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פרופ' ארנון קרניאלי

המעבדה לחישה מרחוק
המחלקה לאנרגיה סולרית ופיסיקה של הסביבה
המכונים לחקר המדבר ע"ש יעקב בלאושטיין
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Science from Above

June 24, 2020

Dear colleagues,

Re: VENμS periodic news – June 24, 2020

1. VENμS product updates

On the VENμS website (https://venus.bgu.ac.il/venus/), we have added new L1 and the corresponding L2 products, for the tiles W09 and W10, from 1 Nov. 2017 to 24 Jan. 2018.

In addition to the tiles W09 and W10, all the L2 products for S01, S02, and S03 (from 27 Nov. 2017) are now in 5 m resolution and available on the VENμS website.

We are doing our best to close the gaps and to provide a full series of L2 at 5 m resolution for all other tiles.

Between 04 June 2020 and 16 June 2020, we received from CNES bad L1 products for the Western strip (W01, ... , W12). On Thursday 25 June 2020 we updated the website with the correct L1 and L2 products. If you have ordered these products before Thursday 25 June, we invite you to re-order them in order to be sure to have good products.

2. Feature paper

Utilizing Vegetation and Environmental New Micro Spacecraft (VENμS) Data to Estimate Live Fuel Moisture Content in Israel's Mediterranean Ecosystems

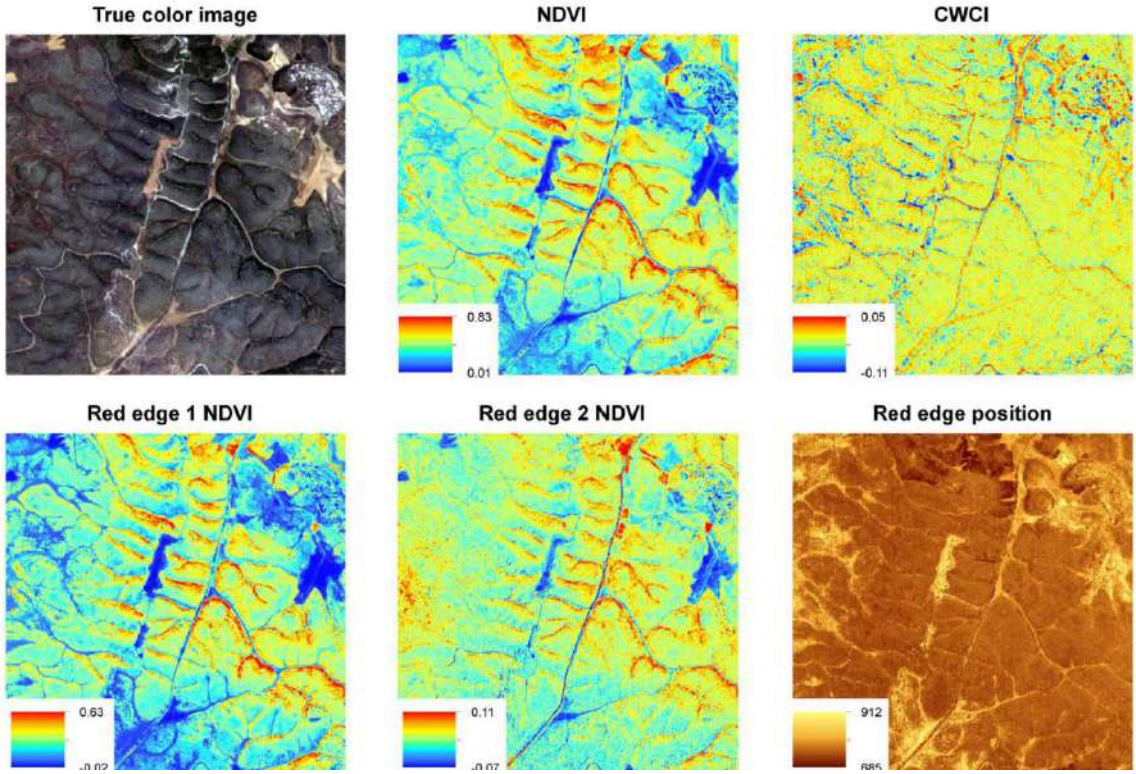
Bar-Massada, A. and Sviri, A (2020) Utilizing Vegetation and Environmental New Micro Spacecraft (VENμS) Data to Estimate Live Fuel Moisture Content in Israel's Mediterranean Ecosystems. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, **13**, 3204-3212.

