

September 11, 2023 Education Working Group Call

Attendees: Freya Olsson, John Zobitz, Alyssa Willson, Antoinette Abeyta, Jody Peters, Jason McLachlan, Mary Lofton, Cazimir Kowalski, Olivia Tabares

Agenda/Notes:

1. Note: Jody will be traveling during the next call on October 2. Can someone else take notes?
2. EFI 2024 Conference Announcement
 - a. Use this short feedback form to submit proposals for workshops, panels, short courses, socials before/after/during this conference.
 - b. Deadline for proposals : 01 Nov 2023
 - c. Registration and Abstract submissions open: 01 Dec 2023
 - d. Accepted contributions are announced: 01 Mar 2024
 - e. Final program announced: 01 Apr 2024
3. Talk to Freya/Mary about the forecasting challenge workshops
 - a. Started with creating materials to increase participation in the Aquatics Challenge theme
 - b. GLEON workshop - all around workshop about forecasting using NEON Challenge and Macrosystems EDDIE
 - c. 3 online workshops
 - i. InvertWater PhD cohort (audience
 - ii. GLEON virtual (materials available/recorded asynchronously)
 - iii. AEMON-J/SDOS Hacking Limnology - targeting aquatic ecosystem modelers
 - d. CEFI short course
 - e. Also modified to work for Terrestrial Challenge
 - i. Global Change Ecology Lab
 - ii. NEON TWG
 - iii. ESA
 - f. Started small and has expanded. May need some streamlining
 - g. 60-90 minute workshops focused on how to submit to forecasting challenge. Less about learning about forecasting. More about the workflow to participate in the challenge
 - h. Was tweaked for different audiences, e.g., for ESA was very basic
 - i. Has introductory presentation that is tailored to the audience (15-25 minutes)
 - i. Why forecast, give examples, introduce data, visualize what to aim for
 - j. Time for questions
 - k. Walk through of code that is in Rmarkdown (30-45 minutes) to show the basic workflow

- i. All materials are on GitHub and Zenodo
- ii. <https://github.com/OlssonF/NEON-forecast-challenge-workshop>
 - “Submit Forecast” folder is the main presentation with Aquatics and Terrestrial forecasts
- iii. Goal is for people to walk through the workshop using the material on GitHub without needing Freya
- iv. Has options for people who want to walk through the code they can, but also have it available with the code already rendered for when internet is not good (e.g., happened at ESA)
- v. Has different options for different levels of coding ability
- vi. All material on the Terrestrial branch is the same as the Aquatics
- vii. The material here uses simple linear models
- viii. Also provide information that is not part of the workshop that includes “Automate Forecasts” that helps with how to
- ix. “Analyze scores” folder - if people want to analyze scores, this shows how that can be done. Look at skill over time or compare models to climatology or the null model to know how well you are doing.
 - If anyone wants to test it out, Freya could use help having someone else test this out
- I. Time at the end for individual/group work - how to improve the forecast or implement something depending on their interest
- m. E.g., Terrestrial Challenge has tons of sites, but maybe people are interested in forested sites, or perhaps people are interested in the non-linear models, etc
- n. Freya’s big picture goal - have a different branch for each theme of the Challenge
- o. Weather forecasts is a key thing for making forecasts.
 - i. The Forecast Challenge cyberinfrastructure has worked to set up to make it easy to access the weather information
- p. Lessons learned
 - i. Send out pre-workshop material (package installation instructions beforehand)
 - This wasn’t possible for ESA, so that was more difficult
 - ii. Having people around to help TA to troubleshoot
 - iii. Got the most engagement when it is possible to have follow-ups
 - For GLEON there was a second opportunity for people to check in and ask more questions
 - iv. Virtual workshops required people to have higher baseline for the coding because it wasn’t possible to troubleshoot as compared to in person
- q. The presentation for the workshop is very tailored to the audience. They aren’t on the GitHub yet, but Freya is happy to share them
- r. Have upfront questions - how many people have heard of ecological forecasts, do you identify as an ecological forecaster, do you have experience with Docker - don’t expect people to have these experiences, but do want to get to know how to tailor the presentation and whether to have people live code or not
- s. Any thoughts about turning this into a publication?

