



College of

Agricultural, Human,
& Natural Resource Sciences

WASHINGTON STATE UNIVERSITY

Department of Crop and Soil Sciences



2019 Campbell Lecture

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University of Bologna, Italy

Dielectric spectroscopy to investigate ice and frozen porous media: a journey between spatial and time scales

Monday – November 4, 2019

1.10 – 2.00 pm in VBR 305

Department of Crop and Soil Sciences

Washington State University

(Reception to follow)



Dr. Marco Bittelli is an Associate Professor of soil physics and hydrology at the University of Bologna, Italy. He received his BS in Agricultural Sciences at the University of Bologna, and his MS and PhD in the Department of Crop and Soil Sciences at Washington State University. Dr. Bittelli's research focusses on heat and mass transfer in soils, with an emphasis on characterization and quantification of the different phases of water. He investigates soils as chaotic and complex system. He is a research scientist in the Italian National Research Project in Antarctica. Dr. Bittelli is the authors of two textbooks: *Soil Physics with Python: Transport in the Soil-Plant-Atmosphere System* (co-authored with Dr. Gaylon Campbell) and *Nonlinear Time Series Analysis* with R.

About the lecture

In this presentation the application of dielectric spectroscopy to measure ice properties in both ice and frozen porous media is discussed and new development are presented. Polar regions, including Antarctica, are severely affected by effects of anthropogenic climate change. To understand the mechanisms that affect Earth's global climate, we need to observe and monitor the entire geographic extent of the polar regions, including Antarctica. Due to Antarctica's extent, extreme weather conditions, and remoteness, satellite remote sensing constitutes a unique tool to estimate the ice-sheet mass balance. The availability of new low-frequency microwave spaceborne sensors pushed the investigations further, into the deeper layers of the ice sheet, down to the bedrock. However, to maximize the scientific return of these new satellite missions, corresponding in situ measurements of the firn and ice electromagnetic characteristics are required, to calibrate and validate satellite remote sensing data.



The Campbell Lecture was created to help further understanding of environmental soil science. It is named for Dr. Gaylon Campbell, who spent nearly 30 years as a professor of environmental biophysics and soil physics in the WSU's Crop & Soil Sciences department. He retired from WSU in 1998 to become vice president of engineering at Decagon Devices, a manufacturer of biophysical research instrumentation. The lecture was created through gifts from Campbell Scientific, Inc., and Decagon Devices, Inc (now Meter Group).