CaNOP - CubeSat

Award: Undergradte Student Instrument Project; $49,500.00

Research Topic: Canopy Near-Infrared Observing Project

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Abstract: The Canopy Near-IR Observing Project will utilize a multispectral pushbroom imager in a 3U CubeSat to carry out spectrally resolved imaging of global forest regions with spectral resolution sufficient to reproduce early LandSat and MODIS missions.   
  
Forests currently absorb as much as 30% of annual global anthropogenic carbon dioxide emissions (Schimel, 2014). Natural carbon flux is a critical yet poorly understood component of climate change, particularly in the mitigation of its effects. Many of the scientific questions around global forest carbon-uptake are large-scale questions of landscape ecology and therefore are appropriately addressed through space-based remote sensing. The Wisconsin Space Grant Consortium (WSGC) proposes to develop a CubeSat-based platform for performing multispectral imaging of forests around the world in an effort to support and understand large-scale biomass production and carbon sequestration in both mature and young second-growth forests. CaNOP will be a CubeSat platform for performing basic multispectral imaging of forest canopies in the Landsat Thematic Mapper bands TM2, TM3, and TM4, and in select MODIS bands.  
  
The specific scientific goals of this project are to image forests (which are categorized by biome), and collect reflectance data about the target regions. Illumination data (gathered in the visible and Near Infrared (NIR) spectra) will be used to compute the Normalized Difference Vegetation Index (NDVI), a ratio of the amount of light reflected in the NIR ranged compared to that of visible light. The comparison between young secondary and old-growth forests may help address a recent and paradoxical observation that suggests that primary forests are absorbing more carbon than their younger counterparts.  
  
The primary technological objective of the mission is to demonstrate that the types of landform observations made possible by LandSat and MODIS class instruments can be reproduced with comparable spectral resolutions using less expensive equipment and a CubeSat based platform.