

Exploring a Dynamic Soil Information System: A Workshop

► MARCH 2-4, 2021

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Board on Agriculture and Natural Resources
Board on International Scientific Organizations
Board on Earth Sciences and Resources

VIRTUAL WORKSHOP

A dynamic soil information system for the United States would overlay important chemical, physical, and biological information about soil samples taken across a wide range of geographies with information on influences on soils, such as land use and land management, soil moisture, weather, and other variables. This workshop will examine the level of detail needed by potential users of this combined information and envision how data on soils and other parameters can be most effectively collected, combined, and curated over time.

AGENDA

Tuesday, March 2

(All times in Eastern Time, U.S. & Canada)

11:00 **Welcome**

Bruno Basso, Michigan State University

11:15 **Keynote Talks**

Innovative Technology for Managing Soils

Joe Cornelius, Gates Ag One

Soil in Agricultural Systems

Jerry Hatfield, USDA Agricultural Research Service (retired)

The Importance of Data Archiving and Data Integration

Alison Hoyt, Max Planck Institute for Biogeochemistry

12:15 **Q&A with Drs. Cornelius, Hatfield, and Hoyt**

12:45 **Break**

1:05 **Panel Discussion: Why do we need a dynamic soil information system?**

David Babson, DOE Advanced Research Projects Agency–Energy

Jim Dobrowolski, USDA National Institute of Food and Agriculture

Matt Kane, National Science Foundation

David Lindbo, USDA Natural Resources Conservation Service

John Mesko, National Corn Growers Association

Stephen Wood, The Nature Conservancy

Moderated by Bruno Basso, Michigan State University

2:15 **Lessons Learned from Listening Sessions**

Alison Marklein, University of California, Riverside

2:45 **Break**

2:55 **Panel Discussion: What soil information systems do we have now?**

Mark Farrell, CSIRO (prerecorded)

Drew Kinney, USDA Natural Resources Conservation Service

Luca Montanarella, European Commission Joint Research Centre

Rik van den Bosch, ISRIC–World Soil Information

Samantha Weintraub, National Ecological Observatory Network

Skye Wills, USDA Natural Resources Conservation Service

Moderated by Charles Rice, Kansas State University

3:55 **Preview of Second Day**

4:00 **Adjourn**

Wednesday, March 3

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11:00 **Fireside Chat with Industry Representatives**

Teddy Bekele, Land O'Lakes Inc.

Adrian Percy, UPL Ltd.

Karsten Temme, Pivot Bio

Moderated by Ranveer Chandra, Microsoft Azure Global

11:45 **Breakout Session 1**

Topic A: Measurements and Sampling and Archiving

- What should be measured? Where and when should it be measured?
- What protocols or standardizations would be useful?
- What other parameters need to be collected routinely (for example, temperature, rainfall, land management practices)?
- Collection and preservation of physical samples
- Linking physical samples to digital data

Topic B: Collection and Curation (including cyber infrastructure)

- Harmonization of data and methodology
- Semantic and ontology structures
- Data models
- Avoiding the proliferation of standards
- Internet of Things
- Cloud infrastructure for data storage and data processing
- Data repository federations
- Security/privacy issues
- Machine learning tools in databases
- Data platforms

Topic C: Data Analysis and Models

- Machine learning algorithms for gap filling and spatial inference
- Process modeling
- Decision support tools
- Meta-analyses

1:00 **Break**

1:15 **Breakout Session 2**

Topics A, B, and C repeated

2:30 **Adjourn**

Thursday, March 4

(All times in Eastern Time, U.S. & Canada)

11:00 **Welcome**

Bruno Basso, Michigan State University

11:10 **Reports from Breakout Groups**

1:00 **Break**

1:30 **Continuing Engagement Opportunities**

Kathe Todd-Brown, University of Florida

1:40 **Synthesis Session**

2:15 **Concluding Remarks**

2:30 **Adjourn**