



THE REMOTE SENSING
LABORATORIES



20 & 21 October 2014
Athens, Greece

**2nd South-Eastern Europe GEO Workshop
on Integrating Earth Observation Data
and Services for monitoring the
Environment, protecting the citizens and
stimulating the regional economic growth**

The Israel (GEO) Activities

Pro. Eyal Ben Dor
Director of Department of Geography
Head of the RSL laboratory
Tel Aviv University



BEYOND



GEO GROUP ON
EARTH OBSERVATIONS

TAU-RSL (1)

- TAU- RSL is “a national excellence center” for HSR (Ministry of Science)
- Over 230 peer reviewed papers , chapter books and reports on HSR
- Serving at the advisory boards for EnMAP , HypSIRI and Shalom programs (Germany US and Israel Space Agencies)
- WP leader: ISPRS VII/2 [information extracted from HSR data](#) and EUAFR WG 3 [spectral information of soil](#)
- Editor and co editors: *Journal of Imaging Spectroscopy, Remote Sensing, Soil and Environment*
- 30 invited lectures in International RS and HSR conferences
- Chair and organizer of 3 international HSR conferences

TAU-RSL (2)

The group is leaded by two TAU faculties:

Dr Alexandra Chudnovsky - Remote Sensing of the Atmosphere

Prof. Eyal Ben Dor – Remote Sensing of the Earth Solis and Liquid Phase

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

Table of Contents:

participation in GEO/GEOSS (if applicable) - GEO Principals, partner organizations, involvement in GEO Tasks and Working Groups

Apparently no real GEO activity was found in Israel.

New application from TAU has been submitted.

Indirect (international) activities

- EO-MINERS FP-7 project (with TAU)
- 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)



Notional Center for HSR



The Remote Sensing and GIS Laboratory (RSGL) in Tel- Aviv University **History and Aim**

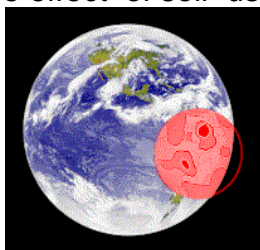
The Remote Sensing and GIS laboratory (RSGL) is located at the Department of Geography and Human Environment at the Tel-Aviv University and was established in 1994 in order to provide an advanced scientific environment for studying the earth from air and space. The aim was to gather under one-roof students, university staff, and academic fellows worldwide to study environmental problems of the earth, using, remote sensing means,. Beside the pure scientific research conducted at the Remote Sensing and GIS Laboratories, we also provide courses at a high level for BSc and M.Sc degrees and a close supervision of students for M.Sc and Ph.D theses.

Applications

In the RSGL we use *state-of-the-art* methods to map the environment from far distances. We mainly specialize in Hyper spectral Remote Sensing and its application in soil, water and atmosphere.

Some Examples

- mapping soil salinity in agricultural field;
- mapping sand dune stabilization processes;
- mapping water quality over inland water bodies;
- developing advance mapping techniques for geological, soil and geo- morphological applications;
- mapping the urban heat island for improving quality of life in densely populated areas;
- developing methods to obtain data relating to small changes in the lithosphere and atmosphere and simulation of scenarios to enable better understanding and managements of the environment.\
- Post fire effect of soil using HSR technology



For more information please contact:

Prof. Eyal Ben-Dor

The Remote Sensing and GIS laboratory

The Geography and Human Environment Department, Tel-Aviv University

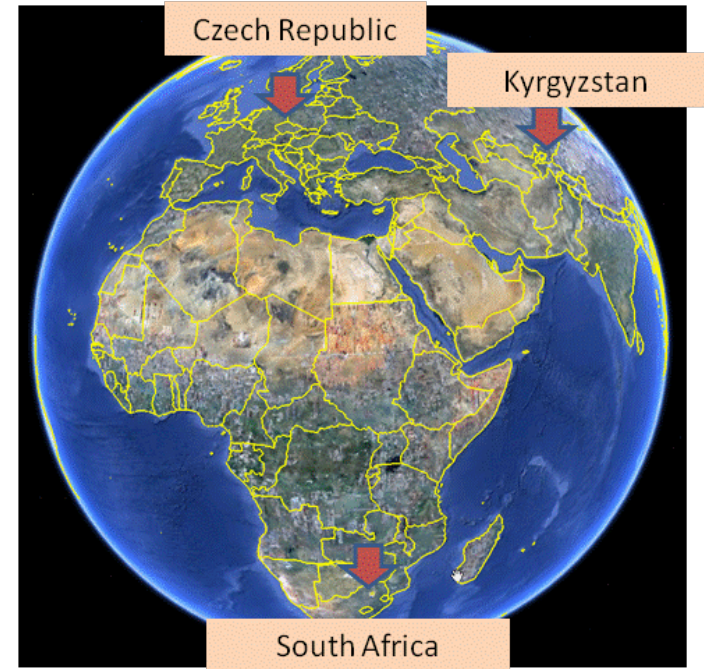
P.O.Box 39040, Ramat Aviv, Tel-Aviv, Israel, 69978

email: bendor@post.tau.ac.il

<http://www.tau.ac.il/humanities/geography/rs/>



Part of EO-Miners – FP7



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




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

EO-MINERS WP-2 products

- 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)
- Thermal atmospheric correction protocol and TES
- Emissivity field measurement protocol
- Thermal clay/ sand mapping
- Apparent thermal inertia mapping
- WV-2 iron oxides mineral mapping
- New digital field archiving tool (CSIRO has requested a copy)
- Spectral prediction of dust components
- Reflectance measurement of soils in the laboratory protocol







