March 15, 2024 Joint Methods & CI Working Group Call

Attendees: Quinn Thomas, Carl Boettiger, Brittany Barker, Emma Mendelsohn, Tom McLaren, Sue Bainbridge, Jody Peters
Regrets: John Smith, David Durden

Agenda/Notes:

1. Reminders/Announcements:
    a. EFI Steering Committee elections end today - if you are an EFI member you should have received a ballot
    b. Early bird registration for the EFI 2024 Conference ends today
    c. May 30 SERDP and ESTCP webinar at noon ET: Fire Modeling and Mapping to Improve Decision Making;
       https://serdp-estcp.mil/events/details/18c4a44e-1273-44f9-b0e8-e9030dd26370/fire-modeling-and-mapping-to-improve-decision-making
        i. This SERDP and ESTCP webinar focuses on DoD-funded research efforts on the use of prescribed fires to support ecological objectives in an effective, efficient, and safe manner on DoD lands. Specifically, investigators will discuss a suite of advancements that can help the planning and design of prescribed fires, and the use of an innovative fuel mapping tool (FuelsCraft) to aid with fuel characterization, fire behavior predictions, and post-fire monitoring.

2. Project Overview and resources: Forecasting Wildfire Recovery Using MODIS Leaf Area Index (LAI)
    a. Background of the project - the goal is to develop a spatially explicit forecast that could be used with the NEON Forecast Challenge cyberinfrastructure. This project was started at the EFI Unconference (summer 2023).
        i. GitHub repo: https://github.com/eco4cast/modis-lai-forecast/
        ii. This is a prototype for working with spatial data and for managing large datasets in geotiff format instead of the csv/netcdf format that had already been developed for the Forecast Challenge
        iii. Here is the example of the standard Forecast Challenge CI: https://github.com/eco4cast/neon4cast-ci wanted to replicate this and apply to a spatial example for this project. This repo has workflows with GitHub actions that do tasks automatically - it gives a modular way to see what actions need to take place which we can use to check off what is done for the modis-lai spatial forecast example
        iv. We are using the STAC framework - spatial temporal assets catalog - this allows for the Challenges to be discoverable
        v. TERN example to use as reference: https://projects.ecoforecast.org/tern4cast/

3. Updates from the working group that met on Friday, March 8
    a. Make progress on targets generation
    b. The group looked at what John had been working on and it looked pretty good and was on track

4. Check in with Brittany about the NASA ROSES proposal - **A.47 Earth Action: Wildland Fires**
    a. PDF of the RFP
    b. Send email to program officer that summarizes the project and identifies how the project aligns with the needs identified in the proposal
    c. Letter of intent due Apr 8
    d. Full proposal due May 24
    e. Emma has an admin on her team who can help on - setting up tracking documents and shepherding the process
    f. If going through OSU have to have it ready a week ahead of time to get through OSP
    g. Meeting the RFP themes
        i. Pg 2 in the pdf - identifies 7 key themes
        ii. New approach - novelty is having a framework that allows for the democratization of the predictions. Creates capacity for many people to make predictions and make multi-model products and engage the community. People have been making spatial predictions for a long time, but it is the design of the challenge that is novel.
        iii. Supporting collaboration - relates to the challenge. Open source - some decision support systems users have to pay or there is a fee. Want to highlight that there is multiple ways the product is open source. The software the challenge is built on is open source. The forecasts being produced are open source as well. The dashboard is open source
        iv. Mitigating and recovering from fire - if we better understood recovery then could focus on specific areas.
            1. Want to figure out the narrative for mitigating and recovery
            2. Good forecasting leads to understanding geographic recovery
                a. What does it mean if something never burns -
                b. Look at rates of recovery and if there are places that have burned multiple times then that adds another dimension
                c. Once you can study an area that is reburned then it opens up things to prescriptive burning.
            3. We will be around the resilience theme. We are not predicting fire. Not forecasting resilience, but the forecast will shed light on resilience
            4. Prediction and planning - planning means being able to plan for recovery. Knowing how fast or not that recovery will be.

