

IEEE P4005 Working Group  
Teleconference 2<sup>nd</sup> Meeting Minutes  
21<sup>st</sup> of July 2020  
WG Chair: Eyal Ben-Dor  
WG Vice Chair: Sabine Chabrilat  
WG Secretary: Konstantinos Karyotis

1. Call to Order & Opening Remarks
  - a. *The meeting was called to order by the Chair at 15:00. He gave his welcome and opening remarks.*
2. Roll Call and Affiliation
  - a. *. There were 40 participants at the 2<sup>nd</sup> meeting. Their names and affiliations are listed at the end of the minutes. The participants attended the meeting are from Brazil, USA, Europe, Australia, Middle East, Africa and Asia*
3. Quorum establishment
  - a. *Quorum was established at the start of the meeting with 33 voting members. At the kick-off meeting, voting membership was established with 46 members.*
4. Approval of agenda
  - a. *The Chair presented the meeting agenda and called for a motion to approve.*
    - i. *Motion moved by Dr Khalsa*
    - ii. *Seconded by Nikos Tsakiridis*
    - iii. *Motion passed unanimously*
5. Review and Approval of Kick-off Meeting minutes
  - a. *The Chair briefly highlighted sections of the kick-off meeting minutes (which were shared with the participants for their review prior to the meeting). The Chair called for a motion to accept the kick-off meeting minutes.*
    - i. *Motion moved by Dr Chabrilat*
    - ii. *Seconded by Konstantinos Karyotis*
    - iii. *Motion passed unanimously*
6. Presentation of WG Policies & Procedures (P&Ps)
  - a. *The Chair and IEEE SA Program Manager briefly highlighted sections of the P&Ps (which were shared with the participants for their review prior to the meeting).*
7. Discussion of future P4005 meetings
  - a. *The Chair proposed –the below topics to be discussed in depth at subsequent meetings. A 10 minutes Q&A and small discussion commenced around the topics.*

- i. - Internal standards (soil samples/pure minerals)*
  - ii. - Methods of measurements (configuration/geometry/lamps)*
  - iii. - instrumentation*
  - iv. laboratory conditions*
  - v. Soil declaration (2mm<?)*
  - vi. Sample preparation*
  - vii. Reproducibility, uncertainties*
  - viii. Archiving (information, sample, format, depth)*
  - ix. Replications*
  - x. Documentation*
  - xi. Spectral Region (optical, thermal)*
  - xii. Meta data*
  - xiii. Lab vs field?*
  - xiv. Harmonization*
- b. The Chair proposed the formation of six distinct Sub Groups.. The Sub Groups proposed are:*
- i. Methods of Measurement*
  - ii. Data Harmonization (past data)*
  - iii. Laboratory tour (instrumentation, lab conditions, sample preparation)*
  - iv. Metadata and archiving*
  - v. Reproducibility and uncertainties*

## 8. Technical Discussion

- a) Dr. Mila Luleva gave a presentation on the subject of “Calibration transfer”. She presented a detailed comparative research on different calibration transfer methods of hyperspectral sensors. Three different calibration transfer protocols were evaluated including quartz soil samples and polymer UD material on a soil library containing 6654 distinct samples, over 14 different instruments. By briefly presenting their affiliation and their novelty-based capacities on soil health assessment, she presented the challenges that need to be faced. Dr. Luleva pointed out the necessity for establishment of a globally accepted calibration transfer framework for the synchronization of multiple different instruments. The presented case study contained a comparative research on modeling under different calibration methods. The methods that were checked are the usage of quartz soil samples (Willy Bay and Lucky Bay), the usage of polymer UD material (UD21-Ballistic Uni-Directional laminate) and the absence of calibration transfer. 15 predictions models were used and their predictive performance was assessed via 5-fold cross validation. The discussed performance results indicated that the absence of calibration led to the lowest accuracy in terms of  $R^2$  in most modeling cases, while the polymer approached the performance of quartz based calibration. The presenter concluded with the following:*
- i. The type of standard influences more significantly the lower quality models (available K, pH, exchangeable and total P, total S).*