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The USGS Remote Sensing Technologies Project

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Remote Sensing Technologies - Satellite

A QUALITY ASSURANCE
FRAMEWORK FOR
EARTH OBSERVATION

Test Site Catalog


Site Location: Makhtesh Ramon

Radiometric

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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





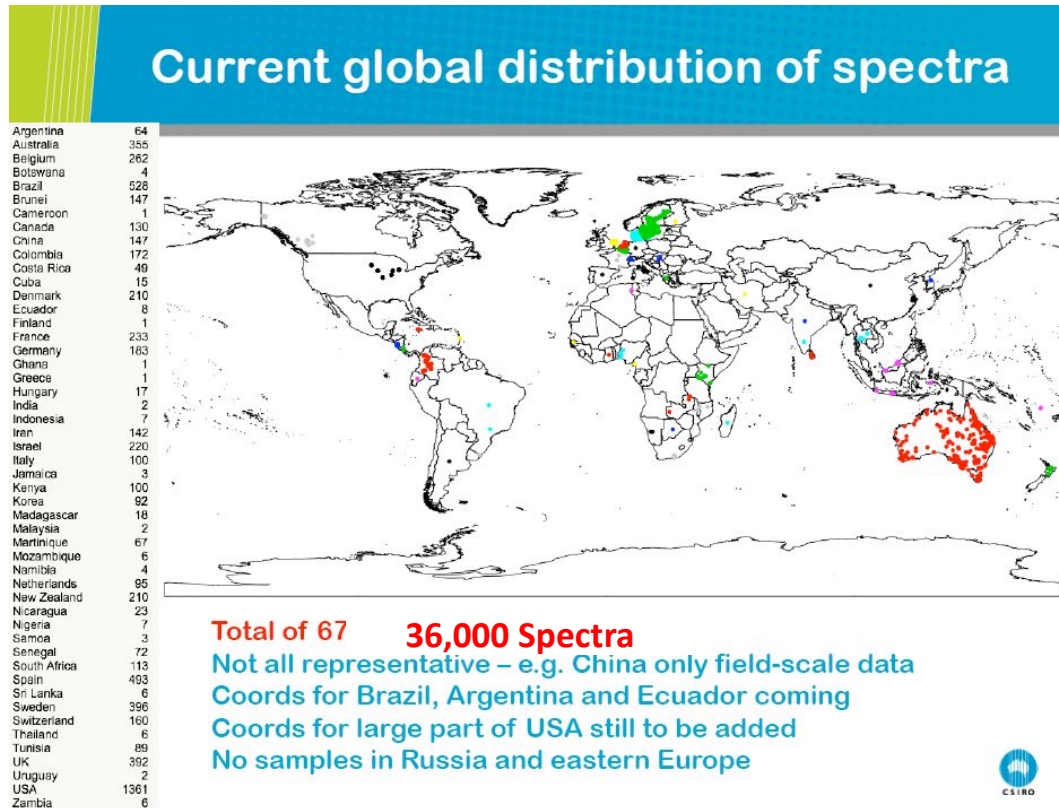
Site Location

[Download L7 ETM+ GeoTiff Data](#)
[Download Google Earth KMZ File](#)



