THE REMOTE SENSING LABORATORIES

The 9th GEOSS Asia-Pacific Symposium Towards the Next Decade of GEOSS in the Asia-Pacific Region

11-13 January 2017
Tokyo , Japan

The Israel (GEO) Activities

Pro. Eyal Ben Dor
The Israel Principle for GEO

Head of the RSL laboratory
Tel Aviv University

TAU

GROUP ON EARTH OBSERVATIONS

THE REMOTE SENSING LABORATORIES

TAU-RSL

The group is leaded by :

Prof. Eyal Ben Dor – Remote Sensing of the Earth Solis and Liquid Phase
GEO principle of Israel (ISA)

2 PhD Employees, 2 Post DOC, 5 PhD, 4 MSc.

All activities are conducting by international collaboration (Europe, US, South America and Australia) using state of the art sensors, platform and selected state-of-the optical technologies.

Recent activity:

- Enlarging the Hyperspectral remote sensing to the Thermal Region by opening a "***knowledge HSR national center***" under ISA
- Building Soil Spectral Libraries for Mediterranean, North Africa and Balkan countries

THE REMOTE SENSING LABORATORIES

GEO Direct

- GEO principle of Israel
- Energy and Mineral SBA
- GEOGLAM

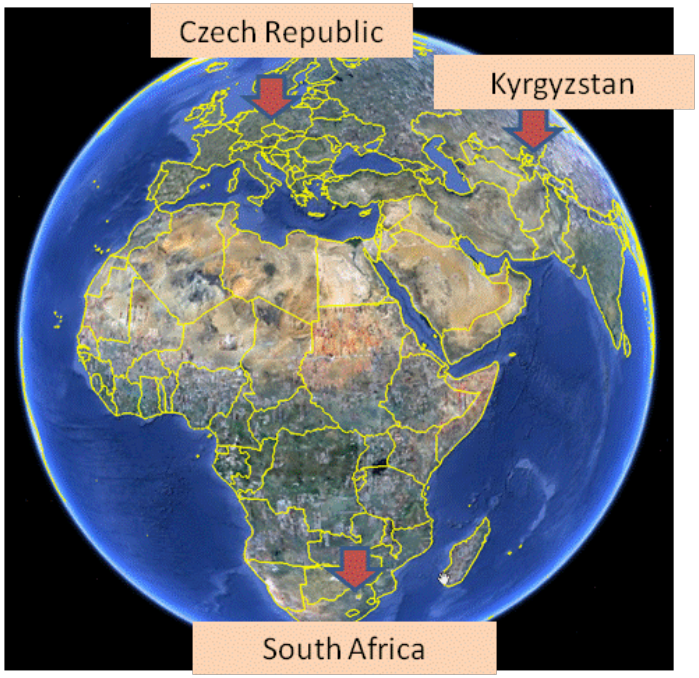
GEO Indirect

- EO-MINERS FP-7 project (with BRDM)
- CAL/VAL initiative TAU and BGU (within CEOS)
- WG 7/III Information extracted from hyperspectral sensor (with ISPRS)
- EWG 8 Hyperspectral Applications of Soils (with EUFAR)
- EO-CRADEL H202 project (with NOA)
- GSSL-Global Soil Spectral Library

THE REMOTE SENSING LABORATORIES

Part of EO-Miners – FP7

ANGLO AMERICAN · brgm · British Geological Survey · CAIAG · Council for Geoscience · DLR · GeoZS · miro · SOKOLOVSKÁ UHELNÁ · TEL AVIV UNIVERSITY · Wuppertal Institute for Climate, Environment and Energy



"Integrate new and existing Earth Observation tools to improve best practice in mining activities and to reduce the mining related environmental and social footprint"

2010-2014

THE REMOTE SENSING LABORATORIES

Work package 2 – TAU
Background

- WP2 is focused on **standards and protocols** for EO projects and utilization
- A large number of EO working protocols were collected and developed during the project period.
- The output of WP2 is 5 deliverables that can be used in future projects and researches as standard working protocols

THE REMOTE SENSING LABORATORIES

Standard and Protocol + QA/QI

- Mapping indicators for EO tools
- Mission planning protocol (airborne, space borne)
- Geo-rectification protocol
- Geo-rectification quality indicators
- Field spectral measurements protocol
- HRS atmospheric correction protocol
- HRS atmospheric correction quality indicators
- HRS atmospheric correction comparison
- New innovative HRS change detection approach (spectral based) – Protocol
- Thermal atmospheric correction protocol and TES
- Emissivity field measurement protocol
- New digital field archiving tool (CSIRO has requested a copy)
- Spectral of dust components -protocol
- Reflectance measurement of soils in the laboratory protocol
- Reflectance measurement of soils in the field protocol

2015-2018

GEO-CRADLE

Coordinating and integRating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS

Technical Annex 1-3

ID	Participant Organisation Name	Country	Logo
1	National Observatory of Athens (NOA) - **Coordinator**	Greece	
2	Interbalkan Environment Center (IBEC)	Greece	
3	Center for Environment and development for the Arab Region and Europe (CEDARE)	Egypt	
4	Research and Studies Telecommunications Centre (CERT)	Tunisia	
5	Tel Aviv University (TAU)	Israel	
6	Cyprus University of Technology (CUT)	Cyprus	
7	TUBITAK UZAY Space Technologies Research Institute (UZAY)	Turkey	
8	Space research and technology institute (SRTI)	Bulgaria	
9	National Institute of R&D for Optoelectronics (INOE)	Romania	
10	University of Ss Cyril and Methodius (USCM)	FYROM	
11	Institute for Nature Conservation in Albania (INCA)	Albania	
12	Institute of Physics Belgrade (IPB)	Serbia	
13	CIMA Research Foundation (CIMA)	Italy	
14	Academy of Athens (AOA)	Greece	
15	INOSENS (INS)	Serbia	
16	European Association of Remote Sensing Companies (EARSC)	EU	
17	EURISY	EU	
18	EuroGeoSurveys (EGS)	EU	
19	University of UAE (UUAE)*	UAE	
20	King Fahd University of Petroleum and Minerals (KFUPM)*	Saudi Arabia	
21	World Radiation Center (PMOD/WRC)*	Switzerland	
22	National Authority for Remote Sensing & Space Sciences (NARSS) (subcontractor to CEDARE)**	Egypt	
23	Royal Centre for Remote Sensing (CRTS) (subcontractor "in-kind" to EURISY)**	Morocco	

*Note: UAE, Saudi Arabia and Switzerland are not requesting financial contribution from the EC

