sPlot – the new global vegetation-plot database for addressing trait-environment relationships across the world's biomes

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Meet us at the conference:

2013

03/2013 1st sPlot Workshop at iDiv

06/2013 Collaboration agreement with EVA

07/2013 Governance and Data Property Rules approved

Invitation of contributing databases started

12/2013 Implementation of sPlot under TURBOVEG 3 (S. Hennekens)

2014

04/2014 First databases included (official start of sPlot)

11/2014 sPlot 1.0

Matching sPlot 1.0 with TRY 2.0

12/2014 2nd sPlot Workshop at iDiv

2015

02/2015 Release of sPlot 2.0

Future

Aims

1. Analysis of plant trait-environment relationships across the world's biomes **(global extent)** on the basis of vegetation-plot/community data **(small grain).**

2. Provide a global vegetation plot data base to address questions of **functional biodiversity research.**

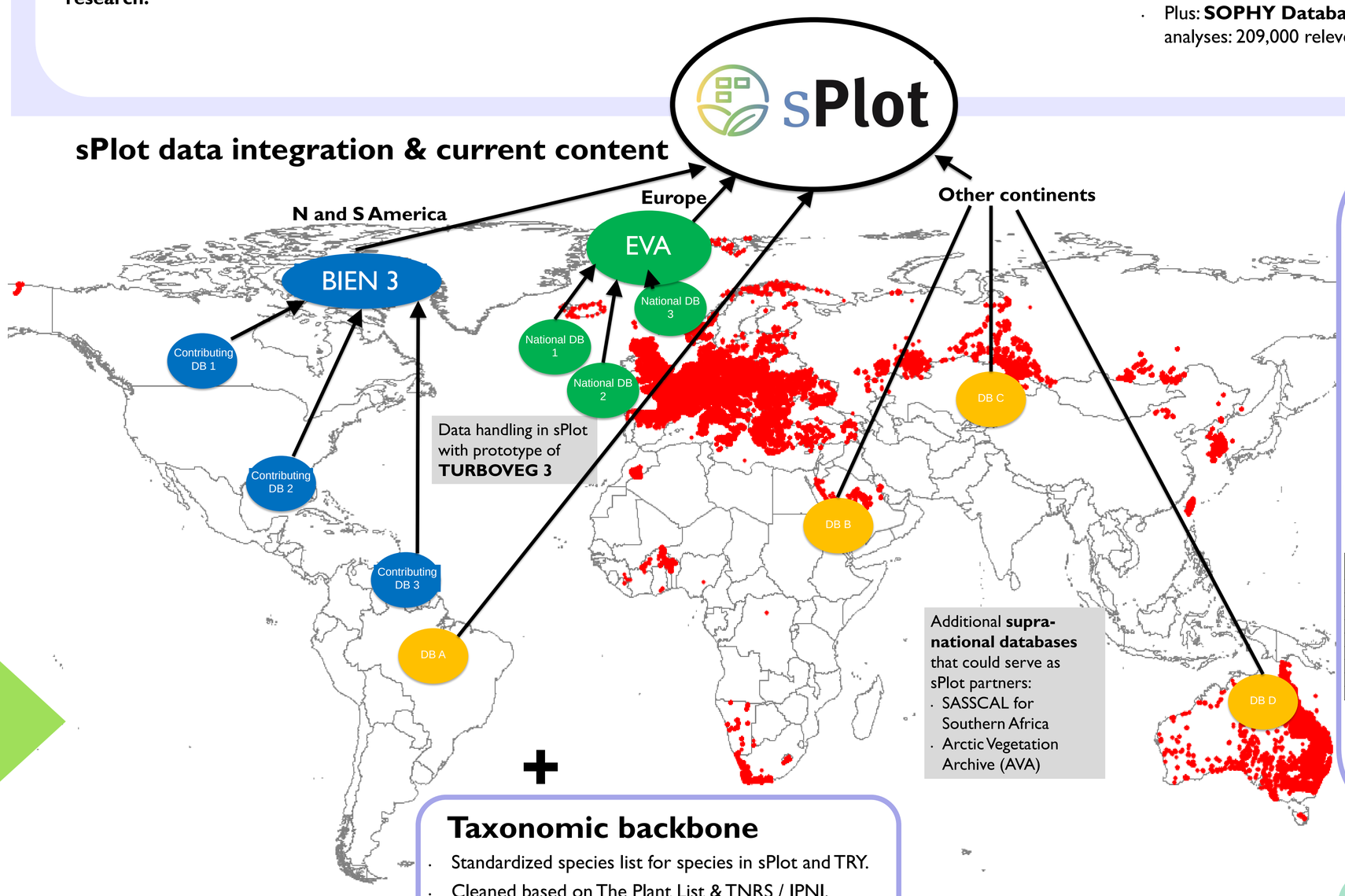
What is sPlot?

