

sDiv working group meeting report

"sTRAITS III"

The third workshop lasted five days and was focused on developing a framework to establish global-scale monitoring of foliar traits using both in-situ and remote sensing approaches. Specifically, we envision the need for trait networks that satisfy data needs for both ecological and remote sensing research and applications. The first two days consisted of an overview of sTRAITS and the work done so far as well as the key characteristics of the national/regional/global measurement networks before discussions and work on a manuscript on how to make progress towards global-scale monitoring in the remaining days.

On the first day, an overview of sTRAITS activities was given to inform the new participants including the representatives of measurement networks. This included a summary of the intercomparison of global upscaled foliar trait maps, the discussions from the second workshop on the aspects of representativeness and the history and status of upcoming hyperspectral satellite missions (especially SBG and CHIME) that will be used for global-scale foliar trait estimation.

On the second day, the different measurement networks presented overviews of their sites and measurement protocols. The networks that presented included NEON, TERN, SAEON, ICOS, ICP Forests, ForestGEO, IRD-ENS, BIEN, and eLTER. Also, the extensive field sampling of the Townsend group (University of Wisconsin) across North America were presented. In the afternoon, we went on a field trip to visit the research station in Bad Lauchstädt. We were fortunate to be guided by scientists with detailed knowledge of the MyDiv tree diversity experiment, the Ecotron facility as well as the Global Environmental Change Facility. We also learnt about the long-term fertilization experiment and other smaller installations related to DroughtNet and BugNet.

On the third day, we started discussions about the added value and incentives of integrating and harmonizing foliar trait measurements across the different networks. Apart from obvious benefits of easier access to trait data, ideas that were brought up included capacity building, providing suitable remote sensing data at sampling sites, and the need for additional funding for field sampling, especially in under-resourced regions. Regarding the capacity building, the training in the use of remote sensing data and methods for extending leaf-level sampling using spectroscopic methods was suggested. Newly taught skills in remote sensing data processing and analysis could then also be applied to airborne or UAV imagery around measurement sites to link to the in-situ data and scale them to a larger area. Suitable data would include hyperspectral imagery and airborne lidar, as well as high-resolution multispectral data and could potentially be provided by current airborne platforms for some of the sites. Apart from this, concrete suggestions were made to link samples from different databases with a unique identifier such that existing infrastructure could be used without the need to develop new databases.

On the fourth and fifth day, we spend part of the time in groups working on a perspective manuscript. Groups were organized around the topics of the motivation for global-scale foliar trait monitoring, establishing a global-scale in-situ trait monitoring meta-network, and the sampling strategies to allow linking with remote sensing. We agreed that part of the motivation should be to link to ongoing efforts of global biodiversity monitoring. Also, we agreed that the global in-situ trait monitoring network has great value on its own but that it should be compatible with the needs for remote sensing methods so as to make the network data collections maximally valuable to a wide variety of research communities. We worked on the manuscript text and figure suggestions and started harmonizing the different parts such that we had a document that is a solid basis for a paper to submit for publication in 2024.

At the end of the workshop, we made a plan for finishing the manuscript and also discussed options to continue some of the work of the sTRAITS working group beyond the sDiv funding. Among other things, we discussed the option to link with GeoBON, organizing conference sessions around the relevant topics and writing proposals to fund some of the planned activities.

The meeting was very productive and profited from the great organization by the iDiv events team, for which we are grateful. Many discussions continued during the coffee breaks, lunches and dinners as well as during the excursion to the research station. In particular, the workshop connected groups from multiple networks, enabling discussions of methods to harmonize observations and paths forward for further synthesis activities.