**Note 2: NARSS and CRTS are considered as key subcontractors and thus are presented in this list

THE REMOTE SENSING LABORATORIES

Coordinating and integRating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related intiatives toward GEOSS

Thematic Areas

Adaptation to Climate Change (ACC)

Improved Food Security – Water Extremes Management (IFS)

Access to Raw Materials (ARM)

Access to Energy (SENSE)

Protocol , SSL

IAASARS

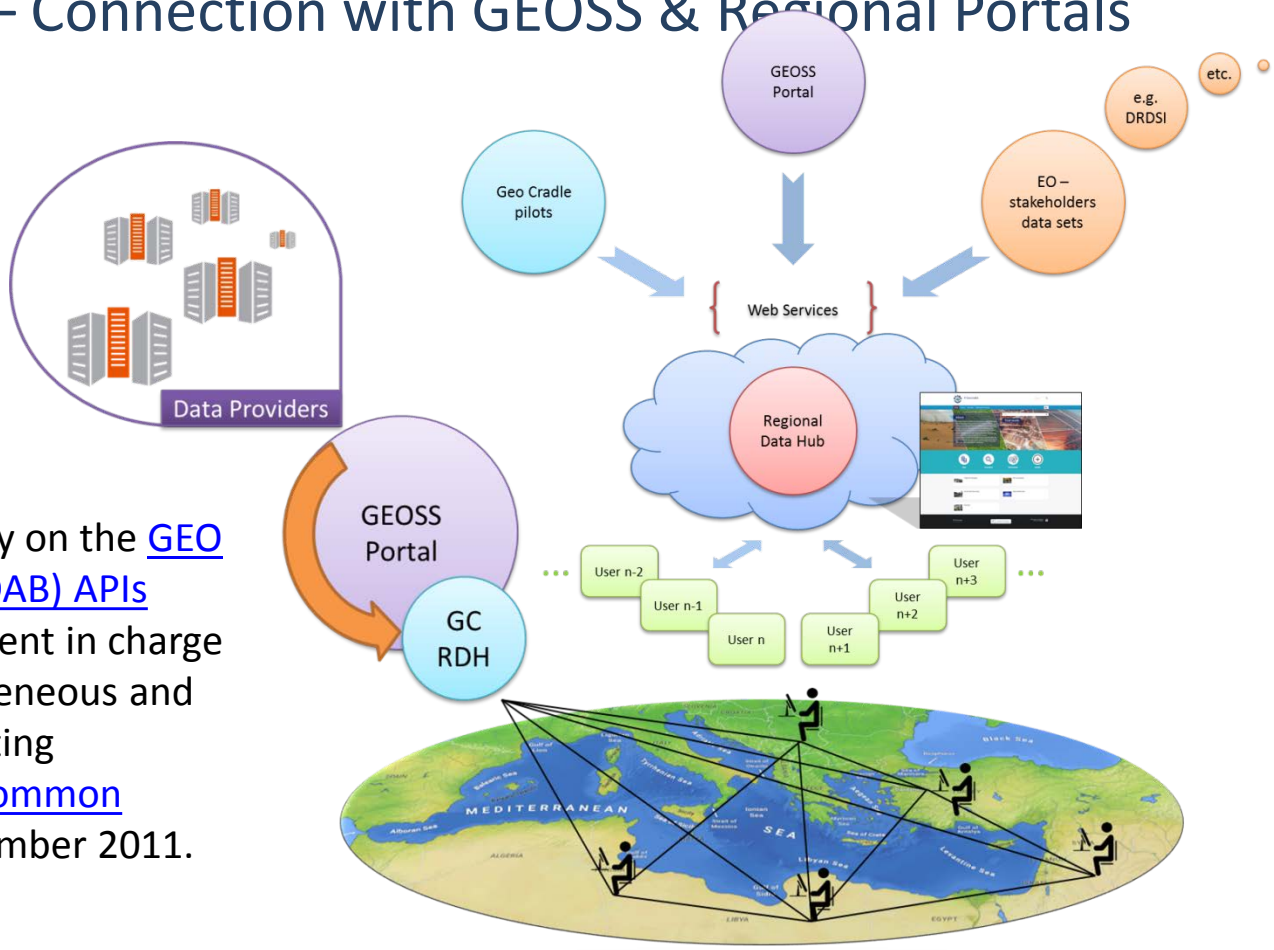
GROUP ON EARTH OBSERVATIONS

THE REMOTE SENSING LABORATORIES

Coordinating and integRating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East and Balkans and Developing Links with GEO related intiatives toward GEOSS

Regional Data Hub – Connection with GEOSS & Regional Portals

- The GEO CRADLE Regional Data Hub (GC-RDH) is going to provide its users with a transparent discovery and access mechanism of the GEOSS portal's resources, and other regional portals!



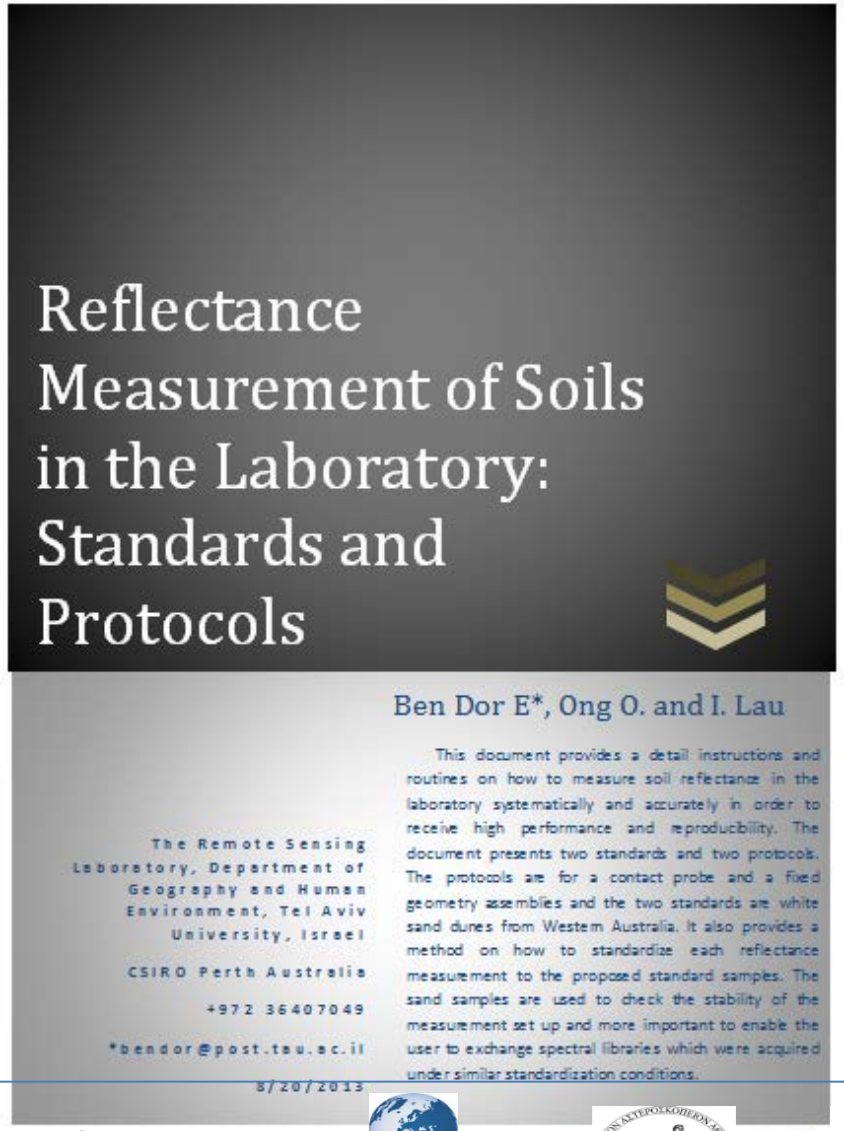
- This mechanism will heavily rely on the GEO Discovery and Access Broker (DAB) APIs which is a middleware component in charge of interconnecting the heterogeneous and distributed capacities contributing to GEOSS; part of the GEOSS Common Infrastructure (GCI) since November 2011.

