



Department of Astronomy



Field Campaign Support Capabilities for VIIRS at University of Maryland

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Outline

We present an overview of the field campaign support capabilities in various areas at University of Maryland

- Overflight field campaign support
- Lunar observation at UMD Astronomical Observatory
- Ground measurements of aerosol optical thickness (AOT) and PM 2.5
- Integration of modular spectrometer and Unmanned Aviation Vehicle (UAV) rotary drone system to support field measurements
- Hardware integration to enable automatic data acquisition.

Over-Flight Field Campaign Support at UMD

- An example of participating field measurements in support of the NASA HYSPIRI mission to collect ground spectral reflectance and aerosol data near Los Angeles with ASD spectrometer and sun photometer provided by NOAA/NESDIS/STAR.
- The team performed measurements for about 20 types of ground covers at ~ 30 locations near Los Angeles.
- These ground spectral reflectance and aerosol data are analyzed to calibrate over-flight remote sensing measurements.



Figure 1: Left: Aerosol Optical Thickness (AOT) measurements from the field campaign (June 3-6, 2013); Right: Performing field measurement.



Figure 2: Typical Ground Covers Measured

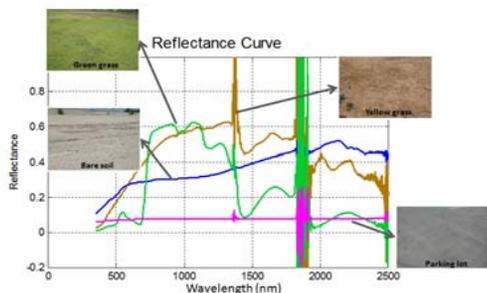


Figure 3: Measured reflectance for several types of ground cover

Lunar Observation at UMD Astronomical Observatory



Figure 4: UMD Astronomical Observatory (3202 Metzert Road, College Park, MD 20740)

- The University of Maryland Astronomical Observatory serves as an important component of the teaching and research program in the Department of Astronomy. It also brings the excitement of astronomy to the University community and the general public through public program.
- The Observatory has four permanently mounted telescopes on site, and a collection of 12 portable telescopes used both on and off site.
 - 8" NASA Refractor; 7" Astro-Physics Refractor
 - Celestron 14" Schmidt-Cassegrain Reflector; 20" Eichner Bent Cassegrain Reflector



Figure 5: Lunar observation with NOAA/NESDIS/STAR scientists at UMD Astronomical Observatory.



Figure 6: State of the Art polarimeter with automation in collaboration with L-1 Standards and Technology LLC., which enables polarization measurements of the moon, atmosphere and surfaces. (To be tested at UMD Observatory)

Ground Measurements of PM 2.5 and Hardware Integration

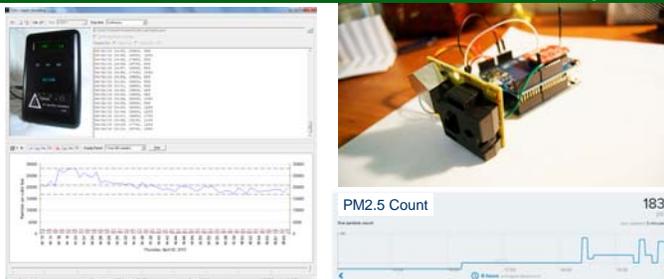


Figure 7: Left: PM2.5 and PM10 data acquired with Dylas; Right: An integrated prototype Wi-Fi-enabled PM2.5 data collection system (Arduino-based, Shinyei PPD-42 Dust Sensor, Roving Networks RN-XV Wi-Fi module) Data can be collected wirelessly through Wi-Fi router and made available online.

Integration of Modular Spectrometer with UAV (Rotary System) to enable Aerial Radiometric Data Acquisition



Ocean Optics Modular Spectrometer

- Versatile, general-purpose UV-Vis-NIR spectrometers for absorption, transmission, reflectance, emission, color and other applications.
- Compact size, robust optoelectronics and easy modularity
- The most popular spectrometers in the world, supporting thousands of applications, from research and life sciences to education and materials identification.
- Spectral Range: 350 nm to 1000 nm; Spectral Resolution: 0.38 nm.

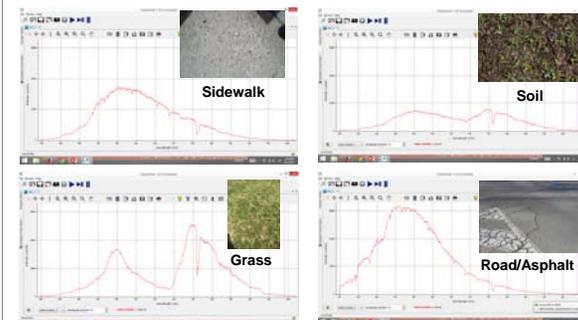


Figure 8: Spectral measurements of various land surfaces at UMD using Ocean Optics spectrometer

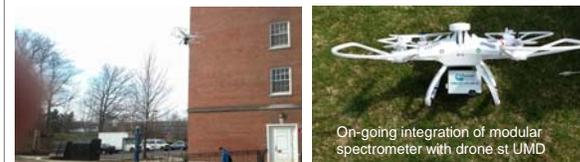


Figure 9: UAV drone measurements in action by UMD students

Summary

- UMD has a long-history and tradition with capabilities and experiences in supporting field campaign with ground measurements, drone system and variety of sensors.
- UMD has been supporting VIIRS Cal/Val work in many areas.
- Unique advantage of leveraging resources at UMD such as Astronomical Observatory, engineering students
- Provide opportunities for education and outreach to university students.

Acknowledgement

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