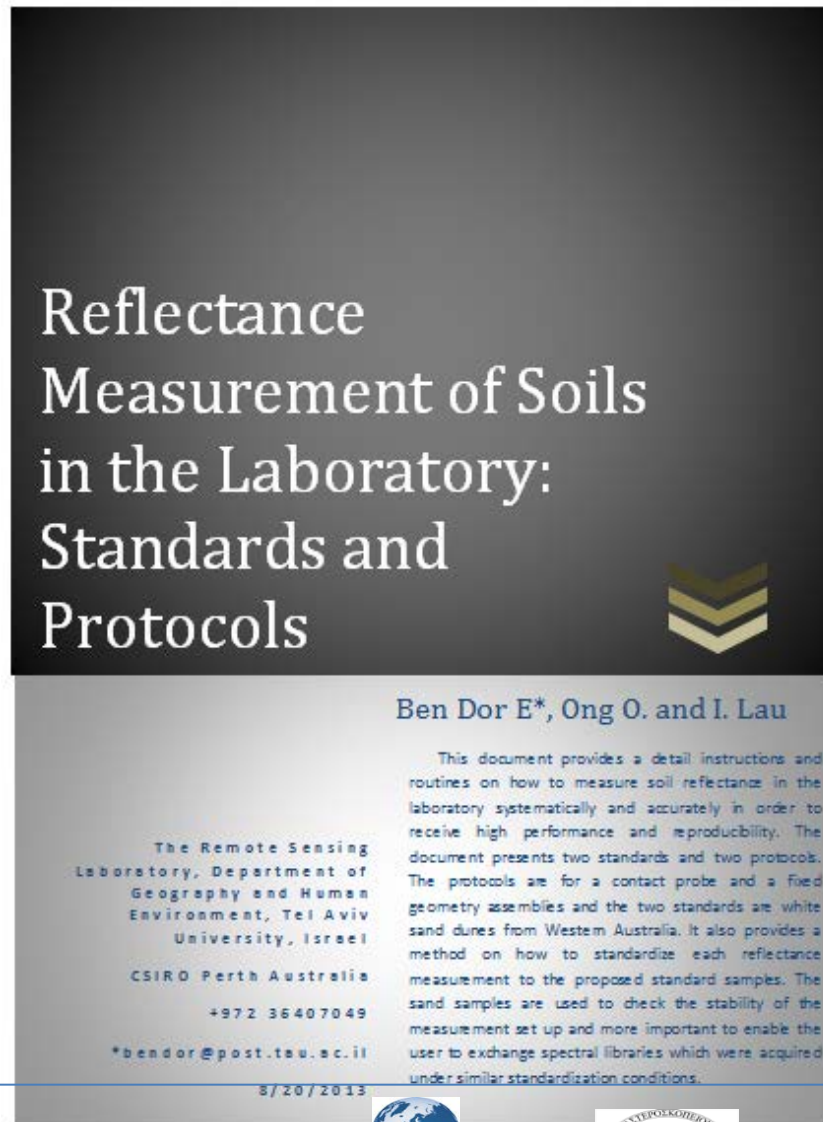
EWG 8 Hyper spectral Applications of Soils with EUFAR (1)

Soil Spectral Library



<http://groups.google.com/group/soil-spectroscopy/files>

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



Four Protocols:

two are well recommended
from CSIRO

[\(bendor@post.tau.ac.il\)](mailto:bendor@post.tau.ac.il)

Other two - from TAU

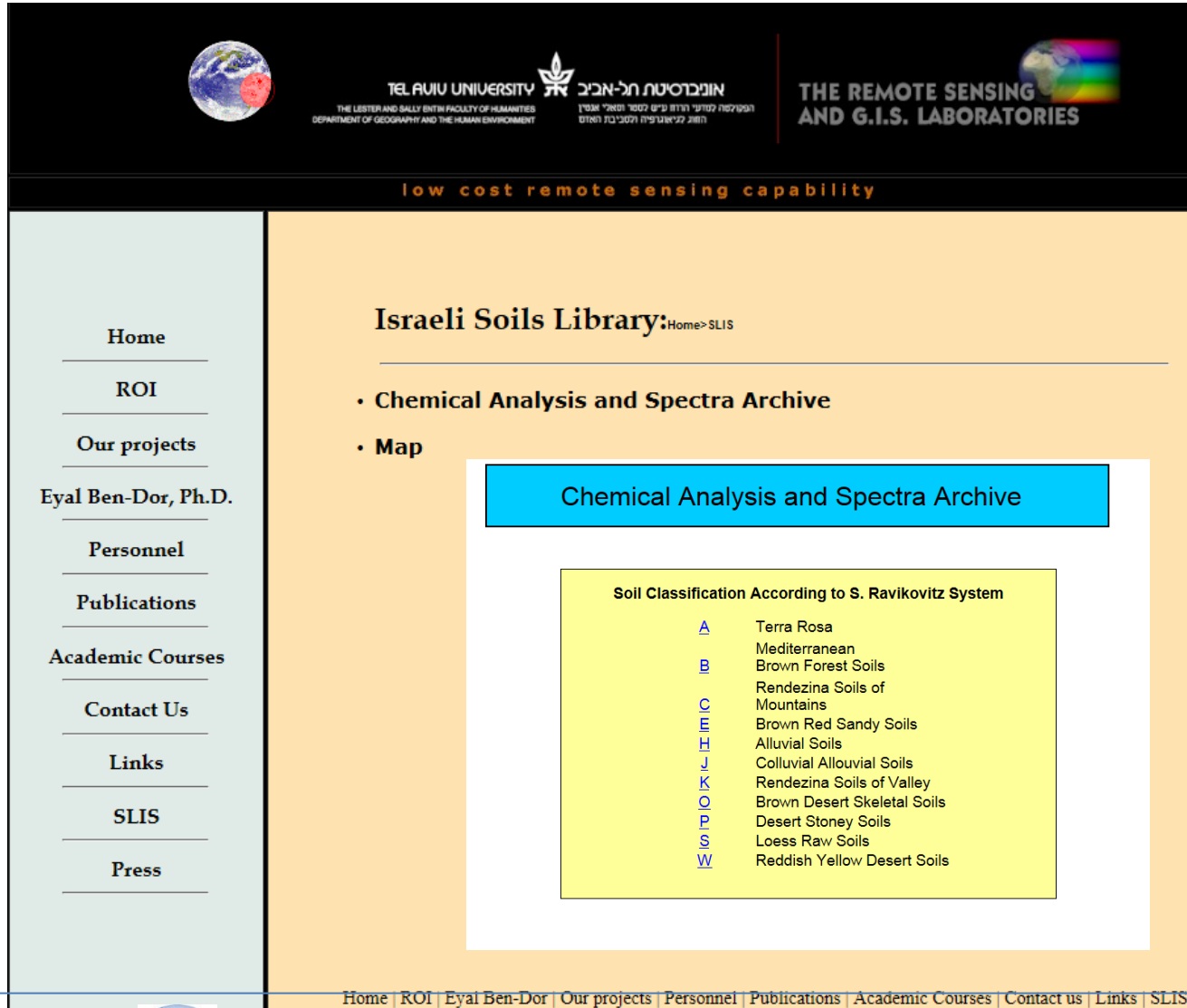
Status of intention or planning in participation in GEO (If not already member of GEO)