DOI: HTTP10.1109/JSTARS.2020.3001677

Abstract: Increasing fire activity in Mediterranean ecosystems necessitates the development of new methods to quantify fire risk. Fire risk is strongly affected by live fuel moisture content (LFMC) in plants. Unfortunately, LFMC

is time-consuming to measure in-situ. Remote sensing is a promising alternative to field sampling of LFMC, but existing approaches utilize sensors with high spatial resolution but infrequent revisit times, or frequent acquisition at coarse spatial grains. We developed and evaluated LFMC models for Israel's Mediterranean ecosystems using Vegetation and Environmental New Micro Spacecraft (VENμS), a satellite which was developed specifically for monitoring Mediterranean vegetation. We combined vegetation indices derived from VENμS with ancillary data to build statistical models of LFMC in six study sites located along a steep rainfall gradient. Out of the five vegetation in-dices we tested, only red-edge position was a significant predictor of LFMC, though its effect depended on tree cover. A model including red-edge position, tree cover, year-day, and slope-aspect explained 32.5% of the variation in LFMC. The moderate predictive power of this model was higher than expected given that VENμS does not have the shortwave infrared (SWIR) bands which are typically used to detect water content in plants. A comparison with six vegetation indices derived from Sentinel 2 data revealed that VENμS' data explained considerably more variation in LFMC, even though some Sentinel 2 VI's are based on SWIR bands. Our results suggest that VENμS data, combined with ancillary data, may provide a rough estimate of LFMC in Israel's Mediterranean regions and as such might be suitable for preliminary monitoring purposes.

For more information, contact: Dr. Avi Bar-Massada avi-b@sci.haifa.ac.il



True color composite of a VENμS image of the area around Nehusha field site, acquired on August 16th, 2018; and the five VI's used in this study.

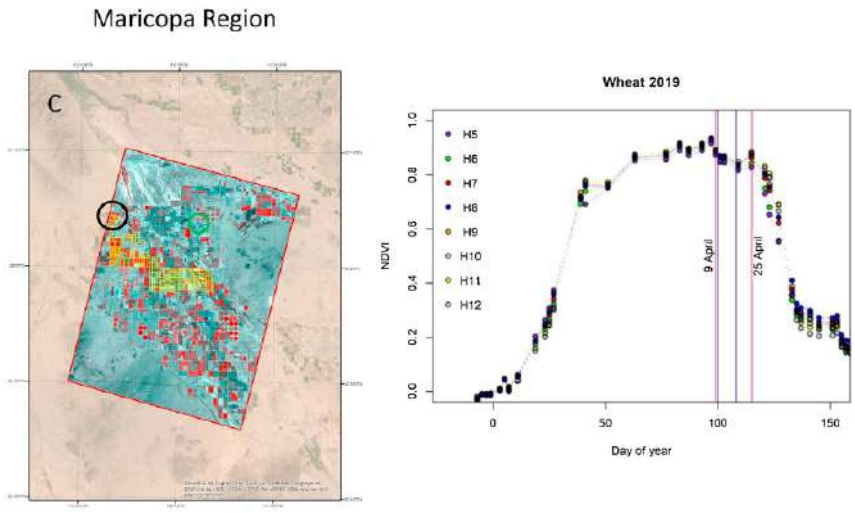
3. Feature paper

Satellite-based NDVI crop coefficients and evapotranspiration with eddy covariance validation for multiple durum wheat fields in the US Southwest

French, A.N., Hunsaker, D.J., Sanchez, C.A., Saber, M., Roberto, Gonzalez, J., Anderson, R. 2020. Satellite-based NDVI crop coefficients and evapotranspiration with eddy covariance validation for multiple durum wheat fields in the US Southwest. *Agricultural Water Management*. **239**, 106266. https://doi.org/10.1016/j.agwat.2020.106266.