- Established by a working group **hosted by the Synthesis Centre (sDiv)** of the German Centre of Integrative Biodiversity Research Halle-Jena-Leipzig (**iDiv**).
- **sPlot** is a common vegetation-plot database for data from all continents in combination with **mean species trait values from the TRY database** and tools to match data from different sources taxonomically.

Content of sPlot 1.0 (30th November 2014)

- Currently, concentrating on Old World (Eastern Hemisphere).
- **Europe** (including Turkey): 40 DBs, 611,397 relevés.
- **Africa, Asia, Australasia:** 10 DBs, 46,895 relevés.
- **Americas:** 2 DBs, 587 relevés (Alaska included, Neotropical forests delivered).
- **Total: 52 DBs and 659,000 relevés from 70 countries.**
- Plus: **SOPHY Database** from France, not in sPlot, but available for particular analyses: 209,000 relevés.

sPlot data integration & current content



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Taxonomic backbone

- Standardized species list for species in sPlot and TRY.
- Cleaned based on The Plant List & TNRS / IPNI.
  -> 52.000 standardized names

Plot density

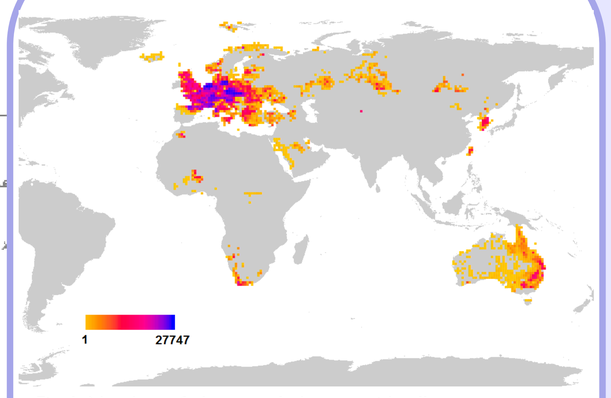

Fig. 1. Number of plots per 1-degree grid cell.

Ecozone (according to Schultz)	Number of plots	Plots per 1,000,000 km²	Coverage
1 – Tropics with year-round rain	1,358	109	Very poor
2 – Tropics with summer rain	5,394	220	Poor
3 – Dry tropics and subtropics	9,998	323	Poor
4 – Subtropics with winter rain	78,185	29,274	Good
5 – Subtropics with year-round rain	12,179	2,030	Moderate
6 – Temperate midlatitudes	588,419	40,581	Good
7 – Dry midlatitudes	5,644	342	Poor
8 – Boreal zone	8,133	417	Poor
9 – Polar and subpolar zone	1,378	230	Poor

Table1. Numbers of plots and plot densities per biome (Schultz classification scheme).

Tropic, subtropic & polar zones poorly represented!

Call for additional databases!

If you have an own database not yet contributed or know of other colleagues and institutions with suitable databases **please contact**
Jürgen Dengler:
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Link to traits in TRY

- Species-level **mean trait values** for **18 traits** in TRY 2.0 (Kattge et al. 2011).
- Fully **gap-filled** species trait matrix based on Hierarchical Matrix Factorization (Shan et al. 2012).
- **41% overall match between species in sPlot and TRY.**

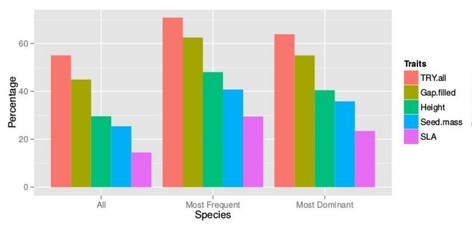

Fig. 2. Match (in %) between species (all, most frequent and dominant) in sPlot 1.0 and TRY 2.0; for all TRY-species, gap-filled and LHS-traits (height, seed mass, SLA), respectively.

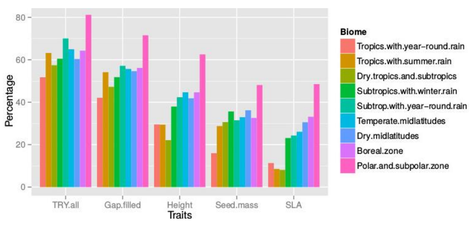

Fig. 3. Match (in %) between species in sPlot 1.0 and TRY 2.0; for all TRY-species, gap-filled and LHS-traits (height, seed mass, SLA), respectively across the nine biomes.

