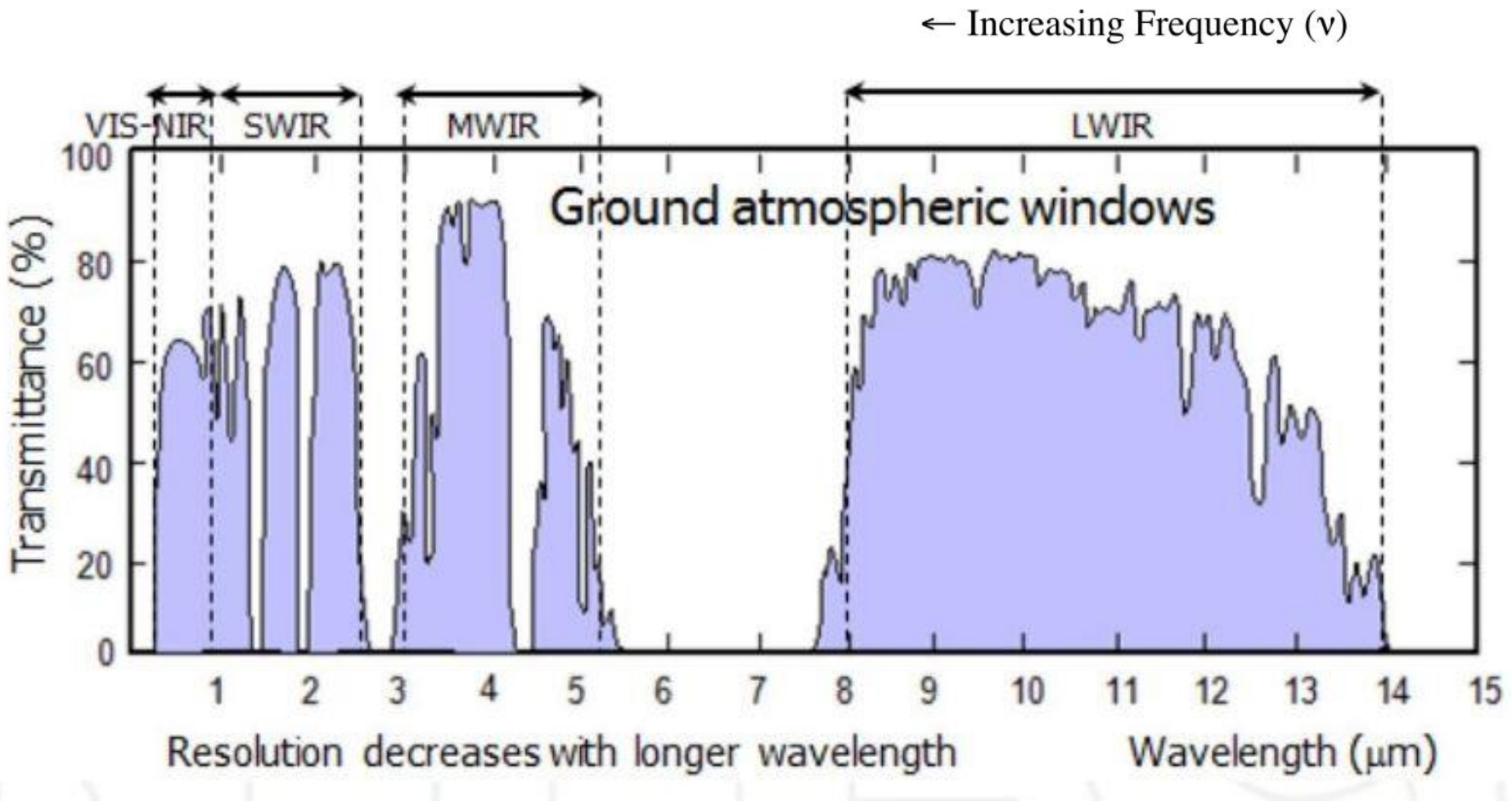
~5000 sold spectrographs

~150 sold AISA sensors (AISA = Airborne Imaging Spectrograph for Applications)

~60 employees, privately owned

From Oulu, Finland

SPECTRAL RANGE COVERED



AISA HISTORY

NEW AISA FAMILY

SPECIM
SPECTRAL IMAGING

FENIX	FENIX 1K	OWL	IBIS	KESTREL
Co-registered **VNIR** and **SWIR** pixels through one front optics in one File	Co-registered **VNIR** and **SWIR** pixels through one front optics in one File	Smallest high performance thermal infrared (**LWIR**) hyperspectral imager with system integral radiometric calibrator	First airborne sensor to quantitatively map sun-induced fluorescence. Spectral range at **red edge**	High performance UAS sensor (< 5 kg), **VNIR** and **eNIR** models (Kestrel10, Kestrel16)
Pushbrooming hyperspectral imager, 384 swath pixels, 380-2500nm, Up to 620 bands of 3-10nm FWHM	Pushbrooming hyperspectral imager, 1024 swath pixels, 380-2500nm, Up to 620 bands of 3-10nm FWHM	Onboard radiometric calibrator, Pushbrooming hyperspectral imager, 384 swath pixels, 7.7-12.6µm, 95 bands of 100nm FWHM	Pushbrooming hyperspectral imager, 384 swath pixels, 680-840nm, 1000bands of 0.25nm	Pushbrooming hyperspectral imager, 640-2040 swath pixels, 380-1600nm, Up to 350 bands of 3-8nm FWHM

SPECIM FX10 / 17

Free wavelength selection from 220 bands
within the camera coverage at very high collection speeds