IAASARS

GROUP ON EARTH OBSERVATIONS

THE REMOTE SENSING LABORATORIES

EWG 8 Hyper spectral Applications of Soils with EUFAR (2)



Four Protocols:

two are well recommended from CSIRO

(bendor@post.tau.ac.il)

BEYOND

Greek GEO Office

MARIOLOPOULOS-KANAGINIS FOUNDATION FOR THE ENVIRONMENTAL SCIENCES

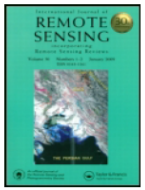
European Commission

GEO GROUP ON EARTH OBSERVATIONS

THE REMOTE SENSING LABORATORIES

Two Standards

Lucky Bay Wiely Bay



Taylor & Francis
Taylor & Francis Group

International Journal of Remote Sensing

ISSN: 0143-1161 (Print) 1366-5901 (Online) Journal homepage: http://www.tandfonline.com/loi/tres20

Normalizing reflectance from different spectrometers and protocols with an internal soil standard

Veronika Kopačková & Eyal Ben-Dor

To cite this article: Veronika Kopačková & Eyal Ben-Dor (2016) Normalizing reflectance from different spectrometers and protocols with an internal soil standard, International Journal of Remote Sensing, 37:6, 1276-1290

To link to this article: http://dx.doi.org/10.1080/01431161.2016.1148291

Soil Mineralogy

Performance of Three Identical Spectrometers in Retrieving Soil Reflectance under Laboratory Conditions

Agustin Pimstein*
Facultad de Agronomía e Ingeniería Forestal of the Pontificia Universidad Catolica de Chile.

Gila Notesco
Eyal Ben-Dor
Dep. of Geography and Human Environment, Tel-Aviv Univ., P.O.B. 39040, Ramat Aviv 69978, Israel.

A wide range of electronic and mechanical noise factors can affect soil spectra when using different instruments or even when repeating a specific sample's measurements with the same spectrometer. In soil samples where very weak spectral features are monitored for chemometric purposes, alterations in wavelength location, peak absorption shape, or albedo intensity can limit the use of previously developed spectral models. To quantify this alteration and propose a standardization method, 12 soil samples and three different materials for internal standards (sand, glass and polyethylene) were analyzed. This population was concurrently measured with three identical spectrometers using a strict measurement protocol, and then by different operators with different protocols. Significant changes in the soil spectra were found when different operators performed the measurements, being reduced >50% when the strict protocol was applied. Sand was found to be the ideal internal standard for correcting the spectra to a reference spectrometer, even when different measuring protocols were used. This standardization also showed an improvement in the prediction of soil properties when applying chemometric spectral models even with different instruments, concluding that the use of an internal standard and a strict protocol must be applied for soil spectral measurements. As the measuring factors described in this research also affect any infrared diffuse reflectance spectroscopy measurements, the proposed method should be applicable to any instrumentation and configuration being used. This is crucial to enabling spectral comparisons between different spectrometers or, more importantly, to establishing robust chemometric models and to exchange soil spectral information.

Abbreviations: ASD, Analytical Spectral Devices, Inc.; CR, continuum removal; NIRS, near infrared analysis; PLS, partial least squares; RGB, red-green-blue color model; RMSEP, root mean square error of prediction; SAM, spectral angle mapper; TAU, Tel Aviv University.

Many reflectance spectroscopy applications have been developed for soils in the last 20 yr (Malley et al., 2004). Today, reflectance in the VIS-NIR-SWIR region is considered to be a solid and mature technique for qualitative and quantitative analyses of soil material (Ben-Dor et al., 2008b). Soil spectroscopy has advanced the discipline of soil science by providing a rapid and accurate methodology for quantitative analyses that bypasses the traditional "wet" laboratory analyses. Whereas most of the work in evaluating soil information from reflectance spectroscopy has been performed under controlled laboratory conditions, field applications are now rapidly gaining an important place in soil spectroscopy (Ben-Dor et al., 2009; Cecillon et al., 2009). Accordingly, portable spectrometers are being developed and utilized worldwide for many natural resource applications, such as soil, rock, vegetation, and water studies. In addition, a wide range of soil spectral measurements are being gathered around the globe with the intention of building a universal soil spectral library (Viscarra Rossel, 2009). However, this kind of initiative, or even the routine analyses of spectral data collected in one specific laboratory, are limited by the differences that are usually obtained when different spectrometers and protocols are used (Milton et al., 2009; Price, 1994). Spectral performance may vary among different types of spectrometers, or even among models from the same manufacturer, being therefore important to characterize

This article has supplemental material available online.
Soil Sci. Soc. Am. J. 75:2011
Posted online 18 Feb. 2011
doi:10.2136/sssaj2010.0174
Received 20 Apr. 2010.
*Corresponding author (pimstein@uc.cl).

