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sDiv working group meeting report

”sPectra II”

Working group meeting report

The sPectra working group had its second meeting at iDiv in Leipzig from May 12 to 16, 2025. While a couple group members were not able to make it to this meeting, we were also pleased to welcome two new members—Kyle Kovach (University of Wisconsin – Madison) and Isabelle Helfenstein (University of Zurich)—as well as Anna Schweiger, who was unexpectedly unable to attend the first meeting. Other attendees included Swapna Mahanand, Julia Joswig, Elisa van Cleemput, Shan Kothari, and Ny Aina Rakotoarivony (online).

Between our first and second meetings, we had semi-regular online meetings. Shan Kothari led a group focused on continuing our synthesis of leaf spectral data, resulting in a dataset of more than 14,000 spectral measurements from a wide range of biomes. This dataset was (and is still) a work in progress, since we have identified yet more data to incorporate and standardize, and are still working to compile useful metadata to include in analyses. Teja Kattenborn and Eya Cherif constituted a group working on approaches to dimensionality reduction of spectral data and had also compiled (originally for a different project) the canopy spectral data that we used; unfortunately, they were unable to join in person. Julia Joswig led a group focused on pushing forward our statistical analyses and interpretation. Julia presented some of our preliminary results at the iDiv annual conference in 2024. Although we came in rather short of our (very ambitious) goal of having a complete, polished manuscript before this meeting, we had made decent progress.

Our second meeting began with some short introductions of the new members followed by a presentation by Julia Joswig to summarize our progress up to that point. We then picked up a number of threads from our first in-person meeting and our online meetings. We had a couple of main challenges and tasks. One of the main challenges was determining which approaches *not* to take when faced with a dizzying variety of methodological choices. During the meeting, we deliberated quite a bit about which approaches we found most promising and succeeded in placing a good number of roadblocks in the garden of forking paths. As with any synthesis of heterogeneous data, there were also questions about how much of the variation is driven by non-biological factors (e.g. measurement setup) rather than aspects of plant function. We have identified a couple promising ways to address this question directly, which we are planning to implement soon.

We made a lot of progress on conceptualizing what we can learn by comparing spectral axes, traits, and macroenvironmental variables. We welcomed a guest speaker, Jean-Baptiste Féret, who joined us online for a discussion on radiative transfer modeling as a potential approach to mitigate the challenges with using the available trait data as a tool for interpretation. In general, we made a lot of progress on conceptualizing what we can learn by comparing spectral axes, traits, and macroenvironmental variables. Having fresh ideas from Kyle, Isabelle, and Anna was tremendously useful.

Alongside discussions of these big themes, we spent much of the weekend working independently or in small groups to tackle concrete issues. These included fixing errors in the leaf synthesis and filling in missing geographic coordinates in the canopy synthesis. We also worked (and are continuing to work) to improve our data processing and analysis pipeline so that performing analyses does not require a relay between multiple people. Towards the end of the week, we cobbled together a list of further tasks of this sort to complete following the meeting.

In the last two days, we discussed strategies to keep up our efforts between this meeting and the next one, since we recognized that we struggled to maintain momentum after the first meeting. We decided to keep up a monthly online meeting schedule to provide updates on results and define next steps. We've been doing this since the in-person meeting, and so far it has been very helpful. We feel that we have quite a strong storyline that emphasizes the richness and complexity of the information contained in spectra at both leaf and canopy scales; a substantial part of our first manuscript draft is written, and we have a nice set of preliminary figures. We are now continuing to push forward on the leaf data synthesis, data analysis, and interpretation.

Although there remains much work to do, we feel confident about the progress we've made since the last meeting. Before the next meeting, we plan to finalize the leaf synthesis, complete the analyses, and ideally have a polished manuscript. The leaf synthesis will also be thoroughly documented and released as a deliverable. Since the most time-consuming parts—the data syntheses—should be over, we will also take time before and during the meeting to discuss and work on the next manuscript/deliverable idea(s) that we want to pursue. We have a list of candidates already; one particular idea that was in our original proposal is to build an application so that users can explore how their own spectral data fit within the global distribution.

We are tremendously grateful to sDiv for funding and hosting us, especially to Ronja Wodner for taking such excellent care of the meeting logistics so that we could focus on science and to Marten Winter for his advice on running a successful meeting. The iDiv facilities were phenomenal; the AV equipment, for example, really streamlined online participation. We really enjoyed the Cake & Connect and other opportunities to connect with the iDiv community. We hope to return next year to once again be part of this dynamic community!