First results

Global patterns of community-weighted SLA

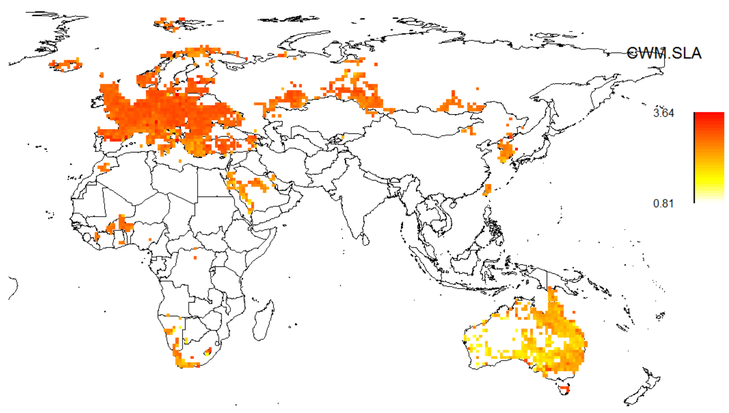

Fig. 4. Community-weighted means of specific-leaf area (SLA) in m²/kg (ln-transformed) averaged across all plots within a 1-degree grid cell.

SLA vs. Mean temperature

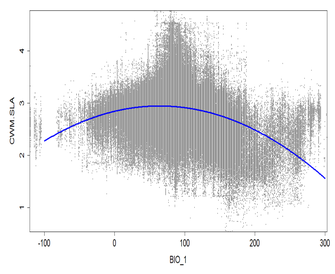

Fig. 5. Relationship between CWM of SLA and mean annual temperature (BIO_1). Fitted line indicates significant quadratic effect.

Outlook and next steps

- In Dec. 2014, **64** medium to large **databases,** particularly from underrepresented biomes and continents outside Europe, have been **invited**, of which 24 agreed or delivered data.
- Currently, sPlot is negotiating with BIEN about contributing plot data from several major American databases in an integrated manner.
- Currently, also EVA is updating its content (in terms of improved/ augmented/ additional databases from Europe).
- Release of sPlot version 2.0 around end Feb. 2015 (likely ~ 1Mio. plots).
- Preparation of sPlot database paper and further analytical papers; see sPlot newsletter: www.idiv.de/sdiv/workshops/workshops-2013/splot/materials
- Linking sPlot to gap-filled trait data in TRY 3.0 (available early 2015).

Functional diversity explained by temporal climatic variability

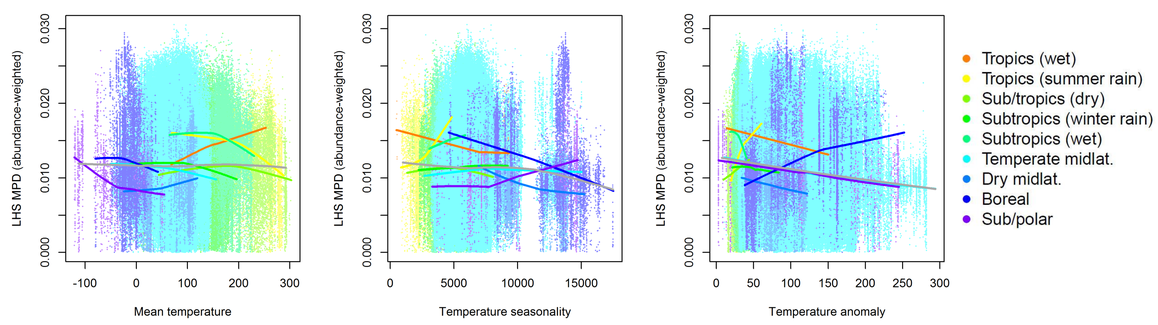

Fig. 6. Relationship between multi-trait (LHS: SLA, plant height, seed mass) functional diversity (abundance-weighted MPD) and (a) mean annual temperature, (b) temperature seasonality and (c) climate change velocity (temperature anomaly). Fitted regression splines indicate (i) overall relationships across all biomes (grey line) and (ii) relationships within each of the nine biomes (colored lines).

We thank those thousands of vegetation scientists who recorded relevés or measured plant traits and made these data available in common databases!

iDiv German Centre for Integrative Biodiversity Research

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More information about sPlot: www.idiv.de/sdiv/workshops/workshops-2013/splot

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