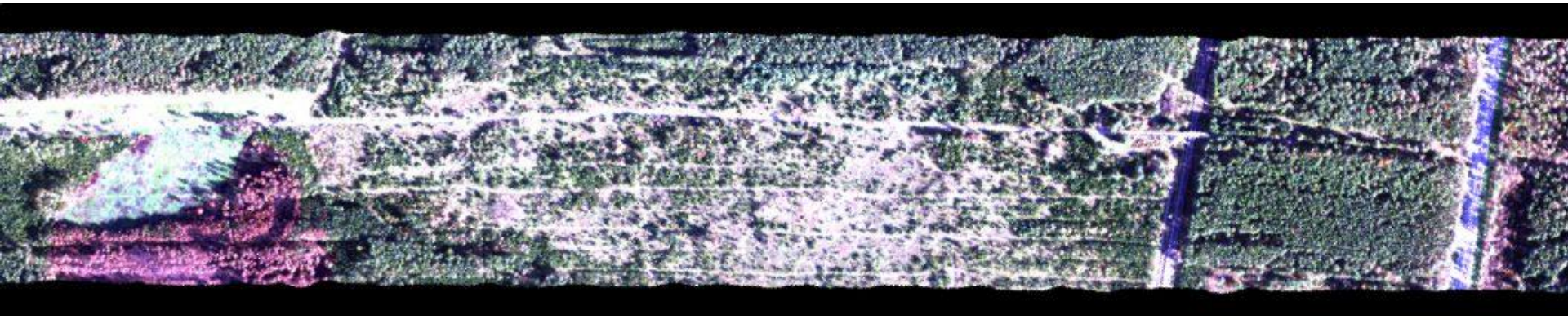
WHAT IS NEW IN THE SENSOR FAMILY

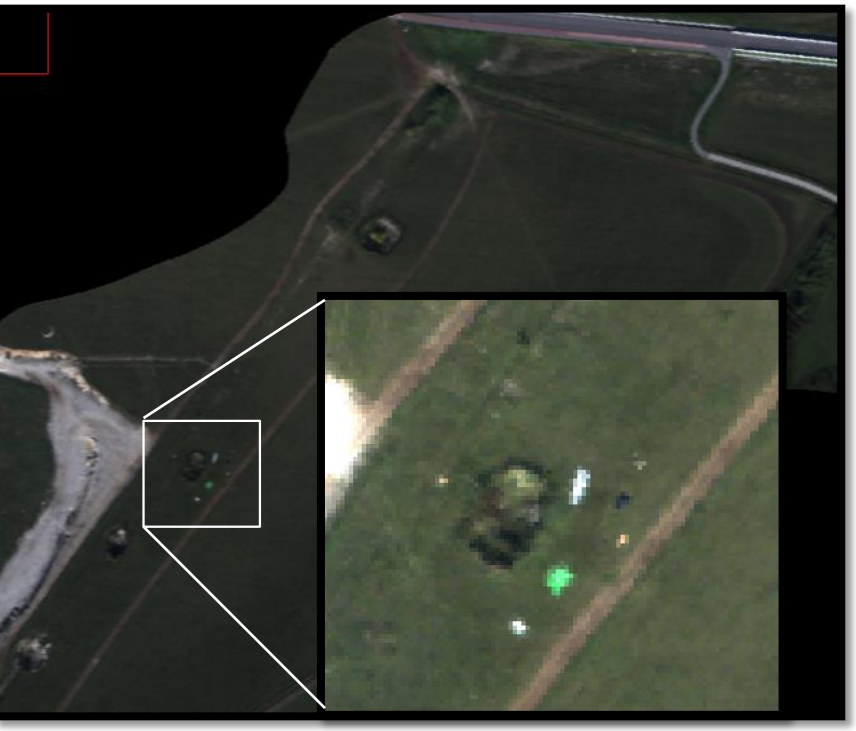
- Smaller SWaP (Size, Weight and Power requirements)
- Simplified operation
- Full calibrations provided for each AISA sensor: Radiometric, Spectral and Geometric
  - Improved support for atmospheric correction routines
  - Improved georeferencing accuracy
  - Improved spectral accuracy

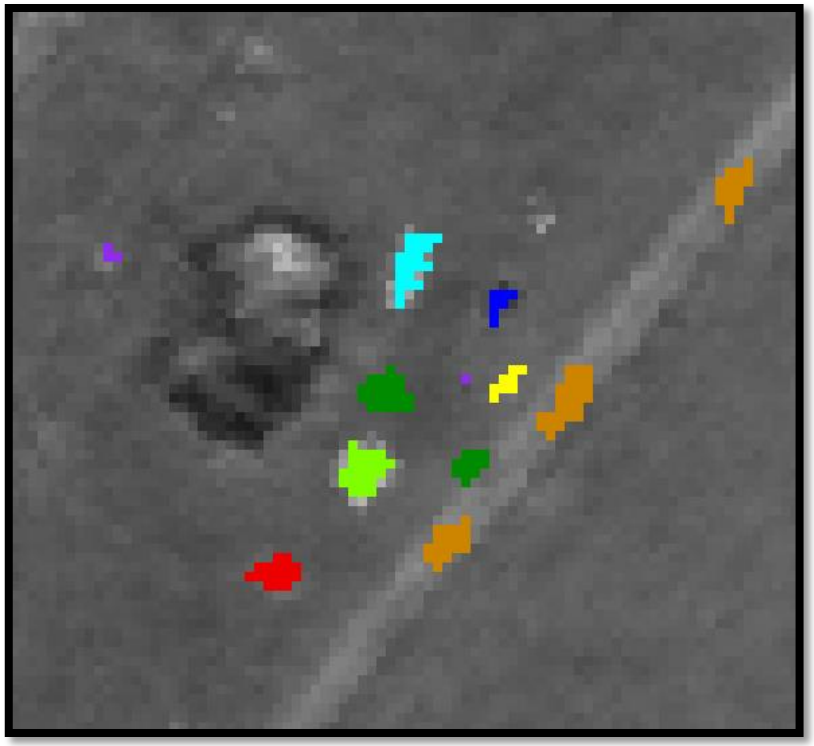
SAME SENSOR FOR FLYING, FIELD AND LAB USE

