



## Early stage litter decomposition across biomes

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## Early stage litter decomposition across biomes

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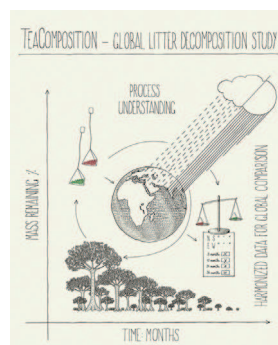
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## HIGHLIGHTS

- Litter quality is the key driver of initial litter decomposition at the global and regional scale.
- MAT has a low explanatory power on initial litter decomposition and is litter specific.
- MAP significantly affected litter decomposition but has low explanatory power.
- When data were aggregated at the biome scale, climate played a significant role on decomposition.
- The TeaComposition initiative is a low-cost standardized metric on litter decomposition.

## GRAPHICAL ABSTRACT



## ABSTRACT

### Keywords:

Tea bag  
Green tea  
Rooibos tea  
Carbon turnover  
TeaComposition initiative

Through litter decomposition enormous amounts of carbon is emitted to the atmosphere. Numerous large-scale decomposition experiments have been conducted focusing on this fundamental soil process in order to understand the controls on the terrestrial carbon transfer to the atmosphere. However, previous studies were mostly based on site-specific litter and methodologies, adding major uncertainty to syntheses, comparisons and meta-analyses across different experiments and sites. In the TeaComposition initiative, the potential litter decomposition is investigated by using standardized substrates (Rooibos and Green tea) for comparison of litter mass loss at 336 sites (ranging from  $-9$  to  $+26$  °C MAT and from 60 to 3113 mm MAP) across different ecosystems. In this study we tested the effect of climate (temperature and moisture), litter type and land-use on early stage decomposition (3 months) across nine biomes. We show that litter quality was the predominant controlling factor in early stage litter decomposition, which explained about 65% of the variability in litter decomposition at a global scale. The effect of climate, on the other hand, was not litter specific and explained  $<0.5\%$  of the variation for Green tea and 5% for Rooibos tea, and was of significance only under unfavorable decomposition conditions (i.e. xeric versus mesic environments). When the data were aggregated at the biome scale, climate played a significant role on decomposition of both litter types (explaining 64% of the variation for Green tea and 72% for Rooibos tea). No significant effect of land-use on early stage litter decomposition was noted within the temperate biome. Our results indicate that multiple drivers are affecting early stage litter mass loss with litter quality being dominant. In order to be able to quantify the relative importance of the different drivers over time, long-term studies combined with experimental trials are needed.

## 1. Introduction

Through litter decomposition  $>50\%$  of net primary production is returned to the soil (Wardle et al., 2004) and  $60 \text{ Pg C year}^{-1}$  is emitted to the atmosphere (Houghton, 2007). Depending on the type of ecosystem, the quantity of soil organic carbon (SOC) in the top 1-m depth range from 30 tons/ha in arid climates to 800 tons/ha in organic soils in cold regions, with a predominant range from 50 to 150 tons/ha (Lal, 2004). The amount of SOC is determined by the balance of carbon inputs from primary production and losses through the decomposition of organic matter over time (Olson, 1963). However, there is a large degree of variability in this balance and more research is needed for a better mechanistic understanding of decomposition processes at various scales and for a more accurate estimation of present and future global carbon budgets (Aerts, 2006).

Decomposition of plant litter may be divided into at least two stages (e.g. Berg and McClaugherty, 2008). The early stage of decomposition (ca. 0 to 40% mass loss) is characterized by leaching of soluble compounds and by decomposition of solubles and non-lignified cellulose and hemicellulose (Couteaux et al., 1995; Heim and Frey, 2004). The late stage (ca. 40–100% mass loss) encompasses the degradation of lignified tissue. In general, microbial decomposition of organic substrates is controlled by both biotic factors (substrate quality and microbial community composition) and abiotic factors (temperature and moisture; Gavazov, 2010). Research to understand the impact of global changes such as climate on decomposition processes has typically been conducted at individual sites and/or through cross-site observations and experiments (e.g. Emmett et al., 2004; Heim and Frey, 2004; García Palacios et al., 2013). This has sometimes lead to controversial conclusions since the observed decomposition may be dependent on local litter quality used in the study and the factors controlling decomposition may be influenced by the methodologies and experimental designs applied. Consequently, comparisons across observations and common conclusions may be hampered. For example, early stage decomposition (mainly microbial) has been reported to be primarily controlled by climate and major nutrients in pine needle litter (Berg and McClaugherty, 2008), by microbial and nematode communities in pine needle litter (García Palacios et al., 2016), by litter content of water soluble substances (Heim and Frey, 2004) and by soil temperature and soil pH for a maize straw-soil mixture (Djukic et al., 2012). At regional and global scales, litter decomposition has been reported to be controlled

by climate and litter quality (explaining about 60–70% of litter decomposition rates; Parton et al., 2007) and by soil meso- and micro-fauna communities (explaining about 7%; Wall et al., 2008). However, at the biome scale the metadata-analysis by García Palacios et al. (2013) showed that the variables controlling decomposition vary with decomposition in cold and dry biomes being mostly controlled by climatic conditions while soil fauna seemed to have a more defining role in warm and wet biomes. Moreover, Bradford et al., (2014) showed that climate has a main control on decomposition only when local-scale variation is aggregated into mean values. In order to pinpoint the specific drivers of litter decomposition across various litter types with different decomposition rates and across multiple sites, standardized studies across sites and regions are needed (Wickings et al., 2012; Handa et al., 2014; Parsons et al., 2014).

Decomposition studies across multiple sites using standardized methods already exist within observational networks or experimental studies such as GLIDE (Global Litter Invertebrate Decomposition Experiment – Wall et al., 2008), LIDET (Long-term Intersite Decomposition Experiment Team – Adair et al., 2008), CIDET (Canadian Intersite Decomposition Experiment – Trofymow and CIDET Working Group, 1998), DIRT (Detrital Input and Removal Experiment – Nadelhoffer, 2004), BioCycle (Biodiversity and biogeochemical cycles: a search for mechanisms across ecosystems – Makkonen et al., 2012), DECO (European Decomposition project – Johansson et al., 1995), CANIF (Carbon and Nitrogen Cycling in Forest Ecosystems project – Persson et al., 2000), MICS (Decomposition of organic matter in terrestrial ecosystems: microbial communities in litter and soil – Cotrufo et al., 2000), VULCAN (Vulnerability assessment of shrubland ecosystems in Europe under climatic changes – Emmett et al., 2004), and VAMOS (Variation of soil organic matter reservoir – Cotrufo et al., 2000). Results from these have been used by predictive models such as Yasso07 (Tuomi et al., 2009) and in meta-analyses such as the ART-DECO project (Cornwell et al., 2008). These studies have all provided important information on the decomposition of litter, but have been limited to specific biomes or ecosystem types or have used site specific litter.

Therefore, despite the many efforts, a general understanding of the litter decomposition process and its driving factors is hampered by (1) use of site- or network/project-specific litters and methodologies (e.g. different study lengths, litter bag mesh sizes, incubation depths, litter type and litter mixes; García Palacios et al., 2013), and (2) the low number of global studies that go across all biomes

(Bradford et al., 2016). This study presents results from the TeaComposition initiative which uses standard litters (tea bags - Keuskamp et al., 2013) and a common protocol allowing global and long-term application to overcome these limitations by providing standardized litter decomposition measurements across broad spatial scales. This paramount importance of standardized methods has also been emphasized by Haase et al., 2018 and Mollenhauer et al., 2018 in press. The study presents early stage litter mass loss across nine biomes with the aim to determine and compare globally the main drivers of decomposition at present climatic conditions. The early stage decomposition is generally expected to show greater mass loss rates and a dynamic response of mass loss to controlling factors (e.g. Heim and Frey, 2004; Pérez-Suárez et al., 2012). Therefore the specific objectives of the study were to estimate the variation in early stage mass loss of two litter types worldwide, to explore the linkage of early stage litter mass loss with key drivers (climate, litter type, land-use), and to explore whether the relative importance of the drivers differ between the litter types. Our research questions are (1) does early stage litter mass loss of Green tea and Rooibos tea vary at the global scale due to the different litter qualities (Didion et al., 2016; Keuskamp et al., 2013), (2) are abiotic drivers controlling the initial stage of mass loss (Bradford et al., 2016) with temperature being the main regulating factor in the cold biomes and precipitation in the warmer biomes (Adair et al., 2008), and (3) does early stage litter mass loss vary between land-use types due to changes in the microclimates (Fig. 1).

## 2. Material and methods

### 2.1. Background of the TeaComposition initiative

The TeaComposition initiative was started in summer 2016. The main objective is to investigate long-term litter decomposition and its key drivers at present as well as under different future climate scenarios using a common protocol and standard litter (tea) across nine terrestrial biomes. It is one of the first

comprehensive global studies on litter decomposition focusing on the litter decomposition in the topsoil and the degradation of the main litter components (lignin, cellulose and hemicellulose) to carbon dioxide and soluble or leachable compounds. As a collaborative network the TeaComposition initiative has involved a large number of international research projects and networks with observational or experimental approaches, which are relevant for increasing our mechanistic understanding of decomposition processes as well as for improving the predictive power of process-based models.

### 2.2. Study sites

The TeaComposition initiative comprises 570 sites across nine terrestrial biomes (Fig. 2). Here “biome” is defined as a region with specific macroclimate and its classification was done according to Walter and Breckle (1999). In this study, data from 336 sites were used for analyses. Some of the sites included manipulation experiments (e.g. including treatment plots such as fertilizer addition or climate manipulation) in which case only the tea bags from the untreated control plots were used in the analyses. Sub-sites with different conditions (e.g. tree species diversity experiments or altitudinal gradients) were considered as single sites.

Overall, the sites represented all terrestrial biomes (Table 1) and each site provided information on location (i.e. coordinates), climate (averaged monthly or daily temperature (MAT) and cumulative precipitation (MAP)), vegetation type, and specific land-use (Table S2). Climate data were measured at the site or taken from nearby weather stations. In cases where no climate data were provided, data were extracted from WorldClim (Fick and Hijmans, 2017). The mean annual air temperature (MAT) in our dataset ranges from  $-9$  to  $+26$  °C and the mean annual precipitation (MAP) from 60 to 3113 mm (Table 1; Site specific data can be found in the Table S2). Since sites were assigned to different land-use categories from

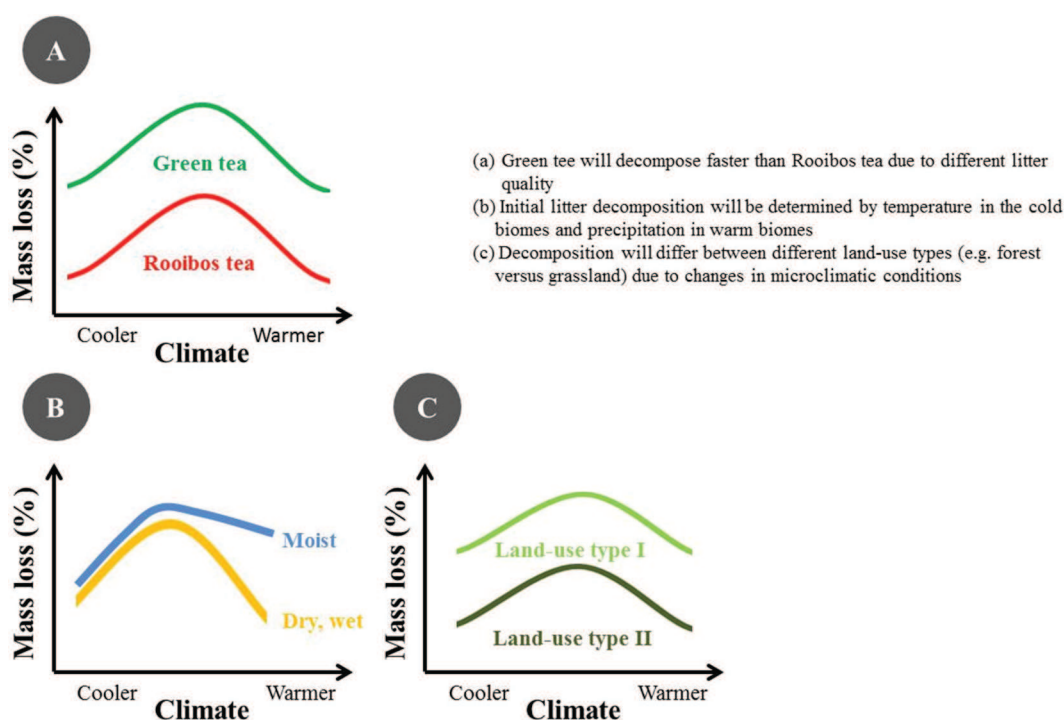
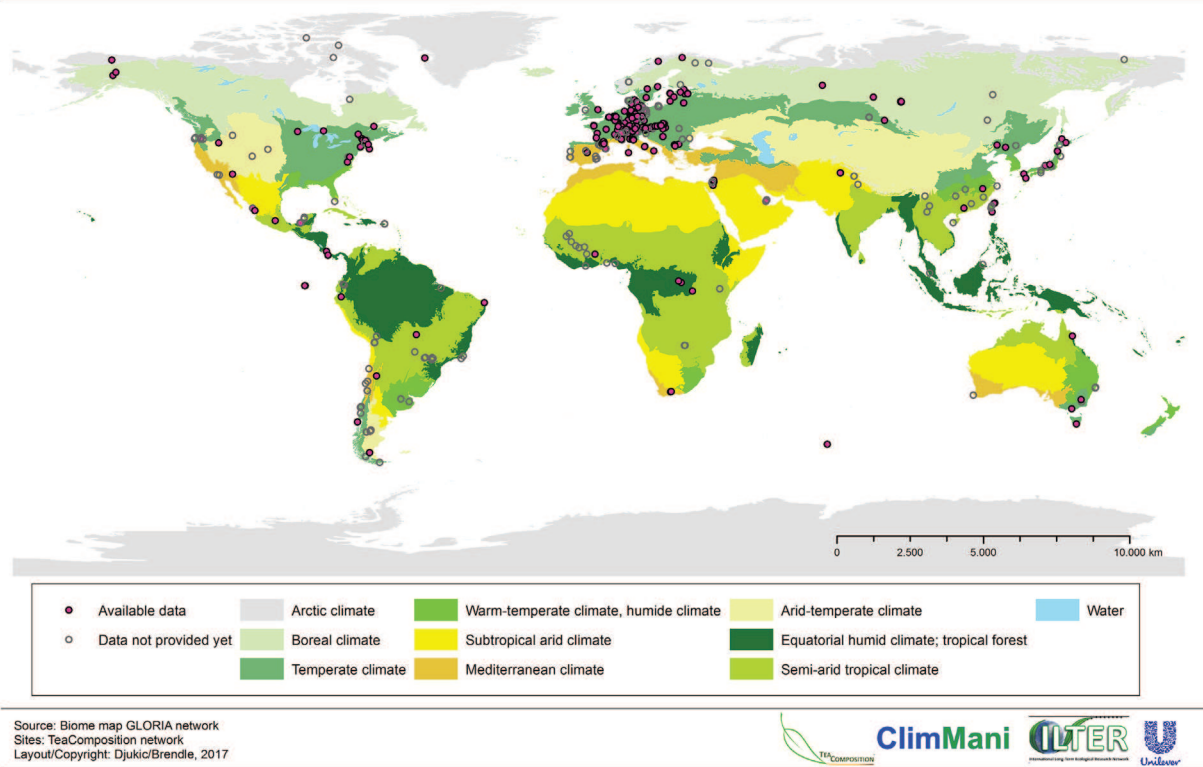


Fig. 1. Conceptual depiction of the main research questions. The temperature dependency across the temperature range (figure b) is arbitrary.

## Global litter decomposition study - TeaComposition sites 2017



**Fig. 2.** Map showing the location of the 570 study sites involved in the TeaComposition initiative so far. Data from the sites with the red circles have been used in the present study. Data from Qatar come from [Alsafran et al., 2017](#). See [Tables 1](#) and [S2](#) for more detailed information. Classification of the biomes was according to [Walter and Breckle \(1999\)](#). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

different classification schemes, we reclassified them into five broader classes: arable, forest, grassland, shrubland and wetland based on the site description.

### 2.3. Method and study design

The TeaComposition initiative uses tea bags as a standardized metric for decomposition as proposed by [Keuskamp et al. \(2013\)](#), and applies a standardized protocol adapted to match global and long-term applications. The standardized protocol ensures: (i) use of the same batch of tea bags assuring the same substrate quality for all sites, (ii) harmonized start of the decomposition at the same season at the year for northern and southern hemisphere

(i.e. start in summer; June–August in northern hemisphere and December–February in southern hemisphere), (iii) comparable incubation depth at the upper 5 cm of the soil relevant for litter decomposition, and (iv) standardized and comparable incubation times covering both short and long term dynamics with incubation times extending to three years (sampling points after 3, 12, 24, and 36 months).

