Prof. Arnon Karnieli

The Remote Sensing Laboratory
Jacob Blaustein Institutes for Desert Research
Ben-Gurion University of the Negev
Sede-Boker Campus 84990, ISRAEL
Tel: +972-8-6596855 Mobile: +972-52-8795925
Fax: +972-8-6596805
E-mail: karnieli@bgu.ac.il

פרופ ארנון קרניאלי

המעבדה לחישה מרחוק
המכונים לחקר המדבר ע"ש יעקב בלאושטיין
אוניברסיטת בן-גוריון בנגב
קמפוס שדה-בוקר 84990
טלפון: 08-6596855 נייד: 052-8795925
פקס: 08-6596805
http://www.bgu.ac.il/BIDR/research/phys/remote

Science from Above

August 20, 2019

Dear colleagues,

Re: VENµS periodic news – August 20, 2019

1. VENµS image processing updates

We continue processing the VENµS L2 (after atmospheric correction at 5 m resolution. Such products are available on the website from June 2019. Additonally, we are reprocessing the archived images. By now, we have updated the website with L2 Q2 5 m for the month of Nov. and Dec. 2017. The reprocessing assignment is a slow procedure, by routinely continue.

2. COSPAR Symposium

The VENµS session in the COSPAR conference will be held on Thursday, Nov. 7, 2019 at Hall C of the Daniel Hotel (Herzlia), starting at 09:50 AM.

Below are the list of speakers:

M. Dejus (France) - VENµS mission overview

A. Dick (France) - VENµS: Specificities of Image Quality and In-Orbit Calibration Monitoring

A. French (USA) - Using VENµS to Map Daily Evapotranspiration over Irrigated Agricultural in Arizona

G. Dedieu (France) - The VENµS Mission: A Tool for the Scientists, a Contribution to Prepare the Next Generation of SENTINEL-2

P. Kamoun (Israel) - Land Monitoring Aspects by SENTINEL-2 and VENµS

K.-H. Tseng (Taiwan) - Monitoring Inland Waterbody from Multiple Remote Sensing Satellites: A Case Study in Tsengwen Reservoir, Taiwan

I. Herrmann (Israel) - Assessment of Chickpea Morpho-Physiological Traits by VENμS All Bands and Vegetation Indices

A.Karnieli (Israel) - VENμS Observations Over Israel

E. Walter-Shea (USA) - Estimation of Functional and Structural Traits of C3 and C4 Crops using VENμS and in situ Reflectance Data

F. Gao (USA) - Mapping Crop Phenology using VENμS Observations over Maryland Experimental Sites

I. Herrmann (Israel) - The Effect of less than 2 Minutes and Viewpoint on Vegetation Indices Obtained by VENμS

F. Zemek (Czech Rep.) - Impact of Flux Footprint Heterogeneity of Agricultural Site on Surface-Atmosphere Exchange

T. Wijmer (France) - Crop Stages and Biophysical Variables Retrieval Using VENμS Observations

C. Desjardins (France) - The VENμS L2A and L3A Surface Reflectance Products

G. Henebry (USA) - Land Surface Phenologies of Grasslands: Comparing VenμS Time Series from Naryn, Kyrgyzstan and the Eastern Sandhills of Nebraska, USA

J.-L. Raynaud (France) - VENμS Ppoduction and Image Quality Monitoring Operations

J. Chen (USA) - Remote Sensing Modeling of Ecosystem Productivity and Evapotranspiration: New Insights from VENμS

A. Rolland (France) - DEM generation from native stereo VENμS Acquisitions

S. Elbaz (Israel) - Using UAVs and VENμS to Characterize the Phenology of Mediterranean Woody Species Across Spatial Scales

Y. Michl (Israel) - Monitoring Nitrogen Application with VENμS

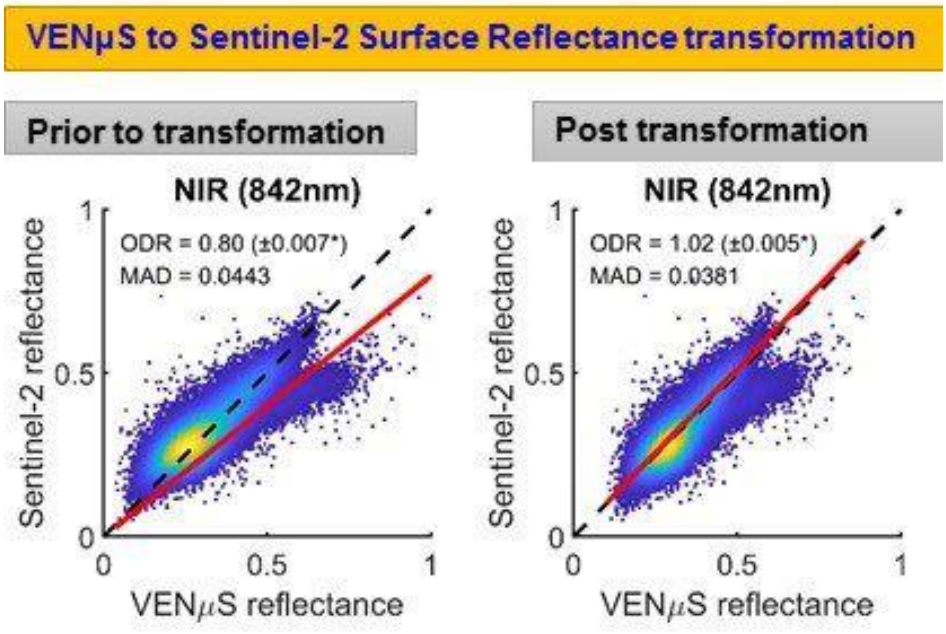
3. Feature study using VENμS

Developing Transformation Functions for VENμS and Sentinel-2 Surface Reflectance over Israel