Vegetation / pollution / material detection: FENIX

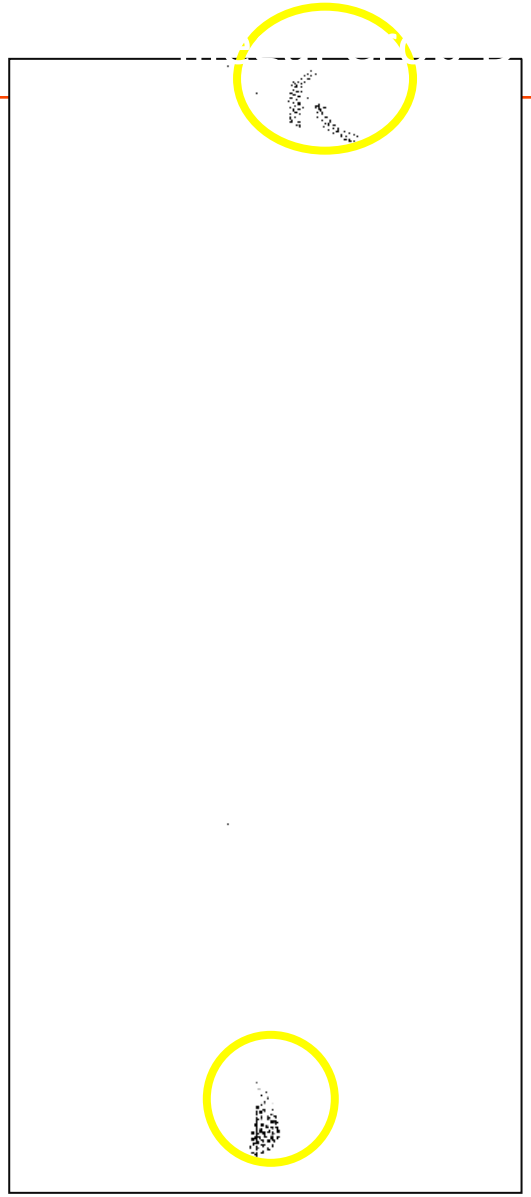
SPECIM
SPECTRAL IMAGING