5. You may not have management options to change the resilience of the area, but you could use forecasts to make long term plans for looking at places that recovery faster vs those
6. If it is possible to incorporate the quality of the recovery - that will be very useful for management
7. There is land cover component for the Great Basin which has remotely sensed annual herbaceous, perennial cover, etc. Very few annual herbaceous in Great Basin, so can assume that the annual herbaceous plants are the invasive species.
8. Hard to be ecosystem specific, but linking the mechanism into the forecast
9. In CA: Conifers replacing oak stands and then conifers are more likely to burn. Not invasive per sae, but changing ecosystems
10. There is difference between old stand forests that can't be regenerated in our life spans vs the new forests that come in
11. Forest fire severity indices based on degree of tree mortality indicates natural reseeding potential
12. Are any places we are modeling going to have prescribed fires?
    a. Could use the multiple reburned areas to help understand the risk of rapid reburning
    b. High intensity stand clearing burn with recovery that is decades.
    c. If we can use the challenge to know what is recovered fast then can help us know what fires are beneficial vs those that
13. Decision making - major purposes of the forecasting tool
14. Using NASA derived remote sensing data.
15. Are we using any previously published technology?
    a. Narrative trick - make it clear we are building a platform for community innovation. This isn't a team of 3 people that will make a forecast.
    b. We will make a forecast, but it won't answer all the questions. The shared platform will allow anyone working with fires to inform decision making on a big scale
    c. Use this to build the community
    d. It opens opportunity for multi-model decision making which allows decision science to participate. Opportunities to allow decision science practitioners to work on a data set.
16. Part of the grant needs to be developing the tutorials and lower the barriers of entry so people will submit the forecasts
17. We want people to focus on spatial maps of LAI with spatio-temporal uncertainty quantified
18. NEON Challenge is multi-model - to predict water temp in a lake - need to filter through a catalog of model and forecasts to develop

the best forecast of recovery and being able to summarize that for a decision maker is still an open question.

    v. This is a platform to modernize tools. We have a modular design. None of the choices are bolted down. If we find that LAI is not the best metric, or if MODIS is the best product, this won't collapse. We can swap out a better metric.

    vi. This modernizes the tool. Things are not bolted in so we can make changes.

    vii. If MODIS doesn't work out what else to propose?

    viii. We will build a platform that is input agnostic. We will prove it works putting in MODIS and prove it when LANDSAT goes in. And when new NASA products are developed then we can plug those in.

    ix. That gives us a lot of flexibility and nimbleness as new tools are developed and new NASA products are released. Be sure to include the new tool that NASA is coming out with

    x. Have figure in the proposal that shows we can map out MODIS

    xi. Spatio-temporal forecasts with spatio-temporal uncertainty that is then evaluated with probabilistic analyses
- 1. If you swap out spatial map of ET (ecostress map) or biomass from JEDI - it is a different theme, but it is all in the spatio-temporal forecasting capacity that we don't have
- 2. People have been producing maps for a long time. But maps with good characterization of the spatio-temporal uncertainty and probabilistic analysis of those maps

    xii. Could help save money by focusing on areas with better chance of recovery or are least likely to need assistance in recovery

    xiii. Understanding mechanisms - if we know what variables are most predictive for recovery then we might have more control over some vs others

h. Phases of the fire life cycle - lean into the post fire phase. Pitch it as a distinguishing feature. Lots of people focused on pre-fire or putting out the fire. But if we don't focus on recovery then we miss the long game.

i. This proposal focuses on post-fire and the post fire phase is the most important for long term ecosystem health

j. Next steps
- i. Have short version for the program officer - half page
- ii. Don't build pages of anything until we get feedback from PO
- iii. Once we have their feedback
- iv. Brittany to highlight connect community to NASA data products
- v. Think about personnel on the grant and roles
  - 1.

5. For reference here is the list of Tasks to set up GitHub Action Workflow
   https://github.com/eco4cast/modis-lai-forecast/issues/10

a. Targets generation

b. Benchmark forecast generation

c. Scores

d. Submissions/validation

    i. Jody is leaving in a placeholder that Brittany is willing to look at the fire dataset from Justin Welty to find other fires to add to the targets

e. Generate Dashboard/visualizations

f. Generate STAC collections for forecasts, targets, scores tifs

6. Running list of potential proposals to keep in mind.
   a. [NASA ROSES](#) -
          i. Proposal due Apr 8 is related to wildland fires - this is when the letter of intent is required. The full proposal is due in May
          ii. NASA target would be providing deliverables for managers
          iii. Brittany and Emma are interested in this
   b. Thinking about NSF timelines - could pitch to core programs. For Bio they are all rolling submissions
          i. Target for NSF would be modeling and evaluating methods
          ii. John is interested in this
   c. Proof of principle grant - smaller budget to get a basic competition going and then come back to think about how to scale up
   d. ESTCP - call for nature based solutions in arid landscapes
          i. https://www.serdp-estcp.mil/workingwithus/fundingprocess
          ii. scroll to the bottom for FY 2025 proposal guidance
          iii. Implementation of the science
          iv. Nature based solutions in arid landscapes, specific call: https://serdp-estcp.mil/workingwithus/callforproposal?id=13b8ee7a-bba0-4d71-b257-11a1024464a4
          v. Really want justification on the benefit cost - you said you are doing this, how will it save DoD money. The way you calculate that needs to pass
          vi. Andy Chubaty is willing to help with this
   e. If people come up with other funding opportunities that fit, let the group know

7. **This is for reference, not necessarily needed for today's call:** Resources from Justin Welty's visit on the November call (see full list of notes from the call in the link to the Nov calls above)
   a. Databases and tools mentioned
          i. [Geodatabase of wildfires](#)
          ii. [Wildfire Fire Trends Tool](#)
          iii. [Land Treatment Exploration Tool](#)

iv.   [RAD framework](#)