Abstract: A three-year study was conducted to assess the ability of satellite-based vegetation index (VI) images to track evapotranspiration over wheat. While the ability of using VIs, notably with the Normalized Difference Vegetation Index (NDVI), to track vegetation growth has been well established, the operational capability to accurately estimate the crop coefficient (K_c) and crop evapotranspiration (ET_c) at farm-scale from spaceborne platforms has not been widely studied. The study evaluated wheat ET over 7 sites between 2016 and 2019 in Yuma and Maricopa, Arizona, USA estimated by using Sentinel 2 and VENµS satellites to map NDVI timeseries or entire wheat cropping seasons, December to June. The basal crop coefficient (K_{cb}) was modeled by the NDVI time-series and the daily FAO56 reference ETo was obtained by near-by weather network stations. Eddy covariance (EC) stations in each field observed ET_c during the same seasonal periods, and applied irrigation amounts were logged. The experiment found that remote sensing of NDVI and modeled K_{cb} accurately estimated Kc and crop ET during mid-season through senescence in most cases. However, NDVI-based estimation performed less well during early season (<60 days after planting), when observed ET_c was highly variable due to frequent rain and irrigation at low crop cover. Mid-season K_c values observed for the seven wheat fields were from 0.92 to 1.14, and end of season K_c values ranged from about 0.20 to 0.40, in close agreement to values reported elsewhere. Seasonal VI-based transpiration and ET_c values ranged from 467 to 618 mm, closely agreeing with seasonal EC data, which ranged 499–684 mm. Using the VENµS sensor, the study in Maricopa in 2019 revealed that when augmented by a background soil water balance model, water stressed wheat can be detected mid-season with NDVI. This capability is specifically due to the sensor's ability to provide well-calibrated images every 2 days. Findings from this study will help farmers, irrigators, and water managers use and understand the capabilities of visible near infrared remote sensing to track ET_c from space.

For more information, contact: Dr. Andy French, Andrew.french@ars.usda.gov



NDVI time series for 2019 wheat site H8 in Maricopa, Arizona, USA. Atmospherically corrected Venus observations indicated as solid circles. Dotted lines indicate interpolated NDVI. Red vertical lines denote the water stress interval as detected by Venus NDVI. Blue lines denote the onset and end of water stress as based on soil moisture depletion model.

4. Special issue in Remote Sensing – call for papers

remote sensing

an Open Access Journal by MDPI

Consider submitting an article to the special issue of the Remote Sensing journal: "VENµS Image Processing Techniques and Applications". https://www.mdpi.com/journal/remotesensing/special_issues/Venus

Deadline for manuscript submissions: 31 December 2020

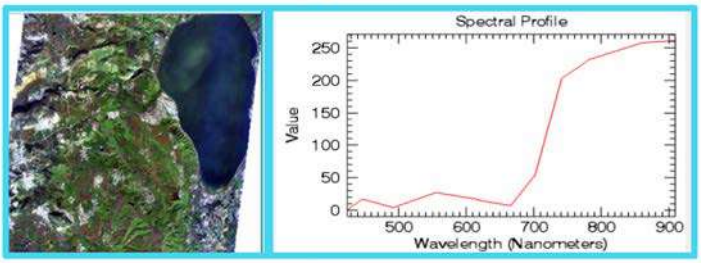
Accepted papers will be published continuously in the journal (as soon as accepted) and will be listed together on the special issue website.