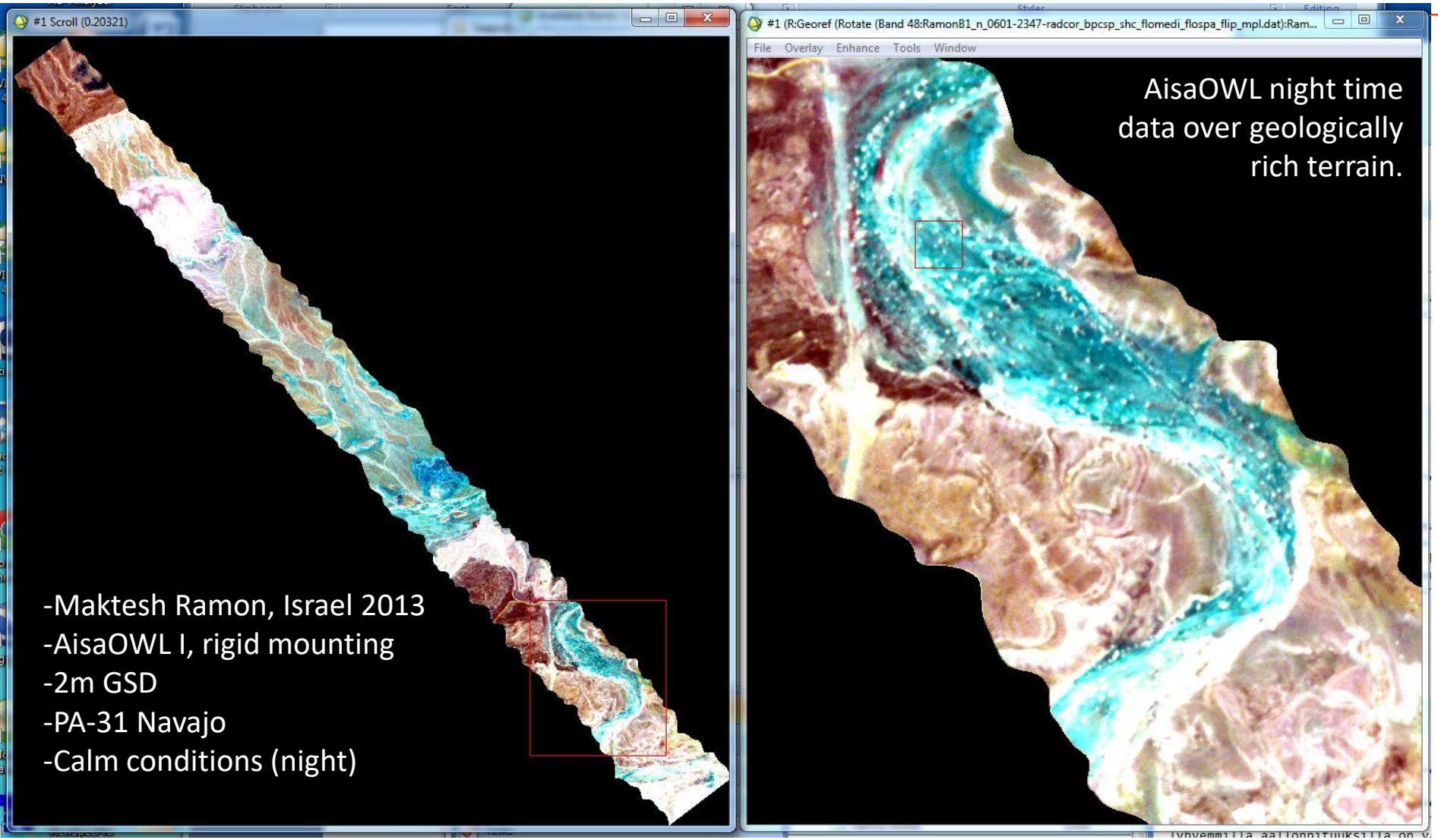




TARGET SPECIES EXAMPLE: FENIX



GEOLOGICAL MAPPING EXAMPLE: OWL



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