

WINDMILLS AND STRAY LIGHT: A QUIXOTIC QUEST FOR RADIOMETRIC CALIBRATION OF AN AIRBORNE IMAGING SPECTROMETER

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ABSTRACT

The quest to perform imaging spectroscopy in the marine environment has been an adventure filled with hardships and triumphs over the last two decades. In the last several years, it appeared that the technical improvements to spectrometers and detectors had made possible the elusive goal of producing scientific quality data at an affordable cost to the research community. However, while the technical improvements in the hardware reduced the cost of individual system components, the actual production of scientific quality data remained a chimera; while data flowed from the sensors, its quality was suspect and the development of algorithms based on the spectral data severely hampered.

There are three requirements for an instrument to be of scientific use. 1) It must be calibrated over the dynamic range of data that it will collect. 2) It must be robust to withstand usage in the field, and its calibration must also remain stable over a wide range of deployment conditions. 3) It must produce results that are reproducible by other scientists when operating similar instruments, under similar deployment conditions. The hype in hyperspectral imaging spectroscopy has been in the hope that we could produce materials classification from the spectral data stream. Yet, without an instrument that satisfies the above three requirements, it has been difficult to obtain the spectral data at the necessary time and spatial scales to accomplish marine environmental research.

The remote sensing groups at NRL and FERI have put together a sensor that satisfies the first, and possibly, the second instrument criteria. This talk will discuss the triumphs and heartbreaks over the last couple of years in the development of an imaging spectrometer. We will demonstrate solutions to many of the problems plaguing this field, as well as point to the requirement for the next generation imaging system.