THE REMOTE SENSING LABORATORIES

In 2015 Raphael effort yield the first GSSL

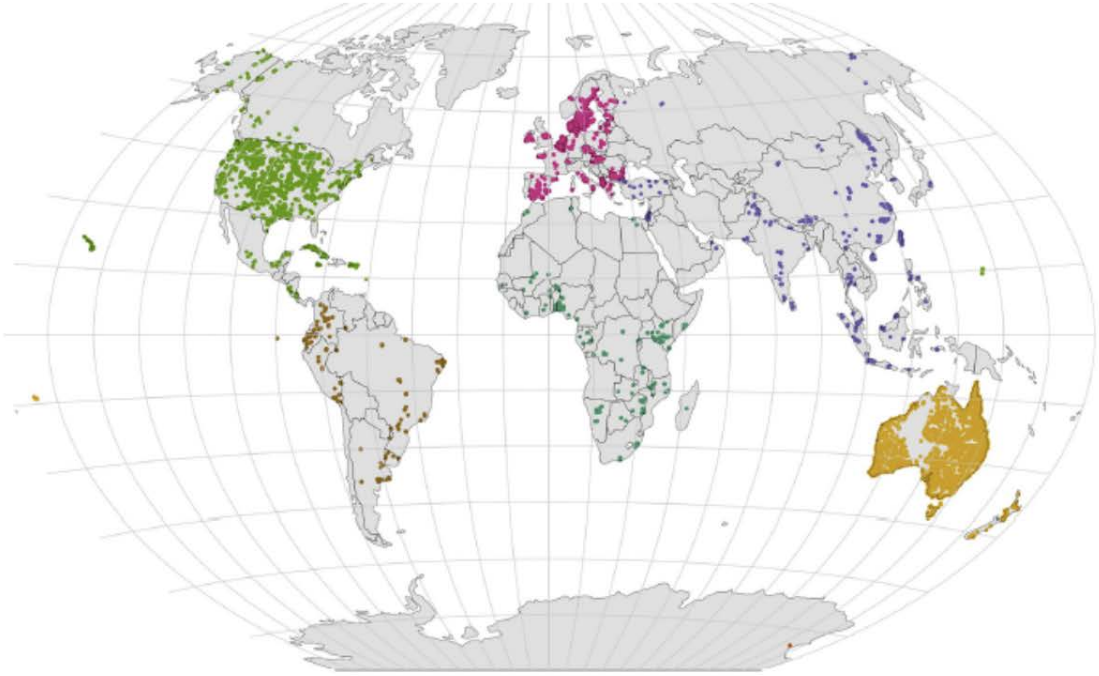
> 2009

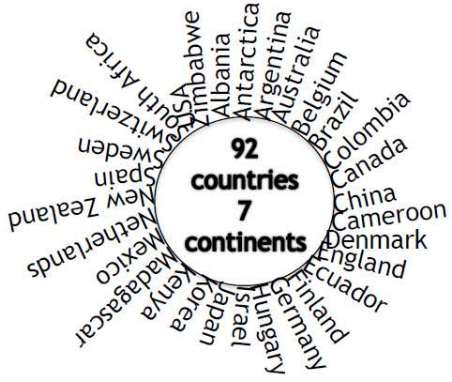
Soil VNIR-SWIR Spectra

Global VNIR-SWIR IR spectra

Some 20,000+ vis-NIR (350-2500 nm) spectra from 12,509 sites

45 collaborators from 35 institutions





provided by Viscorra Rossel

THE REMOTE SENSING LABORATORIES

GSSL

Global soil vis–NIR spectra in numbers

Continent

- 8646 **Oceania**
- 5198 **North, Central America**
- 3518 **Europe**
- 3097 **Asia**
- 1621 **Africa**
- 1407 **South America**
- 144 **Antarctica**

Position

- 84% with **coordinates**
- 60% from the **0–30 cm**
- 30% from the **30–100 cm**
- 10% from **> 1m**

Attributes

- **pH** 20,515 (20,515)
- **Organic C** 17,931 (9757)
- **Clay** 17,463 (10,064)
- **Sand** 12,058 (3395)
- **CEC** 9588 (5014)
- **Silt** 9542 (1280)
- **Fe** 4151 (3311)
- **$CaCO_3$** 2960 (1388)

Description

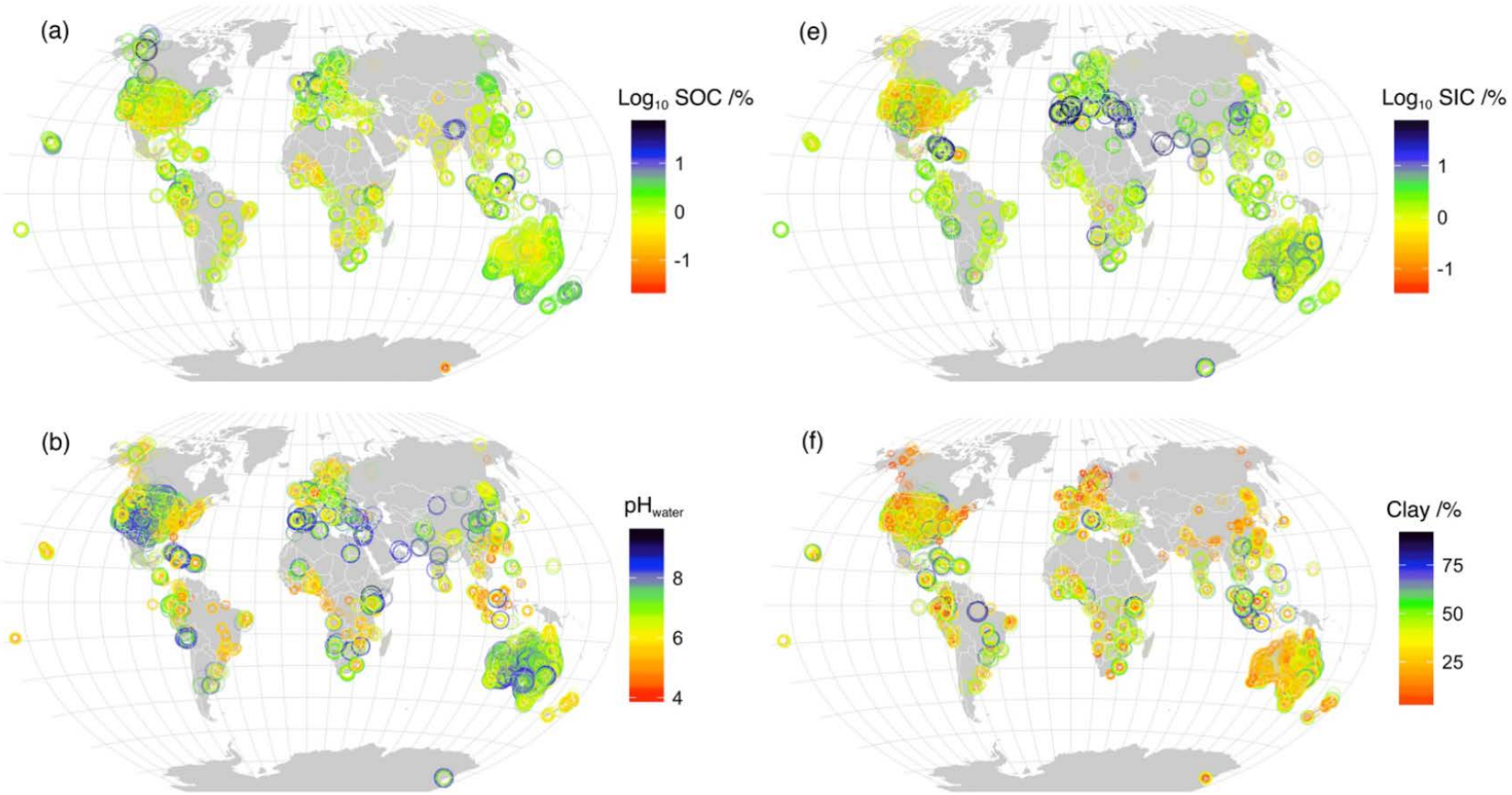
- 15% have **soil horizon**
- 95% with **FAO WRB**
- 80% with **land cover**