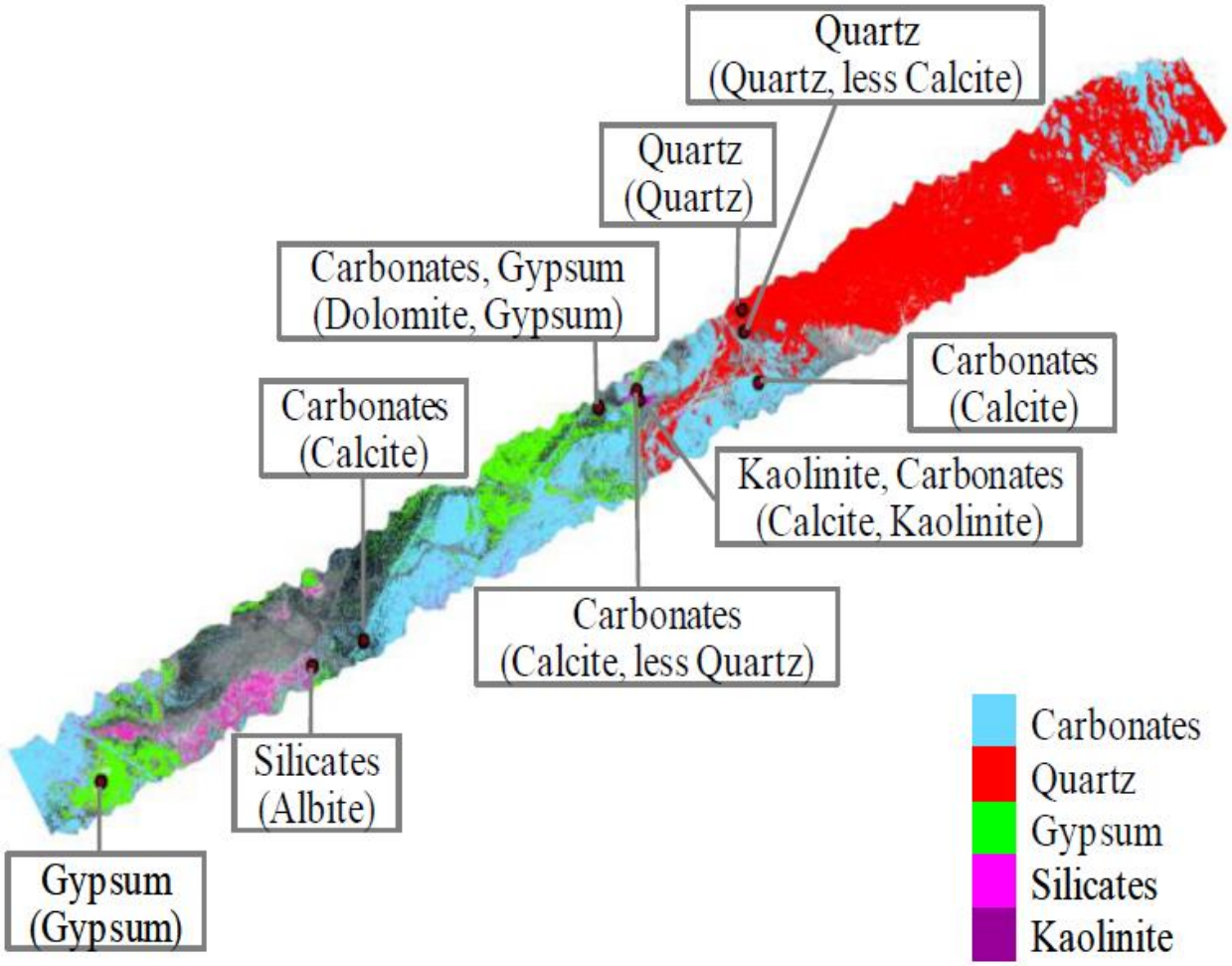
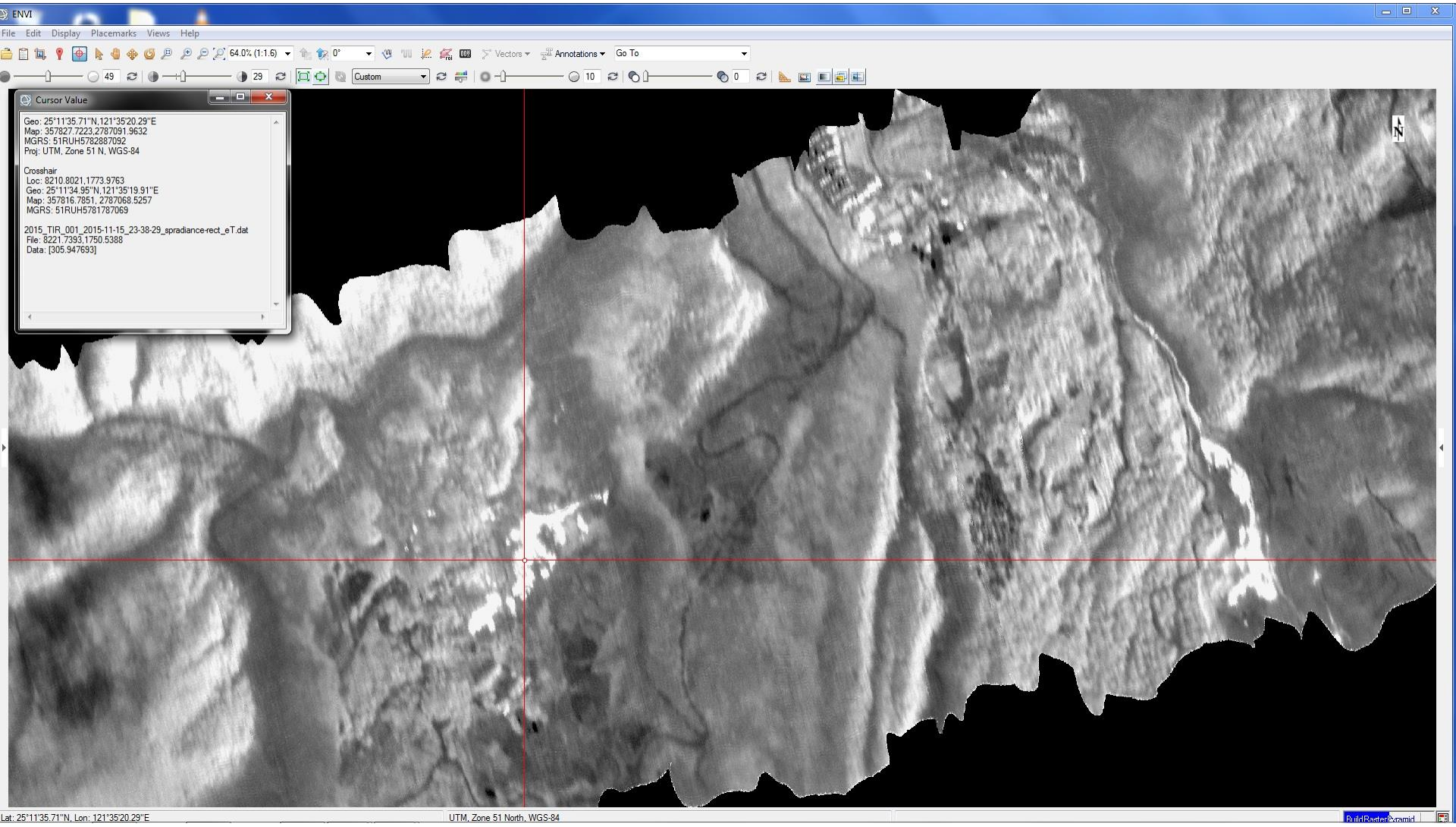
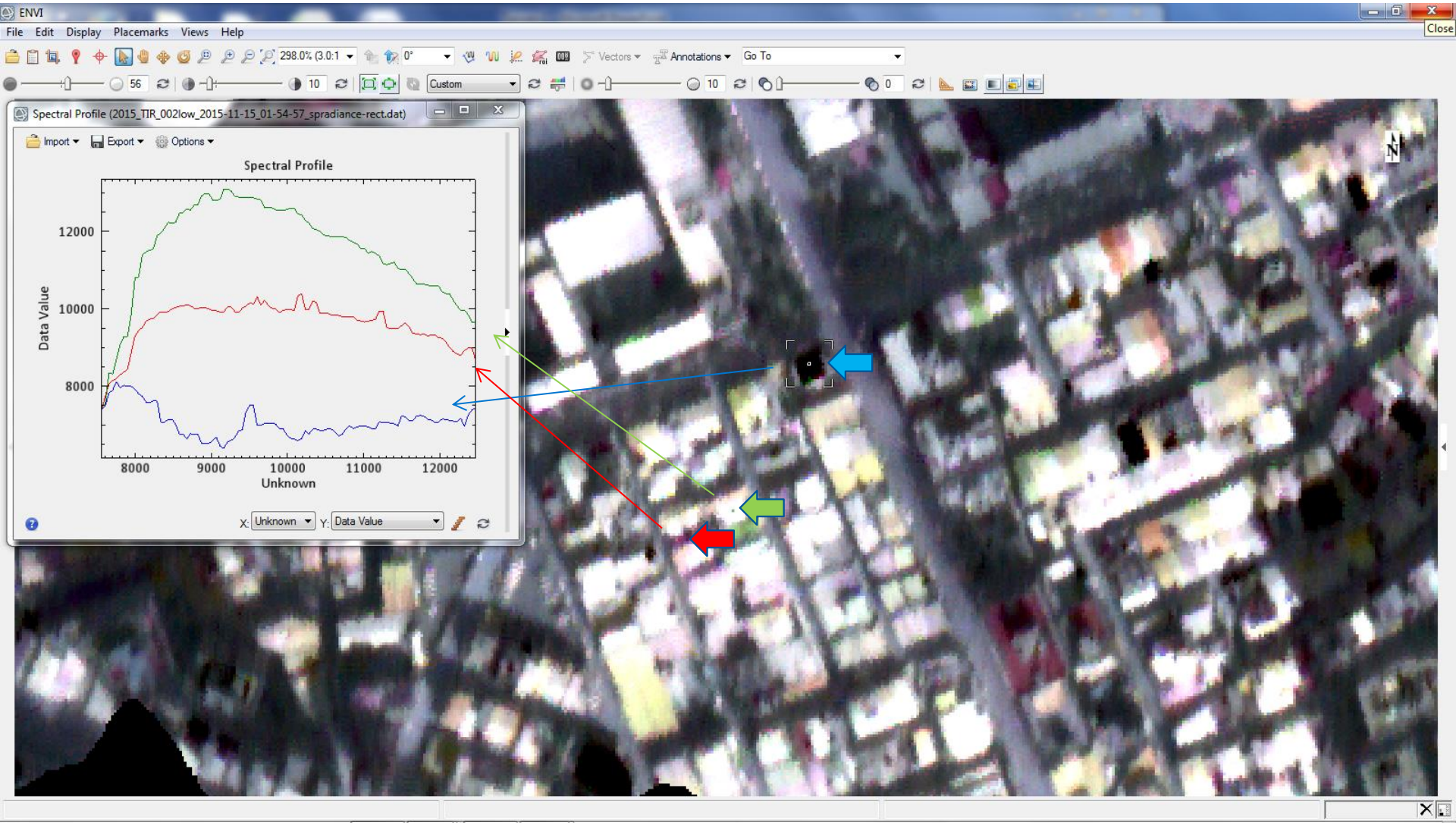