- i. Seems like it could go into a journal like Ethan, Morgan, Hao's paper
 - ii. Hoping to get something drafted by the end of the semester
 - iii. Could add a section to a manuscript on ways the workshop could be adapted for other situations.
 - iv. People attending workshops are people who want to implement forecasts
 - v. Other example - people want to learn about lakes, could use this material as a way to learn about lakes
- t. John took the workshop
 - i. Kudos!
 - ii. Think this could be used in the classroom with limited adaptation
- u. Freya has been working with LM Bradley at Emory who is teaching forecasting for undergrads and this may be used at the end of her class
- v. Jason - thinking about using this material at the beginning of a forecasting class to get people forecasting to get started
- w. Applying the material to other Challenge themes
- x. Is there a tinker toy version where the components of forecasting could be more modular?
 - i. If someone wanted to build a forecast in other contexts, could that be done?
 - ii. This sounds similar to what Quinn and Carl are working on to have forecast for other non-NEON datasets and having the cyberinfrastructure set up to support forecasts (submissions, scoring, etc)
 - iii. CSDMS - modular program for river and coastal geology where you can put different models together
 - https://csdms.colorado.edu/wiki/What_does_the_CSDMS_Model_Repository_provide%3F
 - It is a framework that is set up for the technical challenges
 - It is at the graduate level
- y. Go through and think about what would it take to set up a non-NEON forecast challenge?
 - i. Once we figure that out, then could determine that it is necessary to get grant funding to support it or find out it is the next RCN
 - ii. Can we take existing code and translate it into something where it isn't as much about coding
 - iii. Would be nice to have a users manual - develop materials for participants, and then develop materials that provide instructions on setting up the web documentation so instructors can use it as well
 - If you came across Freya's material you could do it on your own, but don't think you could use it to lead a workshop
 - Change the emphasis of the ReadMe to what it focuses on. Currently, set up for people who want to learn how to submit to the Challenge, but could be expanded to think about how to teach the workshop/use in a classroom (or maybe for the paper stick with

the first focus of participating and then point to future work for moving it to teaching)

4. Next month - see who is available - Ethan, Morgan, Hao or Quinn/Carl
5. Other options for things to discuss or for people to be aware of
 - a. Paper from Mary: "Data Science in Undergraduate Life Science Education: A Need for Instructor Skills Training"
<https://academic.oup.com/bioscience/article/71/12/1274/6403634>
 - i. Discuss the barriers to teaching data science
 - What are the barriers to instructors and how to reduce those barriers?
 - b. Paper from Slack by Morgan Ernest, Ethan White, and Hao Ye: "Ecological Forecasting and Dynamics: A graduate course on the fundamentals of time series and forecasting ecology" <https://jose.theoj.org/papers/10.21105/jose.00198>
 - c. Discussion notes from the CI/Methods Working Group Call
 - i. Are there examples of how the Challenge has been used in the classroom?
 - Yes. See this:
<https://projects.ecoforecast.org/neon4cast-docs/UseInCourse.html>
 - Also NEON wrote blog post about it:
<https://www.neonscience.org/impact/observatory-blog/efi-neon-for-ecasting-challenge-classroom>
 - This also leads to the question of whether people should join the Challenge working group who are interested in using it in education or if that would be separate.
 - There are also workshop materials (this is the one at ESA):
https://github.com/OlssonF/ESA2023_neon4cast_workshop
 - Good example of how to get a forecast going
 - Beetle example:
<https://ecoforecast.org/collaborative-innovation-and-skill-building-at-the-2023-unconference-empowering-ecological-forecasting-with-neon-data/#ground-beetles>
 - Water quality forecasting example with a hierarchical Bayes state space model:
https://github.com/OlssonF/cefi_shortcourse_students_2023/tree/main/CaseStudy_WaterQuality
 - Suggest to Education working group the need for pulling together educational materials more broadly related to the Forecasting Challenge
 - d. From the RCN Steering Committee call - it would be nice to create ecological forecasting examples for the Forecasting: Principles and Practice online book
<https://otexts.com/fpp3/>

- In the Preface this is for a 3rd year undergrad intro master's course
 - Interesting template. Success in part due to free online and R packages are nicely user friendly
 - This is a bookdown format where R code is integrated and is a living document
 - Wouldn't get the credit of something like an AGU Monograph, but would be more broadly available.
 - Could do something that are RMarkdowns that could be combined as a book
 - Loop John Zobitz into this. He is also writing a book for his courses. Mike has used some of his chapters in his 300 level course.
 - Do this in the context of NEON data and walking through all the steps of forecasting. Could get long, but would be a nice resource.
 - A self-contained book to walk through. Could reference other books.
- vii. This sounds like a strong potential for a proposal for NSF Education Directorates, especially if we could bring in an education evaluator who evaluates the open source, collaborative textbook.
- If we structured it well it could have a strong educational research component