V.S. Manivasagam , Gregoriy Kaplan, and Offer Rozenstein

Vegetation and Environmental New micro Spacecraft (VENμS) and Sentinel-2 are both ongoing earth observation missions that provide high-resolution multispectral imagery at 10 m (VENμS) and 10–20 m (Sentinel-2), at relatively high revisit frequencies (two days for VENμS and five days for Sentinel-2). Sentinel-2 provides global coverage, whereas VENμS covers selected regions, including

parts of Israel. To facilitate the combination of these sensors into a unified time-series, a transformation model between them was developed using imagery from the region of interest. For this purpose, same-day acquisitions from both sensor types covering the surface reflectance over Israel, between April 2018 and November 2018, were used in this study. Transformation coefficients from VENμS to Sentinel-2 surface reflectance were produced for their overlapping spectral bands (i.e., visible, red-edge and near-infrared). The performance of these spectral transformation functions was assessed using several methods, including orthogonal distance regression (ODR) the mean absolute di erence (MAD), and spectral angle mapper (SAM). Post-transformation, the value of the ODR slopes were close to unity for the transformed VENμS reflectance with Sentinel-2 reflectance, which indicates near-identity of the two datasets following the removal of systemic bias In addition, the transformation outputs showed better spectral similarity compared to the original images, as indicated by the decrease in SAM from 0.093 to 0.071. Similarly, the MAD was reduced post-transformation in all bands (e.g., the blue band MAD decreased from 0.0238 to 0.0186, and in the NIR it decreased from 0.0491 to 0.0386). Thus, the model helps to combine the images from Sentinel-2 and VENμS into one time-series that facilitates continuous, temporally dense vegetation monitoring.



The paper was published in Remote Sening, 2019, 11, 1710; doi:10.3390/rs11141710;
For more information: *Offer Rozenstein; offerr@volcani.agri.gov.il; Tel.: +972-3-968-3886*

4. The Ramon Hackathon event

During march 27-28th , The Ramon Foundation and partners hosted a 48 hours Hackathon in which data analysts, AI, machine learning experts, big data experts and software developers will utilized satellite imagery data, in order to present an innovative Geo-analytical solution in various domains.

In order to lower barrier of entry for satellite data analysis entrepreneurs, the Ramon Foundation partnered with leading global space imagery and satellite operators such as Airbus, The Israeli Space Agency, ISI & IAI thus enabling exclusive access to leading earth observation data sets for the hackathon as well as additional data sources .

The datasets that were accessible to participants of this Hackathon consists of satellite imagery taken from diverse geographical locations, different times, resolutions, area coverage and image acquisition conditions (weather, sun direction, camera direction, etc.). Image resolution varies between 30cm to 30,000cm GSD (Ground Sample Distance).

Data sources provided were taken from these satellites\constellations:

- VENμS – ISA multi spectral satellite
- Spot- Airbus high-resolution optical imaging constellation
- Pleiades- (HR 1A & HR 1B) Airbus high-high-resolution optical Earth-imaging
- Terrasar-X – Airbus imaging radar earth observation satellite
- BGUSAT- IAI low resolution, research CubeSat.
- Open Source Imagery:
  - Sentinal A,B
  - Planet Labs

The entire programing was based on ORACLE cloud services that included machinery

Among other projects, the VENμS ones were:

Num.	Name	Project	Imagery	Contact
1	Kinneret	Developed a solution that give end-user quantified data obtained from multi-spectral images. (regarding pollution, vegetation, etc)	VENμS	Zohar Tal - rbzohartal@gmail.com
2	Toy Soldiers	Worked on algorithm that identified the density of toxic algae in sweet water reservoirs.	VENμS	Orel Halfon - orelhalfon1@gmail.com

6	SatLight	Team conducted a semi-supervised learning, in order to foreseen disease in fields.	VENμS	moshe yaniv - moshe.yaniv@gmail.co Noa Moriel - nomoriel@gmail.com
13	אראגו	The team succeed to use open image repositories (Google maps) to automatically tag other imagery. They also succeeded in producing a model that selects the ranks classification & identifications by comparison of various imagery sources.	VENμS SPOT	Roee Penso - rpenso@gmail.com
17o	DeepSpace	The team focused on one tile near Israel northern border. They analyzed SAR+Multi spectral imagers, and looked for anomalies (They new anomalies exsit in this tile during the analyzed timepirod)	SAR + VENμS	Shahar Guigui - shahargigi@gmail.com
18	Trellis	The team demonstrated crops identification from variable crops index	VENμS	Mor Doron - Mor@trellis.ag

For more information: *Ran Livne* *ranl@ramonfoundation.org*

Best wishes for the end-of-summer vactions,

Manuel and Arnon