- TAU is interested to participate in GEO and will call ISA too (data policy for Venus)
- Cal Val - Growing activity with NASA , CSIRO and ASI along two sites: Amiaz Playa and Shizafon (IL) and Lake leffroy (AUS)
- Establishing of the *National Observatory for Environmental Studies* (under construction)
- EO-MINRES *knowhow* for EO observation and data integration (specifically for monitoring activity in open mine peat to the environment (data and protocols are available.)
- Standards and Protocols

• *National Existing EO capacity related to GEOSS Strategic Areas (Agriculture, Biodiversity, Climate, Disasters, Ecosystems, Energy, Health, Water, Weather)*

- National Soil Spectral library
- Aeronet Stations
- Observatory for Environmental Studies (under construction)
- National CAL/VAL 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 Soil Spectral library



low cost remote sensing capability

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ROI

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Eyal Ben-Dor, Ph.D.

Personnel

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SLIS

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Israeli Soils Library: Home > SLIS

- Chemical Analysis and Spectra Archive
- Map

Chemical Analysis and Spectra Archive

Soil Classification According to S. Ravikovitz System	
A	Terra Rosa
B	Mediterranean
C	Brown Forest Soils
E	Rendezina Soils of Mountains
H	Brown Red Sandy Soils
J	Alluvial Soils
K	Colluvial Alluvial Soils
O	Rendezina Soils of Valley
P	Brown Desert Skeletal Soils
S	Desert Stony Soils
W	Loess Raw Soils
	Reddish Yellow Desert Soils

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AERONET

AEROSOL ROBOTIC NETWORK

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Aerosol Optical Depth

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AERONET Data Display Interface **Version 2 Direct Sun Algorithm**
Level 2.0. Quality Assured Data.

The following AERONET data are pre and post field calibrated, automatically cloud cleared and manually inspected.

1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

To zoom the map click on it.
[Back to World Map](#)

Total Data (Years): ☒ All ☐ >0.5 ☐ >1 ☐ >2 ☐ >3 ☐ >5 ☐ >7 ☐ >10 ☐ >15

AOT Level ☐ Level 1.0 ☐ Level 1.5 ☒ Level 2.0

Cairo_EMA (30N,31E)	Cairo_University (30N,31E)	CUT-TEPAK (34N,33E)
Dead_Sea (31N,35E)	Eilat (29N,34E)	Nes_Ziona (31N,34E)
SEDE_BOKER (30N,34E)		

Observatory for Environmental Studies (under constriction)



Planning & Budgeting Committee | הוועדה לתכנון ותקצוב

Proposal for Research Infrastructure

Name of infrastructure:

Integrated Biosphere-Atmosphere Research Observatory (iBARO)

Research area

Environmental Sciences

Name of proposers/contact persons:

Yohay Carmel (Technion) and Dan Yakir (Weizmann Institute)
(Host Institute: Technion; Full list of participants below)

Email:

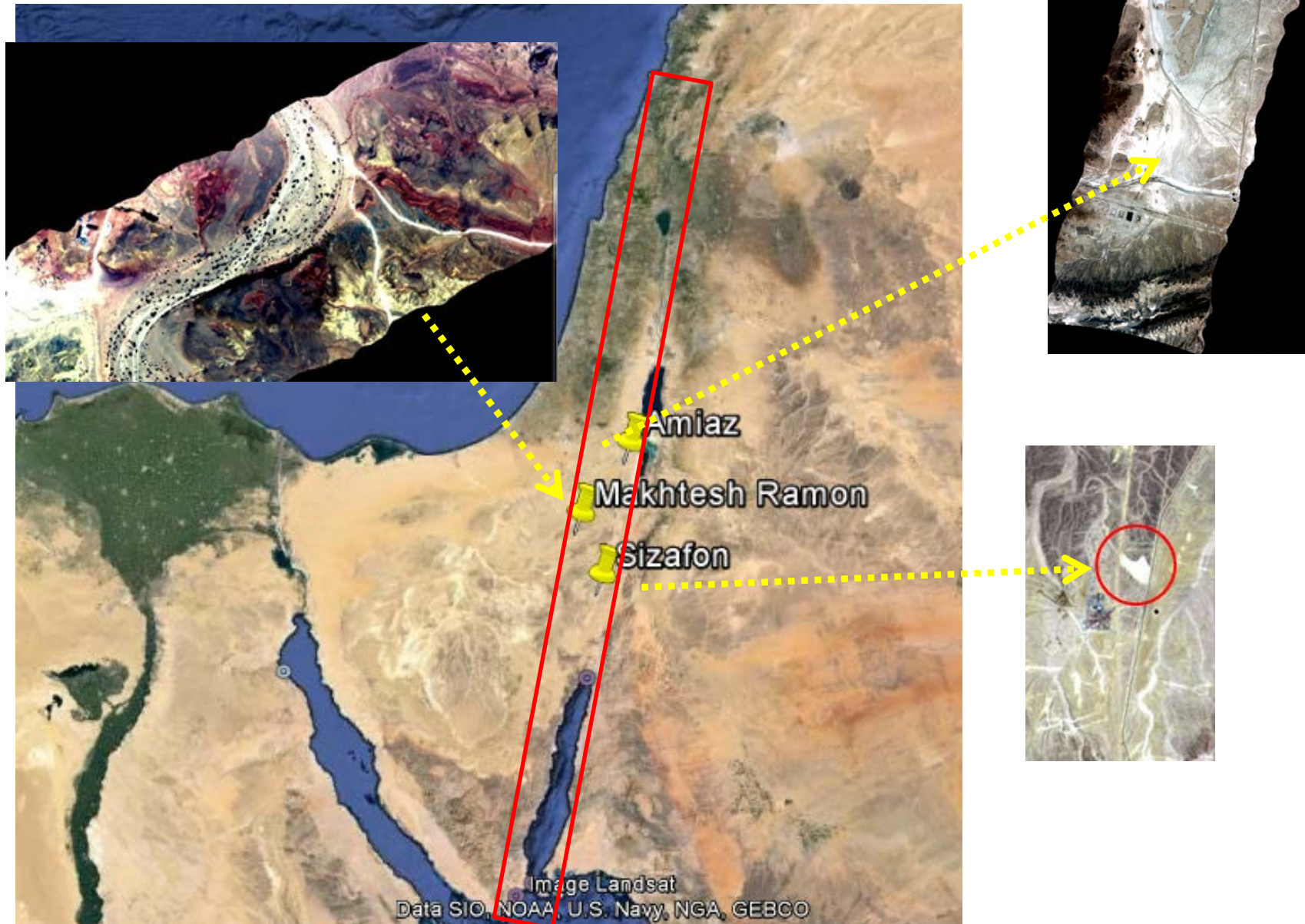
yohay@technion.ac.il ; dan.yakir@weizmann.ac.il

Part One: Rational and description of infrastructure

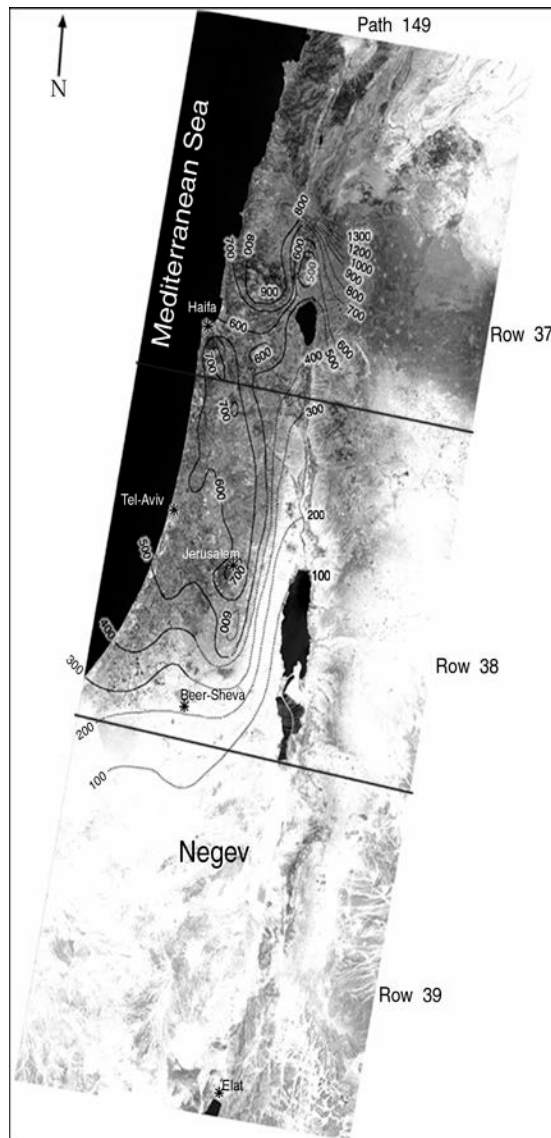
1. Research area and existing infrastructure in Israel and around the world.

Global change research requires concentrated efforts: Climate and land use changes are key factors influencing the terrestrial system, which need to be managed by society in the coming decades. These changes cause system reactions on different spatial and temporal scales, which result in immense challenges for environmental research and, in turn, to policy makers. New approaches are needed to detect complex interaction and feedback mechanisms between the various compartments of the terrestrial system and to identify long and short-term trends in observed states and fluxes. Therefore, the development and implementation of such infrastructure is essential.