- ii. *Little or no influence was found for models with R2 higher than 0.80 (total Al, total Ca, CEC, Fe).*
- iii. *In general, however, the results confirm that the use of an internal standard improves model performance in comparison to not using a standard.*
- iv. *The difference between model performance across all soil parameters was relatively small not*
- v. *statistically significant. This can be assigned to the fact that the 14 instruments are subjected to daily quality assurance protocol.*
- vi. *In addition, they are operated by trained laboratory staff and the samples are prepared following all ISO norms and protocols. As a result, the difference between the instruments is minimal, and the chance of operator or protocol error very limited. • The study is now extended to covering instruments that are handled by Agorcares' clients, who are not trained in following ISO procedures.*
- vii. *In addition, three ASD instruments are used to test the transferability between SiWARE collected spectra, and ASD-collected spectra.*
- viii. *Following this, we plan to assess the influence of the internal standard on more sensitive MIR-based equipment.*

The final part of the presentation contained the WEPAL paradigm as a world-leading organizer of proficiency testing programs bringing in collaboration more than 500 participants. The key role of this initiative is to minimize the variations between Wet-Chemistry labs and to change the perception of how to report accuracy. For this scope, more sensor labs are needed.

9. Call for any additional discussion or topics

A small fruitful discussion followed regarding the suitability of polymer UD material against quartz samples for calibration and the quality assurance protocols used.

10. Next meeting

- a. *It will be announced after 1<sup>st</sup> of August.*

11. Adjournment

- a. *The Chair called for a motion to adjourn the meeting at 17:52*
  - i. *Motion moved by Dr Chabrilat*
  - ii. *Seconded by Mr Karyotis*
  - iii. *Motion passed unanimously*
- b. *Minutes submitted by: Konstantinos Karyotis*

12. List of attendees includes 6 new members who joined at this 2<sup>nd</sup> mtg. Their names are in red.

*Agnelo Rocha da Silva, METER Group, Inc. USA,*

*Andreas Christofe, University of Cyprus in Limassol*

*Andrew Vincent Bradley, University of Nottingham*

*Anne Gobin, VITO*

*Antonella Tornato, ISPRA-Institute for Environmental Protection and Research (Rome)*

*Asa Gholizadeh, Czech University of Life Sciences Prague*

*Brendan Malone, Soil Processes & Function CSIRO*

*Charles M. Bachmann, Rochester Institute of Technology, Rochester, N.Y*

*Christian Omuto, FAO*

*Eyal Ben Dor, Tel Aviv University | TAU*

*Emmanuelle Vaudour, AgroParisTech*

*Euclides Lourenco Chuma, hotonics Innovation Institute*

*Gifty E. Acquah, Rothamsted Research, Harpenden, UK,*

*Gil Eshel, Soil and Water Conservation Center Israel*

*Ian Lau, CSIRO Perth*

***János Mészáros, Eötvös Loránd University, Department of Cartography And Geoinformatics***

*Jean Robertson, The James Hutton Institute, Scotland UK,*

***Jonathan Sanderman, Joint research centre, United States***

*Konstantinos Karyotis, Interbalkan Environment Center*

*Kyriacos Themistocleous, Cyprus University of Technology*

*Lubos Boruka, Life Science University Prague*

*Macoumba Loum, National Institute of Pedology*

*Martin Schodlok, Federal Institute for Geosciences and Natural Resources (BGR)*

***Mbedzi Thembinkosi, Soil Science and Agricultural Engineering***

*Michael Berger, ESA/ESRIN*

*Mila Luleva, Agrocares BV*

*Nicolas Francos, The Remote Sensing Laboratory, Tel Aviv University*

*Nikos Tsakiridis, Interbalkan Environment Center*

***Nikos Tziolas, Aristotle University of Thessaloniki***

*Robert Milewski, Research Institute for Soil and Water Conservation*

*Sabine Chabrilat, Helmholtz Center Potsdam GFZ German Research Center for Geosciences*

*Sadeq Dwenee, Ministry of science and technology/ Directorate of agricultural research, Iraq*

*Simone Pascucci, CNR IMAA*

*Siri Jodha Khalsa, National Snow and Ice Data Center*

*Stefano Pignatti, CNR IMAA*

*Theodora Aggelopoulou, Laboratory of Remote Sensing,*

*Thomas Schmid, Soil Conservation and Remediation Unit, Department of Environment*

***Uta Heiden, DLR Oberpfaffenhofen***

*Veronika Strnadová, Czech Geological Survey*

*Viktor Bacu, Technical University of Cluj-Napoca*

***Yijian Zeng, University of Twente***