**Boston University GSO Travel Grant Application**

**I. Personal Information**

**Name:**  Zoey Werbin

**Boston University ID#:** U61183137

**Department or Program:**  Biology - Ecology, Behavior, & Evolution

**Expected Graduation:** 2024

**Check One:** *Master’s***☐** *Ph.D.* **☒**

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By signing below, I certify that all of the information provided in this application is true and accurate to the best of my knowledge. I understand that failure to attend the conference and participate in the way outlined in this application, failure to submit original receipts within the specified time period, or non-acceptance of the proposed paper, poster, or panel by the conference named in my application will constitute forfeiture of this award. (**Note**: typing your name in a font of your choosing in the space provided, as well as emailing this application from your personal BU account will serve as an electronic signature for this application.)

Zoey Werbin 05/14/20

**Applicant’s signature Date**

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**II. Conference Information:**

**Title of conference:** British Ecological Society Annual Meeting

**Dates:** December 14-17 2020

**Location:** Edinburgh, UK

**Conference website, if applicable:** <https://www.britishecologicalsociety.org/events/ecology-across-borders-2020/>

**Have you already been accepted to the conference?** \_\_\_\_ **Yes** \_\_X\_\_ **No**

*I am an invited speaker for a proposed session; the session has not been accepted for the program.*

If yes, please indicate confirmation number or reference number from the conference:

**In which of the following ways will you participate in the conference?**

☒ Presenting a paper

☐ Presenting a poster

☐ Participating in a panel

☐ Chairing a session or panel

**Title of your proposed paper / poster / panel:**

Forecasting the soil microbiome using microbial networks

**Have you applied for a GSO Travel Grant in the past?** ☒ **Yes ☐** **No**

**If yes, were you awarded money for your trip?** ☐ **Yes ☒** **No**

**Is funding for conference travel available in your department?**

☒ **Yes** ☐ **No**

**If yes, have you applied for departmental funds?** ☐ **Yes ☒** **No**

**Is funding for conference travel available from your advisor?**

**☒** **Yes**  ☐**No**

**If yes, please list amounts/sources below.**

Departmental funds are currently unavailable because I received a $200 award last Fall, and only one award is allowed per academic year.

My advisor, Jennifer Bhatnagar, has some funding for me to attend conferences, under the assumption that I am seeking other funding as much as possible.

**III. Funding Information:**

Please list alternative sources for conference travel to which you have applied or intend to apply.

**Name of Source:** Biology Graduate Student Travel Awards

**Have Applied/Intend to Apply:** Intend to apply in Fall

**Amount Requested:** Total cost of trip, with partial funding determined by department (usually $200)

**Name of Source:** Biogeoscience Research and Travel Award

**Have Applied/Intend to Apply:** Intend to apply in Fall

**Amount Requested:** $500

Please list expenses that you will incur during conference participation.

**Room:** $50/night **×** 5 nights

**Total:** $250

**Board:** $40/day **×** 6 daysClick here to enter text.

**Total:** $240

**Air:** $800 (current flight price for the conference dates, likely to change)

**Conference Registration, abstract fees:** $914.25 (£750)

**Grand Total:** $2204.25

**IV. Personal Statement (1000 word maximum. Describe your research and its importance, your current academic situation, and how this experience will help your career aspirations. This should be tailored to non-specialists) Please do not include your name in this section:**

I am a PhD student in the Biology department, studying soil microbes as part of an project within the emerging field of ecological forecasting. Ecological forecasting aims to predict the future of ecosystems, similar to the way we predict the weather.

I have been working on forecasting changes in the soil microbiome, which includes fungi, bacteria, and archaea. These microbes are responsible for cycling most of the Earth’s nutrients. For example, through decomposition, fungi release about 10 times more CO2 each year than all of human activity combined, and bacteria are crucial for fixing and transforming nitrogen. We know these groups are important for understanding climate change, yet we know very little about how soil microbes form and maintain communities. In fact, many researchers believe that microbes are fundamentally unpredictable, because soil communities can vary drastically even within a small patch of land. But my work these past two years, using Bayesian statistical modeling, has helped to show that these communities *are* predictable at certain taxonomic and spatial scales. I have been building a modeling framework to track changes in microbial at five sites in the US, and adding new data as it released yearly. This will be useful for understanding (in near-real-time) how microbial communities respond and interact with climate change.

One novel aspect of my research is my consideration of species interactions. The soil microbiome can contain thousands of species in just a handful of soil, which makes it very difficult to determine if some soils have more complex communities than other soils. I am using tools from the field of network statistics to create microbial interaction networks. and integrate information from those networks into forecasts. I have been invited to speak on a panel of seven experts for a proposed session at the British Ecological Society (BES) Annual Meeting. This session is called “Species interactions and the challenge of mechanistic ecological forecasts,” which is the closest any conference session has ever come to the topic of my dissertation. I have never spoken to the BES audience before, so this will be a valuable opportunity to get feedback from a new collection of researchers. It is rare that graduate students are invited speakers in my field, so it will be a particularly good experience for my career prospects. Exposure to international research will also help my (eventual) search for a post-doctoral position, as I currently do not have any connections to labs in the UK.

This conference takes place in December 2020, right after my final semester of graduate courses. As I transition into working on my dissertation full-time, it will be an excellent opportunity to learn about cutting-edge work that should inform my research decisions. Despite the fact that I research the soil microbiome, not a single one of my graduate courses at BU has focused on microbiology, let alone the soil microbiome. Conference lectures are therefore an especially critical aspect of my education. This conference is particularly expensive, but even partial funding will make it more likely that my advisor can fund the difference.

**V. Abstract (Insert the abstract with which you applied to the conference. If you didn’t apply using an abstract, write a summary of the work you plan to present. 1000 word maximum.) Please do not include your name in this section:**

The soil microbiome is an incredibly complex ecosystem, with species competing for some nutrients while depending on each other for other nutrients. Interactions between microbes can therefore shape biogeochemical cycles, but understanding the strength and importance of interactions in specific soils is difficult. We have adapted tools from the field of network science to quantify the strength of fungal and bacterial interactions within a sample, using a combination of statistical relationships between taxa and their abundances. These interaction metrics can easily be included into microbial models. We show that these metrics are useful for predicting turnover (beta diversity) in fungal and bacterial communities, using pairwise comparisons of over a thousand soil samples from five sites across the United States. Models containing interaction metrics as well as abiotic predictors (such as soil characteristics) outperform all existing models for predicting microbial community turnover. We discuss the limitations of these metrics, as well as early research suggesting that this approach may improve predictions of biogeochemical transformation rates.

**Session Selection:**

Species interactions and the challenge of mechanistic ecological forecasts