5. Education

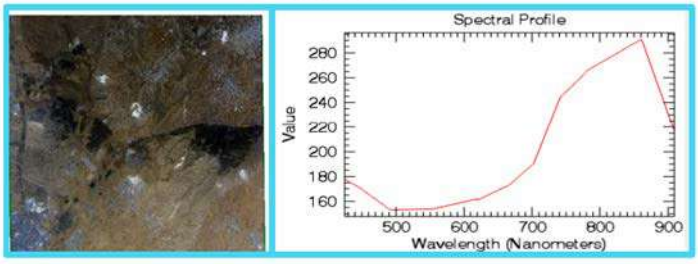
The She Space program was built to inspire young girls to study science, technology, engineering, arts, and mathematics (STEAM) subjects. The basic premise of the program is that exposure to advanced scientific disciplines, especially in an active research context, encourages young women to continue studying science throughout their educational careers. She Space uses exposure to remote sensing to push high school age girls outside of their comfort zones and help them learn about STEAM subjects without preconceptions and existing stereotypes. In 2019, She Space turned to be an international program, including Israel, Germany, the United States, and Brazil. Several environmental-related research projects were studied by the Israeli group using the unique characteristics of VENµS.

One of the projects was devoted to comparing between forest health and climate in the Galilee (Birya Forest) and the Northern Negev (Lahav Forest). The surprising results revealed that overall reflectance in the Lahav Forest area was higher than that of the Birya Forest. This finding was explained by the fact that there are differences in the land types between the two sites.

Birya forest



Lahav forest



For more information, contact: Dr. Shimrit Maman, tiroshs@bgu.ac.il

6. VENµS ZOOM Workshop in Memory of Dr. Naftaly Goldshleger

Utilizing VENµS time Series for mapping Life-form Compositions and Live Fuel Moisture Content (LFMC): an innovative implementation of a Deep Learning Algorithm

WORKSHOP IN MEMORY OF DR. NAFTALY GOLDSHLEGER

Principle Investigators:

Dr. Avi Bar-Massada Research & Workshop Coordinator, Haifa University;

Prof. Maxim Shoshany, Technion;

Prof. Nathan Netanyahu, Bar-Ilan University.

July 23, 2020

16:00 – 20:00

Preliminary Program:

16:00-16:15	Goldshleger Family	In memory of Naftaly

First Session: The Research of Naftaly Goldshleger

16:15-1630	Prof. Eyal Ben-Dor	Naftaly's work on hyperspectral sensing of soils
16:30-16:45	Dr. Eli Zaady	Naftaly's work on biological crusts
16:45-17:00	Dr. Eli Argaman	Naftaly's work in the Soil Erosion Research Unit
17:00-17:15	Dr. Uri Basson	Naftaly's work on sub-surface soil sensing
17:15-17:30	Prof. Chudnovsky	Naftaly's work on ecological quality

Second session: **Remote Sensing Using VENµS Data**

17:50-18:10	Dr. Avi Bar-Massada	Using VENµS to map Live Fuel Moisture
18:10-18:25	Ido Faran & Prof. Netanyahu	Deep learning Classification of VENµS
18:25-18:40	Dr. Jisung Chang	VENµS multi-temporal mapping of shrubs
18:40-18:55	Prof. Shoshany	Long-Term Ground Truth Network (LTGTN)
18:55-19:10	Prof. Arnon Karnieli	Final remarks

For participating send mail to: barmassada@gmail.com and maximsh@technion.ac.il

7. Previous VENµS Newsletters

Previous VENµS Newsletters along with more information about VENµS can be read in the following link: https://karnieli-rsl.com/newsletters

8. Unsubscribe

If you wish to unsubscribe from the future VENµS Newsletters, write an e-mail to karnieli@bgu.ac.il.

Best wishes and stay healthy!

Manuel and Arnon

Ben Gurion University