provided by Viscorra Rossel

THE REMOTE SENSING LABORATORIES

Chemomtric (non linear spectral data mining) from the GSSL

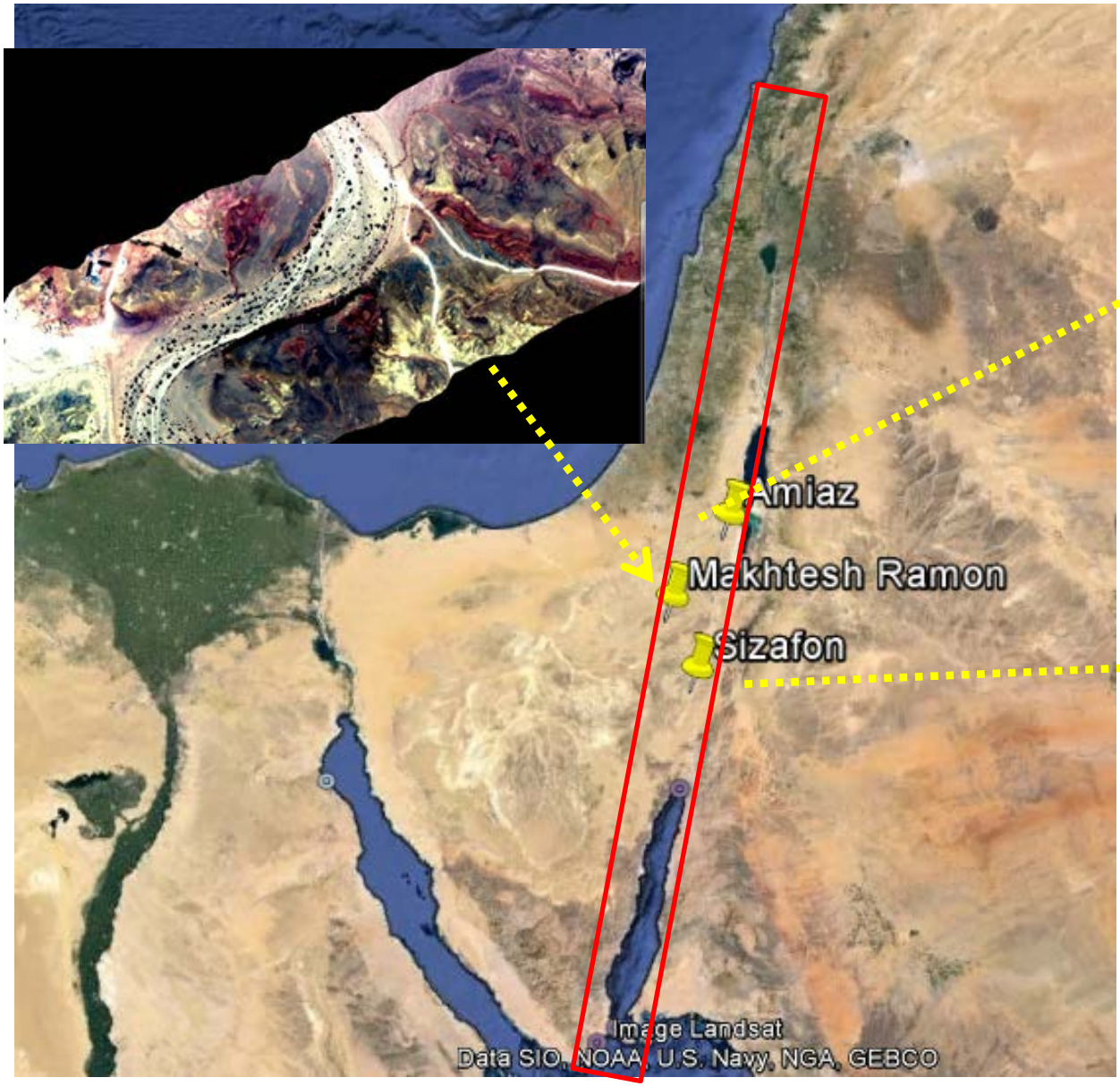
Spatial distribution of predictions

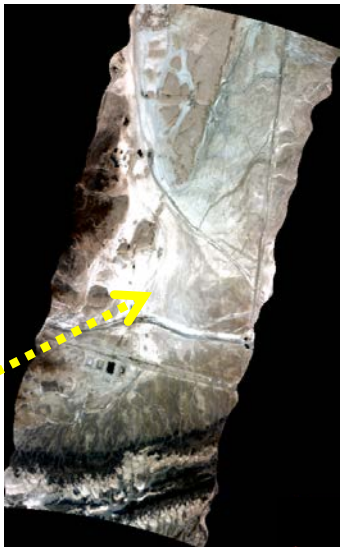


Viscorra Rossel 2015

- National Soil Spectral library
- Aeronet Stations
- National CAL/VAL (vicariuse) sites for EO
- Super site calibration area for EO
- Notional Center for HSR (under construction)
- Comprehensive research (in GEOSS related issues) is conducted at all Universities (6) and National Institutes (5)
- Eros satellite
- Venus satellite
- SHALOM satellite

