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Author: Mr. Geiner Gustavo Fonseca Naranjo  
Universidad de Costa Rica, Costa Rica, geiner.fonseca@ucr.ac.cr

Ms. Melissa Mirino  
Universita Roma 3, Italy, mela\_90@hotmail.it

Ms. Rashmi Nayar  
National Law School of India University, India, rashminayar@nls.ac.in

ALTERNATIVE APPROACHES FOR REMOTE SENSING: A STRATOSPHERIC BALLOON  
EDUCATIONAL EXPERIMENT TO ANALYSE PHOTOSYNTHETIC ACTIVITY OF PLANTS**Abstract**

The use of satellite technology for remote sensing and earth observation is widespread and essential for obtaining useful information on topics like land-use patterns, crops, forests, minerals, water and various other resources. However, there are regions of the world where satellite imagery is not accessible or available in required resolutions. A possible solution in these cases is to perform localized, small scale remote sensing.

This paper focuses on the use of stratospheric balloons, which is a relatively cheap method for obtaining remotely sensed data, and analysis of this data using freely available software. We also analyse other methods for localised high altitude imaging that can be used for similar projects. To demonstrate the potential of a stratospheric balloon, participants of the International Space University's Southern Hemisphere Space Studies Program 2016 built a relatively simple payload carrying three cameras designed to capture visible and near-infrared images. The stratospheric mission reached an apogee of 36.4 km and was recovered 130km from the launch site. The area around the Mount Barker township in South Australia was successfully recorded, with the payload cameras. The project demonstrated that high quality and relevant remote sensing can be achieved for a comparably low price.

To understand the quality of data obtained using a stratospheric balloon, we analysed the images retrieved from the payload and estimated the Normalized Difference Vegetation Index (NDVI) for the area around the Mount Barker township, South Australia. The NDVI is an indicator that describes 'the greenness' or photosynthetic activity of plants (the relative density and health of vegetation). Analysing this can be useful for monitoring the health of the vegetation, the quality of the fields for the agriculture, etc.

Recommendations are made to improve this method, such as technical improvements for obtaining better images. We also propose that this kind of project can be used as a practical method for education and outreach.