July 22, 2024 Joint Methods & CI Working Group Call

Attendees: John Smith, Brittany Barker, Jody Peters, Carl Boettiger
Regrets: Jake Zwart

Agenda/Notes:

1. John Smith - Update about the CDS&E/EAGER NSF grants
    a. Notes from June call to follow up with John about
        i. Sounds like it is up to John on how much to pitch about what will be the new algorithm or computational model. Think it can be sold this way. But if not and leans into this is built on things that already exist then it may be easier to press for a Biology call. Let John decide which way he wants to go.
        ii. Encourage John to lead something. If he can put something down about the novelty of methodology for stats/computation, then go with that.
        iii. If prefer to go with novelty in the bio realm then we can make that pitch.
        iv. No one is doing this on either side - so it is a good proposal.
        v. Mike has never been on a stats proposal - so doesn't know how to pitch to that community.
        vi. Nice that the CDS&E-MSS emphasizes the algorithm need rather than requiring pitch on theoretical ground.
        vii. Discussion
            1. John happy to through stats methodology at the problem. Not familiar with process based modeling for fire. If there are people with expertise in that area then could pitch it through that lens
            2. Was going to think about ensemble statistical modeling approach.
            3. NSF is hungry with AI application stuff. So could write the pitch that way
            4. John is on NIH grant now - physics informed neural network that could be applied to fire model
            5. With AI need to feed good data. Have ton of LAI data from MODIS. Have bounding box for fires from Justin's database. Don't have data right now, but definitely data is available
            6. Justin has land treatment data for Great Basin - e.g., reseeded sagebrush, removal of cheatgrass. This could also be a good dataset. Brittany is looking into it.
            7. This is John's first time being the PI so feedback is useful.
            8. Carl can be co-PI, but may be easier to not put him in.
            9. If going EAGER that reduces the pot.
            10. John is leaning towards CDS&E-MSS
            11. Brittany can help with processing datasets that are fed into model.
            12. Would be good to have Brittany as Co-I
            13. John has NSF AI grant

14. Grad student funding - would like 2 grad students
    a. Look at the budget to see what can support it.
    b. If can't budget fully 2 students, then put them in as ½ time. NSF likes to see students.
15. Is John eligible for EPSCoR? https://new.nsf.gov/funding/opportunities/epscor-research-infrastructure-improvement-epscor
    a. Not sure but Montana is an EPSCoR state
    b. You can have collaborators who are not EPSCoR states - you can work with people outside of EPSCoR states but the money has to
    c. Learn about the NASA EPSCoR fellow as well
    d. Check to see what the rules are about supporting Brittany's time.
16. John will look over options and think about what is needed then the group can plug in as needed.
17.

2. Forecasting Wildfire Recovery Using MODIS Leaf Area Index (LAI) Forecast Challenge
    a. Any updates?
        i. David, any update about presenting at AGU? Abstract deadline is July 31
        ii. From the last call, David mentioned using functions from the spatial challenge and adapting them to grab data for NEON sites and added them to the eddy4R package. David can you share that package or more details?
    b. If Brittany is available for the call, check in about future NASA grant options. Jody is including the notes from the discussion about NASA grants below as reference.
        i.
    c. Going back to NASA funding - have we considered it?
        i. Yes. Brittany was interested in applying for the wildfire, but deadline was too short
        ii. Also looked at the Biodiversity which has 2 levels - basic and applied
        iii. For ROSES, there isn't much that is appropriate with what is coming up.
        iv. We need 6 months to set up a proposal.
        v. For ROSES the call comes out Feb 14 every year with the full list announced.
        vi. But programs don't change much each year. So if we know what we want, then we can make small adaptations when the announcement comes out and the deadlines in April, May, June
        vii. Terrestrial Ecology and Carbon Cycle have not been announced yet - after the switch of fiscal year, there could be a later due date
            1. Mike hasn't seen these two in a while, but it is worth keeping an eye out