- National CAL/VAL sites for EO



Super site calibration area for EO



➤ **Climate** : Mediterranean to arid regimes (35-1300mm in 350km distance)

➤ **Water**: Extreme saline to fresh water bodies (35% to 0.02%)

➤ **Elevation**: -400m to 1600m

➤ **Vegetation**: Large biodiversity of natural vegetation, from dense coniferous forest to biogenic soil crusts.

➤ **Rocks**: Sand stones, carbonate sedimentary rocks, magmatic and metamorphic rocks

➤ **Soil**: Alfisol, Vertisol, Aridisol, Oxisol, Mollisol, Entisol (from 10 soils order)

➤ **Atmosphere** : Different types of aerosols, desert dust, maritime, as well as anthropogenic pollution

➤ **Snow**: 1-5m depth in high elevation zones

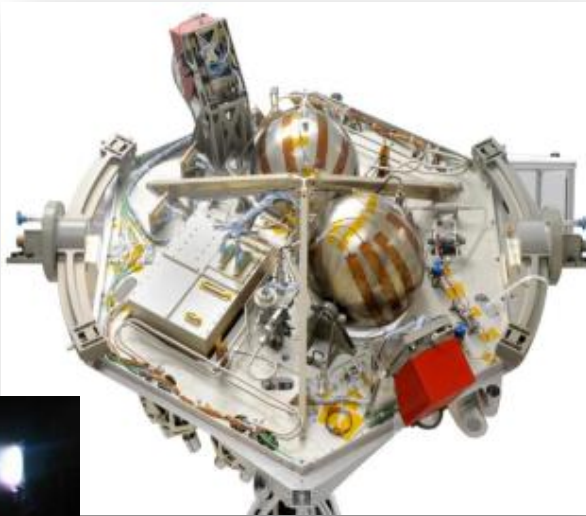
➤ **Landscape**: Smooth to rough

Venus satellite

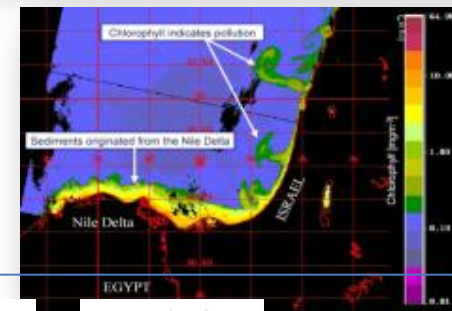
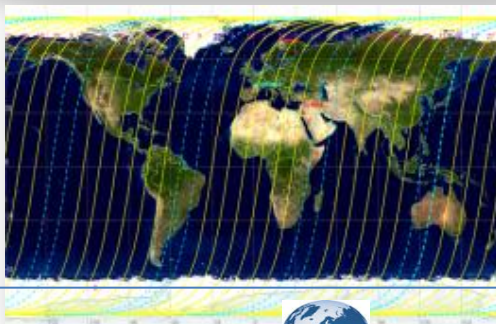
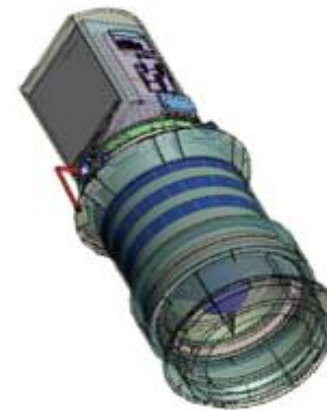
Venμs: Vegetation and **E**nvironment **N**ew **μ**Satellite

Technology Mission – Electric Propulsion

Scientific Mission – Super spectral camera



12 bands
VNIR





- Eros satellite



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Very High Resolution Satellite Imagery

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Data
(commercially)
available

Satellite Imagery Applications

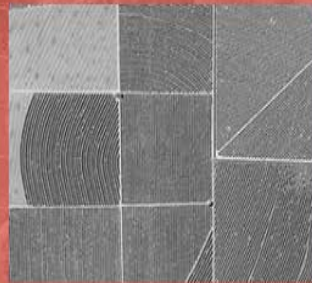
Satellite Environmental Monitoring



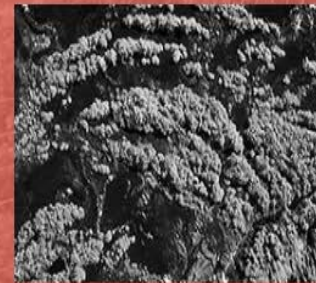
Disaster Control and Monitoring



Precision Agriculture

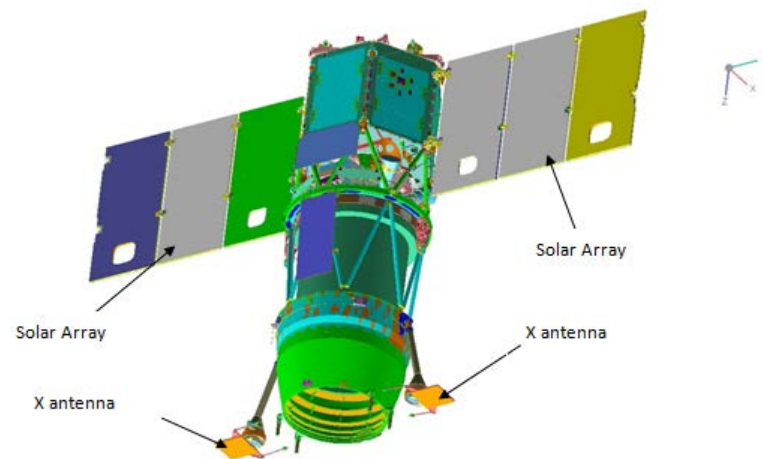


Forest Observation



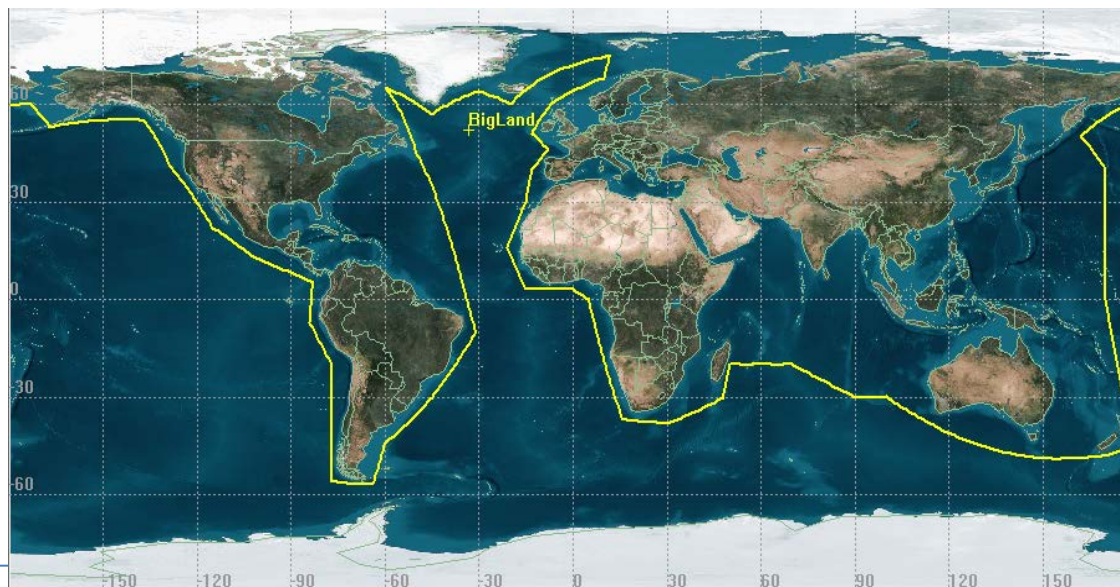
SHALOM: **S**PACEBORNE **H**YPERSPECTRAL **A**PPLICATIVE **L**AND **A**ND **O**CEAN **M**ISSION:

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,.



Infrastructures

- Six Universities, more than 800 peer review papers in RS and growing students number and interest
- Field and laboratory spectrometers for VIS-NIR-SWIR-TIR: 3 ASD's, LT-1200, LiCOR , Thermal Image radiometer 3-12
- Sun-photometers and GPS : portable and fix stations
- Software: ENVI, IDL, MODTRAN, FLAASH, ACORN, ATCOR, HATCH, ArcViwe, ArcInfo, IDRISI, self developed
- Climate station: fix and portable
- Satellite receivers: NOAA, SeaWifs and MODIS
- **Airborne Spectrometer**
AISA-ES (0.4-2.4 μ m) soon HSR-TIR



- Networking Activities – Reference to EO Projects at National and Regional level

EO-MINERS - <http://www.eo-miners.eu/>

Aeronet - <http://aeronet.gsfc.nasa.gov/>

ISPRS VII/3 – CAL/VAL – airborne and spaceborne calibration

<http://www2.isprs.org/commissions/comm7/wg3.html>

Excellence HSR group at TAU (6 universities) – data acquisition and protocols from airborne domains. <http://www.tau.ac.il/~rslweb/personnel.html>

EUFAR -2 - Merging LIDAR and HSR data – <http://www.eufar.net/>

EWG- EUFAR – Soil Spectroscopy - <http://www.eufar.net/index.php?page=exp>



2014-10-09



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WG VII/3: Information Extraction from Hyperspectral Data

Our Mission

Our mission is to lead the hyper spectral activities across several innovative areas summarized in the WG VII/3 terms of reference.

Specifically, we will gather active groups worldwide, collaborate with other organizations and foster an environment where senior to juniors researchers can meet and discuss.

We will focus on new applications, suggest new directions and especially promote education in the hyperspectral field. A few examples of planned activities include organizing workshops in collaboration with ISPRS, invited sessions in scientific conference and special issues in the scientific literature. As the hyperspectral activity is approaching the orbital domain, specific attention will be given to this issue alongside with collaborating with national space agencies and the private sector.

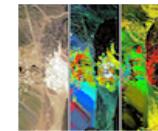
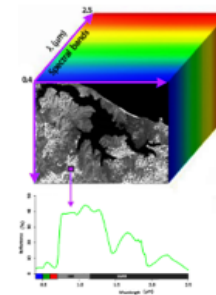
Working Group Officers:

Chair



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🌐 www.tau.ac.il/~rslweb/

ISPRS WG VII/3





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European Facility
For Airborne
Research

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-Select an aircraft-

-Select a working group-

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COPIAL
European Facility For Airborne Laboratory



Welcome to EUFAR


EUFAR is an 'Integrating Activity' funded by the European Commission under FP5/FP6/FP7. EUFAR works to coordinate the operation of instrumented aircraft and hyperspectral imaging sensors, exploiting the skills of experts in airborne measurements in the fields of environmental and geo-sciences, in order to provide researchers with the infrastructure best suited to their needs. [Read More](#)

For an overview of EUFAR achievements up to 2013, [visit this page](#).



What's new? Get the EUFAR network news!

- ▶ **Transnational Access:** The currently open Calls for Proposals for Transnational Access to research aircraft and instrumentation are closing at the end of September! For more information, and to submit a proposal follow the link above.
- ▶ The journal [Miscellanea Geographica](#) is proposing to publish a Special Edition on methods and applications of data from the APEX instrument. Papers should be around 5 to 8 pages in length. Other general guidance to authors can be found [here](#). The deadline for manuscript submission is 30 October 2014.
- ▶ The **Royal Aeronautical Society** is holding a conference on Research Aircraft Operations from 3-5 November 2014 in London. This conference aims to bring together the global research aircraft operating community to share lessons and capabilities, as well as future plans for both campaigns and facility improvements. A call for papers for this conference is currently open until 27 June 2014. For more information click [here](#).
- ▶ The next ISPRS workshop will be held in Munich, Germany from 25 to 27 March 2015. This is a joint workshop that will cover both **Photogrammetric Image Analysis (PIA)** and **High resolution earth imaging from geospatial information (HRIGI)**. For more information and to find out about the calls for proposals click [here](#).
- ▶ The **BELAIR workshop** was held on 13 June 2014 in Gembloux - Belgium, where the results of the BELAIR2013 campaign were presented and validated by keynote speakers. Click [here](#) to access the presentations made at the workshop.
- ▶ The EUFAR book on [Airborne Measurements for Environmental Research](#), Manfred Wendisch (Editor), Jean-Louis Brenguier (Editor), is now available for purchase [here](#)!!!!
- ▶ As approved by the EUFAR General Assembly, a **Scientific Coordination position is created** and this responsibility held up to now by Jean-Louis Brenguier (MF-CNRM) is transferred to **Phil Brown (MetOffice)** for two years from 01/03/2013.



Description of Work

Expert Groups:

- All
- ☐ Support
- ☐ Specific Fields

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Working groups designation	Coordinator
Calibration/Validation	Tim Malthus
Certification/Operation	Aurelien Bourdon
Hyperspectral Data Processing	Daniel Schlaepfer
Imaging Sensors	Koen Meuleman
Instrument Integration	Joss Kent
Quality Assurance / Quality Control	Hans georg Schläger
Unmanned Aerial Systems	Joachim Reuder

• [Specific measurement fields:](#)

Working groups designation	Coordinator
Active remote sensing	Jacques Pelon
Cloud Microphysics	Manfred Wendisch
Gas phase chemistry	Jim McQuaid
Hyperspectral Applications for Soil	Eyal Ben-dor
Hyperspectral Applications for Vegetation	Michael Schaepman
Hyperspectral Applications for Water	Steve Groom
Imaging remote sensing	Jose-antonio Gomez-sanchez
In-Situ Aerosols	Paola Formenti
Polar Research	Tom Lachlan-cope
Radiation	Thomas Ruhtz
Stratospheric Measurements	Fred Stroh
Thermodynamics	Martin Zoger
Turbulence	Marco Esposito

Comprehensive research (in GEOSS related issues)

RSL Current Projects

- EO- MINERS “Monitoring of contamination from open mines activities world wide” **under FP7 framework** (3 years)
- Ministry of Science - “Establishing of hyperspectral Remote Sensing capabilities in the TIR region” (3 years)
- Ministry of Defense – “Spectral Sensing” (10 years)
- Ministry of Agricultures – Precision Agriculture: Spectral Soil Sensing (3 years)
- EUFAR – European Fleet for Remote Sensing – Data fusion (LIDAR-HSR) (4 years)
- Belgium Ministry of Science – Mapping of Organic Matter (2 years)
- Czech-Israel Ministries of Science Foundation - Developing a data mining machine to extract spectral information
- Italian Space Agency- Israel Space Agency – Developing vicarious calibration method for HSR satellite calibration (1 year)
- Private Sector- Mentoring man mines fields with HSR technology (3 years)

- *Refer to positive or negative lessons/experience learned through your involvement in GEOSS (For Members of GEO)*

Not Relevant

***Thank you
for your attention***

**THE REMOTE SENSING
LABORATORIES**



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

Laboratory webpage: <http://www.tau.ac.il/~geograph/bendor>