Notesco, G., Ben Dor, E. and Brook, A. (2014). Mineral mapping of Maktesh Ramon in Israel using hyperspectral remote sensing day and night LWIR images. GRSG AGM meeting, London, December 2014.

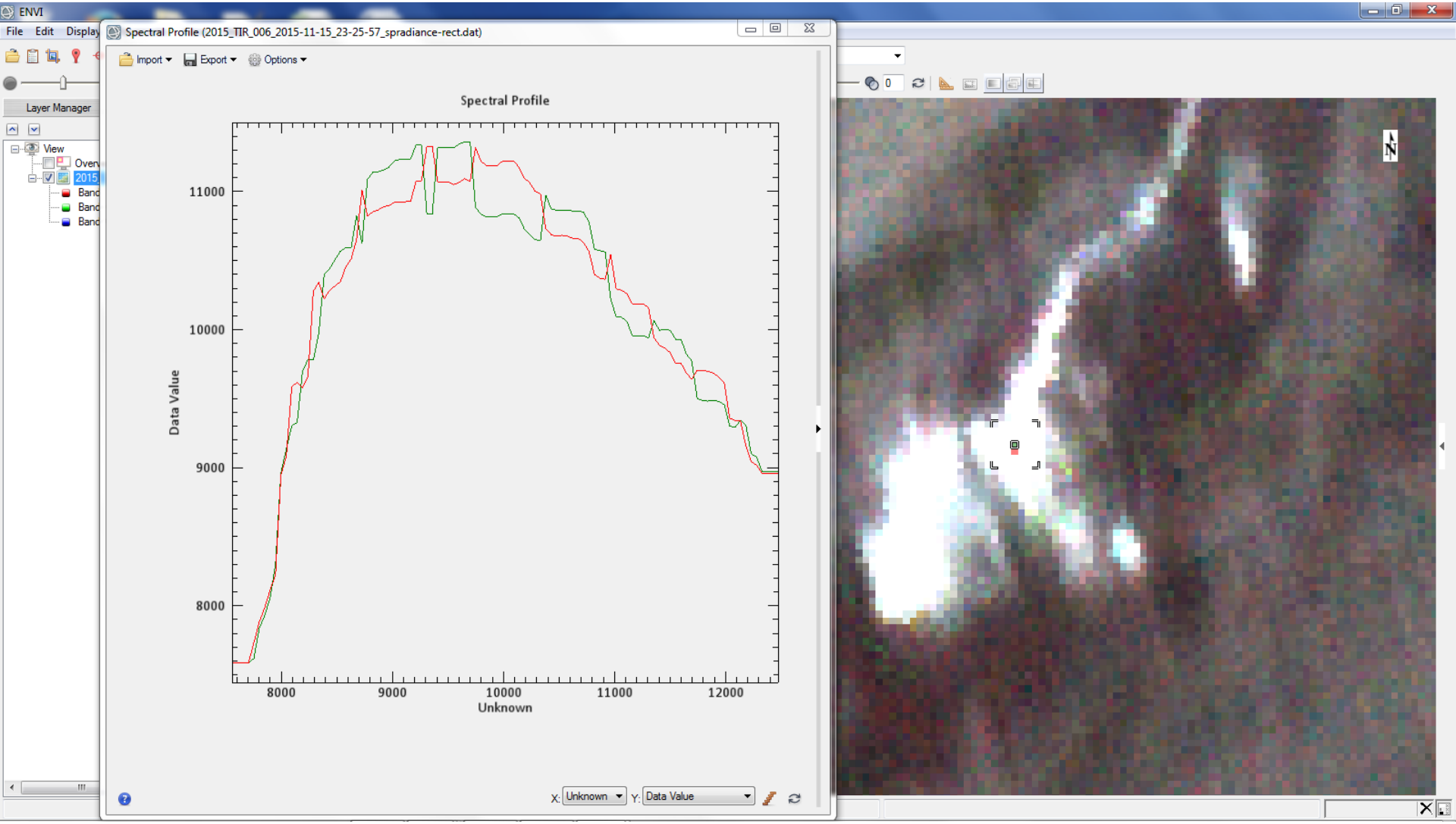
GEOTHERMAL EXAMPLE: OWL



EMISSIVITY MEASUREMENT: OWL

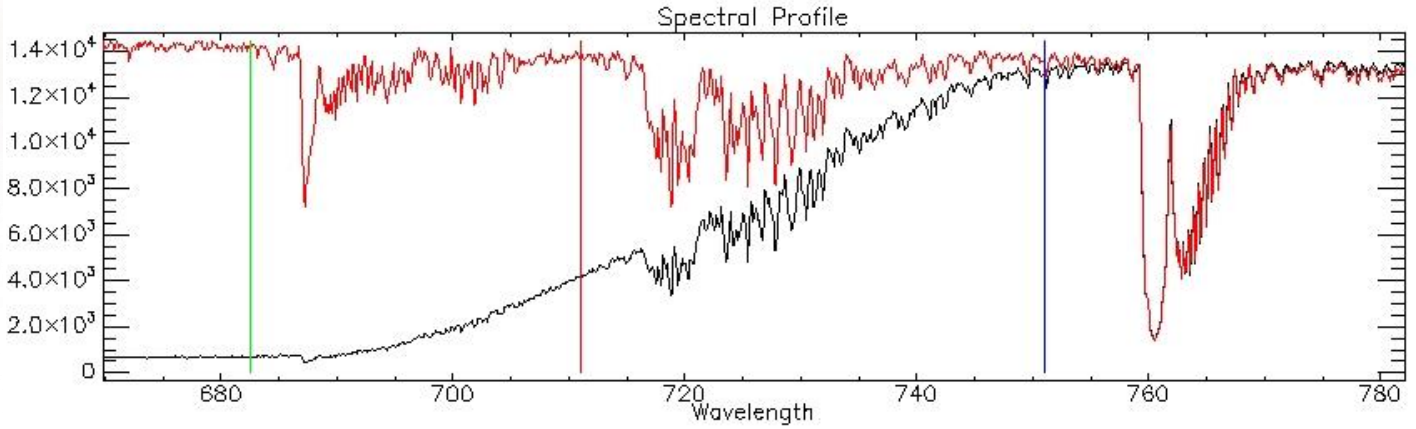


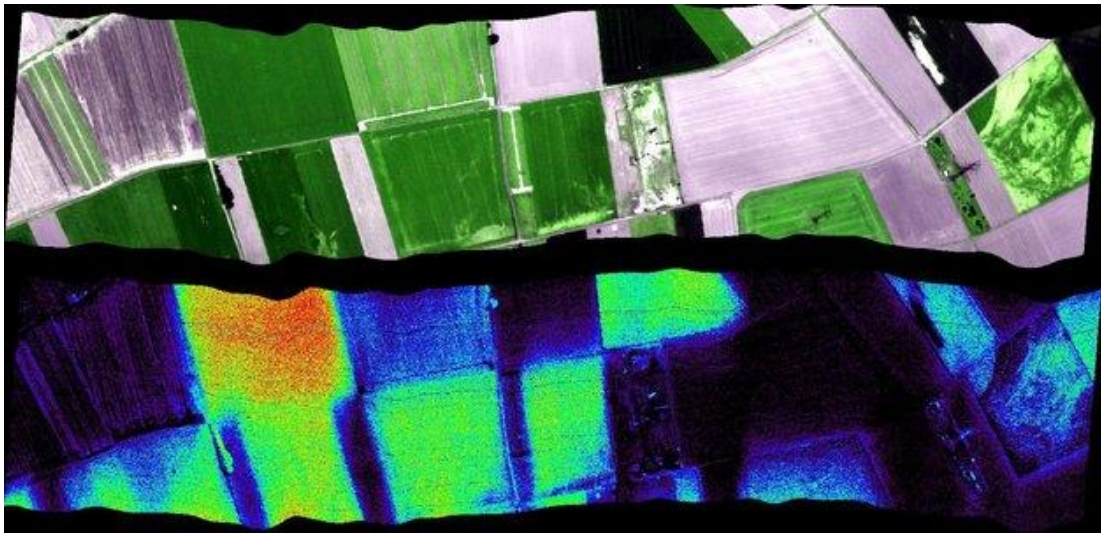
HOT SPRING EXAMPLE: OWL



IBIS

- For direct measurement of plant growth





AisaIBIS

680-780 nm

