

WORKSHOPS

Pre-Registration Required by Jan. 30

W8 Postmortem Interval Estimation Using a Novel Data Set and Methods

Monday, February 13, 2023

8:30 AM – 12:00 PM

CE Hours: 3.25

Learning Overview: Attendees of this workshop will learn how to use geoFOR application to record decomposition characteristics and estimate the Postmortem Interval (PMI) using the available machine-learning models.

Impact Statement: This workshop will impact the forensic science community's practice by demonstrating a procedure for recording scene and decomposition information and machine learning models to estimate PMI.

This workshop will introduce a data repository and associated machine learning models to provide a novel method of estimating the PMI in the geoFOR application. The lack of a large reference dataset for developing reliable and accurate models has been a major barrier for improving methods for determining the time since death.

Since 2019, data from forensic cases and observations from anthropological research facilities have been collected in a reference dataset that contains over 1,500 cases from locations across the United States. This reference dataset is representative of forensic casework; it is geographically diverse and encompasses the various scenarios in which human remains are discovered in forensic casework. Along with decomposition characteristics, the application records location, which allows environmental data from existing databases from the National Oceanic and Atmospheric Administration (NOAA), such as temperature, humidity, and precipitation, to be tied to the location of death to model variables important in the decomposition process. The availability of this reference dataset allows for machine learning models to be employed to provide a robust estimate of PMI with an associated prediction interval.

This workshop will first demonstrate the application, reference data set, and the data entry process. Secondly, Geographic Information Systems (GIS) methods and spatial coding will be introduced to demonstrate how environmental datasets are automatically populated and used in the statistical models and how ArcGIS® is used to store and manage data for collaborators. Third, machine learning models that are used in the predictions of PMI from both observed decomposition variables and integrated environmental variables will be explained. Next, Bayesian generative models will be discussed. These methods are useful for improving research design for future studies of decomposition. For example, using expert knowledge and a priori knowledge, this information can be integrated to provide data-informed stages of decomposition or how decomposition variables are associated with body size or age. Finally, this workshop will provide an overview of how this project aims to follow an Open Science model from the National Institutes of Health with the goal of sharing scientific data to accelerate research discovery, enhance research rigor and reproducibility, provide accessibility to high-value datasets, and promote data reuse for future research studies. Participants will gain experience using the geoFOR application to input data, manage their data in ArcGIS®, and make predictions of PMI.

Chair:

Katherine E. Welsenee, PhD
Clemson University
Clemson, SC

Co-Chair:

Cristina I. Tica, PhD
Clemson University
Clemson, SC

Presenters:

D. Hudson Smith, PhD
Clemson University
Clemson, SC

Carl Ehrett, PhD

Clemson University
Clemson, SC

Patricia Carbajales-Dale, MS

Clemson University
Clemson, SC

Target Audience: Anthropology, Criminalistics, General, Pathology/Biology

Knowledge Level Required: Basic