Two types of tea material with distinct qualities are being used; the Green tea viz. green leaves (*Camellia sinensis*; EAN no.: 8 722700 055525) with high cellulose content and expected fast decomposition, and rooibos tea (*Aspalanthus linearis*; EAN no.: 8 722700 188438) with high lignin content and expected slow decomposition ([Keuskamp et al., 2013](#)). The bag material is made of

**Table 1**  
 Summarized general characteristics of the study sites used for the analysis within the TeaComposition initiative. Note: Detailed table on the single site characteristics can be found in the Supplementary material.

| Biomes                     | Number of sites | Land use                                                                                | Climate data (MAT / MAP)* |
|----------------------------|-----------------|-----------------------------------------------------------------------------------------|---------------------------|
| Arctic climate             | 4               | Grassland                                                                               | -9 to 5 / 237 to 709      |
| Boreal climate             | 17              | Boreal Forest, Shrubland, Grassland, Bog, Ecotone                                       | -3 to 6 / 293 to 1015     |
| Temperate climate          | 250             | Agriculture, Forest, Shrubland, Grassland (Meadows), Wetland, Ecotone, alpine Grassland | -7 to 14 / 265 to 2140    |
| Warm-temperate climate     | 13              | Forest, Shrubland, Grassland, Wetland                                                   | 6 to 21 / 955 to 3072     |
| Arid-temperate climate     | 9               | Desert, Shrubland, Grassland steppe, Ecotone                                            | 6 to 21 / 174 to 528      |
| Mediterranean climate      | 13              | Agriculture, Forest, Shrubland, Grassland, Wetland, Lake, Subalpine / Alpine Grassland  | 7 to 25 / 569 to 1627     |
| Subtropical arid climate   | 15              | Forest, Grassland, Wetland                                                              | 15 to 24 / 60 to 412      |
| Equatorial humid climate   | 6               | Agriculture, Forest, Wetland (Mangrove, Freshwater Swamp), Ecotone                      | 22 to 26 / 1298 to 3113   |
| Semi-arid tropical climate | 9               | Agriculture, Forest, Shrubland, Grassland (Savanna), Wetland                            | 11 to 26 / 636 to 1268    |

\* MAT = Mean annual temperature; MAP = Mean annual precipitation.

woven nylon and has a mesh size of 0.25 mm allowing access of microfauna (Bradford et al., 2002) in addition to microbes and very fine roots. Before the start of the incubation all tea bags were oven-dried at 70 °C for 48 h and the initial weight was recorded (overall mean = 1.81 g, s.d. = 0.10). Each bag was identified with a unique number and was buried in the upper 5 cm of the top soil layer during summer seasons in both the northern and southern hemisphere. At least two homogenous areas (plots) were selected (at least 1 m apart) at each site. Two replicates of the two litter qualities (Green tea and Rooibos tea) were installed in each of the two blocks, resulting in minimum 4, maximum 250, and in average 8.33 bags of each tea type per site and sampling time. Tea bags were collected at all sites after a field incubation period of three months. The tea bags were cleaned from soil and roots, oven dried (70 °C for 48 h), and the weight of the remaining tea (without bag) was recorded. Instead of weighing incubated tea bags (as often damaged, tag dissolved or rope missing) an averaged bag weight (40 empty tea bags; 0.248 g per bag) was used to estimate the amount of the tea before the incubation. If the collected tea bags were visibly contaminated with soil, ash content (refers to the mineral residue after removal of organic matter by ignition) was determined by heating in a muffle oven at 500 °C for 16 h, in order to correct for the mineral part (Soil Survey Staff, 2004).

#### 2.4. Data analyses

Because not all tea bags were incubated for exactly three months (overall mean = 92 days, s.d. = 13.2) we linearly standardized all mass loss data to a fixed period of 90 days prior to data analyses. As such, the reported mass loss data therefore represent a rate of mass loss over 90 days.

##### 2.4.1. Differences in tea mass loss across biomes and between tea types

We quantified differences in remaining litter mass between biomes using linear mixed models with biome and tea type as fixed factors and site as a random factor accounting for the dependence in observations within site. Residual plots were visually inspected for deviations from model assumptions. If the interaction between biome and tea type was significant, multiple comparisons between biomes within each tea type were tested applying post hoc contrasts with P-values adjusted for multiplicity with the single-step method (Hothorn et al., 2008).

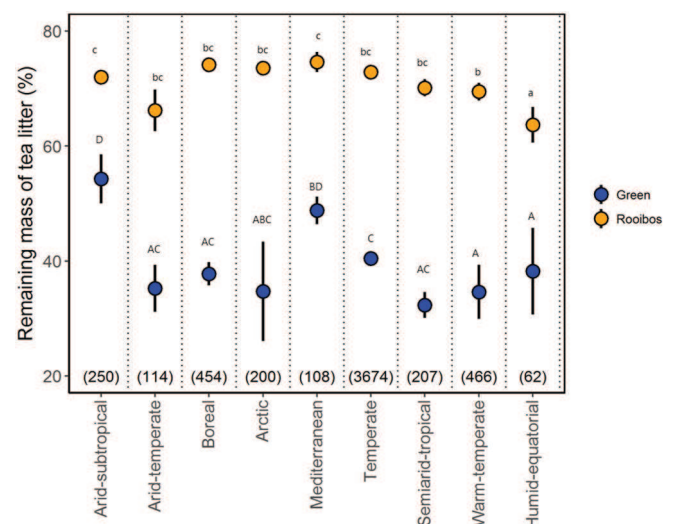
To quantify the different sources of variation in our data we used a linear mixed effect model with a nested structure (sites nested within biome). Biome and site were set as random factors and tea type as a fixed factor. We then ran separate analyses for each tea type to investigate whether biome, site and individual tea bags accounted differently for the variation for each tea type.

##### 2.4.2. Effects of climate on the initial litter mass loss

To investigate the effects of climatic variables on remaining tea mass after three months of field incubation we applied

linear mixed models with local climate as fixed factors and site as random factor. We used local climate data (average monthly air temperature and total precipitation) measured at nearby weather stations during the period of incubation when data were available (n = 124; Fig. 4; Table 2). For sites with no local climate data, we imputed the monthly averages of temperature and the total precipitation for the corresponding measurement period from WorldClim (Fick and Hijmans, 2017). Whereas local climate represent the weather conditions measured at the sites during the incubation period, WorldClim represents the average climate for the period 1970–2000. We assessed the congruency between the two types of climate data by also running models including only the sites where both types of data were available. The results were qualitatively similar to the model including all sites. Moreover, local and WorldClim climate data were highly correlated (precipitation:  $r = 0.83$ ;  $P < .01$ ; temperature:  $r = 0.87$ ,  $P < .01$ , Pearson's product moment correlation).

We modeled the remaining mass as a function of tea type, temperature and precipitation. Differences between litter types were tested by including interaction terms for tea type with both climatic variables. We used backward selection for model simplification until only significant terms remained in the final model. When a significant interaction with tea type was found, we used post hoc contrasts to test for significant relationships between the climatic variable and each tea type (i.e. test for slope different from 0); P-values were adjusted for multiplicity using a single-step method based on the joint normal distribution. Goodness of fit for these models were calculated based on marginal and conditional  $R^2$  (Nakagawa and Schielzeth, 2013). Because climatic effects on decomposition can depend on the spatial scale of the observation (Bradford et al., 2014) we conducted a separate analysis, using the average remaining mass, temperature and precipitation, aggregated at the biome level. We tested for effects of climate factors using simple linear models, with temperature, precipitation and their interaction as independent variables. Significant interactions were further tested as described above.



**Fig. 3.** Percentage remaining mass for Green and Rooibos teas across climatic biomes. The difference between Tea types was significant ( $F = 9802$ ;  $P < .01$ ). Blue and orange circles show the mean and the bars are the standard errors based on the total number of observations. Letters show pairwise comparisons within each tea type: lowercase for rooibos and uppercase for green. Numbers in parentheses are the total number of tea bags for each biome. Biomes are ordered by increasing mean annual precipitation. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

**Table 2**

Effects of climatic factors on the site level remaining mass of the two tea types (statistics relates to Fig. 4). Estimates obtained from mixed effect model with site as a random factor.  $R^2$  marginal: 0.74;  $R^2$  conditional = 0.88.

|                    | Est.(SE) <sup>a</sup> | t     | P    |
|--------------------|-----------------------|-------|------|
| Green tea          | 45.81(1.79)           | 25.62 | <.01 |
| Rooibos tea        | 79.57(1.80)           | 44.31 | <.01 |
| PREC               | −8.87(2.68)           | −3.32 | <.01 |
| Green tea × TEMP   | 0.14(0.17)            | 0.88  | .38  |
| Rooibos tea × TEMP | −0.12(0.17)           | −0.74 | .82  |

<sup>a</sup> Models were fitted using precipitation/1000 to avoid very small estimates. Est. = estimates, SE = standard error.

### 2.4.3. Effects of land-use on the initial litter mass loss

We tested for differences in remaining tea mass between land-use types only for the temperate biome as this was the only biome with enough sites of the different land-use categories. We used a mixed model including land-use, tea type and their interaction as fixed factors and site as random factor. Separate models were used for each tea type to further explore differences. If the interaction between land-use type and tea type was significant, multiple comparisons among land-use types within each tea type were tested using post hoc contrasts with P-values adjusted for multiplicity with the single-step method.

All statistical analyses were conducted with R (version 3.1.2; R core team 2014). The level for detecting statistical differences was set at  $P < .05$ . The lme4 package (Bates et al., 2015) was used for fitting the mixed models and the multcomp package (Hothorn et al., 2008) was used for multiple comparisons. The percentage of variance explained by the fixed and the different random components was calculated using the “variancePartition” package in R (Hoffman and Schadt, 2016).

## 3. Results

### 3.1. Relative importance of litter quality on mass loss across biomes

Across all biomes, tea mass remaining after three months of field incubation (Fig. 3) was higher for Rooibos tea (78%, SD = 10.31) than for Green tea (38%, SD = 15.86). Overall, similar mass loss patterns were recorded for both tea types across biomes with tendencies or significantly higher mass loss at warm and humid climates compared to the dry and/or cold biomes. However, there was a significant interaction between biome and tea type ( $F = 84$ ;  $P < .01$ ) indicating that some differences between biomes depend on tea type. For Rooibos tea, significantly lower remaining mass was found at sites in equatorial-humid climate. For Green tea, we found the highest remaining mass at the sites from the arid-subtropical and Mediterranean climates, which were significantly different from the sites found in cooler and more humid biomes (Fig. 3).

The analysis of data variation showed that 65% of the variation in the remaining litter mass was related to tea type while 13% was related to biome (Fig. 3). The variation was 11% within biomes and 11% within sites.

### 3.2. Effects of climate on the initial litter mass loss

Our final model showed that climatic variables had different effects on early stage decomposition. Remaining mass loss decreased with increasing precipitation. This pattern was similar for both tea types as revealed by the not significant interaction between tea type and precipitation ( $F = 0.01$ ,  $P = .96$ ). We also found a significant interaction between tea type and temperature ( $F = 64$ ,  $P < .01$ ) indicating that the response of mass loss to temperature depends on tea type, i.e. litter quality. However, the analyses using post hoc contrasts showed that temperature did not have any significant effect on any of the tea types (Table 2; Fig. 4).

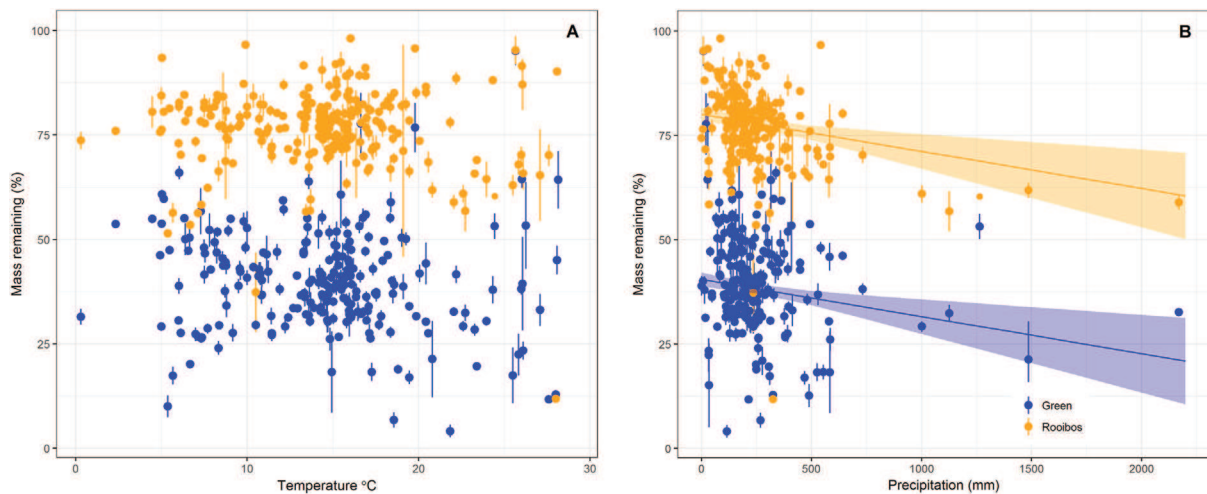
In contrast, the biome-scale analyses focusing on the mean values for the given biome revealed some variation in remaining litter mass loss from low (equatorial humid climate) to high (arid subtropical and Mediterranean climates) mass losses (Fig. 5a). In the linear models, we found a non-significant interaction between tea type and MAP ( $F = 0.20$ ,  $P = .66$ ); and between tea types and MAT ( $F = 0.39$ ,  $P = .54$ ). Whereas MAT had no effect ( $F = 0.64$ ,  $P = .43$ ), remaining mass decreased with increasing MAP for both tea types (Table 3).

### 3.3. Effects of land-use on the initial litter mass loss

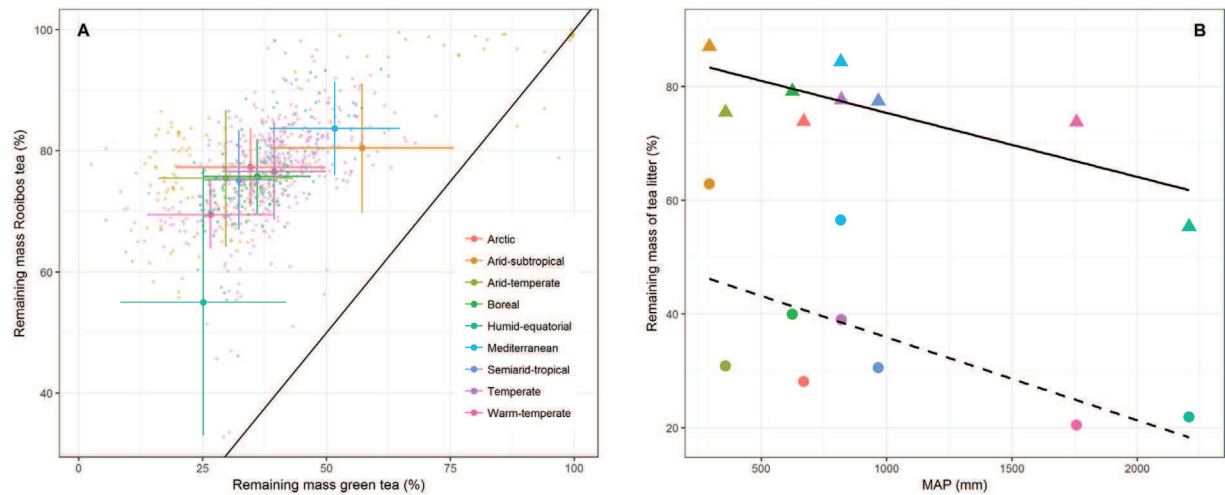
We used the data set from the temperate biome (228 sites out of 250; Table 1) to test the effect of land-use on litter mass loss. The model for land-use effects showed a significant interaction between land-use and tea type ( $F = 41$ ,  $P < .01$ ). However, post hoc contrasts showed no differences among land-use types for either Green or Rooibos tea (all comparisons:  $P > .05$ ).

## 4. Discussion

The early stage of litter decomposition is a highly dynamic phase and therefore important for the understanding of litter decay and the controlling factors across biomes and ecosystem types. Here we studied the early stage mass loss of two standardized litter types (Green tea and Rooibos tea) across 336 sites globally and found that the litter type (quality) was the



**Fig. 4.** Relationship between remaining mass of Green tea and Rooibos tea and temperature (A) and precipitation (B) after the 3-month incubation period. Climatic variables were obtained from local weather stations or from WorldClim for sites with no data. Circles show the mean values for each site and bars the standard errors. The regression line from the minimum adequate model is plotted only for the significant effects of precipitation and is obtained using only fixed factors. Band shows 95 confidence interval.



**Fig. 5.** A) Correlation between remaining mass of tea litter of different qualities (green and rooibos tea) after 3 month of incubation during the growing season. Symbols are arithmetic means for each biome and error bars indicate  $\pm$  standard deviation. B) The average remaining mass aggregated by biome of Green tea (dashed line) and Rooibos tea (solid line) plotted against the mean annual precipitation for each biome (Table 1). The regression line is from a simple linear model showing significant effects for Green ( $R^2 = 0.40$ ) and Rooibos ( $R^2 = 0.64$ ).

main determinant of the mass loss while climate and land use had little effect.

#### 4.1. Substrate quality effects on litter decomposition

The effect of initial litter quality (chemical and physical composition) has been reported to be one of the key drivers of litter decomposition (Bradford et al., 2016; Cornwell et al., 2008; Heim and Frey, 2004). In our study, the litter type also had a strong control on initial decomposition as Green tea consistently decomposed faster than Rooibos tea (Fig. 3). Faster initial decomposition of Green tea is expected due to its higher fraction of water-soluble compounds in contrast to the low content of soluble or hydrolysable compounds in Rooibos tea (Didion et al., 2016). The mass loss of the litter during this early stage may be more related to the leaching losses than to microbial mineralization of soil organic C at the early stage of decomposition. In a pilot study, we measured changes in the initial weight after 3–4 min of cooking ( $n = 332$ ) and recorded a weight loss of 31% for Green tea compared to 17% for Rooibos tea. Similar observation was made within different urban soil habitats by Pouyat et al. (2017). Moreover, Green and Rooibos tea differ in their carbon and nutrient chemistry (Keuskamp et al., 2013) and physical features (Didion et al., 2016). In a meta-analysis of the factors influencing mass loss rates involving 70 published studies, Zhang et al. (2008) demonstrated, similar to our study, the direct influence of litter quality (C:N ratio and total nutrient content) on mass loss rates. The mass loss of both tea types decreased when precipitation increased (Table 2) which is in agreement with several studies showing a positive

relationship between moisture availability and decomposition rates (Gholz et al., 2000; Prescott, 2010; García Palacios et al., 2016).

Overall, litter type explained 65% of the variability in litter mass loss at the global scale, which in turn implies that potential shifts in the relative abundance of vegetation types in the future caused by climatic changes could have large effects on global carbon budgets alone due to the differences in litter quality and consequently decomposition rates (Cornwell et al., 2008; Cornelissen et al., 2007).

#### 4.2. Climate effects on litter mass loss

Across biomes, climatic factors are assumed to have a significant influence on litter decomposition by affecting the activity of decomposer organisms (Bradford et al., 2014); namely for every 10 °C increase in temperature a doubling of microbial decomposition is anticipated ( $Q_{10} = 2$ ; Friedlingstein et al., 2006). Here, processes in the topsoil deserve special attention since they are particularly exposed to dynamic changes in environmental conditions.