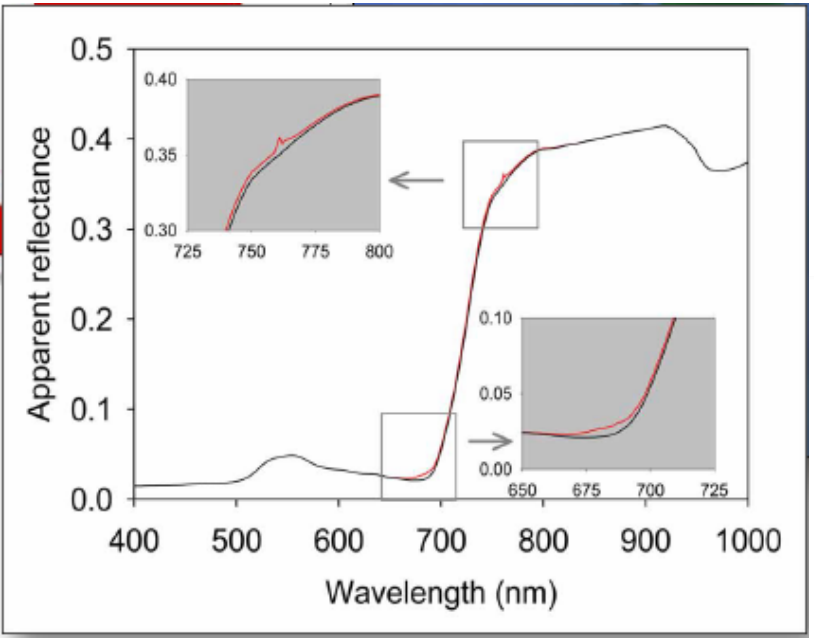
0.11 nm sampling

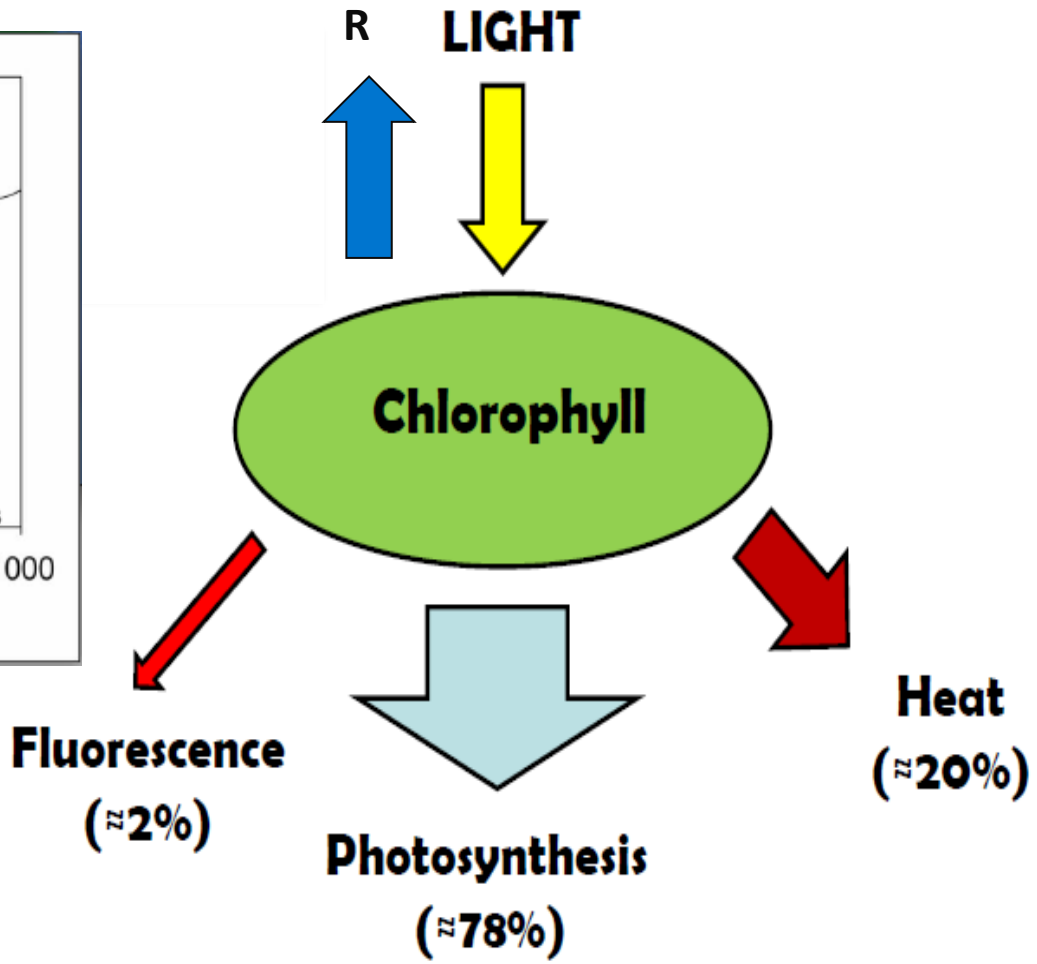
0.25 nm spectral resolution

Extremely low noise

High SNR

SUN-INDUCED CHLOROPHYLL FLUORESCENCE

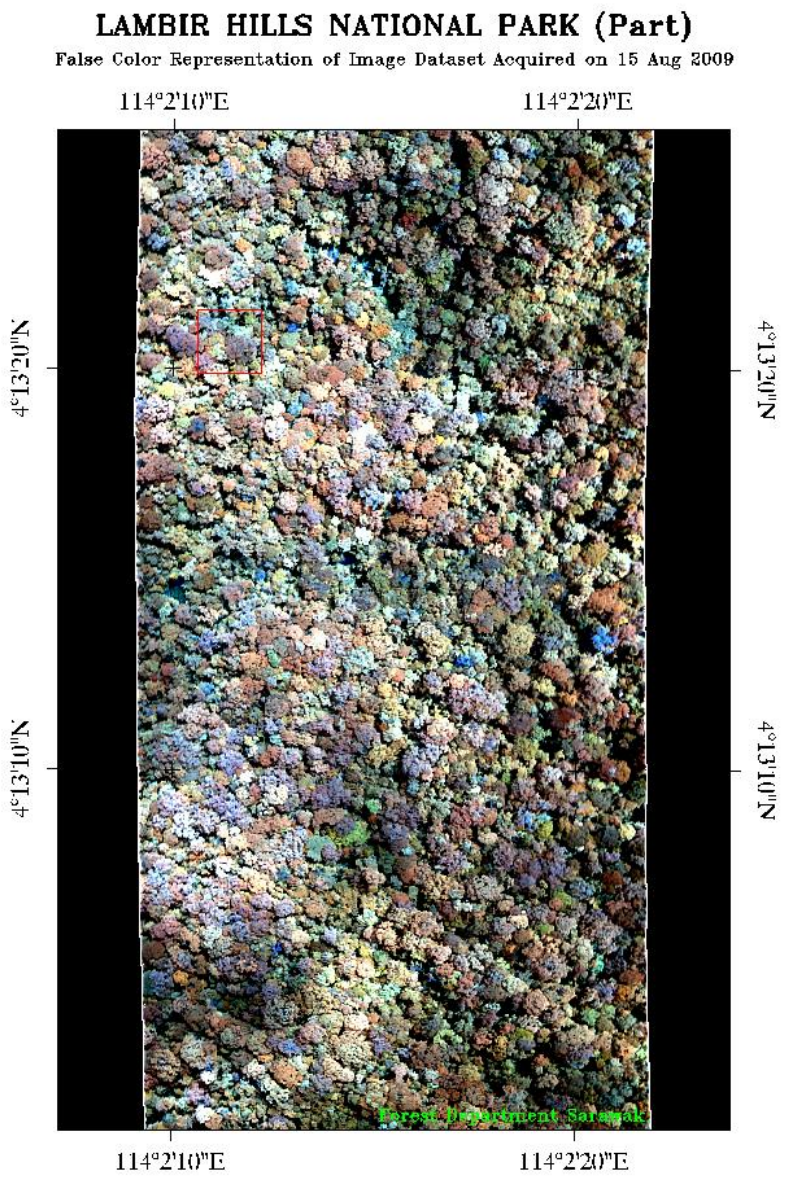




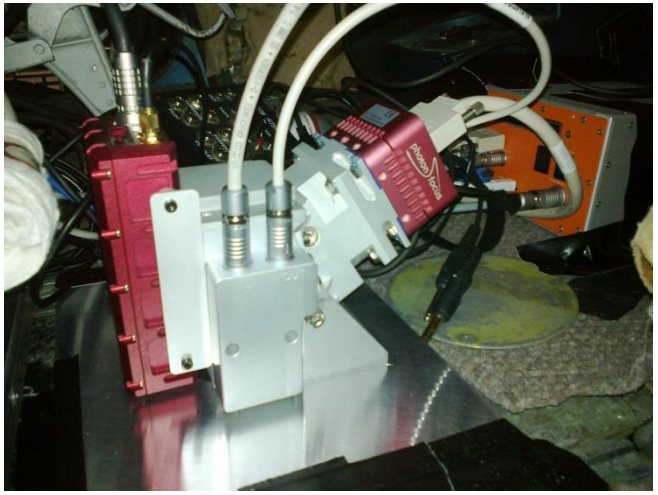
LATEST AISA: KESTREL

- 4.8kg system weight
- Remote control capability through Ground Station sw
- Kestrel 10 : 400-1000nm
  - Vegetation and water related applications
- Kestrel 16: 600-1600nm
  - Industrial applications
- Full system level product
  - Sensor
  - Data collection device (DPU)
  - Scanner- and georeferencing accessories available

TREE SPECIES CLASSIFICATION: KESTREL



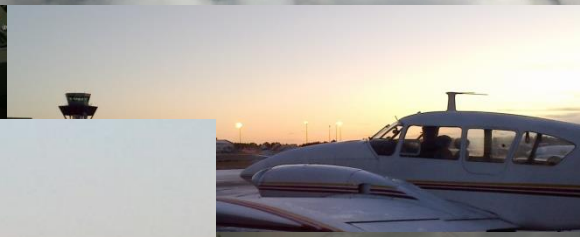
KESTREL IN MANNED AIRCRAFT



UAV INSTALLATIONS

OH-CNU

NAVER
HL5115



Specim

SPECTRAL IMAGING

PROCESSING STAGES

Raw data from flight (non-georectified DN numbers)

Preprocessing (georectified radiances)

Atmospheric correction (georectified reflectances)

Analysis

Delivery