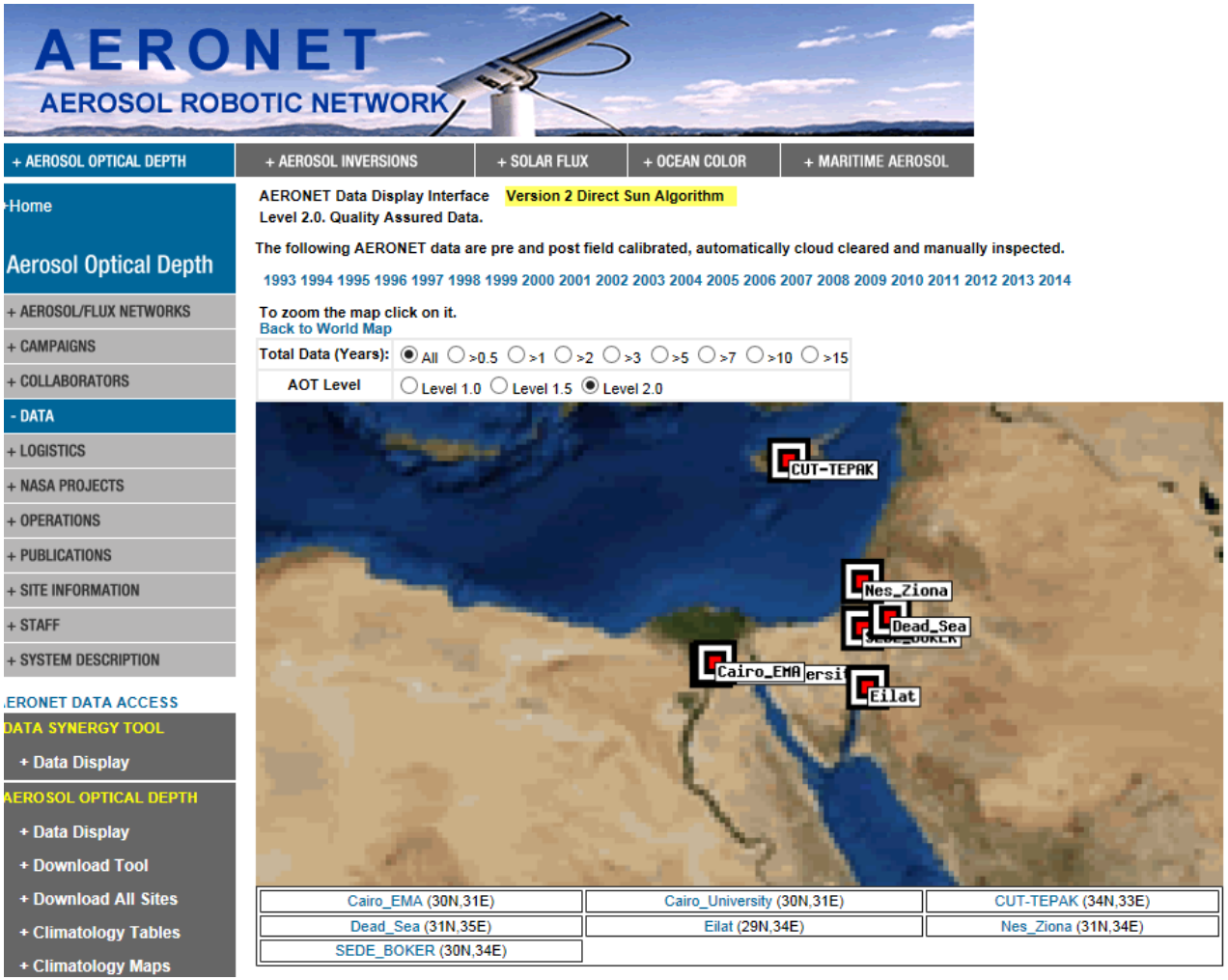
- National vicarious calibration (CAL/VAL) sites for EO





THE REMOTE SENSING LABORATORIES

- Aeronet Stations



The Israel (GEOSS) Activity

THE REMOTE SENSING LABORATORIES

USGS science for a changing world

USGS Home
Contact USGS
Search USGS

The USGS Remote Sensing Technologies Project

Enter text: Google™ Custom Search | Search RST

Home | About Us | Aerial | Satellite | Instrumentation | Collaborations | Resources | Contact Us

Remote Sensing Technologies - Satellite

Test Site Catalog

CEOS | QA4EO — A QUALITY ASSURANCE FRAMEWORK FOR EARTH OBSERVATION

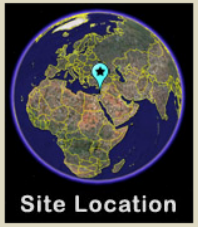
Site Location: Makhtesh Ramon

Radiometric ◀Prev Next▶

Location (City, State, Country):	Makhtesh Ramon, Southern Israel, Asia
Altitude above sea level (meters):	557
Center Latitude,Longitude (Degrees):	+30.59 , +34.84
Landsat WRS-2 Path/Row:	174 / 39
Size of Usable Area (km):	TBD
Owner:	TBD
Researcher:	TBD

Choose A Radiometric Site

Home
Test Site Gallery
Radiometry Sites
Geometry Sites
CEOS Reference Sites
Acronyms
Reference

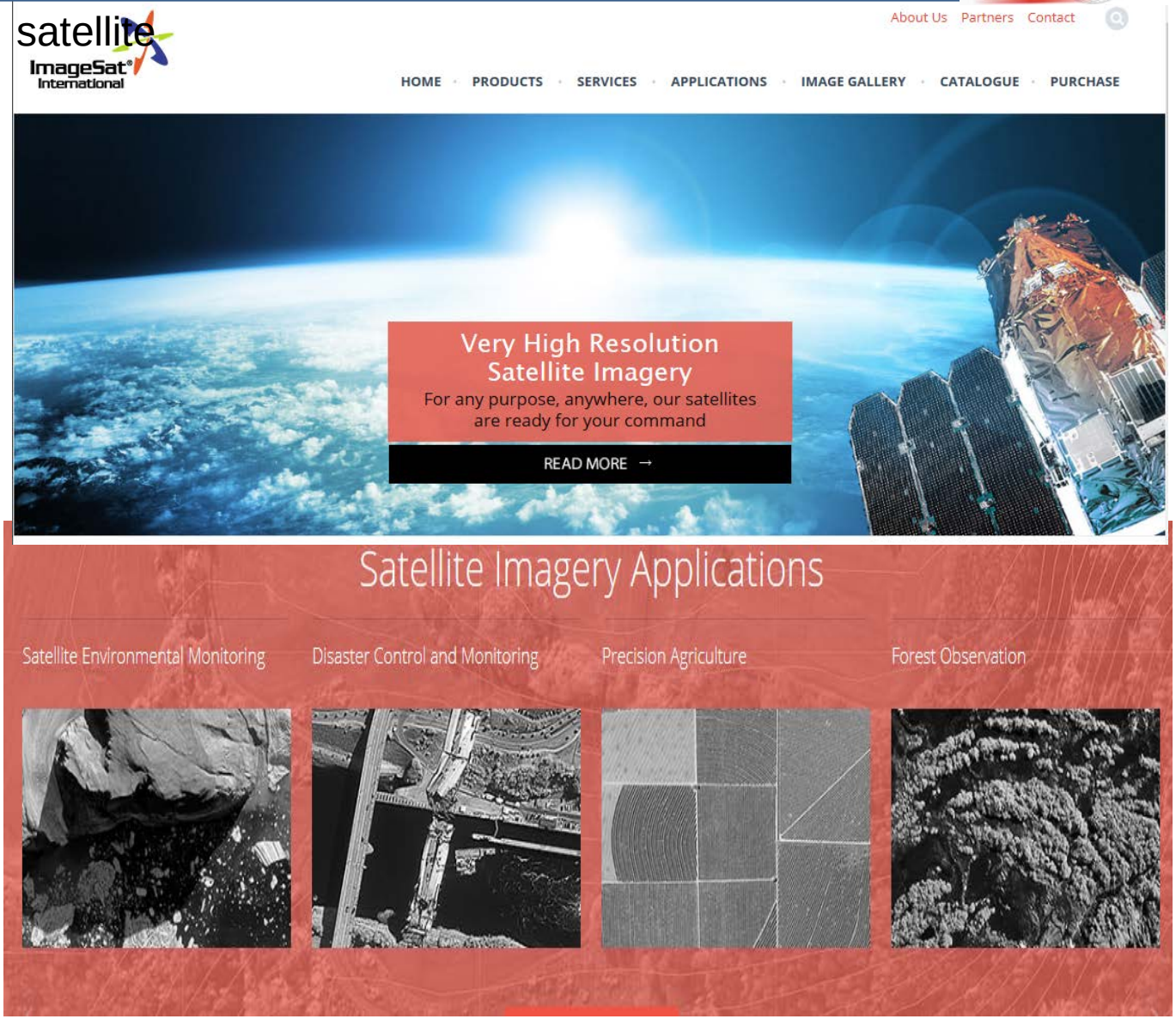


Download L7 ETM+ GeoTiff Data
Download Google Earth KMZ File

The Israel (GEOSS) Activity

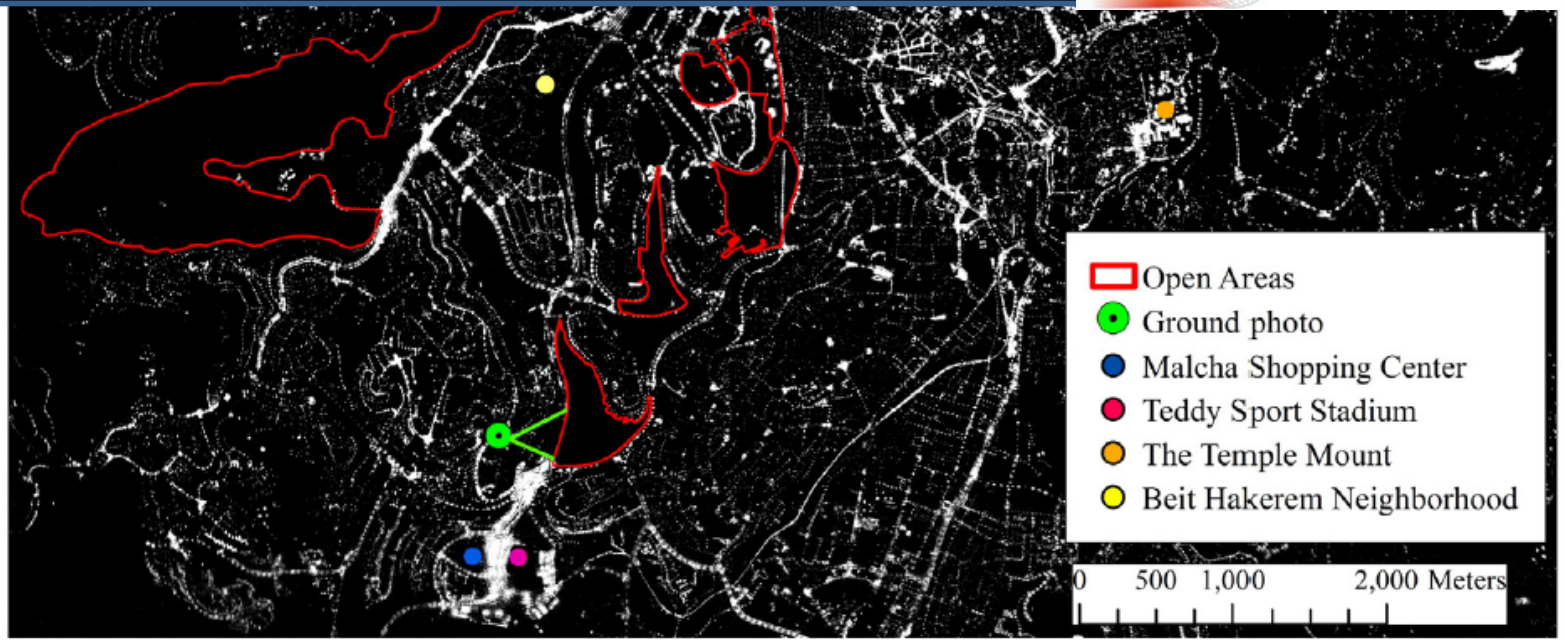
THE REMOTE SENSING LABORATORIES

- Eros satellite



Data (commercially) available

THE REMOTE SENSING LABORATORIES



Jerusalem at night: EROS-B night-lights image, 12/2/2014

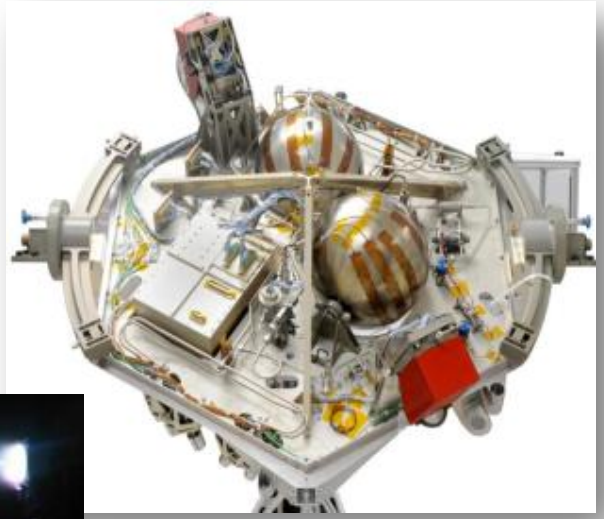
(

THE REMOTE SENSING LABORATORIES

Venus satellite

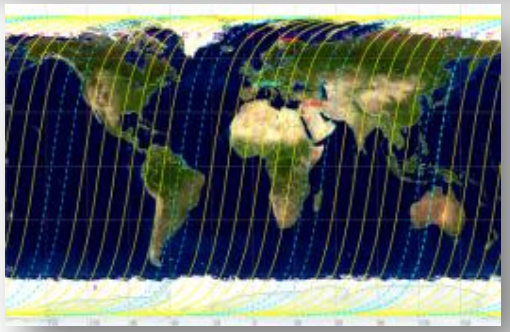
Venμs: **V**egetation and **E**nvironment **N**ew **μS**atellite

Technology Mission – Electric Propulsion

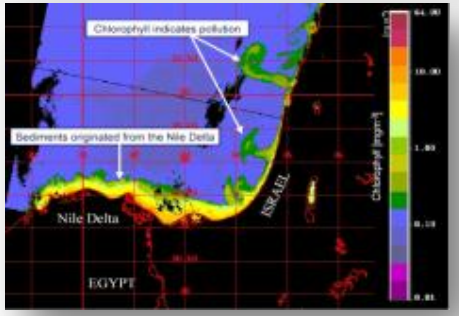


Scientific Mission – Super spectral camera

12 bands
VNIR



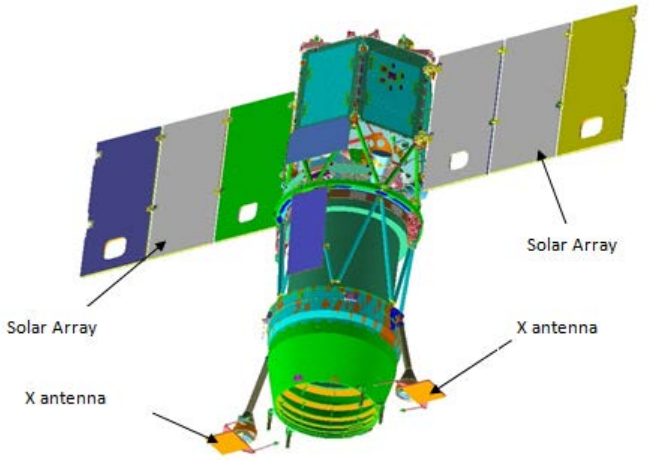
Elbit Systems
Electro-optics - Elop
RAFAEL
ADVANCED DEFENSE SYSTEMS LTD.



THE REMOTE SENSING LABORATORIES

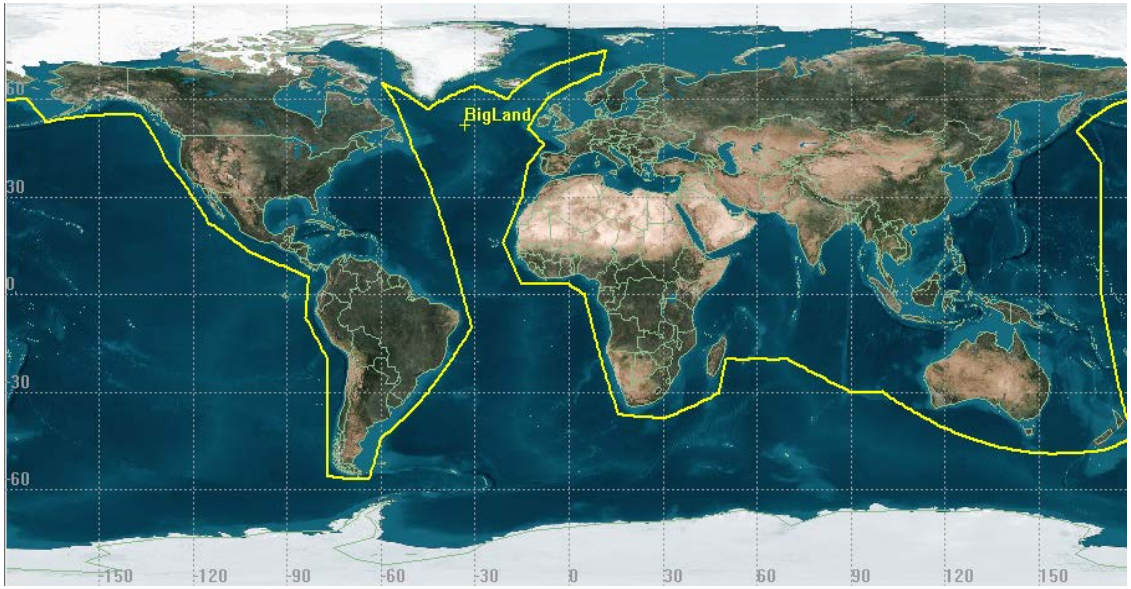
SHALOM: SPACEBORNE HYPERSPECTRAL APPLICATIVE LAND AND OCEAN MISSION:

A JOINT PROJECT OF ASI-ISA



Data Characteristics

- Panchromatic camera to acquire a GSD of 2.5 m
- Swath width : 10Km for VNIR/SWIR.
- GSD of 10 m for VNIR/SWIR
- The spectral bands for instruments will be comprised between:
- VNIR = 400-1010nm.
- SWIR = 920-2500nm.
- PAN = 400-700nm.
- with a spectral resolution and spectral sampling interval equal to 10nm.
- LTAN, between 10:00 and 11.30,.



Thank you for your attention

THE REMOTE SENSING LABORATORIES

Point of contact:

Prof Eyal Ben Dor
bendor@post.tau.ac.il

Laboratory webpage: ***http://www.rslab.co,***