We analyzed the across-site variation in initial litter mass loss at the site and biome scales. In this study, investigated sites are spread across large temperature and moisture gradients. We observed an effect of precipitation on early stage litter mass loss, while temperature did not show any significant effects (Fig. 3). Mean annual temperatures of <10 °C and moisture contents of <30% or >80% have been suggested as inhibiting thresholds for litter decay (Prescott, 2010). The absence of any significant effect of temperature on litter mass loss in our study may be a consequence of the fact that all sites incubated the tea bags during the “summer” under relatively favorable conditions where temperature values were generally within the “optimal” decay range. Furthermore, large variation in litter mass loss was observed for both litter types within any given biome (Fig. 5a, Table 2) suggesting that local-scale factors (e.g. soil properties, soil water content, disturbances) other than climate had strong controls on regional litter mass loss dynamics (Cornwell et al., 2008). Similarly, Ise and Moorcroft (2006) reported a low temperature sensitivity of decomposition ( $Q_{10} = 1.37$ ) at the global scale. On the other hand, when examined separately, climate explained 40%

**Table 3**  
Effects of climatic factors on the biome level remaining mass of the two tea types for data aggregated by biome (statistics relates to Fig. 5). Estimates obtained from simple linear models after backward selection.  $R^2 = 0.84$ .

|             | Est.(SE) <sup>a</sup> | t     | P    |
|-------------|-----------------------|-------|------|
| Green tea   | 48.94(4.62)           | 10.60 | <.01 |
| Rooibos tea | 88.23 (4.62)          | 19.10 | <.01 |
| PREC        | −12.93(3.64)          | −3.64 | <.01 |

<sup>a</sup> Models were fitted using precipitation/1000 to avoid very small estimates. Est. = estimates, SE = standard error.

of the variation for Green tea and 64% for Rooibos tea when the mean litter mass loss values were used for the given biome (Fig. 5b, Table 3). A similar finding was reported by Bradford et al. (2014), where the explanatory power of climate was increased to 84% when analyses were conducted on aggregated data.

Interestingly, early-stage litter mass loss of both litter types were comparable across all biomes (Fig. 3). The relative mass losses observed in the arctic sites may seem surprisingly high relative to the other warmer biomes. However, the study was carried out in the “summer season” where climatic conditions, even at the arctic sites are rather mild and warm and therefore favorable for decomposition (Couteaux et al., 1995). On the contrary, sites in the warmer biomes received less precipitation in the summer often being below potential evapotranspiration and leading to soil moisture deficit which again may result in lower mass losses. However, it has to be kept in mind that the results for arctic and arid-temperate biomes are based on a lower number of sites and should be interpreted with caution.

The data in this study collected during the growing season revealed that direct climatic control on early stage decomposition is of relatively minor importance. Instead, indirect climatic effects (e.g. plant community structure and associated microclimate, soil organic matter quality and structure of decomposer communities) may play a relatively stronger role in the early stage decomposition and may mask any importance of direct climatic controls (Aerts, 1997).

#### 4.3. Land-use effects on litter mass loss

Long-term prevailing climatic conditions together with human activities define plant species composition and ecosystem structure, which in turn may affect decomposition rates. We did not observe any significant effects of land-use or management practices on the initial litter decomposition in the temperate biome. This may be caused by microbial decomposition not being limited by nutrients during the growing season. Another reason may be that in the early stage decomposition mineralization of labile C compounds is carried out by many groups of microorganisms while in the later stage of decomposition, decomposer groups may become more selected due to increased substrate complexity which in turn might lead to differences in litter mass loss between the land-use types (McGuire and Treseder, 2010). Hence, home-field advantage (Gholz et al., 2000) is expected to explain a fraction of the remaining variability at later and more advanced stages of decomposition. A detailed definition of different land-use categories would be necessary in order to be able to run more specific data analyses across all biomes.

## 5. Conclusions

Our study showed that litter type has the strongest influence on mass loss globally in the early stage of decomposition, while the effect of climate was only important under less favorable climatic conditions and when data were aggregated at the biome scale. This finding is particularly relevant for the general understanding of litter and carbon dynamics in relation to biosphere-atmosphere feedback, since the early stage litter decay is responsible for a significant fraction of the carbon loss from litter, and because the lack of site specific climate control for this decomposition phase should be reflected in soil carbon models. The short-term period of just three month incubations used in this study provides insight into the short mass loss dynamics of plant litter. On the other hand the

results cannot be extrapolated to capture a reliable signal of the long term nature of the decomposition rates, because long term decomposition involves other litter components and the drivers are likely to vary at spatial and temporal scales (Couteaux et al., 1995; Berg, 2014). Therefore caution should be paid when extrapolating from short-term to long-term rates (Moore et al., 2017). Therefore, the TeaComposition initiative includes additional sampling points after 12, 24, and 36 months, which will provide long term litter decomposition dynamics globally. Repeated observations over time (medium to long-term data) are essential for improving our understanding of the long term decay process of plant litter. Further, in addition to the observational networks included in this study (e.g. ILTER – see Mirtl et al., *this issue, in press*), the TeaComposition initiative includes studies across collaborative experiments which are needed to identify and quantify the relative importance of multiple drivers (Verheyen et al., 2017; Borer et al., 2014).

## Acknowledgements

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## Authorship

ID designed and coordinated the study with extensive input from CB, IKS, SKR, KSL accomplished data collection and preparation. SKR conducted statistical analyses. KV and BB provided inputs for manuscript concept. ID wrote the manuscript with contribution from all authors. The TeaComposition team implemented the study and provided site specific and climatic data. The authors declare no conflict of interest.

## Appendix A

**Table 2s**

General characteristics of the study sites within the TeaComposition initiative.

| Site ID | Site                                                              | Country   | Latitude | Longitude | Altitude (m asl) | MAT (°C) | MAP (mm) | Biome                         | Type of biotope                                                                                                   | Contact                  |
|---------|-------------------------------------------------------------------|-----------|----------|-----------|------------------|----------|----------|-------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------|
| 333     | Patagonia                                                         | Argentina | -51.92   | -70.41    | 165              | 6.40     | 202      | Arid-temperate climate        | Managed grassland                                                                                                 | Pablo Peri               |
| 424     | Facundo                                                           | Argentina | -45.11   | -69.99    | 460              | 9.30     | 162      | Arid-temperate climate        | Shrubland                                                                                                         | Laura Yahdjian           |
| 425     | Aldea beileiro                                                    | Argentina | -45.58   | -71.39    | 640              | 5.90     | 497      | Arid-temperate climate        | Grasland                                                                                                          | Laura Yahdjian           |
| 426     | Rio Mayo                                                          | Argentina | -45.39   | -70.25    | 460              | 9.20     | 192      | Arid-temperate climate        | Shrub-grass steppe                                                                                                | Laura Yahdjian           |
| 427     | Las Chilcas                                                       | Argentina | -36.28   | -58.27    | 12               | 15.10    | 930      | Warm-temperate, humid climate | Grassland                                                                                                         | Laura Yahdjian           |
| 293     | Cattai, NSW, Lilly                                                | Australia | -31.83   | 152.64    | 5                | 14.50    | 799      | Warm-temperate, humid climate | Restored swamp                                                                                                    | Stacey Trevathan-Tackett |
| 294     | Cattai, NSW, Melaluca                                             | Australia | -31.83   | 152.64    | 11               | 14.50    | 799      | Warm-temperate, humid climate | Restored swamp                                                                                                    | Stacey Trevathan-Tackett |
| 295     | Darawakh, NSW                                                     | Australia | -32.09   | 152.49    | 3                | 14.50    | 799      | Warm-temperate, humid climate | Seasonal wetland                                                                                                  | Stacey Trevathan-Tackett |
| 296     | Rhyll, Victoria                                                   | Australia | -38.46   | 145.29    | 0                | 14.30    | 832      | Temperate climate             | Grassland                                                                                                         | Stacey Trevathan-Tackett |
| 297     | Rhyll, Victoria                                                   | Australia | -38.46   | 145.29    | 0                | 14.30    | 832      | Temperate climate             | Mangrove                                                                                                          | Stacey Trevathan-Tackett |
| 298     | Rhyll, Victoria                                                   | Australia | -38.46   | 145.29    | 0                | 14.30    | 832      | Temperate climate             | Succulent saltmarsh                                                                                               | Stacey Trevathan-Tackett |
| 411     | Snowy Mountain_Mt Clarke                                          | Australia | -36.42   | 148.28    | 2041             | 4.48     | 1979     | Temperate climate             | Alpine grassland                                                                                                  | Ken Green                |
| 457     | FNQ Rainforest SuperSite, Daintree, Cape Tribulation (Rainforest) | Australia | -16.10   | 145.45    | 56               | 24.40    | 5143     | Wet tropical rainforest       | Natural rainforest                                                                                                | Michael Liddell          |
| 458     | Tumbarumba Wet Eucalypt SuperSite                                 | Australia | -35.66   | 148.15    | 1100             | 9.60     | 1274     | Temperate climate             | Managed wet eucalypt forest                                                                                       | Jacqui Stol              |
| 459     | Warra Tall Eucalypt SuperSite                                     | Australia | -43.10   | 146.68    | 100              | 10.00    | 1379     | Temperate climate             | Natural tall eucalypt forest                                                                                      | Timothy Wardlaw          |
| 4.01    | Zöbelboden-IP1                                                    | Austria   | 47.84    | 14.44     | 950              | 6.90     | 1061     | Temperate climate             | Spruce forest, initial Cardamino trifoliae-Fagetum sensu Willner 2002                                             | Ika Djukic               |
| 4.02    | Zöbelboden-IP2                                                    | Austria   | 47.84    | 14.44     | 950              | 6.90     | 1061     | Temperate climate             | Mixed beech, spruce, maple, ash forest. Potential naural vegetation:Adenostylo glabrae-Fagetum sensu Willner 2002 | Ika Djukic               |
| 4.03    | Zöbelboden-IP3                                                    | Austria   | 47.84    | 14.44     | 950              | 6.90     | 1061     | Temperate climate             | Mixed spruce-beech forest                                                                                         | Ika Djukic               |
| 4.04    | Zöbelboden-nutrient addition                                      | Austria   | 47.84    | 14.44     | 950              | 6.90     | 1061     | Temperate climate             | Spruce forest; initial carbonate spruce-fir-beech forest                                                          | Ika Djukic               |
| 6       | Klausen-Leopoldsdorf                                              | Austria   | 48.11    | 16.08     | 510              | 8.10     | 724      | Temperate climate             | Beech forest                                                                                                      | Ferdinand Kristöfel      |
| 7       | Mondsee                                                           | Austria   | 47.88    | 13.35     | 860              | 7.20     | 1353     | Temperate climate             | Mixed spruce-broadleaved forest                                                                                   | Ferdinand Kristöfel      |
| 8       | Mürzzuschlag                                                      | Austria   | 47.63    | 15.66     | 715              | 5.20     | 978      | Temperate climate             | Spruce forest                                                                                                     | Ferdinand Kristöfel      |
| 9       | Murau                                                             | Austria   | 47.06    | 14.11     | 1540             | 3.30     | 1366     | Temperate climate             | Spruce forest                                                                                                     | Ferdinand Kristöfel      |
| 10      | Jochberg                                                          | Austria   | 47.33    | 12.41     | 1050             | 3.00     | 1143     | Temperate climate             | Spruce forest                                                                                                     | Ferdinand Kristöfel      |
| 11      | AREC Raumberg-Gumpenstein                                         | Austria   | 47.50    | 14.15     | 720              | 9.10     | 1088     | Temperate climate             | Meadow                                                                                                            | Andreas Bohner           |
| 12      | Neustift im Stubaital                                             | Austria   | 47.12    | 11.30     | 970              | 6.50     | 852      | Temperate climate             | Managed grassland                                                                                                 | Georg Wohlfahrt          |
| 13      | Illmitz                                                           | Austria   | 47.77    | 16.75     | 113              | 10.10    | 599      | Temperate climate             | Managed grassland                                                                                                 | Thomas Zechmeister       |
| 14      | Pürgschachen Moor                                                 | Austria   | 47.58    | 14.35     | 632              | 7.30     | 1248     | Temperate climate             | Peat bog                                                                                                          | Simon Drollinger         |
| 15      | Jamtalferner                                                      | Austria   | 46.85    | 10.15     | 2960             | -4.43    | 1374     | Temperate climate             | High alpine                                                                                                       | Andrea Fischer           |
| 275     | Gossenköllesee                                                    | Austria   | 47.23    | 11.01     | 2417             | 3.20     | 1112     | Temperate climate             | High alpine                                                                                                       | Birgit Sattler           |
| 16      | Jalhay-La Robinette                                               | Belgium   | 50.55    | 6.07      | 500              | 7.70     | 1134     | Temperate climate             | Forest                                                                                                            | Monique Carnol           |
| 17      | Waroneu                                                           | Belgium   | 50.57    | 6.10      | 420              | 7.70     | 1134     | Temperate climate             | Forest                                                                                                            | Monique Carnol           |
| 18      | Brasschaat                                                        | Belgium   | 51.31    | 4.52      | 14               | 10.00    | 785      | Temperate climate             | Scots pine forest                                                                                                 | Arne Verstraeten         |
| 19      | Zoniënwood                                                        | Belgium   | 50.75    | 4.41      | 129              | 9.90     | 823      | Temperate climate             | Beech forest                                                                                                      | Arne Verstraeten         |
| 20      | Gontrode                                                          | Belgium   | 50.98    | 3.80      | 26               | 10.00    | 776      | Temperate climate             | Pedunculate oak - Beech forest                                                                                    | Arne Verstraeten         |
| 21      | Ravels                                                            | Belgium   | 51.40    | 5.05      | 35               | 9.50     | 799      | Temperate climate             | Corsican pine forest                                                                                              | Arne Verstraeten         |
| 22      | Wijnendale                                                        | Belgium   | 51.07    | 3.04      | 31               | 10.10    | 708      | Temperate climate             | Beech forest                                                                                                      | Arne Verstraeten         |
| 351     | Zedelgem (FORBIO)                                                 | Belgium   | 51.15    | 3.12      | 15               | 10.10    | 708      | Temperate climate             | Tree plantations                                                                                                  | Kris Verheyen            |
| 352     | Gedinne (FORBIO)                                                  | Belgium   | 49.99    | 4.98      | 397              | 10.40    | 670      | Temperate climate             | Tree plantations                                                                                                  | Quentin Ponette          |
| 353     | Hechtel-Eksel (FORBIO)                                            | Belgium   | 51.16    | 5.31      | 56               | 8.60     | 1030     | Temperate climate             | Tree plantations                                                                                                  | Bart Muys                |
| 346.01  | BO-TUC-COP                                                        | Bolivia   | -16.22   | -68.27    | 4862             | 4.02     | 785      | Semi-arid tropical climate    | Tropical dry alpine (Subnival), Grassland (Xerophytic Puna)                                                       | Rosa Isela Meneses       |
| 346.02  | BO-TUC-PAT                                                        | Bolivia   | -16.21   | -68.27    | 5058             | 3.58     | 799      | Semi-arid tropical climate    | Tropical dry alpine (Nival), Grassland (Mesic Puna)                                                               | Rosa Isela Meneses       |
| 346.03  | BO-TUC-WAT                                                        | Bolivia   | -16.23   | -68.26    | 4650             | 5.33     | 749      | Semi-arid tropical climate    | Tropical dry alpine (subnival), Grassland (Mesic Puna)                                                            | Rosa Isela Meneses       |
| 347.01  | BO-SAJ-HUI                                                        | Bolivia   | -18.12   | -68.96    | 4567             | 2.49     | 382      | Semi-arid tropical climate    | Semi-arid tropical, climate (Subnival),                                                                           | Rosa Isela Meneses       |

(continued on next page)

Table 2s (continued)

| Site ID | Site                                   | Country      | Latitude | Longitude | Altitude<br>(m asl) | MAT<br>(°C) | MAP<br>(mm) | Biome                                          | Type of biotope                                                                                                                | Contact                 |
|---------|----------------------------------------|--------------|----------|-----------|---------------------|-------------|-------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 347.02  | BO-SAJ-JAS                             | Bolivia      | -18.16   | -68.86    | 4931                | 4.30        | 373         | Semi-arid tropical climate                     | Shrubland and grassland (Xerophytic Puna)<br>Semi-arid tropical, climate (Nival),<br>Shrubland and grassland (Xerophytic Puna) | Rosa Isela Meneses      |
| 347.03  | BO-SAJ-PAC                             | Bolivia      | -18.21   | -68.97    | 4192                | 2.33        | 377         | Semi-arid tropical climate                     | Semi-arid tropical climate (Alpin),<br>Shrubland and grassland (Xerophytic Puna)                                               | Rosa Isela Meneses      |
| 347.04  | BO-SAJ-SUM                             | Bolivia      | -18.13   | -68.94    | 4759                | 5.60        | 344         | Semi-arid tropical climate                     | Semi-arid tropical climate (Subnival),<br>Shrubland and grassland (Xerophytic Puna)                                            | Rosa Isela Meneses      |
| 28      | Mata dos Godoy State Park              | Brazil       | -23.43   | -51.23    | 620                 | 20.60       | 1486        | Equatorial humid climate; tropical rain forest | Forest fragment and restoration site                                                                                           | Jose Marcelo Torezan    |
| 29      | Congonhas Farm                         | Brazil       | -22.73   | -51.18    | 340                 | 22.20       | 1285        | Equatorial humid climate; tropical rain forest | Forest fragment and restoration site                                                                                           | Jose Marcelo Torezan    |
| 30      | Alvorada Farm                          | Brazil       | -22.98   | -50.93    | 340                 | 22.00       | 1271        | Equatorial humid climate; tropical rain forest | Forest fragment and restoration site                                                                                           | Jose Marcelo Torezan    |
| 31.01   | Natal Restinga Forest                  | Brazil       | -5.90    | -35.17    | 40                  | 25.70       | 1298        | Equatorial humid climate; tropical rain forest | Restinga forest                                                                                                                | Adriano Caliman         |
| 31.02   | Natal Restinga Shrubs                  | Brazil       | -5.91    | -35.18    | 50                  | 25.70       | 1298        | Equatorial humid climate; tropical rain forest | Restinga shrubland                                                                                                             | Adriano Caliman         |
| 32.01   | Bodoquena                              | Brazil       | -20.99   | -56.52    | 378                 | 22.40       | 1353        | Subtropical arid                               | Savannah forested                                                                                                              | Franco Leandro de Souza |
| 32.02   | Bodoquena                              | Brazil       | -21.00   | -56.51    | 367                 | 22.40       | 1353        | Subtropical arid                               | Savannah forested                                                                                                              | Franco Leandro de Souza |
| 32.03   | Bodoquena                              | Brazil       | -21.00   | -56.51    | 358                 | 22.40       | 1353        | Subtropical arid                               | Riparian forest                                                                                                                | Franco Leandro de Souza |
| 33.01   | Restinga de Jurubatiba - Forest        | Brazil       | -22.26   | -41.61    | 20                  | 25.70       | 1298        | Equatorial humid climate                       | Restinga forest                                                                                                                | Rodrigo Lemes Martins   |
| 33.02   | Restinga de Jurubatiba - Shrubs        | Brazil       | -22.26   | -41.61    | 30                  | 25.70       | 1298        | Equatorial humid climate                       | Restinga shrubland                                                                                                             | Rodrigo Lemes Martins   |
| 34.01   | Floodplain Paraná River                | Brazil       | -22.80   | -53.54    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Atlantic forest                                                                                                                | Evanilde Benedito       |
| 34.02   | Floodplain Paraná River                | Brazil       | -22.86   | -53.60    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Atlantic forest and grassland                                                                                                  | Evanilde Benedito       |
| 34.03   | Floodplain Paraná River                | Brazil       | -22.72   | -53.30    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Shrubland                                                                                                                      | Evanilde Benedito       |
| 34.04   | Floodplain Paraná River                | Brazil       | -22.71   | -53.28    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Shrubland and grassland                                                                                                        | Evanilde Benedito       |
| 34.05   | Floodplain Paraná River                | Brazil       | -22.77   | -53.33    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Shrubland                                                                                                                      | Evanilde Benedito       |
| 34.06   | Floodplain Paraná River                | Brazil       | -22.72   | -53.22    | 250                 | 22.80       | 1280        | Semi-arid tropical climate                     | Atlantic forest                                                                                                                | Evanilde Benedito       |
| 35      | Tijuca National Park                   | Brazil       | -22.96   | -42.27    | 350                 | 23.00       | 1157        | Equatorial humid climate; tropical rain forest | NA                                                                                                                             | Vinicius Farjalla       |
| 36      | Fazenda Miranda                        | Brazil       | -15.73   | -56.07    | 184                 | 26.00       | 1268        | Semi-arid tropical climate                     | Native forest                                                                                                                  | Francisco Lobo          |
| 37      | Baia das Pedras                        | Brazil       | -28.37   | -68.28    | 127                 | 26.20       | 1245        | Subtropical arid climate                       | Native forest                                                                                                                  | Francisco Lobo          |
| 38      | Parque Estadual do Utinga              | Brazil       | -1.43    | -48.42    | 18                  | 26.80       | 2369        | Equatorial humid climate; tropical rain forest | NA                                                                                                                             | Thaísa Sala Michelan    |
| 23      | Beklemeto                              | Bulgaria     | 42.78    | 24.61     | 1420                | 7.50        | 682         | Temperate climate                              | Beech forest                                                                                                                   | Miglena Zhiyanski       |
| 24      | Sofia-FRI                              | Bulgaria     | 42.63    | 23.35     | 650                 | 8.60        | 602         | Temperate climate                              | Cedrus atlantica trees                                                                                                         | Maria Glushkova         |
| 25      | Sofia-FRI                              | Bulgaria     | 42.63    | 23.20     | 650                 | 8.60        | 581         | Temperate climate                              | Grassland                                                                                                                      | Maria Glushkova         |
| 26      | Govedarci                              | Bulgaria     | 42.23    | 23.44     | 1310                | 5.90        | 658         | Temperate climate                              | Spruce forest                                                                                                                  | Miglena Zhiyanski       |
| 27      | Govedarci                              | Bulgaria     | 42.24    | 23.44     | 1320                | 5.60        | 658         | Temperate climate                              | Grassland                                                                                                                      | Miglena Zhiyanski       |
| 414     | Dindereso Forest                       | Burkina Faso | 11.21    | -4.40     | 397                 | 27.10       | 1014        | Semi-arid tropical climate                     | Savannah shrub                                                                                                                 | Jean-Christophe Lata    |
| 39      | Flashline Mars Arctic Research Station | Canada       | 75.43    | -89.82    | 225                 | -17.30      | 131         | Arctic climate                                 | NA                                                                                                                             | Susan Holden Martin     |
| 320     | Igloodik (Nunavut)                     | Canada       | 69.40    | -81.54    | 15                  | -14.37      | 115         | Arctic climate                                 | Tundra                                                                                                                         | Nicolas Lecomte         |
| 362     | IDENT-Sault Ste. Marie                 | Canada       | 46.87    | -84.57    | 210                 | -0.80       | 327         | Temperate climate                              | Plantation                                                                                                                     | Bill Parker             |
| 363     | IDENT-Montreal                         | Canada       | 45.86    | -73.93    | 39                  | 6.20        | 976         | Temperate climate                              | High input agriculture                                                                                                         | Alain Paquette          |
| 364     | IDENT-Auclair                          | Canada       | 48.23    | -69.10    | 333                 | 2.30        | 1015        | Temperate climate                              | Low input abandoned agriculture                                                                                                | Alain Paquette          |
| 444     | Bylot Island                           | Canada       | 73.16    | -79.97    | 20                  | -15.40      | 175         | Arctic climate                                 | Tundra                                                                                                                         | Vincent Maire           |
| 445     | Umiujaq                                | Canada       | 56.55    | -76.55    | 5                   | -5.40       | 525         | Arctic climate                                 | Tundra                                                                                                                         | Vincent Maire           |
| 40      | Pan de Azúcar, fog zone                | Chile        | -26.15   | -70.65    | 814                 | 18.00       | 16          | Subtropical arid climate                       | Desert with fog influence                                                                                                      | Rafaella Canessa        |
| 41      | Pan de Azúcar, interior zone           | Chile        | -26.15   | -70.65    | 533                 | 18.00       | 16          | Subtropical arid climate                       | Desert                                                                                                                         | Rafaella Canessa        |
| 42      | Reserva Quebrada de Talca              | Chile        | -30.01   | -71.04    | 648                 | 13.50       | 92          | Mediterranean climate                          | Shrubland                                                                                                                      | Rafaella Canessa        |
| 43      | Parque Nacional La Campana             | Chile        | -32.92   | -71.15    | 726                 | 13.40       | 377         | Mediterranean climate                          | Mediterranean Forest                                                                                                           | Rafaella Canessa        |
| 44      | Parque Nacional Nahuelbuta             | Chile        | -37.78   | -72.98    | 1205                | 8.10        | 1525        | Temperate climate                              | Temperate Rain Forest                                                                                                          | Rafaella Canessa        |
| 45      | Monumento Nacional Contulmo            | Chile        | -38.02   | -73.23    | 350                 | 11.00       | 1544        | Temperate climate                              | Temperate Rain Forest                                                                                                          | Rafaella Canessa        |

|        |                                       |                           |        |        |         |       |      |                                                             |                                                     |                        |
|--------|---------------------------------------|---------------------------|--------|--------|---------|-------|------|-------------------------------------------------------------|-----------------------------------------------------|------------------------|
| 46     | Fray Jorge National Park              | Chile                     | -30.67 | -71.67 | 450     | 15.70 | 134  | Temperate climate                                           | Temperate Fog Forest                                | Aurora Gaxiola         |
| 47     | LTSER Senda Darwin Biological Station | Chile                     | -42.47 | -74.12 | 200     | 8.40  | 2140 | Temperate climate                                           | NA                                                  | Aurora Gaxiola         |
| 48     | Punta Arenas                          | Chile                     | -53.17 | -71.62 | 100     | 4.90  | 795  | Temperate climate                                           | Native Forest                                       | Aurora Gaxiola         |
| 49     | Fundo San Martin, Valdivia            | Chile                     | -39.82 | -73.15 | 115     | 11.70 | 2011 | Temperate climate                                           | Native Forest                                       | Aurora Gaxiola         |
| 50     | Omora Biosphere Reserve               | Chile                     | -54.93 | -67.32 | 50      | 4.70  | 480  | Subantarctic climate                                        | Native Forest                                       | Aurora Gaxiola         |
| 51     | Parque Nacional Nahuelbuta            | Chile                     | -37.78 | -72.98 | 1205    | 8.10  | 1525 | Mediterranean climate                                       | Temperate Rain Forest                               | Liesbeth van den Brink |
| 52     | Parque Nacional La Campana            | Chile                     | -32.97 | -71.08 | 721     | 13.40 | 377  | Mediterranean climate                                       | Mediterranean Forest                                | Liesbeth van den Brink |
| 53     | Reserva Quebrada de Talca             | Chile                     | -30.01 | -71.04 | 636     | 13.50 | 92   | Mediterranean climate                                       | Shrubland                                           | Liesbeth van den Brink |
| 54     | Parque Nacional Pan de Azucar         | Chile                     | -26.15 | -70.65 | 511     | 18.00 | 16   | Subtropical arid climate                                    | Desert                                              | Liesbeth van den Brink |
| 55     | Hulunbeier grassland, Inner Monglia   | China                     | 50.17  | 119.37 | 516     | -1.80 | 374  | Arid-temperate climate                                      | Managed grassland                                   | Wentao Luo             |
| 281    | Xishuangbanna                         | China                     | 22.01  | 100.80 | 556     | 21.70 | 1460 | Semi-arid tropical climate                                  | Primary forest                                      | Wenjun Zhou            |
| 282    | Yuanjiang                             | China                     | 28.95  | 112.60 | 30      | 24.30 | 790  | Warm-temperate, humid climate                               | Savannah forested                                   | Wenjun Zhou            |
| 283    | Ailao Mountain                        | China                     | 23.83  | 101.57 | 1852    | 11.00 | 1980 | Semi-arid tropical climate                                  | Primary forest                                      | Wenjun Zhou            |
| 284    | Lijiang                               | China                     | 26.87  | 100.23 | 2517    | 9.10  | 1160 | Arid-temperate climate                                      | Primary forest                                      | Wenjun Zhou            |
| 285    | Jilin                                 | China                     | 42.38  | 128.08 | 802     | 2.50  | 688  | Temperate climate                                           | Secondary forest and white birch plantation         | Yalin Hu               |
| 286    | Liaoning                              | China                     | 41.85  | 124.93 | 597     | 4.80  | 885  | Temperate climate                                           | Laruch monoculture                                  | Yalin Hu               |
| 287    | Zhejiang                              | China                     | 29.97  | 122.35 | 786     | 16.70 | 1249 | Warm-temperate, humid climate                               | Secondary forest and chinese fir plantation         | Yalin Hu               |
| 288    | Fujian                                | China                     | 26.56  | 118.11 | 360     | 18.70 | 1729 | Semi-arid tropical climate (Subtropical climate)            | Secondary forest and chinese fir plantation         | Yalin Hu               |
| 289    | Hainan                                | China                     | 18.73  | 108.89 | 800     | 21.70 | 1523 | Semi-arid tropical climate (Tropical climate)               | Secondary forest and chinese fir plantation         | Yalin Hu               |
| 290    | Jiangxi                               | China                     | 24.56  | 114.43 | 550-600 | 18.50 | 1821 | Semi-arid tropical climate (Subtropical climate)            | Secondary forest and chinese fir plantation         | Yalin Hu               |
| 291    | Hunan                                 | China                     | 26.85  | 109.61 | 432     | 16.50 | 1280 | Semi-arid tropical climate (Subtropical climate)            | Secondary forest and chinese fir plantation         | Yalin Hu               |
| 292    | Inner Mongolia                        | China                     | 42.50  | 122.32 | 120     | 7.60  | 506  | Arid-temperate climate                                      | Mongolian pine monoculture                          | Wentao Luo             |
| 359    | BEF-China Main Experiment: Site A     | China                     | 29.12  | 117.91 | 180     | 17.10 | 1777 | Warm-temperate, humid climate                               | Subtropical broadleaf forest                        | Heike Feldhaar         |
| 428    | Dinghushan                            | China                     | 23.17  | 112.17 | 200-350 | 21.85 | 1773 | Humid-arid tropical climate                                 | NA                                                  | Jiangming Mo           |
| 56.01  | CATIE, Turrialba                      | Costa Rica                | 9.89   | -83.65 | 600     | 22.40 | 3113 | Equatorial humid climate; tropical rain forest              | Mature secondary forest and mature disturbed forest | Geovana Carreno        |
| 56.02  | CATIE, Turrialba                      | Costa Rica                | 9.90   | -83.67 | 615     | 22.40 | 3113 | Equatorial humid climate; tropical rain forest              | Coffee agroforestry                                 | Geovana Carreno        |
| 454    | La Gamba                              | Costa Rica                | 8.70   | -83.20 | 80      | 25.20 | 5748 | Equatorial humid climate; tropical rain forest              | Secondary forest                                    | Florian Hofhansl       |
| 455    | La Gamba                              | Costa Rica                | 8.70   | -83.20 | 80      | 25.20 | 5748 | Equatorial humid climate; tropical rain forest              | Primary forest                                      | Florian Hofhansl       |
| 57     | Nature Reserve Červený kříž           | Czech Republic            | 49.99  | 13.93  | 420     | 7.50  | 584  | Temperate climate                                           | Oak forest                                          | Petr Petřík            |
| 418    | Načetín                               | Czech Republic            | 50.59  | 13.25  | 775     | 5.40  | 789  | Temperate climate                                           | Spruce forest                                       | Michal Ruzek           |
| 419    | Načetín                               | Czech Republic            | 50.59  | 13.27  | 805     | 5.40  | 789  | Temperate climate                                           | Natural monocultural beech forest                   | Michal Ruzek           |
| 447    | Kahuzi-Biega                          | Democratic Republic Congo | -2.32  | 28.75  | 1900    | 14.90 | 1796 | Equatorial humid climate; tropical rain forest              | Natural forest (montane)                            | Marijn Bauters         |
| 448    | Yoko                                  | Democratic Republic Congo | 0.29   | 25.30  | 400     | 24.90 | 1779 | Equatorial humid climate; tropical rain forest              | Natural forest (lowland)                            | Marijn Bauters         |
| 449    | Yangambi Arboretum                    | Democratic Republic Congo | 0.79   | 24.49  | 400     | 24.50 | 1770 | Equatorial humid climate; tropical rain forest              | Forest plantation                                   | Marijn Bauters         |
| 63     | Mols                                  | Denmark                   | 56.39  | 10.96  | 57      | 7.80  | 573  | Temperate climate                                           | Grass, heath                                        | Inger Kappel Schmidt   |
| 64     | Brandbjerg                            | Denmark                   | 55.26  | 11.27  | 5       | 8.30  | 591  | Temperate climate                                           | Grass, heath                                        | Klaus Steenberg Larsen |
| 66     | Odsherred                             | Denmark                   | 55.83  | 11.70  | 30      | 8.20  | 602  | Temperate climate                                           | Forest                                              | Inger Kappel Schmidt   |
| 67     | Mattrup                               | Denmark                   | 55.16  | 10.04  | 110     | 7.20  | 796  | Temperate climate                                           | Forest                                              | Inger Kappel Schmidt   |
| 68     | Valloe                                | Denmark                   | 55.42  | 12.05  | 46      | 8.30  | 596  | Temperate climate                                           | NA                                                  | Inger Kappel Schmidt   |
| 69     | Nørholm                               | Denmark                   | 56.13  | 9.02   | 52      | 7.50  | 803  | Temperate climate                                           | NA                                                  | Inger Kappel Schmidt   |
| 70     | Kragelund                             | Denmark                   | 56.17  | 9.42   | 85      | 7.30  | 748  | Temperate climate                                           | NA                                                  | Inger Kappel Schmidt   |
| 336    | EC_ANT                                | Ecuador                   | -0.48  | -78.14 | 5509    | 8.00  | 1336 | Equatorial humid climate; Montane Grasslands and Shrublands | Grassland                                           | Priscilla Muriel       |
| 337    | EC_PIC                                | Ecuador                   | -0.18  | -78.60 | 4676    | 10.60 | 1320 | Equatorial humid climate; Montane Grasslands and Shrublands | Native grassland                                    | Francisco Cuesta       |
| 339.01 | EC_PNP1                               | Ecuador                   | -4.11  | -79.16 | 3311    | 14.50 | 1163 | Equatorial humid climate                                    | Native shrubland                                    | Marina Mazón           |

(continued on next page)

Table 2s (continued)

| Site ID | Site                                         | Country | Latitude | Longitude | Altitude<br>(m asl) | MAT<br>(°C) | MAP<br>(mm) | Biome                    | Type of biotope                                                                | Contact                       |
|---------|----------------------------------------------|---------|----------|-----------|---------------------|-------------|-------------|--------------------------|--------------------------------------------------------------------------------|-------------------------------|
| 339.02  | EC_PNP2                                      | Ecuador | -4.11    | -79.16    | 3352                | 14.50       | 1163        | Equatorial humid climate | Native shrubland                                                               | Marina Mazón                  |
| 339.03  | EC_PNP3                                      | Ecuador | -4.10    | -79.16    | 3367                | 14.50       | 1163        | Equatorial humid climate | Native shrubland                                                               | Marina Mazón                  |
| 453.01  | Galapagos WP169, Garrapatero - cinder cone   | Ecuador | -0.70    | -90.23    | 57                  | 23.89       | 260         | Subtropical arid climate | Semi-dry, deciduous vegetation                                                 | Heinke Jäger & Franz Zehetner |
| 453.02  | Galapagos WP171, Garrapatero - lava flow     | Ecuador | -0.68    | -90.22    | 47                  | 23.91       | 276         | Subtropical arid climate | Semi-dry, deciduous vegetation                                                 | Heinke Jäger & Franz Zehetner |
| 453.03  | Galapagos WP172, Garrapatero - cinder cone   | Ecuador | -0.67    | -90.25    | 210                 | 22.99       | 302         | Subtropical arid climate | Sub-tropical deciduous and evergreen shrubs and small trees                    | Heinke Jäger & Franz Zehetner |
| 453.04  | Galapagos WP180, Garrapatero - lava flow     | Ecuador | -0.67    | -90.25    | 231                 | 22.62       | 315         | Subtropical arid climate | Sub-tropical deciduous and evergreen shrubs and small trees                    | Heinke Jäger & Franz Zehetner |
| 453.05  | Galapagos WP174, Cerro Mesa - cinder cone    | Ecuador | -0.64    | -90.29    | 497                 | 21.56       | 338         | Subtropical arid climate | Mosaic of sub-tropical herb, evergreen shrub and tree vegetation, semi natural | Heinke Jäger & Franz Zehetner |
| 453.06  | Galapagos WP175, Cerro Mesa - lava flow      | Ecuador | -0.64    | -90.29    | 424                 | 21.56       | 338         | Subtropical arid climate | Mosaic of sub-tropical herb, evergreen shrub and tree vegetation, semi natural | Heinke Jäger & Franz Zehetner |
| 453.07  | Galapagos WP184, Cerro Crocker - cinder cone | Ecuador | -0.64    | -90.33    | 866                 | 19.87       | 398         | Subtropical arid climate | Sub-tropical shrub and fern vegetation                                         | Heinke Jäger & Franz Zehetner |
| 453.08  | Galapagos WP185, Cerro Crocker - lava flow   | Ecuador | -0.65    | -90.33    | 800                 | 19.87       | 398         | Subtropical arid climate | Sub-tropical shrub and fern vegetation                                         | Heinke Jäger & Franz Zehetner |
| 71      | Saarejärve-1                                 | Estonia | 58.66    | 26.76     | 56                  | 4.90        | 606         | Temperate climate        | Pine forest                                                                    | Ivika Ostonen                 |
| 72      | Saarejärve-2                                 | Estonia | 58.65    | 26.76     | 45                  | 4.90        | 606         | Temperate climate        | Spruce forest                                                                  | Ivika Ostonen                 |
| 73      | Vilsandi                                     | Estonia | 58.39    | 21.84     | 2                   | 6.00        | 586         | Temperate climate        | Pine forest                                                                    | Ivika Ostonen                 |
| 74      | Tõravere                                     | Estonia | 58.28    | 26.46     | 67                  | 5.00        | 598         | Temperate climate        | Spruce forest                                                                  | Ivika Ostonen                 |
| 75      | Sagadi                                       | Estonia | 59.56    | 26.05     | 45                  | 4.80        | 624         | Temperate climate        | Pine forest                                                                    | Ivika Ostonen                 |
| 76      | Vihula                                       | Estonia | 59.58    | 26.13     | 14                  | 4.80        | 624         | Temperate climate        | Pine forest                                                                    | Ivika Ostonen                 |
| 77      | Vändra                                       | Estonia | 58.71    | 25.06     | 43                  | 5.20        | 672         | Temperate climate        | Spruce forest                                                                  | Ivika Ostonen                 |
| 78      | Kuusnõmme                                    | Estonia | 58.31    | 21.97     | 5                   | 6.00        | 592         | Temperate climate        | Mixed pine and spruce forest                                                   | Ivika Ostonen                 |
| 79      | Järvselja-1                                  | Estonia | 58.31    | 27.33     | 33                  | 5.00        | 604         | Temperate climate        | Drained pine forest, monoculture                                               | Ivika Ostonen                 |
| 80      | Järvselja-2                                  | Estonia | 58.30    | 27.29     | 31                  | 5.00        | 604         | Temperate climate        | Drained spruce forest, monoculture                                             | Ivika Ostonen                 |
| 81      | Järvselja-3                                  | Estonia | 58.29    | 27.32     | 33                  | 5.00        | 604         | Temperate climate        | Drained birch forest                                                           | Ivika Ostonen                 |
| 82      | Lammi Biological Station                     | Finland | 61.05    | 25.04     | 112                 | 3.70        | 645         | Boreal climate           | Native broad-leaf and spruce forests                                           | John Loehr                    |
| 446     | Värriö                                       | Finland | 67.75    | 29.61     | 392                 | -1.30       | 537         | Boreal climate           | NA                                                                             | Frank Berninger               |
| 83      | 83c - Landemarais                            | France  | 49.00    | -1.18     | 145                 | 10.60       | 636         | Temperate climate        | Restored peatland                                                              | André-Jean Francez            |
| 84      | Arboretum Champenoux, 54                     | France  | 48.75    | 6.34      | 256                 | 9.40        | 765         | Temperate climate        | Exotic and local trees                                                         | Marie-Noëlle Pons             |
| 85      | La Bouzule, 54                               | France  | 48.74    | 6.32      | 225                 | 9.40        | 765         | Temperate climate        | Grassland                                                                      | Marie-Noëlle Pons             |
| 86      | Garden 1, Fléville-devant-Nancy              | France  | 48.63    | 6.21      | 236                 | 9.40        | 775         | Temperate climate        | Vegetable garden                                                               | Marie-Noëlle Pons             |
| 87      | GISFI station, Homécourt, 54                 | France  | 49.22    | 6.00      | 231                 | 9.50        | 795         | Temperate climate        | Afforested grassland                                                           | Florence Maunoury-Danger      |
| 88      | Temperate Forest 1, Hémilly, 57              | France  | 49.03    | 6.50      | 280                 | 9.20        | 789         | Temperate climate        | Mixedforest                                                                    | Florence Maunoury-Danger      |
| 89      | Riparian forest, Liverdun, 54                | France  | 48.76    | 6.06      | 200                 | 9.30        | 743         | Temperate climate        | Alluvial forest                                                                | Michael Danger                |
| 90      | Settling pond 1, Pompey, 54                  | France  | 48.77    | 6.14      | 207                 | 9.30        | 743         | Temperate climate        | Afforested settling pond                                                       | Florence Maunoury-Danger      |
| 91      | Settling pond 2, Russange, 54                | France  | 49.48    | 5.93      | 378                 | 8.90        | 818         | Temperate climate        | Afforested settling pond                                                       | Florence Maunoury-Danger      |
| 92      | Gravel pit 1, Corny, 57                      | France  | 49.01    | 6.05      | 167                 | 9.60        | 736         | Temperate climate        | Alluvial forest                                                                | Michael Danger                |
| 93      | Gravel pit 2, Dieulouard, 54                 | France  | 48.83    | 6.08      | 177                 | 9.30        | 743         | Temperate climate        | Alluvial forest                                                                | Michael Danger                |
| 94      | Chitelet Botanical Garden, 88                | France  | 48.04    | 7.00      | 1225                | 9.30        | 1344        | Temperate climate        | Wetland                                                                        | Sylvie Dousset                |
| 95      | JM Pelt Botanical Garden, 54                 | France  | 48.87    | 6.18      | 245                 | 11.10       | 618         | Temperate climate        | Botanical garden                                                               | Sylvie Dousset                |
| 96      | Forest soil SBL, Haye Forest, 54             | France  | 48.64    | 6.12      | 382                 | 11.10       | 618         | Temperate climate        | Mixed forest                                                                   | Sylvie Dousset                |
| 97      | Forest soil Rendzine, Haye Forest, 54        | France  | 48.64    | 6.10      | 402                 | 11.10       | 618         | Temperate climate        | Mixed forest                                                                   | Sylvie Dousset                |
| 98      | Haut Jacques - Podzol, 88                    | France  | 48.28    | 6.86      | 600                 | 9.30        | 1344        | Temperate climate        | Mixed forest                                                                   | Sylvie Dousset                |
| 99      | Haut Jacques - SBA, 88                       | France  | 48.28    | 6.86      | 600                 | 9.30        | 1344        | Temperate climate        | Mixed forest                                                                   | Sylvie Dousset                |
| 100     | Rudlin - SOP, 88                             | France  | 48.12    | 7.04      | 600                 | 9.30        | 1344        | Temperate climate        | Alpine grassland                                                               | Sylvie Dousset                |
| 101     | Rudlin - SBA, 88                             | France  | 48.12    | 7.04      | 600                 | 9.30        | 1344        | Temperate climate        | Alpine grassland                                                               | Sylvie Dousset                |
| 108     | LTSERZAA_ORCHAMP_ CHAMROUSSE_1_CHAM1250      | France  | 45.07    | 5.86      | 1249                | 7.50        | 1220        | Temperate climate        | Deciduous Broad-leaved Forest                                                  | Thomas Spiegelberger          |
| 109     | LTSERZAA_ORCHAMP_ CHAMROUSSE_2_CHAM1470      | France  | 45.09    | 5.86      | 1471                | 7.50        | 1220        | Temperate climate        | Mixed Forest                                                                   | Thomas Spiegelberger          |
| 110     | LTSERZAA_ORCHAMP_ CHAMROUSSE_3_CHAM1710      | France  | 45.11    | 5.89      | 1713                | 6.20        | 1158        | Temperate climate        | Evergreen Coniferous Forest                                                    | Thomas Spiegelberger          |

|        |                                            |         |        |       |      |       |      |                                            |                                                                                                          |                      |
|--------|--------------------------------------------|---------|--------|-------|------|-------|------|--------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|
| 111    | LTSERZAA_ORCHAMP_<br>CHAMROUSSE_4_CHAM1890 | France  | 45.11  | 5.90  | 1887 | 4.70  | 1032 | Temperate climate                          | Forest-grassland ecotone                                                                                 | Thomas Spiegelberger |
| 112    | LTSERZAA_ORCHAMP_<br>CHAMROUSSE_5_CHAM2020 | France  | 45.12  | 5.91  | 2021 | 4.70  | 1032 | Temperate climate                          | Mountain Grassland                                                                                       | Thomas Spiegelberger |
| 113    | LTSERZAA_ORCHAMP_<br>CHAMROUSSE_6_CHAM2180 | France  | 45.12  | 5.91  | 2179 | 3.10  | 877  | Temperate climate                          | Alpine meadow                                                                                            | Thomas Spiegelberger |
| 118    | LTSERZAA_ORCHAMP_<br>RISTOLAS_1_RIS1870    | France  | 44.75  | 7.00  | 1876 | 5.10  | 532  | Temperate climate                          | Deciduous Coniferous Forest                                                                              | Amélie Saillard      |
| 121    | LTSERZAA_ORCHAMP_<br>RISTOLAS_4_RIS2540    | France  | 44.71  | 7.05  | 2555 | 1.75  | 403  | Temperate climate                          | Alpine meadow                                                                                            | Amélie Saillard      |
| 125    | FR AME CFE - Cime de Fer                   | France  | 44.33  | 6.94  | 2700 | 0.70  | 508  | Temperate climate                          | Alpine meadow                                                                                            | Philippe Choler      |
| 129    | FR AME LAU - Butte des Laussets            | France  | 44.33  | 6.91  | 2508 | 2.50  | 674  | Temperate climate                          | Subalpine grassland                                                                                      | Philippe Choler      |
| 132.01 | Lyon (grasslands)                          | France  | 45.78  | 4.87  | 170  | 11.50 | 783  | Temperate climate                          | Urban grassland                                                                                          | Pierre Marmonier     |
| 132.02 | Lyon (undercover)                          | France  | 45.78  | 4.87  | 170  | 11.50 | 783  | Temperate climate                          | Urban forest                                                                                             | Pierre Marmonier     |
| 133    | Kerguelen Islands                          | France  | -49.35 | 70.21 | 15   | 4.87  | 753  | (Sub-)Arctic climate (Subantartic climate) | Grassland                                                                                                | Marc Lebouvier       |
| 134    | Forêt de Chaux                             | France  | 47.10  | 5.73  | 260  | 10.50 | 943  | Temperate climate                          | Forest                                                                                                   | Eric Lucot           |
| 135    | Zone Atelier Plaine et Val de Sèvre        | France  | 46.14  | -0.49 | 66   | 12.40 | 901  | Temperate climate                          | Agriculture                                                                                              | Vincent Bretagnolle  |
| 136    | Tourbière de la Guette                     | France  | 47.32  | 2.28  | 165  | 11.00 | 705  | Temperate climate                          | Peatland                                                                                                 | Sébastien Gogo       |
| 137    | Vosges (88)                                | France  | 48.17  | 5.94  | 420  | 9.20  | 852  | Temperate climate                          | Agriculture                                                                                              | Marie-Noëlle Pons    |
| 138    | Experimental station Gardouch              | France  | 43.37  | 1.67  | 180  | 12.80 | 751  | Temperate climate                          | Forest                                                                                                   | Joël Merlet          |
| 139    | Toulouse (VCG)                             | France  | 43.60  | 1.44  | 333  | 12.70 | 698  | Temperate climate                          | Semi-natural grassland                                                                                   | Annie Ouin           |
| 361    | ORPHEE                                     | France  | 44.74  | -0.80 | 60   | 12.75 | 876  | Temperate climate                          | Pine plantation                                                                                          | Hervé Jactel         |
| 367    | LTSERZAA_ORCHAMP_<br>LORIAZ_1_LORI1370     | France  | 46.03  | 6.92  | 1359 | 7.10  | 1207 | Temperate climate                          | Mixed forest                                                                                             | Amélie Saillard      |
| 368    | LTSERZAA_ORCHAMP_<br>LORIAZ_2_LORI1620     | France  | 46.03  | 6.92  | 1606 | 6.00  | 1170 | Temperate climate                          | Coniferous forest                                                                                        | Amélie Saillard      |
| 369    | LTSERZAA_ORCHAMP_<br>LORIAZ_3_LORI1800     | France  | 46.04  | 6.92  | 1785 | 6.00  | 1170 | Temperate climate                          | Coniferous forest                                                                                        | Amélie Saillard      |
| 370    | LTSERZAA_ORCHAMP_<br>LORIAZ_4_LORI1930     | France  | 46.04  | 6.91  | 1923 | 4.30  | 1104 | Temperate climate                          | Forest-grassland ecotone                                                                                 | Amélie Saillard      |
| 371    | LTSERZAA_ORCHAMP_<br>LORIAZ_5_LORI2130     | France  | 46.04  | 6.92  | 2125 | 2.70  | 975  | Temperate climate                          | Subalpine grassland                                                                                      | Amélie Saillard      |
| 372    | LTSERZAA_ORCHAMP_<br>LORIAZ_6_LORI2330     | France  | 46.05  | 6.91  | 2324 | 2.70  | 975  | Temperate climate                          | Alpine meadow                                                                                            | Amélie Saillard      |
| 373    | FR AME CBA - Cime des Barbarottes          | France  | 44.30  | 6.94  | 2792 | 0.70  | 508  | Temperate climate                          | Alpine scree                                                                                             | Philippe Choler      |
| 403    | FR Armorique-Pleine Fougères               | France  | 48.49  | -1.57 | 93   | 10.60 | 636  | Temperate climate                          | Forest and wetland                                                                                       | Romain Georges       |
| 404    | ZA Armorique - Sougeal                     | France  | 48.51  | -1.51 | 70   | 10.60 | 636  | Temperate climate                          | Wet grassland                                                                                            | Romain Georges       |
| 405    | ZA Armorique - Rimou                       | France  | 48.40  | -1.51 | 26   | 10.60 | 636  | Temperate climate                          | Grassland                                                                                                | Romain Georges       |
| 420.01 | Toulouse-PYGAR-Auradé                      | France  | 43.56  | 1.06  | 157  | 12.40 | 730  | Temperate climate                          | Agriculture (grass band along stream)                                                                    | Jean-Luc Probst      |
| 420.02 | Toulouse-PYGAR-Auradé                      | France  | 43.56  | 1.07  | 178  | 12.40 | 730  | Temperate climate                          | Agriculture (fallow)                                                                                     | Jean-Luc Probst      |
| 420.03 | Toulouse-PYGAR-Auradé                      | France  | 43.56  | 1.07  | 198  | 12.40 | 730  | Temperate climate                          | Agriculture (grass fallow)                                                                               | Jean-Luc Probst      |
| 421    | Toulouse-PYGAR-Baget                       | France  | 42.96  | 1.03  | 522  | 9.30  | 964  | Temperate climate                          | Grassland                                                                                                | Anne Probst          |
| 422.01 | Toulouse-PYGAR-Bernadouze                  | France  | 42.80  | 1.42  | 1355 | 5.30  | 1191 | Temperate climate                          | Peatland                                                                                                 | Thierry Camboulive   |
| 422.02 | Toulouse-PYGAR-Bernadouze                  | France  | 42.80  | 1.42  | 1433 | 7.20  | 952  | Temperate climate                          | Forest                                                                                                   | Thierry Camboulive   |
| 423    | Toulouse-PYGAR-Météo                       | France  | 43.57  | 1.37  | 157  | 12.70 | 698  | Temperate climate                          | Grassland                                                                                                | Christine Delire     |
| 58     | Bad Lauchstädt                             | Germany | 51.39  | 11.88 | 119  | 9.00  | 492  | Temperate climate                          | Grassland                                                                                                | Jutta Stadler        |
| 59     | Bayreuth                                   | Germany | 49.97  | 11.51 | 336  | 7.00  | 720  | Temperate climate                          | Deciduous Forest                                                                                         | Jutta Stadler        |
| 60.01  | Rhine-Main-Observatory                     | Germany | 50.15  | 9.00  | 115  | 9.50  | 665  | Temperate climate                          | Grassland, intensively use                                                                               | Marlen Mährlein      |
| 60.02  | Rhine-Main-Observatory                     | Germany | 50.17  | 9.06  | 115  | 9.50  | 662  | Temperate climate                          | Grassland, intensively use                                                                               | Marlen Mährlein      |
| 60.03  | Rhine-Main-Observatory                     | Germany | 50.13  | 8.96  | 130  | 9.90  | 644  | Temperate climate                          | Deciduous Forest                                                                                         | Marlen Mährlein      |
| 60.04  | Rhine-Main-Observatory                     | Germany | 50.18  | 9.08  | 135  | 9.50  | 662  | Temperate climate                          | Deciduous Forest                                                                                         | Marlen Mährlein      |
| 61     | Landau                                     | Germany | 49.25  | 7.96  | 200  | 8.70  | 644  | Temperate climate                          | Plot forest: mixed beech forest;<br>vineyard: vineyard; stream floodplain:<br>alluvial stream floodplain | Stefan Stoll         |
| 62     | Hiddensee                                  | Germany | 54.55  | 13.10 | 1    | 8.20  | 545  | Temperate climate                          | Coastal heath                                                                                            | Andrey Malyshev      |
| 140    | Lüss                                       | Germany | 52.84  | 10.27 | 109  | 8.80  | 835  | Temperate climate                          | Deciduous Forest                                                                                         | Meesenburg, Henning  |
| 141.01 | Lange Bramke, Kamm                         | Germany | 51.86  | 10.42 | 659  | 5.90  | 1339 | Temperate climate                          | Coniferous forest                                                                                        | Meesenburg, Henning  |
| 141.02 | Lange Bramke, Nordhang                     | Germany | 51.85  | 10.41 | 597  | 5.90  | 1339 | Temperate climate                          | Coniferous forest                                                                                        | Meesenburg, Henning  |

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**Table 2s** (*continued*)

| Site ID | Site                                           | Country | Latitude | Longitude | Altitude<br>(m asl) | MAT<br>(°C) | MAP<br>(mm) | Biome             | Type of biotope    | Contact             |
|---------|------------------------------------------------|---------|----------|-----------|---------------------|-------------|-------------|-------------------|--------------------|---------------------|
| 141.03  | Lange Bramke, Südhang                          | Germany | 51.86    | 10.41     | 597                 | 5.90        | 1339        | Temperate climate | Coniferous forest  | Meesenburg, Henning |
| 142     | Solling, Buche                                 | Germany | 51.76    | 9.58      | 504                 | 6.90        | 1193        | Temperate climate | Deciduous Forest   | Meesenburg, Henning |
| 143     | Solling, Fichte                                | Germany | 51.76    | 9.58      | 508                 | 6.90        | 1193        | Temperate climate | Coniferous forest  | Meesenburg, Henning |
| 144     | Göttinger Wald                                 | Germany | 51.53    | 10.05     | 420                 | 8.40        | 773         | Temperate climate | Deciduous Forest   | Meesenburg, Henning |
| 145     | Augustendorf                                   | Germany | 52.91    | 7.86      | 33                  | 9.00        | 820         | Temperate climate | Deciduous Forest   | Meesenburg, Henning |
| 146     | Ehrhorn                                        | Germany | 53.18    | 9.90      | 115                 | 9.00        | 785         | Temperate climate | Deciduous Forest   | Meesenburg, Henning |
| 147     | Schafstaedt                                    | Germany | 51.37    | 11.74     | 172                 | 8.00        | 611         | Temperate climate | Meadow             | Mark Frenzel        |
| 148     | Friedeburg                                     | Germany | 51.60    | 11.72     | 98                  | 8.00        | 611         | Temperate climate | Meadow             | Mark Frenzel        |
| 149     | Greifenhagen                                   | Germany | 51.63    | 11.46     | 265                 | 7.80        | 614         | Temperate climate | Meadow             | Mark Frenzel        |
| 150     | Siptenfelde                                    | Germany | 51.65    | 11.05     | 397                 | 7.80        | 561         | Temperate climate | Pasture            | Mark Frenzel        |
| 151     | Harsleben                                      | Germany | 51.84    | 11.06     | 152                 | 7.80        | 561         | Temperate climate | Meadow             | Mark Frenzel        |
| 152     | Wanzleben                                      | Germany | 52.08    | 11.44     | 98                  | 8.80        | 513         | Temperate climate | Mown meadow        | Mark Frenzel        |
| 153     | Mueggelsee                                     | Germany | 52.00    | 14.68     | 35                  | 9.10        | 553         | Temperate climate | NA                 | Rita Adrian         |
| 154     | Hohes Holz                                     | Germany | 52.09    | 11.22     | 193                 | 8.80        | 529         | Temperate climate | Mixed beech forest | Corinna Rebmann     |
| 155.01  | Biodiversity-Exploratories, Hainich            | Germany | 50.97    | 10.40     | 330                 | 7.30        | 702         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.02  | Biodiversity-Exploratories, Hainich            | Germany | 51.08    | 10.42     | 330                 | 7.30        | 702         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.03  | Biodiversity-Exploratories, Hainich            | Germany | 51.10    | 10.42     | 330                 | 7.70        | 666         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.04  | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.42     | 330                 | 7.70        | 666         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.05  | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.32     | 330                 | 7.70        | 695         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.06  | Biodiversity-Exploratories, Hainich            | Germany | 51.05    | 10.38     | 330                 | 7.30        | 778         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.07  | Biodiversity-Exploratories, Hainich            | Germany | 51.00    | 10.40     | 330                 | 7.70        | 666         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.08  | Biodiversity-Exploratories, Hainich            | Germany | 51.20    | 10.42     | 330                 | 7.30        | 702         | Temperate climate | Pasture            | Ute Hamer           |
| 155.09  | Biodiversity-Exploratories, Hainich            | Germany | 51.02    | 10.37     | 330                 | 7.70        | 695         | Temperate climate | Pasture            | Ute Hamer           |
| 155.1   | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.43     | 330                 | 7.70        | 666         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.11  | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.45     | 330                 | 7.70        | 695         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.12  | Biodiversity-Exploratories, Hainich            | Germany | 51.30    | 10.37     | 330                 | 7.70        | 695         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.13  | Biodiversity-Exploratories, Hainich            | Germany | 50.97    | 10.75     | 330                 | 7.70        | 695         | Temperate climate | Pasture            | Ute Hamer           |
| 155.14  | Biodiversity-Exploratories, Hainich            | Germany | 51.28    | 10.37     | 330                 | 7.80        | 580         | Temperate climate | Pasture            | Ute Hamer           |
| 155.15  | Biodiversity-Exploratories, Hainich            | Germany | 51.22    | 10.58     | 330                 | 7.70        | 695         | Temperate climate | Meadow             | Ute Hamer           |
| 155.16  | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.50     | 330                 | 7.90        | 638         | Temperate climate | Meadow             | Ute Hamer           |
| 155.17  | Biodiversity-Exploratories, Hainich            | Germany | 51.27    | 10.50     | 330                 | 7.90        | 638         | Temperate climate | Meadow             | Ute Hamer           |
| 155.18  | Biodiversity-Exploratories, Hainich            | Germany | 51.07    | 10.43     | 330                 | 7.90        | 638         | Temperate climate | Mountain grassland | Ute Hamer           |
| 155.19  | Biodiversity-Exploratories, Hainich            | Germany | 51.18    | 10.45     | 330                 | 7.70        | 666         | Temperate climate | Pasture            | Ute Hamer           |
| 155.2   | Biodiversity-Exploratories, Hainich            | Germany | 51.20    | 10.43     | 330                 | 7.70        | 695         | Temperate climate | Pasture            | Ute Hamer           |
| 155.21  | Biodiversity-Exploratories, Hainich            | Germany | 51.22    | 10.47     | 330                 | 7.70        | 695         | Temperate climate | Mown pasture       | Ute Hamer           |
| 155.22  | Biodiversity-Exploratories, Hainich            | Germany | 50.98    | 10.37     | 330                 | 7.70        | 695         | Temperate climate | Pasture            | Ute Hamer           |
| 155.23  | Biodiversity-Exploratories, Hainich            | Germany | 51.20    | 10.42     | 330                 | 7.30        | 702         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.01  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.08    | 13.97     | 50                  | 8.60        | 560         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.02  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.09    | 13.97     | 50                  | 8.60        | 560         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.03  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 13.98     | 50                  | 8.60        | 560         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.04  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 14.00     | 50                  | 8.70        | 547         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.05  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 14.00     | 50                  | 8.70        | 547         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.06  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 13.62     | 50                  | 8.50        | 569         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.07  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.09    | 13.97     | 50                  | 8.60        | 560         | Temperate climate | Pasture            | Ute Hamer           |
| 156.08  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 14.02     | 50                  | 8.70        | 547         | Temperate climate | Mown pasture       | Ute Hamer           |
| 156.09  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.08    | 13.60     | 50                  | 8.50        | 569         | Temperate climate | Pasture            | Ute Hamer           |
| 156.1   | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.14    | 13.87     | 50                  | 8.60        | 560         | Temperate climate | Meadow             | Ute Hamer           |
| 156.11  | Biodiversity-Exploratories, Schorfheide-Chorin | Germany | 53.10    | 13.97     | 50                  | 8.60        | 560         | Temperate climate | Meadow             | Ute Hamer           |

|        |                                                   |         |       |       |     |      |     |                   |              |           |
|--------|---------------------------------------------------|---------|-------|-------|-----|------|-----|-------------------|--------------|-----------|
| 156.12 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.10 | 14.02 | 50  | 8.70 | 547 | Temperate climate | Meadow       | Ute Hamer |
| 156.13 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.10 | 13.62 | 50  | 8.50 | 569 | Temperate climate | Meadow       | Ute Hamer |
| 156.14 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.12 | 13.70 | 50  | 8.50 | 567 | Temperate climate | Meadow       | Ute Hamer |
| 156.15 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.13 | 13.83 | 50  | 8.60 | 560 | Temperate climate | Meadow       | Ute Hamer |
| 156.16 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.15 | 13.82 | 50  | 8.50 | 567 | Temperate climate | Meadow       | Ute Hamer |
| 156.17 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.98 | 13.83 | 50  | 8.70 | 554 | Temperate climate | Pasture      | Ute Hamer |
| 156.18 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.97 | 13.83 | 50  | 8.70 | 554 | Temperate climate | Mown pasture | Ute Hamer |
| 156.19 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.13 | 13.87 | 50  | 8.60 | 560 | Temperate climate | Pasture      | Ute Hamer |
| 156.2  | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 53.10 | 13.67 | 50  | 8.50 | 567 | Temperate climate | Mown pasture | Ute Hamer |
| 156.21 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.97 | 13.82 | 50  | 8.60 | 562 | Temperate climate | Mown pasture | Ute Hamer |
| 156.22 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.87 | 13.97 | 50  | 8.70 | 554 | Temperate climate | Pasture      | Ute Hamer |
| 156.23 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.87 | 13.97 | 50  | 8.70 | 554 | Temperate climate | Pasture      | Ute Hamer |
| 156.24 | Biodiversity-Exploratories,<br>Schorfheide-Chorin | Germany | 52.97 | 13.82 | 50  | 8.60 | 562 | Temperate climate | Pasture      | Ute Hamer |
| 157.01 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.38 | 9.33  | 730 | 7.50 | 911 | Temperate climate | Meadow       | Ute Hamer |
| 157.02 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.37 | 9.47  | 730 | 7.50 | 911 | Temperate climate | Meadow       | Ute Hamer |
| 157.03 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.40 | 9.52  | 730 | 7.10 | 923 | Temperate climate | Meadow       | Ute Hamer |
| 157.04 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.37 | 9.42  | 730 | 7.50 | 911 | Temperate climate | Mown pasture | Ute Hamer |
| 157.05 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.38 | 9.44  | 730 | 7.50 | 911 | Temperate climate | Mown pasture | Ute Hamer |
| 157.06 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.40 | 9.43  | 730 | 7.50 | 911 | Temperate climate | Mown pasture | Ute Hamer |
| 157.07 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.38 | 9.37  | 730 | 7.50 | 911 | Temperate climate | Pasture      | Ute Hamer |
| 157.08 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.42 | 9.48  | 730 | 7.50 | 911 | Temperate climate | Pasture      | Ute Hamer |
| 157.09 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.38 | 9.50  | 730 | 7.10 | 923 | Temperate climate | Pasture      | Ute Hamer |
| 157.1  | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.37 | 9.20  | 730 | 7.80 | 905 | Temperate climate | Meadow       | Ute Hamer |
| 157.11 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.48 | 9.43  | 730 | 7.50 | 911 | Temperate climate | Meadow       | Ute Hamer |
| 157.12 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.48 | 9.43  | 730 | 7.50 | 911 | Temperate climate | Meadow       | Ute Hamer |
| 157.13 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 44.37 | 9.52  | 730 | 9.70 | 942 | Temperate climate | Mown pasture | Ute Hamer |
| 157.14 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.40 | 9.50  | 730 | 7.10 | 923 | Temperate climate | Mown pasture | Ute Hamer |
| 157.15 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.38 | 9.40  | 730 | 7.50 | 911 | Temperate climate | Pasture      | Ute Hamer |
| 157.16 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.45 | 9.45  | 730 | 7.50 | 911 | Temperate climate | Mown pasture | Ute Hamer |
| 157.17 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.45 | 9.45  | 730 | 7.50 | 911 | Temperate climate | Mown pasture | Ute Hamer |
| 157.18 | Biodiversity-Exploratories,<br>Schwäbische Alb    | Germany | 48.45 | 9.48  | 730 | 7.50 | 911 | Temperate climate | Pasture      | Ute Hamer |

(continued on next page)

Table 2s (continued)

| Site ID | Site                                                        | Country   | Latitude | Longitude | Altitude (m asl) | MAT (°C) | MAP (mm) | Biome                    | Type of biotope                                                   | Contact                          |
|---------|-------------------------------------------------------------|-----------|----------|-----------|------------------|----------|----------|--------------------------|-------------------------------------------------------------------|----------------------------------|
| 157.19  | Schwäbische Alb Biodiversity-Exploratories, Schwäbische Alb | Germany   | 48.43    | 9.42      | 730              | 7.50     | 911      | Temperate climate        | Meadow                                                            | Ute Hamer                        |
| 157.2   | Biodiversity-Exploratories, Schwäbische Alb                 | Germany   | 48.38    | 9.42      | 730              | 7.50     | 911      | Temperate climate        | Meadow                                                            | Ute Hamer                        |
| 157.21  | Biodiversity-Exploratories, Schwäbische Alb                 | Germany   | 48.40    | 9.45      | 730              | 7.50     | 911      | Temperate climate        | Meadow                                                            | Ute Hamer                        |
| 157.22  | Biodiversity-Exploratories, Schwäbische Alb                 | Germany   | 48.38    | 9.43      | 730              | 7.50     | 911      | Temperate climate        | Pasture                                                           | Ute Hamer                        |
| 157.23  | Biodiversity-Exploratories, Schwäbische Alb                 | Germany   | 48.45    | 9.50      | 730              | 7.10     | 923      | Temperate climate        | Pasture                                                           | Ute Hamer                        |
| 303     | Hiddensee                                                   | Germany   | 54.55    | 13.10     | 1                | -0.90    | 536      | Temperate climate        | Heathland                                                         | Andrey Malyshev                  |
| 305     | Hanshagen                                                   | Germany   | 54.05    | 13.51     | 45               | 8.30     | 562      | Temperate climate        | Beech forest                                                      | Robert Weigel                    |
| 321     | Fendt                                                       | Germany   | 48.38    | 11.11     | 600              | 8.70     | 982      | Temperate climate        | Grassland                                                         | Ralf Kiese                       |
| 322     | Rottenbuch                                                  | Germany   | 48.18    | 11.64     | 750              | 8.40     | 1158     | Temperate climate        | Grassland                                                         | Ralf Kiese                       |
| 323     | Graswang                                                    | Germany   | 46.94    | 11.06     | 850              | 6.60     | 1359     | Temperate climate        | Grassland                                                         | Ralf Kiese                       |
| 348     | Rostock-ECOLINK-Salix                                       | Germany   | 54.06    | 12.08     | 13               | 8.50     | 590      | Temperate climate        | Willow short rotation coppice                                     | Christel Baum                    |
| 349     | Kaltenborn (BIOTREE)                                        | Germany   | 50.78    | 10.22     | 330              | 7.80     | 650      | Temperate climate        | Tree plantations                                                  | Michael Scherer-Lorenzen         |
| 355     | Kreinitz                                                    | Germany   | 51.39    | 13.26     | 115              | 8.40     | 575      | Temperate climate        | Tree plantations                                                  | Anja Schmidt                     |
| 358     | MyDiv                                                       | Germany   | 51.39    | 11.89     | 115              | 8.80     | 507      | Temperate climate        | Agriculture                                                       | Olga Ferlian and Nico Eisenhauer |
| 412     | Garmisch                                                    | Germany   | 47.47    | 11.06     | 720              | 8.00     | 964      | Temperate climate        | Grassland                                                         | Ralf Kiese                       |
| 413     | Esterberg                                                   | Germany   | 47.52    | 11.16     | 1265             | 6.20     | 1043     | Temperate climate        | Grassland                                                         | Ralf Kiese                       |
| 456.01  | Arctic station                                              | Greenland | 69.27    | -53.46    | 89               | -3.00    | 400      | Arctic climate           | Tundra                                                            | Regin Rønn                       |
| 456.02  | Arctic station                                              | Greenland | 69.27    | -53.46    | 112              | -3.00    | 400      | Arctic climate           | Tundra                                                            | Regin Rønn                       |
| 158     | Síkfökút Project                                            | Hungary   | 47.92    | 20.43     | 345              | 9.40     | 565      | Temperate climate        | Deciduous Forest                                                  | Zsolt Kotroczó and István Fekete |
| 159     | Kiskunság LTER - Fülöpháza                                  | Hungary   | 47.45    | 19.70     | 108              | 10.60    | 522      | Temperate climate        | Grassland                                                         | Erzsébet Hornung                 |
| 442     | Rannsóknastöðin Rif (Rif Field Station)                     | Iceland   | 66.45    | -15.95    | NA               | NA       | 650      | Boreal climate           | Peatlands, salt marshes, lichen rich heathlands                   | Jónína Sigríður Þorláksdóttir    |
| 325.01  | IN-LAC, E-Ladakh/Changthang                                 | India     | 33.01    | 78.42     | 5900             | -7.80    | 250      | Arid-temperate climate   | Cold Himalyan Deserts, Subnival zone                              | Jiri Dolezal                     |
| 325.02  | IN-LAC, E-Ladakh/Changthang                                 | India     | 32.98    | 78.36     | 5050             | -3.50    | 150      | Arid-temperate climate   | Cold Himalyan Deserts, Alpine steppes                             | Jiri Dolezal                     |
| 325.03  | IN-LAC, E-Ladakh/Changthang                                 | India     | 32.98    | 78.34     | 4720             | -3.00    | 100      | Arid-temperate climate   | Cold Himalyan Deserts                                             | Jiri Dolezal                     |
| 329.01  | IN-KJU-MGT                                                  | India     | 30.43    | 79.58     | 4254             | 3.10     | 1224     | Subtropical arid climate | Alpine grassland                                                  | Sabyasachi Dasgupta              |
| 329.02  | IN-KJU-GGT                                                  | India     | 30.46    | 79.58     | 3691             | 5.90     | 1472     | Subtropical arid climate | Subalpin, Rhododendron scrub and grass land                       | Sabyasachi Dasgupta              |
| 329.03  | IN-KJU_TBT                                                  | India     | 30.49    | 79.57     | 3286             | 5.60     | 1472     | Subtropical arid climate | Treeline grassland                                                | Sabyasachi Dasgupta              |
| 329.04  | IN_KJU_MGT                                                  | India     | 30.42    | 79.59     | 4601             | 3.00     | 1224     | Subtropical arid climate | Stony bryophyte and lichens                                       | Sabyasachi Dasgupta              |
| 343.01  | IN-KAS-GUL_1                                                | India     | 34.02    | 74.21     | 3470             | 13.40    | 776      | Temperate climate        | Treeline of subalpine forest (dominated by Betula utilis)         | Anzar A Khuroo                   |
| 343.02  | IN-KAS-GUL_2                                                | India     | 34.02    | 74.20     | 3550             | 13.40    | 776      | Temperate climate        | Alpine scrub grassland (dominated by Rhododendron-Juniperus)      | Anzar A Khuroo                   |
| 343.03  | IN-KAS-GUL_3                                                | India     | 34.01    | 74.20     | 3640             | 13.40    | 776      | Temperate climate        | Alpine scrub grassland (dominated by Rhododendron-Juniperus)      | Anzar A Khuroo                   |
| 343.04  | IN-KAS-GUL_4                                                | India     | 34.01    | 74.20     | 3690             | 13.40    | 776      | Temperate climate        | Alpine scrub grassland (Rhododendron-Juniperus with Rock & Scree) | Anzar A Khuroo                   |
| 160     | Shita                                                       | Israel    | 30.15    | 35.12     | 250              | 19.40    | 207      | Subtropical arid climate | Desert                                                            | Elli Groner                      |
| 161     | Ramon                                                       | Israel    | 31.25    | 35.37     | 440              | 21.30    | 60       | Subtropical arid climate | Desert                                                            | Elli Groner                      |
| 408     | Lehavim LTER                                                | Israel    | 31.36    | 34.85     | 460              | 18.70    | 318      | Mediterranean climate    | Rangeland                                                         | Marcelo Sternberg                |
| 409     | Sde Boquer                                                  | Israel    | 30.87    | 34.77     | 475              | 18.80    | 90       | Subtropical arid climate | Rangeland                                                         | Marcelo Sternberg                |
| 162.01  | Matsch-Mazia                                                | Italy     | 46.68    | 10.58     | 1000             | 1.60     | 528      | Temperate climate        | Dry pasture                                                       | Julia Seeber                     |
| 162.02  | Matsch-Mazia                                                | Italy     | 46.68    | 10.59     | 1500             | 1.60     | 528      | Temperate climate        | Dry pasture                                                       | Julia Seeber                     |
| 162.03  | Matsch-Mazia                                                | Italy     | 46.69    | 10.59     | 2000             | 1.60     | 528      | Temperate climate        | Dry pasture                                                       | Julia Seeber                     |
| 162.04  | Matsch-Mazia                                                | Italy     | 46.70    | 10.60     | 2500             | 1.60     | 528      | Temperate climate        | Dry pasture                                                       | Julia Seeber                     |
| 319     | Mediterranean Shrublands                                    | Italy     | 40.76    | 16.91     | 348              | 13.60    | 650      | Mediterranean climate    | Oak forests and shrubland                                         | Roberto Cazzolla Gatti           |
| 334.01  | IT_ADO_GRM                                                  | Italy     | 46.33    | 11.56     | 2199             | 3.30     | 956      | Temperate climate        | Grassland                                                         | Brigitta Erschbamer              |
| 334.02  | IT_ADO_PNL                                                  | Italy     | 46.38    | 11.59     | 2463             | 2.00     | 1118     | Temperate climate        | Grassland                                                         | Brigitta Erschbamer              |
| 334.03  | IT_ADO_RNK                                                  | Italy     | 46.38    | 11.61     | 2757             | 0.80     | 1177     | Temperate climate        | Grassland & scree vegetation                                      | Brigitta Erschbamer              |

|        |                                            |                    |       |        |      |       |      |                                                |                                                                                       |                                |
|--------|--------------------------------------------|--------------------|-------|--------|------|-------|------|------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------|
| 334.04 | IT_ADO_MTS                                 | Italy              | 46.52 | 11.81  | 2893 | -0.20 | 1121 | Temperate climate                              | scree vegetation                                                                      | Brigitta Erschbamer            |
| 335.01 | IT_MAV_CCR                                 | Italy              | 45.69 | 7.56   | 2340 | 3.80  | 1250 | Temperate climate                              | Grassland with occasional larch                                                       | Umberto Morra di Cella         |
| 335.02 | IT_MAV_LBA                                 | Italy              | 45.64 | 7.55   | 2584 | 1.50  | 1250 | Temperate climate                              | Alpine grassland                                                                      | Umberto Morra di Cella         |
| 335.03 | IT_MAV_PPE                                 | Italy              | 45.65 | 7.54   | 2790 | 1.70  | 1250 | Temperate climate                              | Scree vegetation                                                                      | Umberto Morra di Cella         |
| 335.04 | IT_MAV_CM                                  | Italy              | 45.91 | 7.69   | 3014 | -1.70 | 1200 | Temperate climate                              | Scree vegetation                                                                      | Umberto Morra di Cella         |
| 338.01 | IT_CAM_MAM                                 | Italy              | 42.10 | 14.12  | 2722 | 2.90  | 898  | Mediterranean climate                          | Alpine grassland                                                                      | Angela Stanisci                |
| 338.02 | IT_CAM_MAC                                 | Italy              | 42.05 | 14.10  | 2625 | 2.90  | 898  | Mediterranean climate                          | Alpine grassland                                                                      | Angela Stanisci                |
| 338.03 | IT_CAM_FEM                                 | Italy              | 42.03 | 14.10  | 2411 | 2.90  | 898  | Mediterranean climate                          | Alpine grassland                                                                      | Angela Stanisci                |
| 341.01 | IT -NAP-MOM                                | Italy              | 44.28 | 10.25  | 1842 | 5.70  | 1269 | Temperate climate                              | Mosaic between primary subalpine shrublands and secondary grassland                   | Tomaselli Marcello             |
| 341.02 | IT-NAP-CAS                                 | Italy              | 44.33 | 10.21  | 1960 | 4.80  | 1055 | Temperate climate                              | Subalpine secondary grassland                                                         | Tomaselli Marcello             |
| 341.03 | IT -NAP-PCA                                | Italy              | 44.20 | 10.70  | 1803 | 5.10  | 992  | Temperate climate                              | Subalpine secondary grassland                                                         | Tomaselli Marcello             |
| 341.04 | IT -NAP-FOG                                | Italy              | 44.12 | 10.62  | 1696 | 5.10  | 1065 | Temperate climate                              | Mosaic between primary subalpine shrublands and secondary grassland                   | Tomaselli Marcello             |
| 356    | IDENT-Macomere                             | Italy              | 13.82 | 8.70   | 640  | 13.80 | 866  | Mediterranean climate                          | Abandoned fields in nursery                                                           | Simone Mereu                   |
| 397    | Lamto                                      | Ivory Coast        | 6.22  | 5.03   | 100  | 26.80 | 2146 | Equatorial humid climate; tropical rain forest | Wet tropical savannah (transition tropical rain forest-Guinean savannah)              | Jean-Christophe Lata           |
| 398    | Comoé                                      | Ivory Coast        | 9.11  | -3.73  | 300  | 27.20 | 1096 | Semi-arid tropical climate                     | West Sudanian savannah                                                                | Jean-Christophe Lata           |
| 399    | Banco                                      | Ivory Coast        | 5.39  | -4.05  | 75   | 26.20 | 1738 | Equatorial humid climate; tropical rain forest | Tropical rain forest                                                                  | Jean-Christophe Lata           |
| 163    | Kanumazawa Riparian Research Forest        | Japan              | 39.10 | 141.85 | 450  | 9.20  | 2056 | Temperate climate                              | Forest, deciduous                                                                     | Kazuhiko Hoshizaki             |
| 164.01 | University of Tokyo Chichibu Forest        | Japan              | 35.92 | 138.83 | 880  | 9.00  | 1554 | Temperate climate                              | Natural forest                                                                        | Satoshi Suzuki                 |
| 164.02 | University of Tokyo Chichibu Forest        | Japan              | 35.92 | 138.82 | 1320 | 6.60  | 1554 | Temperate climate                              | Natural forest                                                                        | Satoshi Suzuki                 |
| 164.03 | University of Tokyo Chichibu Forest        | Japan              | 35.92 | 138.80 | 1780 | 3.60  | 1554 | Temperate climate                              | Natural forest                                                                        | Satoshi Suzuki                 |
| 165    | Kasuya Research Forest                     | Japan              | 33.65 | 130.55 | 520  | 14.60 | 1917 | Warm-temperate, humid climate                  | Natural forest                                                                        | Tsutomu Enoki                  |
| 166    | Uryu                                       | Japan              | 44.36 | 142.26 | 300  | 4.40  | 1400 | Temperate climate                              | Cool temperate mixed forest (evergreen coniferous and deciduous broad-leaved species) | Hideaki Shibata                |
| 167    | Yamashiro Experimental Forest              | Japan              | 34.78 | 135.85 | 255  | 13.80 | 1676 | Warm-temperate, humid climate                  | Secondary forest, deciduous                                                           | Mioko Ataka, Yuji Kominami     |
| 168    | Ashoro                                     | Japan              | 43.26 | 143.51 | 330  | 5.50  | 1051 | Temperate climate                              | Forest, deciduous                                                                     | Yasuhiro Utsumi                |
| 169    | Akazu Research Forest                      | Japan              | 36.22 | 137.17 | 304  | 9.70  | 1838 | Temperate climate                              | Secondary forest, deciduous                                                           | Takanori Sato                  |
| 170.01 | Mt. Hakkoda Forest_400B                    | Japan              | 40.59 | 140.96 | 416  | 9.00  | 1501 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 170.02 | Mt. Hakkoda Forest_600B                    | Japan              | 40.60 | 140.95 | 649  | 7.90  | 1501 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 170.03 | Mt. Hakkoda Forest_800B                    | Japan              | 40.64 | 140.93 | 791  | 7.00  | 1501 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 170.04 | Mt. Hakkoda Forest_1000A                   | Japan              | 40.66 | 140.85 | 980  | 6.50  | 1501 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 170.05 | Mt. Hakkoda Forest_1200A                   | Japan              | 40.67 | 140.87 | 1214 | 5.50  | 1501 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 170.06 | Mt. Hakkoda Forest_1400A                   | Japan              | 40.67 | 140.87 | 1404 | 4.90  | 1412 | Warm-temperate, humid climate                  | Natural forest                                                                        | Hiroko Kurokawa                |
| 171    | Ashiu Experimental Forest                  | Japan              | 36.01 | 137.00 | 260  | 9.00  | 2065 | Temperate climate                              | Natural Forest                                                                        | Takeshi Ise                    |
| 172    | Kamigamo Experimental Station              | Japan              | 34.08 | 135.77 | 220  | 12.30 | 2498 | Warm-temperate, humid climate                  | Natural Forest                                                                        | Naoko Tokuchi                  |
| 173    | Shiiba Research Forest                     | Japan              | 32.40 | 131.17 | 1050 | 12.50 | 3072 | Warm-temperate, humid climate                  | Natural mixed forest                                                                  | Takuo Hishi                    |
| 174    | Sugadaira                                  | Japan              | 36.52 | 138.50 | 1320 | 10.60 | 1239 | Warm-temperate, humid climate                  | Grassland, Natural forest                                                             | Tanaka Kenta                   |
| 175    | Tomakomai Experimental Forest              | Japan              | 42.70 | 141.57 | 80   | 6.70  | 1112 | Temperate climate                              | Secondary forest, deciduous                                                           | Tatsuro Nakaji                 |
| 401    | Kapiti                                     | Kenya              | -1.60 | 37.13  | 1646 | 17.80 | 1004 | Semi-arid tropical climate                     | Rangeland                                                                             | Tsutom Hiura                   |
| 402    | Nairobi                                    | Kenya              | -1.27 | 16.72  | 1857 | 18.90 | 592  | Subtropical highland climate                   | Grassland                                                                             | Victoria Carbonell             |
| 176    | Engure LTSE                                | Latvia             | 57.29 | 23.15  | 10   | 6.30  | 634  | Temperate climate                              | Pine Forest                                                                           | Inara Melece                   |
| 179    | Engure LTSE                                | Latvia             | 57.30 | 23.05  | 7    | 6.30  | 634  | Temperate climate                              | Deciduous Forest                                                                      | Inara Melece                   |
| 180.01 | Aukstaitija IMS                            | Lithuania          | 55.46 | 26.00  | 188  | 5.70  | 658  | Temperate climate                              | Forest, coniferous                                                                    | Algirdas Augustaitis           |
| 180.02 | Aukstaitija IMS                            | Lithuania          | 55.45 | 26.07  | 159  | 5.70  | 658  | Temperate climate                              | Forest, coniferous                                                                    | Algirdas Augustaitis           |
| 181    | Zemaitija IMS                              | Lithuania          | 56.02 | 21.89  | 170  | 6.10  | 790  | Temperate climate                              | Forest, coniferous                                                                    | Algirdas Augustaitis           |
| 182    | Forest Research Institute Malaysia, Kepong | Malaysia, Selangor | 3.24  | 101.63 | 82   | 26.10 | 358  | Equatorial humid climate; tropical rain forest | Planted and naturally regenerating forest                                             | Jeyanny Vijayanathan           |
| 183    | SSDE-1                                     | Mali               | 15.32 | -9.05  | 270  | 28.10 | 1500 | Subtropical arid climate                       | NA                                                                                    | Niall Hanan                    |
| 184    | SSDE-2                                     | Mali               | 14.53 | -9.97  | 262  | 27.90 | 712  | Semi-arid tropical climate                     | NA                                                                                    | Niall Hanan                    |
| 185    | SSDE-3                                     | Mali               | 12.88 | -8.48  | 370  | 27.00 | 986  | Semi-arid tropical climate                     | NA                                                                                    | Niall Hanan                    |
| 186    | SSDE-4                                     | Mali               | 11.60 | -7.05  | 368  | 27.20 | 1017 | Semi-arid tropical climate                     | NA                                                                                    | Niall Hanan                    |
| 187    | SSDE-5                                     | Mali               | 11.03 | -6.08  | 347  | 27.10 | 1105 | Semi-arid tropical climate                     | NA                                                                                    | Niall Hanan                    |
| 188    | Estero Pargo                               | Mexico             | 18.65 | -91.76 | 1    | 26.40 | 1502 | Equatorial humid climate; tropical rain forest | Natural mangrove forest                                                               | José Gilberto Cardoso Mohedano |

(continued on next page)

Table 2s (continued)

| Site ID | Site                                               | Country     | Latitude | Longitude | Altitude<br>(m asl) | MAT<br>(°C) | MAP<br>(mm) | Biome                                          | Type of biotope                                          | Contact                     |
|---------|----------------------------------------------------|-------------|----------|-----------|---------------------|-------------|-------------|------------------------------------------------|----------------------------------------------------------|-----------------------------|
| 189     | ESTERO DE URIAS LAGOON                             | Mexico      | 23.17    | -106.33   | 1                   | 24.80       | 752         | Mediterranean climate                          | Natural mangrove forest                                  | Ana Carolina Ruiz Fernández |
| 192     | MARISMAS NACIONALES                                | Mexico      | 22.41    | -105.64   | 1                   | 25.10       | 1627        | Mediterranean climate                          | Natural mangrove forest                                  | Joan-Albert Sanchez Cabeza  |
| 193     | SALAZAR FOREST                                     | Mexico      | 19.29    | -99.38    | 3124                | 12.40       | 1098        | Subtropical arid climate                       | Sacred fir and pinus forest                              | Eduardo Ordoñez Regil       |
| 332.01  | Vole (BLA_VOL)                                     | Norway      | 61.90    | 9.14      | 1100                | 0.28        | 563         | Boreal climate                                 | Alpine Tundra (low alpine lichen heath)                  | Dirk Wundram                |
| 332.02  | Derik (BLA_DER)                                    | Norway      | 61.91    | 9.18      | 1221                | -0.17       | 629         | Boreal climate                                 | Alpine Tundra (low alpine lichen heath)                  | Dirk Wundram                |
| 332.03  | Skurvehøe (BLA_GRA)                                | Norway      | 61.90    | 9.22      | 1365                | -0.54       | 713         | Boreal climate                                 | Alpine Tundra (low alpine lichen heath)                  | Dirk Wundram                |
| 332.04  | Rundhøe (BLA_RUN)                                  | Norway      | 61.91    | 9.25      | 1565                | -1.11       | 804         | Boreal climate                                 | Alpine Tundra (mid alpine lichen heath)                  | Dirk Wundram                |
| 452.01  | Iskoras_Finnmark                                   | Norway      | 69.42    | 25.61     | 350                 | -0.50       | 360         | Boreal climate                                 | tundra palsa mire (dry palsa w intact permafrost)        | Casper T. Christiansen      |
| 452.02  | Iskoras_Finnmark                                   | Norway      | 69.42    | 25.61     | 350                 | -0.50       | 360         | Boreal climate                                 | tundra palsa mire (degrading palsa, degraded permafrost) | Casper T. Christiansen      |
| 452.03  | Iskoras_Finnmark                                   | Norway      | 69.42    | 25.61     | 350                 | -0.50       | 360         | Boreal climate                                 | tundra palsa mire (thaw pond, degraded permafrost)       | Casper T. Christiansen      |
| 201     | Wadi Nar station                                   | Palestine   | 31.72    | 35.29     | 415                 | 18.30       | 412         | Subtropical arid climate                       | Olive orchard                                            | Jawad Shoqeir               |
| 202.01  | Companhia das Lezírias                             | Portugal    | 38.84    | -8.77     | 60                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.02  | Companhia das Lezírias                             | Portugal    | 38.85    | -8.78     | 43                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.03  | Companhia das Lezírias                             | Portugal    | 38.86    | -8.78     | 47                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.04  | Companhia das Lezírias                             | Portugal    | 38.83    | -8.81     | 43                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.05  | Companhia das Lezírias                             | Portugal    | 38.83    | -8.81     | 42                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.06  | Companhia das Lezírias                             | Portugal    | 38.81    | -8.80     | 50                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.07  | Companhia das Lezírias                             | Portugal    | 38.80    | -8.82     | 45                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.08  | Companhia das Lezírias                             | Portugal    | 38.84    | -8.82     | 28                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.09  | Companhia das Lezírias                             | Portugal    | 38.84    | -8.83     | 27                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.1   | Companhia das Lezírias                             | Portugal    | 38.83    | -8.84     | 30                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.11  | Companhia das Lezírias                             | Portugal    | 38.81    | -8.85     | 31                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 202.12  | Companhia das Lezírias                             | Portugal    | 38.82    | -8.86     | 28                  | 17.43       | 774         | Mediterranean climate                          | Evergreen cork oak forest                                | Cristina Branquinho         |
| 203     | Ria de Aveiro                                      | Portugal    | 40.60    | -8.74     | 1                   | 14.30       | 800         | Mediterranean climate                          | Wetland, Salt marsh                                      | Ana I. Lillebø              |
| 203.01  | Ria de Aveiro                                      | Portugal    | 40.60    | -8.74     | 1                   | 14.30       | 800         | Mediterranean climate                          | Wetland, Salt marsh                                      | Ana I. Lillebø              |
| 204     | Luquillo Experimental Forest                       | Puerto Rico | 18.34    | -65.83    | 61                  | 25.40       | 1943        | Equatorial humid climate; tropical rain forest | NA                                                       | Jill Thompson               |
| 205     | Elevational gradient                               | Puerto Rico | 18.34    | -65.83    | 61                  | 25.07       | 2003        | Equatorial humid climate; tropical rain forest | NA                                                       | Grizelle González           |
| 431     | Qatar 1 Acacia                                     | Qatar       | 25.51    | 51.41     | 10                  | 26.70       | 71          | Subtropical arid climate                       | Acacia dryland                                           | Juha Alatalo                |
| 432     | Qatar 2 mangrove                                   | Qatar       | 25.74    | 51.58     | 0                   | 26.70       | 71          | Subtropical arid climate                       | Arid mangrove                                            | Juha Alatalo                |
| 433     | Qatar 3 Saltmarsh veg                              | Qatar       | 25.73    | 51.58     | 1                   | 26.70       | 71          | Subtropical arid climate                       | Arid saltmarsh with vegetation                           | Juha Alatalo                |
| 434     | Qatar 4 mangrove planted                           | Qatar       | 25.66    | 51.55     | 0                   | 26.70       | 71          | Subtropical arid climate                       | Arid planted magrove                                     | Juha Alatalo                |
| 435     | Qatar 5 saltmarsh without veg                      | Qatar       | 25.66    | 51.54     | 1                   | 26.70       | 71          | Subtropical arid climate                       | Arid saltmarsh without vegetation                        | Juha Alatalo                |
| 436     | Qatar 6 Grass                                      | Qatar       | 25.22    | 51.29     | 10                  | 26.70       | 71          | Subtropical arid climate                       | Arid grassland                                           | Juha Alatalo                |
| 437     | Qatar 7 Zygothphyllum                              | Qatar       | 25.23    | 51.29     | 10                  | 26.70       | 71          | Subtropical arid climate                       | Zygothphyllum dryland                                    | Juha Alatalo                |
| 438     | Qatar 8 Acacia                                     | Qatar       | 25.41    | 51.46     | 10                  | 26.70       | 71          | Subtropical arid climate                       | Acacia dryland                                           | Juha Alatalo                |
| 439     | Qatar 9 Mangrove                                   | Qatar       | 25.70    | 51.55     | 0                   | 26.70       | 71          | Subtropical arid climate                       | Arid mangrove                                            | Juha Alatalo                |
| 440     | Qatar 10 saltmarsh veg                             | Qatar       | 25.70    | 51.55     | 1                   | 26.70       | 71          | Subtropical arid climate                       | Arid saltmarsh with vegetation                           | Juha Alatalo                |
| 206     | Braila Islands LTSER                               | Romania     | 44.89    | 27.86     | 9                   | 11.50       | 454         | Arid-temperate climate                         | Wetland                                                  | Elena Preda                 |
| 207     | Braila Islands LTSER                               | Romania     | 44.89    | 27.86     | 9                   | 11.50       | 454         | Arid-temperate climate                         | Wetland                                                  | Elena Preda                 |
| 208     | Neajlov basin LTSER                                | Romania     | 44.34    | 25.67     | 85                  | 10.80       | 598         | Temperate climate                              | Forest                                                   | Elena Preda                 |
| 209     | Neajlov basin LTSER                                | Romania     | 44.34    | 25.67     | 85                  | 10.80       | 598         | Temperate climate                              | Forest                                                   | Elena Preda                 |
| 331.01  | RO-CRO, SE Carpathians, Rodna Mts., Rebra Peak     | Romania     | 47.59    | 24.64     | 2250                | 1.60        | 1255        | Temperate climate                              | Alpine grassland                                         | Mihai Pușcaș                |
| 331.02  | RO-CRO, SE Carpathians, Rodna Mts., Buhăiescu Peak | Romania     | 47.58    | 24.63     | 2200                | 1.60        | 1255        | Temperate climate                              | Alpine grassland                                         | Mihai Pușcaș                |
| 331.03  | RO-CRO, SE Carpathians, Rodna Mts., Gropile Peak   | Romania     | 47.57    | 24.62     | 2050                | 1.60        | 1255        | Temperate climate                              | Alpine grassland                                         | Mihai Pușcaș                |
| 272.01  | Tigirek Strict Reserve, Plot 01                    | Russia      | 51.06    | 82.99     | 1426                | 1.60        | 1120        | Temperate climate                              | Alpine meadow                                            | Evgeny Davydov              |
| 272.03  | Tigirek Strict Reserve, Plot 03                    | Russia      | 51.11    | 83.05     | 994                 | 1.60        | 980         | Temperate climate                              | Meadow                                                   | Evgeny Davydov              |
| 272.05  | Tigirek Strict Reserve, Plot 05                    | Russia      | 51.05    | 82.98     | 1493                | 1.60        | 1120        | Temperate climate                              | Natural forest (Pinus sibirica open forest)              | Evgeny Davydov              |

|        |                                                        |              |        |        |      |        |      |                          |                                                                                 |                        |
|--------|--------------------------------------------------------|--------------|--------|--------|------|--------|------|--------------------------|---------------------------------------------------------------------------------|------------------------|
| 272.06 | Tigirek Strict Reserve, Plot 06                        | Russia       | 51.04  | 83.00  | 1572 | 1.60   | 1120 | Temperate climate        | Natural forest + meadow (timberline)                                            | Evgeny Davydov         |
| 272.07 | Tigirek Strict Reserve, Plot 07                        | Russia       | 51.04  | 83.00  | 1391 | 1.60   | 1120 | Temperate climate        | Natural forest (montane)                                                        | Evgeny Davydov         |
| 272.08 | Tigirek Strict Reserve, Plot 08                        | Russia       | 51.04  | 83.00  | 1453 | 1.60   | 1120 | Temperate climate        | Natural forest + meadow (timberline)                                            | Evgeny Davydov         |
| 272.09 | Tigirek Strict Reserve, Plot 09                        | Russia       | 51.01  | 83.00  | 1537 | 1.60   | 1120 | Temperate climate        | Natural forest + meadow (timberline)                                            | Evgeny Davydov         |
| 272.1  | Tigirek Strict Reserve, Plot 10                        | Russia       | 51.11  | 83.02  | 948  | 1.60   | 980  | Temperate climate        | Natural forest (Abies sibirica)                                                 | Evgeny Davydov         |
| 272.12 | Tigirek Strict Reserve, Plot 12                        | Russia       | 51.05  | 82.99  | 1526 | 1.60   | 1120 | Temperate climate        | Natural forest (Pinus sibirica open forest)                                     | Evgeny Davydov         |
| 272.13 | Tigirek Strict Reserve, Plot 13                        | Russia       | 51.06  | 82.99  | 1455 | 1.60   | 1120 | Temperate climate        | Subalpine tall-grasses                                                          | Evgeny Davydov         |
| 272.14 | Tigirek Strict Reserve, Plot 14                        | Russia       | 51.06  | 82.99  | 1432 | 1.60   | 1120 | Temperate climate        | Alpine meadow                                                                   | Evgeny Davydov         |
| 273.01 | State Nature Reserv "Stolby", Plot 01                  | Russia       | 55.91  | 92.73  | 703  | 1.10   | 552  | Boreal climate           | Natural forest (Pinus sylvestris L., Larix sibirica Ledeb.)                     | Elena Tropina          |
| 273.02 | State Nature Reserv "Stolby", Plot 02                  | Russia       | 55.95  | 92.83  | 285  | 1.20   | 471  | Boreal climate           | Natural forest (Populus tremula L.)                                             | Elena Tropina          |
| 273.03 | State Nature Reserv "Stolby", Plot 03                  | Russia       | 55.71  | 92.93  | 239  | 1.20   | 471  | Boreal climate           | Natural forest (Betula pendula Roth)                                            | Elena Tropina          |
| 273.04 | State Nature Reserv "Stolby", Plot 04                  | Russia       | 55.74  | 92.78  | 218  | 1.20   | 471  | Boreal climate           | Mesophytic meadow                                                               | Elena Tropina          |
| 273.05 | State Nature Reserv "Stolby", Plot 05                  | Russia       | 55.79  | 92.72  | 214  | 1.20   | 471  | Boreal climate           | Mesophytic meadow                                                               | Elena Tropina          |
| 273.06 | State Nature Reserv "Stolby", Plot 06                  | Russia       | 55.83  | 92.81  | 722  | 1.10   | 552  | Boreal climate           | Natural forest (Pinus sylvestris L., Larix sibirica Ledeb.)                     | Elena Tropina          |
| 273.07 | State Nature Reserv "Stolby", Plot 07                  | Russia       | 55.85  | 92.83  | 673  | 1.10   | 552  | Boreal climate           | Natural forest (Abies sibirica Ledeb.) + wet meadow                             | Elena Tropina          |
| 273.08 | State Nature Reserv "Stolby", Plot 08                  | Russia       | 55.91  | 92.89  | 208  | 1.20   | 471  | Boreal climate           | Mesophytic meadow                                                               | Elena Tropina          |
| 273.09 | State Nature Reserv "Stolby", Plot 09                  | Russia       | 55.87  | 92.94  | 709  | 1.10   | 552  | Boreal climate           | Natural forest (Pinus sylvestris L., Larix sibirica Ledeb., Populus tremula L.) | Elena Tropina          |
| 273.10 | State Nature Reserv "Stolby", Plot 10                  | Russia       | 55.89  | 92.92  | 263  | 1.20   | 471  | Boreal climate           | Mesophytic meadow                                                               | Elena Tropina          |
| 274    | State Nature Reserv "Olekminsky"                       | Russia       | 58.00  | 121.00 | 450  | -8.60  | 424  | Boreal climate           | Natural forest (Pinus sylvestris L., Larix gmelinii (Rupr.) Rupr.)              | Yury Rozhkov           |
| 301    | Northeast Science Station, Cherskiy, Russia            | Russia       | 68.74  | 161.41 | 30   | -11.60 | 230  | Arctic climate           | Larch forest                                                                    | Heather Alexander      |
| 443    | Mukhrino Field Station                                 | Russia       | 60.89  | 68.70  | 50   | 8.20   | 545  | Boreal climate           | Raised bog                                                                      | Nina Filippova         |
| 317    | Aktru                                                  | Russia       | 50.08  | 87.78  | 2140 | -5.20  | 430  | Boreal climate           | Alpine tundra                                                                   | Roberto Cazzolla Gatti |
| 318    | Ob River                                               | Russia       | 57.20  | 84.32  | 70   | 0.30   | 532  | Boreal climate           | Taiga forest and wetlands                                                       | Roberto Cazzolla Gatti |
| 451    | Khibiny Station                                        | Russia       | 67.64  | 33.73  | 320  | -1.70  | 600  | Boreal climate           | Podsolic, peat                                                                  | Yulia Zaika            |
| 210.01 | Fruska gora                                            | Serbia       | 45.14  | 19.64  | 403  | 11.10  | 679  | Temperate climate        | Deciduous Forest                                                                | Dušana Krašić          |
| 210.02 | Fruska gora                                            | Serbia       | 45.14  | 19.65  | 478  | 11.10  | 679  | Temperate climate        | Deciduous Forest                                                                | Dušana Krašić          |
| 210.03 | Fruska gora                                            | Serbia       | 45.14  | 19.68  | 468  | 11.10  | 679  | Temperate climate        | Deciduous Forest                                                                | Dušana Krašić          |
| 212.01 | Podunajská nížina Lowland forest                       | Slovakia     | 48.28  | 17.32  | 173  | 9.40   | 669  | Temperate climate        | Vineyard on loess                                                               | Róbert Kanka           |
| 212.02 | Podunajská nížina Lowland vineyard                     | Slovakia     | 48.28  | 17.32  | 173  | 9.40   | 669  | Temperate climate        | Pannonian oak and hornbeam forest                                               | Róbert Kanka           |
| 212.03 | Podunajská nížina Lowland grove grassland              | Slovakia     | 48.31  | 17.29  | 177  | 9.40   | 669  | Temperate climate        | Cherry orchard (Cerasus avium)                                                  | Róbert Kanka           |
| 212.04 | Podunajská nížina Lowland orchard-garden               | Slovakia     | 48.31  | 17.29  | 177  | 9.40   | 669  | Temperate climate        | Lowland ruderalised meadow                                                      | Róbert Kanka           |
| 213    | Tatry, LTER                                            | Slovakia     | 49.08  | 20.23  | 1100 | 5.40   | 781  | Temperate climate        | Temperate oniferous forest                                                      | Peter Fleischer        |
| 214    | Kralova hola                                           | Slovakia     | 48.89  | 20.13  | 1850 | 3.80   | 1017 | Temperate climate        | Alpine grassland                                                                | Veronika Piscová       |
| 215    | Jalovecka dolina                                       | Slovakia     | 49.22  | 19.67  | 1893 | 2.90   | 1259 | Temperate climate        | Alpine grassland                                                                | Veronika Piscová       |
| 216    | Báb                                                    | Slovakia     | 48.30  | 17.89  | 190  | 9.70   | 600  | Temperate climate        | Thermophilic oak forest                                                         | Veronika Piscová       |
| 217    | Kremnické vrchy Ecological Experimental Station        | Slovakia     | 48.63  | 19.07  | 500  | 7.80   | 742  | Temperate climate        | Temperate deciduous forest                                                      | Milan Barna            |
| 218    | Hodruska vrchovina                                     | Slovakia     | 48.55  | 18.86  | 470  | 7.60   | 768  | Temperate climate        | Temperate deciduous forest                                                      | Milan Barna            |
| 219    | Stiavnické vrchy                                       | Slovakia     | 48.55  | 18.95  | 600  | 7.60   | 768  | Temperate climate        | Temperate deciduous forest                                                      | Milan Barna            |
| 220    | Javorie                                                | Slovakia     | 48.50  | 19.19  | 785  | 6.70   | 794  | Temperate climate        | Temperate deciduous forest                                                      | Milan Barna            |
| 223    | Tierberg Karoo Research Station, SAEON Arid Lands Node | South Africa | -33.17 | 22.27  | 752  | 17.80  | 177  | Subtropical arid climate | Livestock/large game enclosure within wildlife ranch                            | Joh Henschel           |
| 222    | Wolwekraal Nature Reserve                              | South Africa | -33.20 | 22.03  | 567  | 17.80  | 177  | Subtropical arid climate | Protected Nature Reserve                                                        | Joh Henschel           |
| 224    | Collserola                                             | Spain        | 41.43  | 2.08   | 255  | 16.10  | 613  | Mediterranean climate    | Protected Nature Reserve                                                        | Anna Avila             |
| 225    | Montseny                                               | Spain        | 41.47  | 2.21   | 760  | 12.60  | 839  | Mediterranean climate    | Protected Nature Reserve                                                        | Fernando Maestre       |
| 226    | Valdemoro                                              | Spain        | 40.19  | -3.60  | 622  | 16.60  | 631  | Mediterranean climate    | Protected area with wild and domestic grazers                                   | Fernando Maestre       |
| 324.1  | ES-SIC-BAR                                             | Spain        | 40.78  | -3.98  | 2170 | 8.95   | 599  | Mediterranean climate    | Alpine shrubland                                                                | Rosario G. Gavilán     |
| 324.2  | ES-SIC-GUA                                             | Spain        | 40.79  | -3.98  | 2210 | 8.95   | 599  | Mediterranean climate    | Alpine grassland                                                                | Rosario G. Gavilán     |
| 324.3  | ES-SIC-VAL                                             | Spain        | 40.79  | -3.96  | 2270 | 8.95   | 599  | Mediterranean climate    | Alpine grassland                                                                | Rosario G. Gavilán     |
| 324.4  | ES-SIC-HEM                                             | Spain        | 40.83  | -3.97  | 2270 | 8.95   | 599  | Mediterranean climate    | Alpine grassland                                                                | Rosario G. Gavilán     |
| 344.1  | ES-CPY-ACU                                             | Spain        | 42.64  | -0.06  | 2242 | 6.90   | 1383 | Temperate climate        | Subalpine environment                                                           | Juan J. Jiménez        |

(continued on next page)

**Table 2s** (continued)

| Site ID | Site                                     | Country     | Latitude | