# The GOFC-GOLD South Central and Eastern European Network (SCERIN)

**SCERIN-10**
**26-29 June 2023**

# SCERIN

*overview and status update*

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# SCERIN Leadership

**Network Coordinator U.S.:**
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**Network Coordinator E.U.:**
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Department of Experimental Plant Biology, Faculty of Science
Charles University, Prague, Czech Republic

**Regional Coordinator, Czech Republic**
**Lucie Kupkova** lucie.kupova@gmail.com
Charles University, Prague, Czech Republic

# SCERIN Goals and Geographic Domain

**Goals:**

- Provide a platform for collaboration among remote sensing experts in SCE, *through collaborative activities*
- Facilitate progress and consistent implementation of remote sensing and LCLUC methodology, *in the region*
- Foster regional collaboration for monitoring the dynamics, stability, and vulnerability of the major ecosystems
- Promote effective sustainable management and preservation, *on the local, regional and pan-European level*

**Geographic Domain:**

Central & South Eastern Europe, the Danube Watershed & Western Black Sea coast

# SCERIN Participants */*

# Regional Background

- Diversity of land forms and environmental conditions has produced a unique richness of species - highly sensitive and vulnerable to climate change.
- SCERIN's area has undergone extensive land-use, which have rendered many of the natural processes of adaptation un-sustainable.

- Rich archive of long-term LULC data
- Archive of methodology for field observations
- LUCC research established
  - ✓ *tradition of 15-25 years in Central EU*
  - ✓ *tradition of 10-15 years in SE EU*
- Availability of regional data
  - from individual institutions or projects
  - not always uniformly organized and consistent

# SCERIN Critical Regional Issues - 2012

- ✓ Changes in forest composition, age, structure, function
- ✓ Changes in ecosystem diversity
- ✓ Increasing urbanization
- ✓ Unbalanced water regime (floods/droughts)
- ✓ ***Transitions to market economy***

***Pre-cursors of LCC:*** natural & anthropogenic *(e.g. technological advancements, political & population changes)*

# SCERIN Structure – Focus Groups

## Focus Groups – FG, *dynamic*

**FG1**: Forest changes: disturbances, biomass production, forest LCLUC, driving forces [Leads: F. Zemek/ J. Albrechtová]

**FG2:** Land Cover Changes: climate change, agricultural land abandonment, urban expansion [Leads: G. Taff/ L. Kupková/ P. Stych/ L. Genc]

**FG3:** Validation/verification of products, for support of current and future satellite missions (e.g. NASA´s LDCM, ESA´s Sentinel 1, 2, and 3) [Leads: A. Halabuk/ L. Filchev/ P. Campbell]

**FG4:** LCLUC water management and ENVIRONMENT (watersheds, catchments, dams) [Leads: V. Starodubtsev/ I. Pilas / V. Lugatov]

# SCERIN Partnerships

- EnviroGRIDS
- IGU LUCC
- EARSeL LCLUC
- Trans-Atlantic Training Initiative (ESA-NASA)
- Collaboration with other GOFC-GOLD RINs

✓ *Inputs from CEOS/WGCV/LPV and relevance of SCERIN's objectives*

# Benefit of having SCERIN

- joint projects and publications
- networking for knowledge and technology exchange (tools)
- using both Landsat-8 and Sentinel-2 data, and knowledge of the processing methodology in land use change monitoring
- capacity building trough exchange of data and methods for satellite products evaluation
- facilitate teaching BS classes (tools and curriculum)
- student and faculty mobility – short and long term visits

# SCERIN Formulation Workshop

## Theme: Land Cover Observations in SC Europe, National & Regional Programs

•Hosted by The National Institute of Meteorology and Hydrology at the Bulgarian Academy of Sciences (NIMH-BAS), Sofia, Bulgaria and its Director General Dr. Georgi Kortchev

•**41 participants:** Bulgaria, Czech Republic, Germany, Poland, Romania, Slovakia, Switzerland (ENVIROGRIDS), The Netherlands (GOFC-GOLD LCPO), TFYR Macedonia, Turkey, USA.

GOFC-GOLD
Global Observation of Forest and Land Cover Dynamics

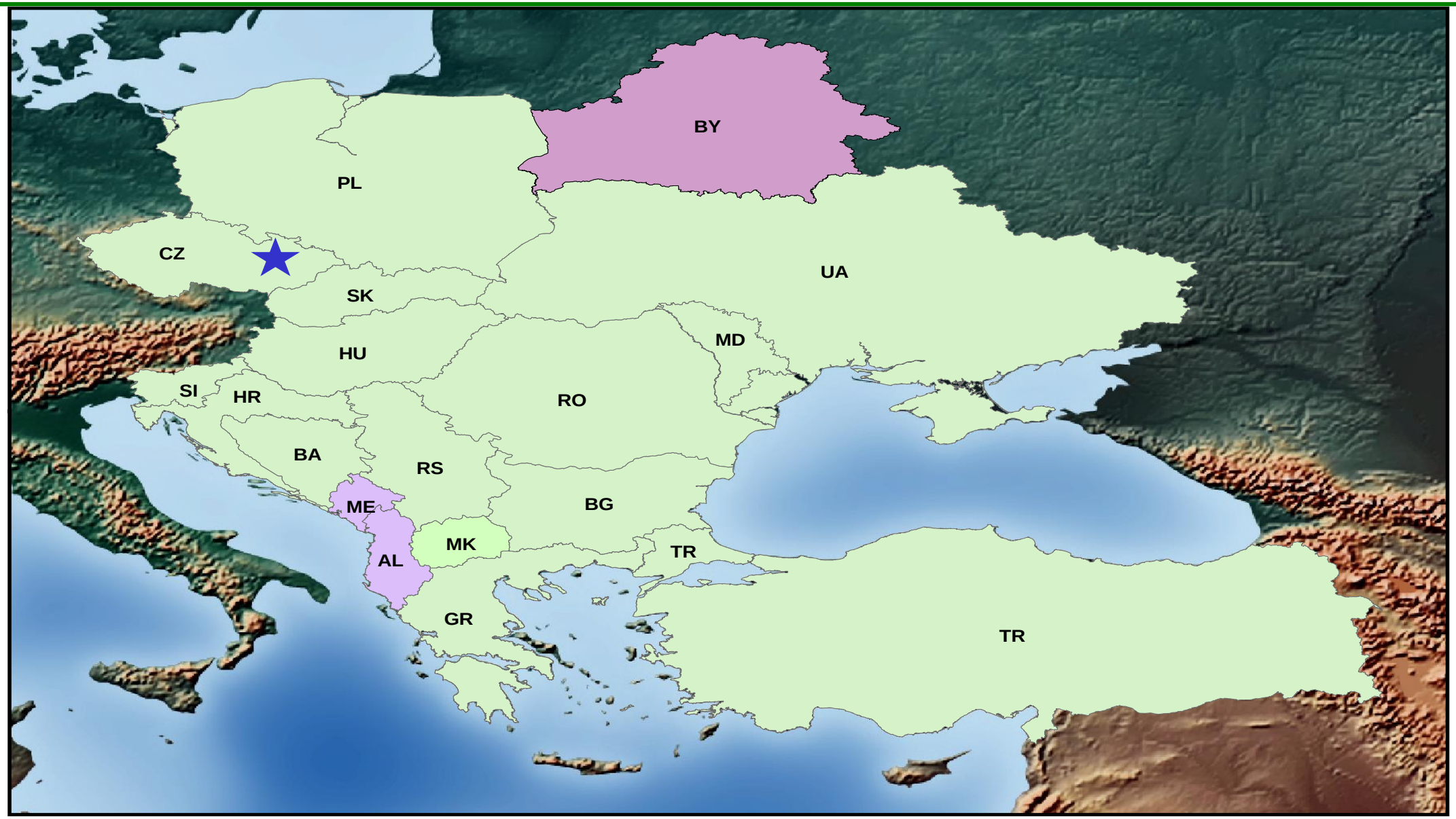
START
global change SysTem for Analysis, Research & Training

1869

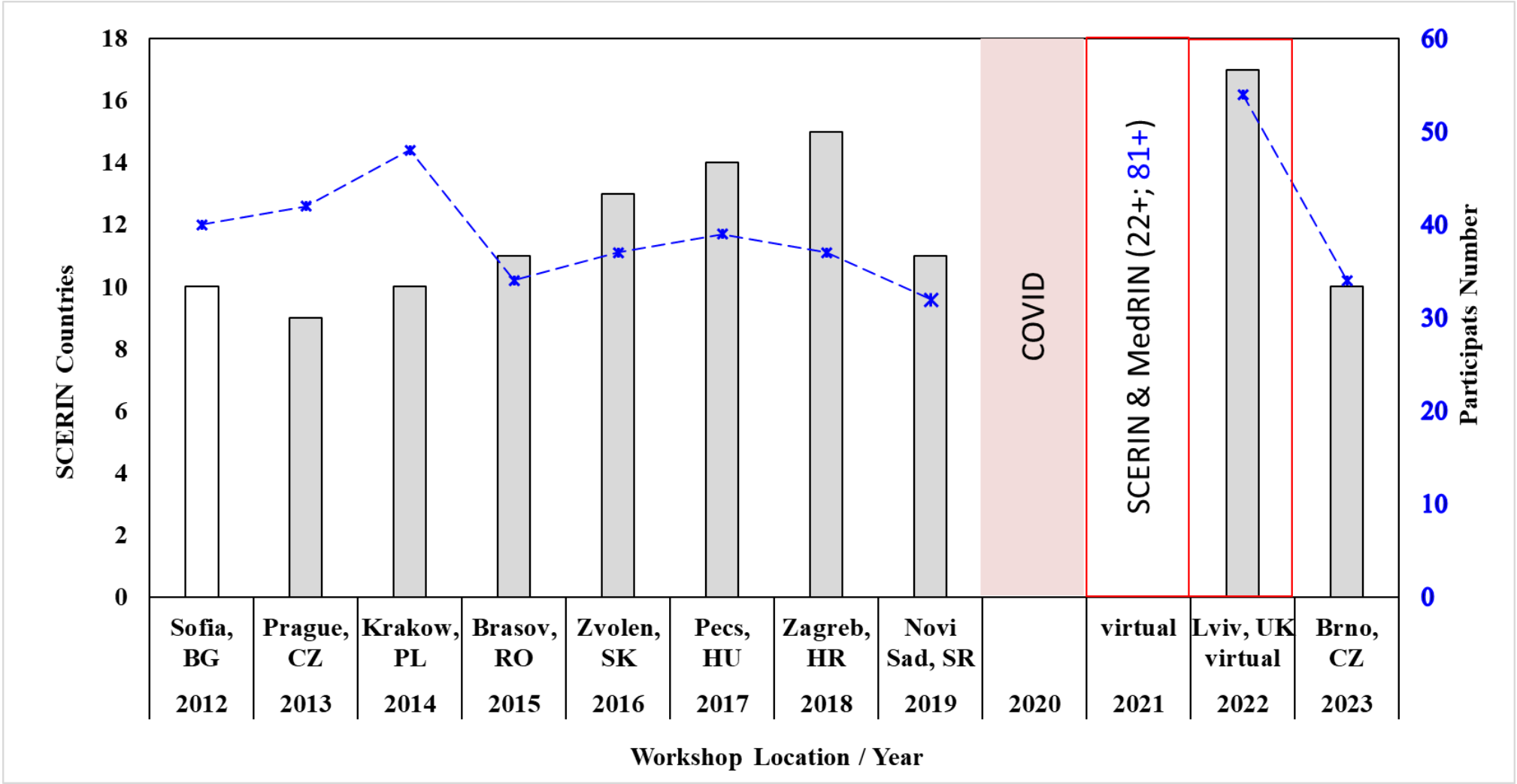
*17 April 2012, Conference Center of Park Hotel Moskva, Sofia, Bulgaria*

# 2023

# SCERIN-10

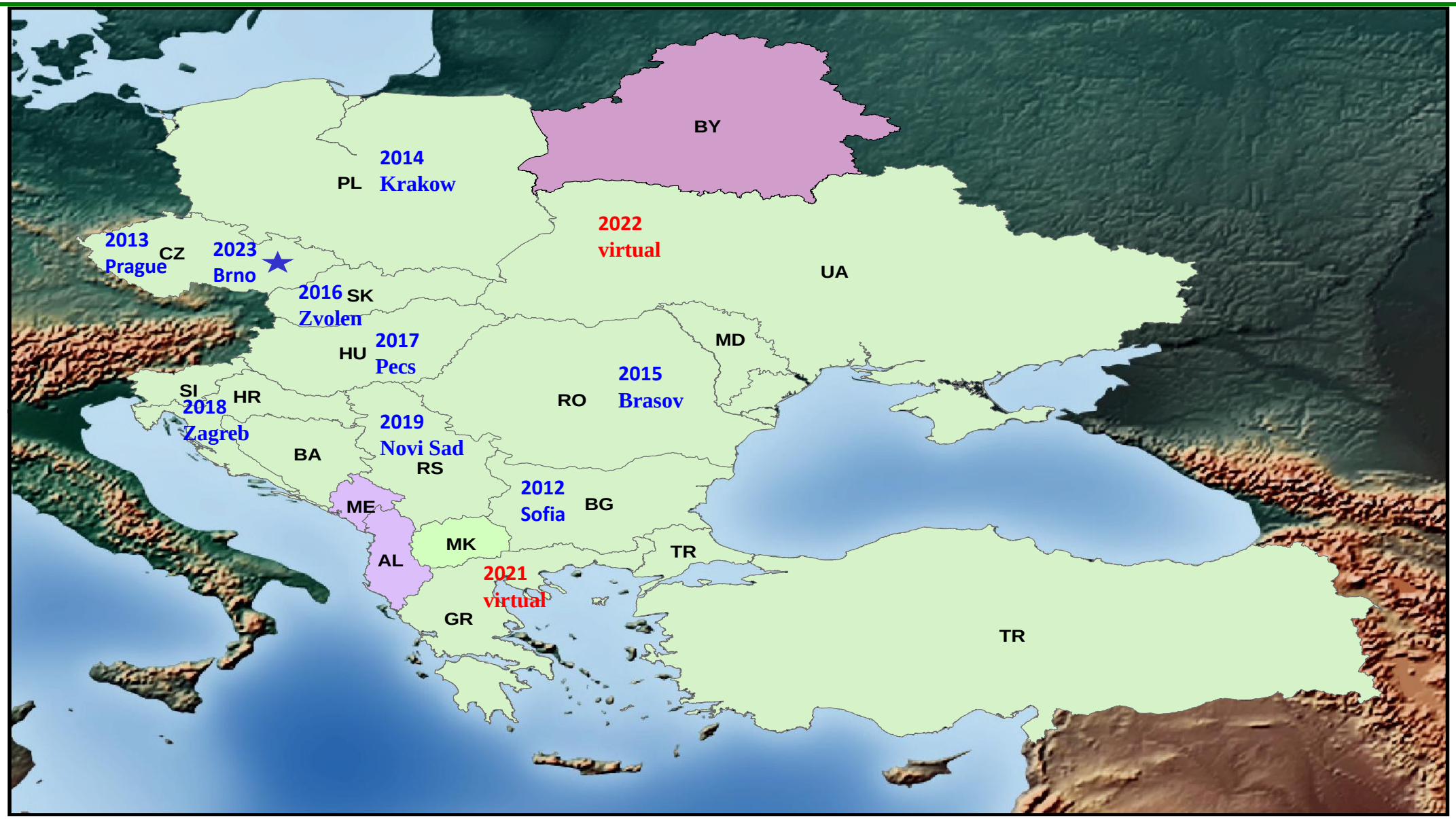


# SCERIN Growth




- Permanent: **BGR**, **CZE, POL, ROU, SVK,** TUR, **HUN**, **UKR,** GRC, HRV, **SRB, SVN**
- Returning: **Bosnia and Herzegovina (BIH),** FYROM, Moldova
- To reach: Albania (AL), Belarus(BY), Montenegro (ME)

# SCERIN Growth



# SCERIN Workshops

- SCERIN 10 person Workshops

- Virtual workshops in 2020, 2021, 2022 and 2023
  – Optical Remote Sensing from the International Space Station with DESIS, 2020
  – SCERIN Seminar on Bark Beetle Damage, March 2021
  – Cloud-gap-filled global maps of essential biophysical variables processed from the TOA Sentinel-3 catalogue in Google Earth Engine, December 2022
  – TIR Remote Sensing from the International Space Station with ECOSTRESS, January 2023

# SCERIN Achievements

Established and growing RIN

Active network collaborations, including:

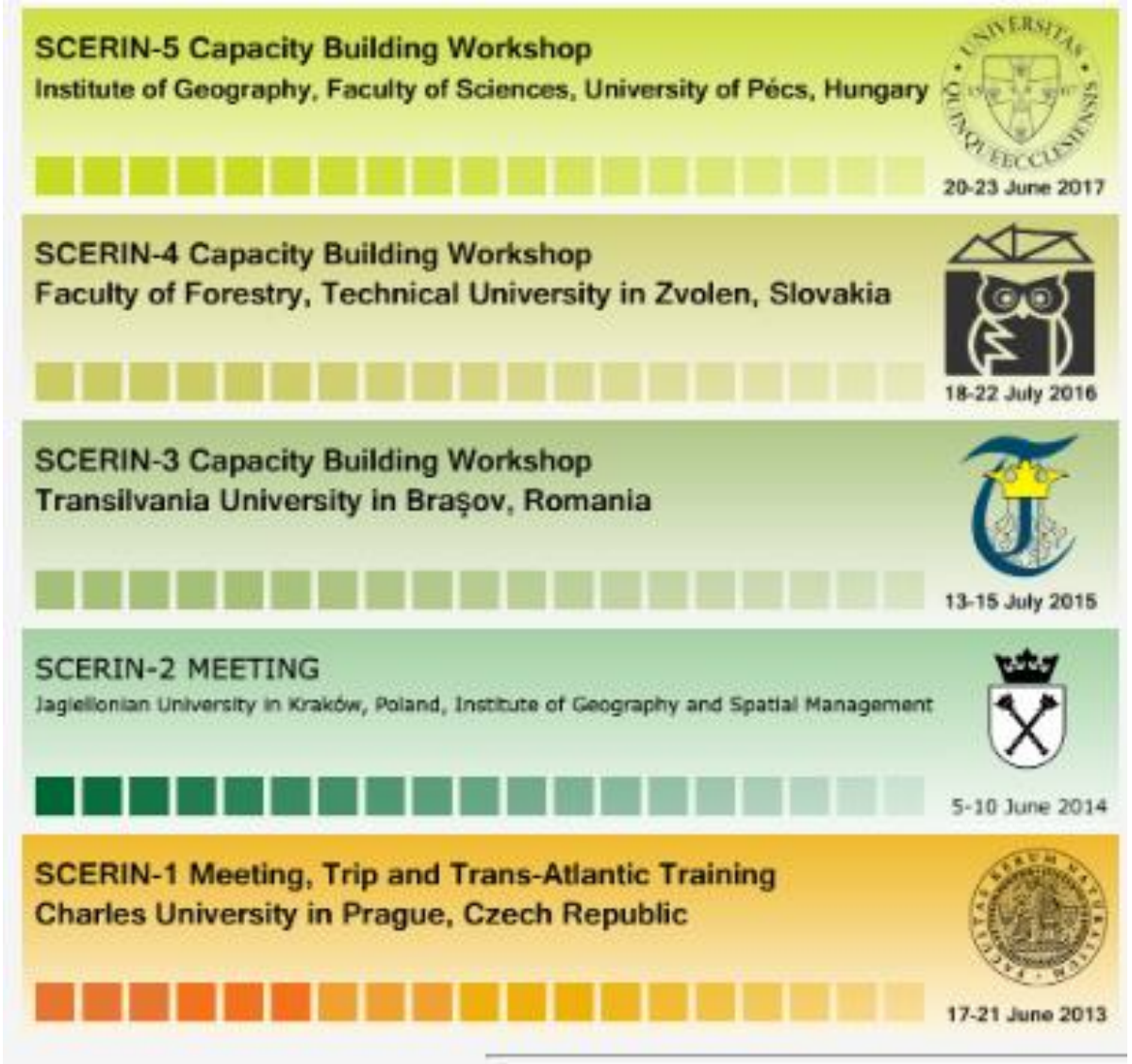
- Joint research projects – past and in progress (range in topics)
- Joint manuscripts, published and in preparation (1 network, 20+)
- Joint presentations, proposals and ongoing collaborative efforts

SCERIN web resources

✓ https://gofcgold.umd.edu/southcentral-european-regional-informational-network-scerin
✓ https://scerin.eu/

# SCERIN Web Pages

- ✓ https://gofcgold.umd.edu/southcentral-european-regional-informational-network-scerin
- ✓ https://scerin.eu/




# SouthCentral European Regional Informational Network (SCERIN)



## SouthCentral European Regional Informational Network (SCERIN)

# Evolution of Priorities in SCERIN – *2023*

**SCERIN's most important research topics**

1. Changes in vegetation cover, function (yield/assimilation) and ecosystem diversity with transition to free market and climate change
2. LCC with agricultural abandonment and urban expansion
3. Floods/droughts and fires – extreme events in the Danube watershed
4. LCC associated with the war in Ukraine
5. RS issues in regional LCLUC validation/verification of methods and products – increased need with increased data availability
6. LCC in SCERIN associated with the pandemic

# SCERIN Challenges and Lessons Learned

## Ongoing or work in progress

- evolving network structure and partnerships within the region
- maintain/update a network participants database – in progress
  - Participants, contacts, publications, involved institutions, etc.
- develop a regional collaborative database
  - Regional networks of relevance to SCERIN – leverage network activities
  - Regional sponsors offering potential for support
  - Relevant active projects, lead person, duration - collaborations
  - List of links to available data for collaborative projects

## Challenges

- Active participation not only from agencies but also from private companies +
- Need more links to and involvement with funding agencies
- Need to involve stakeholders, political scientists, decision makers (invited lectures)
- Educational outreach – successful collaboration with TAT; need for public outreach, and to undergraduate and high school students
- Social media presence
  - Facebook https://m.facebook.com/groups/1598067267142275
  - LinkedIn https://www.linkedin.com/groups/8349564

# SCERIN Long Term Vision

- Include and actively involve all SCERIN countries
- Balanced participation from research and applications
- Transitioning from detection of LCC to monitoring and analysis of trends or LCD
  - collaborate with local, regional and global monitoring networks – long term data records across disciplines
  - transitioning from detection and monitoring to predictions
- Collaboration with the other GOFC-GOLD RNs

# Potential Sources of Support

SCERIN proposals for joint research projects and networking

- Joint Project Proposals in 2023 – Satellite data evaluation (TBD); Mid-resolution product development/evaluation (TBD); Arctic research collaboration (TBD); Global forest hot-spots (TBD)
- Joint Project Proposals in EU as a platform for GOFC-GOLD + SCERIN activities (to consider)

Smaller proposals and collaborative work by collaborating groups within SCERIN

- Visiting Scholars (Fulbright, other)
- Young professionals – visitor exchanges
- Graduate studies
- Research grants

**Collaboration among the GOFC-GOLD networks - MedRIN and SCERIN; CaucRIN and SCERIN?**

examples: exchange of RS tools; product validation; regional flood, fire and snow prediction and mapping, etc.

# Current SCERIN Support

- Main Sponsorship by GOFC-GOLD/START and NASA/LCLUC
- Support of participants from their organizations
- Host and regional partnerships offering partial sponsorship

*Thank You*

# Examples of Collaborative Publications


Švik, M., P. Lukeš, Z. Lhotáková, E. Neuwirthová, J. Albrechtová, P. E. Campbell & L. Homolová (2023) Retrieving plant functional traits through time series analysis of satellite observations using machine learning methods, International Journal of Remote Sensing, 44:10, 3083-3105, DOI: 10.1080/01431161.2023.2216847.

Hunt, L., Z. Lhotáková; E. Neuwirthová; K. Klem; M. Oravec; L. Kupková; L. Červená; H. E. Epstein; **P. Campbell**; J. Albrechtová, 2023. Leaf Functional Traits in Relation to Species Composition in an Arctic–Alpine Tundra Grassland. Plants. 2023; 12(5):1001. https://doi.org/10.3390/plants12051001.

**Campbell, P. K. E.**, Huemmrich, K. F., Middleton, E. M., Alfieri, J., van der Tol, C., and Neigh, C. S. R., 2022. Using DESIS AND EO-1 Hyperion reflectance time series for the assessment of vegetation traits and Gross Primary Production (GPP). Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLVI-1/W1-2021, 1–8, https://doi.org/10.5194/isprs-archives-XLVI-1-W1-2021-1-2022, 2022.

Červená, L., Pinlová, G., Lhotáková, Z., Neuwirthová, E., Kupková, L., Potůčková, M., Lysák, J., **Campbell, P**., and Albrechtová, J. 2022. Determination of chlorophyll content in selected grass communities of Krkonose Mts. Tundra based on laboratory spectroscopy and aerial hyperspectral data. Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLIII-B3-2022, 381–388, https://doi.org/10.5194/isprs-archives-XLIII-B3-2022-381-2022, 2022.

**Campbell, P.K.E.;** Middleton, E.M.; Huemmrich, K.F.; Ward, L.A.; Julitta, T.; Yang, P., van der Tol, C.; Daughtry, C.; Russ, A.L.; Alfieri, J.; Kustas, W.P. 2021. Scaling photosynthetic function and CO2 dynamics from leaf to canopy level for maize – dataset combining diurnal and seasonal measurements of vegetation fluorescence, reflectance and vegetation indices with canopy gross ecosystem productivity. Data in Brief, Volume 39, 2021, 107600, ISSN 2352-3409, https://doi.org/10.1016/j.dib.2021.107600.

j.rse.2019.05.009

# Examples of Collaborative Publications

- Z. Lhotakova, L. Kupkova, P. Lukes, E. Neuwirthová, L. Cervena, R. Janoutová, L. Homolová, M. Potuckova, P. Campbell, J. Albrechtova: Calibration model for different chlorophyll measurement instruments (SPAD-502, CCM-300, DualFlex) development based on laboratory chlorophyll estimations. In progress, submission: 2023.
- P. Campbell, P, Lukes, F. Huemmrich, C. Neight, J. Albrechtova, E. Middleton and others. Multisensory canopy chlorophyll algorithms and time series for crops. In progress, for submission in 2023 to RS special issue on "Remote Sensing for Estimating Chlorophyll Content in Plants".
- Manakos, I.; Tomaszewska, M.; Gkinis, I.; Brovkina, O.; Filchev, L.; Genc, L.; Gitas, I.; Halabuk, A.; Inalpulat, M.; Irimescu, A.; Jelev, G.; Karantzalos, K.; Katagis, T.; Kupkova, L/; Lavreniuk, M.; Mesaros, M.; Mihailescu, D.; Nita, M.; Rusnak, T.; Stych, P.; Zemek, F.; Albrechtova, A.; Campbell, P.K.E. (2018). **Comparison of Global and Continental Land Cover Products for Selected Study Areas in South Central and Eastern European Region**. Remote Sens. 2018, Special Issue Remote Sensing for Land Cover/Land Use Mapping at Local and Regional Scales, 10(12), 1967.
- Mišurec J,Kopačková V, Lhotáková Z, Campbell P and Albrechtová J 2016. Detection of spatio-temporal changes of Norway spruce forest stands in OreMountains using Landsat timeseries and airborne hyperspectral imagery Remote Sens. https://doi.org/10.3390/rs8020092

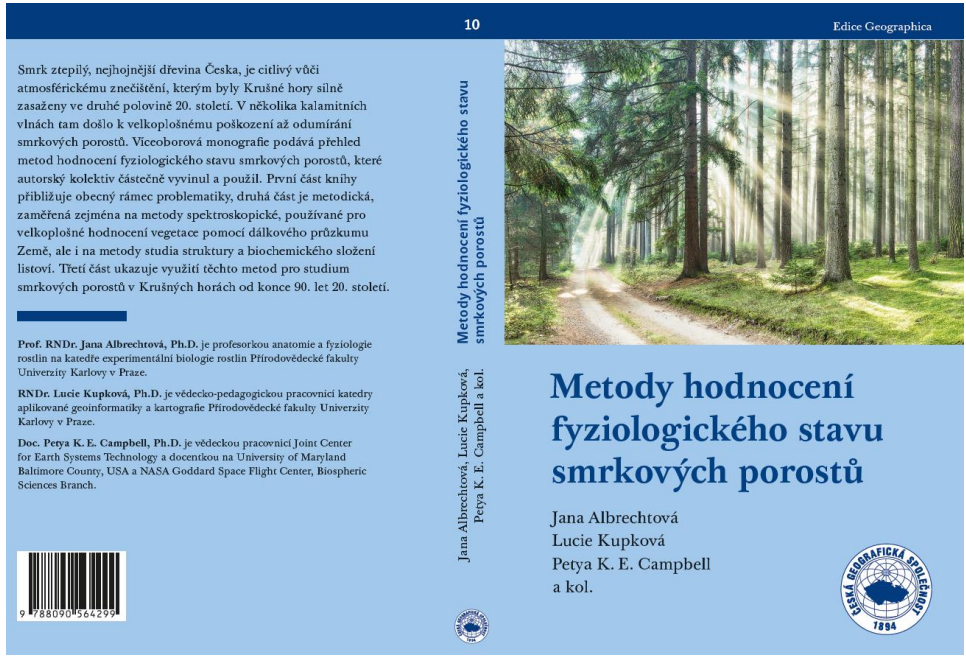
# Examples of Collaborative Publications

**Book in Czech with English summary and captions for figures and tables.**

Czech title: Metody hodnocení fyziologického stavu smrkových porostů : případové studie sledování vývoje stavu smrkových porostů v Krušných horách v letech 1998-2013 .

Albrechtova, J., P.K.E. Campbell, Z. Lhotáková and B.N.Rock (2017). Monitoring of physiological condition of Norway spruce forests. In: Case studies for monitoring of the physiological condition of Norway spruce forests in Krušné hory Mountains 1998 – 2013. Editors: J. Albrechtova, P. Campbell and L. Kupkova; Publishing House of the Czech Geograhpical Society, edition Geographica, Prague, 2017.

Publisher: Praha : Czech Geographical Society (Česká geografická společnost), 2017;. Series: Geographica. ISBN: 978-80-905642-9-9



# SCERIN – Conference Presentations 2019 (before COVID)

P. Campbell, C. Neigh, F. Huemmrich, J. Albrechtova, E. Middleton, M. Abdulahi: Prospects for satellite monitoring of canopy chlorophyll content. Poster presentation by J. Albrechtová, 4th Open Science Meeting of the Global Land Program. https://glp.earth/osm-2019

- **AGU2019, Washigton, DC**

GC51D-0810 **The South Central and Eastern European Regional Information Network (SCERIN) update and Prospects for Satellite Monitoring of Canopy Chlorophyll Content.** Petya K. E. Campbell1, Jana Albrechtova2, Elizabeth Middleton3, Karl F Huemmrich3 and Christopher S R Neigh4, (1)University of Maryland Baltimore County, JCET, Baltimore, MD, United States, (2)Charles University, Faculty of Science, Department of Experimental Plant Biology, Prague, Czech Republic, (3)NASA Goddard Space Flight Cen., Greenbelt, MD, United States, (4)NASA Goddard Space Flight Center, Greenbelt, MD, United States

Friday, 14 December 2018 08:00 - 12:20 Walter E Washington Convention Center - Hall A-C (Poster Hall)

- **ERSEL, Brno, Czech Republic, 6-8 February, 2019, http://is.earsel.org/workshop/11-IS-Brno2019/**

**1) Canopy traits for assessment of vegetation function in different agro-ecosystems in SCERIN**

Petya Campbell[1,2], Petr Lukes[2], Zuzana Lhotakova[2], Lucie Kupkova[2] and Jana Albrechtova[2*]

*Corresponding author: jana.albrechtova@natur.cuni.czm

[1] Joint Center for Earth Systems Technology, University of Maryland Baltimore County, [2] NASA Goddard Space Flight Center, [3] Global Change Research Institute, Czech Academy of Sciences, Brno, [4] Charles University, Faculty of Science

**2) Autonomous Spectral Systems for Monitoring Eco-physiological Dynamics at leaf and canopy scales.** Petya Campbell[1,2], Elizabeth, Middleton[2], K. Fred Huemmrich[1,2], Tomaso Julitta[3], James MacKinnon[2], Dan Mandl[2], Phil Townsend[4] and Craig Daughtry[5] [1]UMBC, Baltimore, MD, USA; [2]NASA/GSFC, Greenbelt, MD, USA; [3] JB Hyperspectral Devices, Germany; [4] University of Wisconsin, Madison, USA; [5] USDA/ARC, Greenbelt, MD, USA

# Outline

I. SCERIN organization

- Network initiation or ‘kick-off’
- SCERIN specifics, organization and structure
- Network workshops (goals, location, participants)
- SCERIN members and observers

II. SCERIN collaborative projects and capacity building initiatives

- Research projects in progress and manuscripts in preparation
- Other capacity building activities
- Challenges

III. Lessons Learned - Suggestions