viii. Carbon Cycle science says they intend to solicit this year https://nspires.nasaprs.com/external/solicitations/summary.do?solId={C9E03D39-95C3-81BB-5875-3156AE1F7DA5}&path=&method=init Terrestrial Ecology says the same
ix. https://nspires.nasaprs.com/external/solicitations/summary.do?solId={AD0010D0-5D24-9A3B-27CB-045E38F11CB2}&path=&method=init
x. Think this could fit with Carbon or Terrestrial. For carbon would need to make a better connection between LAI and carbon. But need to see what the wording looks like when the
xi. If we go with ecosystem recovery doesn't need to be confined to fire - could be sylviculture applications.
xii. All we need is the polygon at this point. If we have polygons of other disturbance, we can do it. Sylviculture and moth
xiii. Only constraining thing with MODIS is that the scale is big - so would need big disturbance
xiv. Could think about moving to Centennial or Harmonized LandSat Centennial
xv. If using NDVI then taking carbon cycle out of the option.
xvi. The appeal of the infrastructure is that it can be modified depending on the question
xvii. If we want to target carbon cycle, there are other options from satellites with better resolution.
xviii. If writing a grant - think about set up with MODIS LAI which is low hanging fruit (low latency, well derived product everyone know how to use), then could build additional infrastructure to move to something like GEDI which gives info about structure.
xix. Hyperspectral will be of interest to Terrestrial - we can anchor it to NASA's long standing platforms, but they want to spend money on what has just been launched or what is in the works since that is what they are excited about,
    1. There is way more info in the hyperspectral
xx. There is planet cube sat stuff (spelling??) as well.

d. Would David want to lead a NASA grant? He is limited on time - doesn't have much time for external grants. Doesn't want to overcommit.
e. Emma can't participate in the proposal at this time, but has a colleague who has done spatial forecasting work and will encourage him to participate
    i. NASA has a mechanism for adding agency personnel. It might be out of Emma's scope at EPA now, but she'll stay in the loop
f. Keep eye on the NASA calls and do a little bit of work to prep.
g. Circle back to Brittany to see if she wants to lead
h. Discussion
    i. Brittany working with Oregon group on Forest Health - pests, drought, fires

   ii. Would be good to have potential stakeholders that we can work with and get letters of support.
   iii. Brittany's homework for next call - read Carbon and Terrestrial Ecology calls

3. Any other updates? Jake, anything from the CI workshop?
   a. Background
      i. EFI and Melissa Kenney in particular hosted U.S. Interagency Forecasting Meetings from 2020-2022 to identify priorities for generating more ecological forecasts in federal agencies.
      ii. And out of these series of meetings, the group identified that the barrier to generating more ecological forecasts is that we can't model these systems, or that we don't have enough data on these systems, but *that forecast production and delivery to stakeholders is the main barrier to producing more near-term ecological and water forecasts.* In other words, the cyberinfrastructure to support these forecasts and stakeholder engagement is a major barrier to producing more forecasts.
   b. CI Workshop
      i. In response to the U.S. Interagency meetings, EFI felt most poised to address the cyberinfrastructure problem first, so we hosted an ecological forecast cyberinfrastructure workshop in April of 2024 which brought together a community of experts from a bunch of agencies, academia, NGOs, and private industry to work towards community-developed forecast cyberinfrastructure.
      ii. At this workshop we discussed
         1. applying design justice principles to forecast CI
         2. identified best practices for CI
         3. synthesized barriers and challenges for creating CI
         4. how to implement CI design across a variety of organizations
      iii. More detailed summary here https://projects.ecoforecast.org/efi-ci-workshop-2024/summary.html
      iv. So far, we collated some of the notes and outcomes from this workshop in a living document hosted through github https://projects.ecoforecast.org/efi-ci-workshop-2024/brief.html , and we welcome more community input to these ideas, so please contribute / comment on these ideas here https://github.com/eco4cast/efi-ci-workshop-2024
      v. We will also solicit more targeted feedback on specific topics. More on that to come…

4. Spatial Forecast Info for Reference
   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/

b. For reference here is the list of Tasks to set up GitHub Action Workflow https://github.com/eco4cast/modis-lai-forecast/issues/10
   i. Targets generation
   ii. Benchmark forecast generation
   iii. Scores
   iv. Submissions/validation
      1. 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
   v. Generate Dashboard/visualizations
   vi. Generate STAC collections for forecasts, targets, scores tifs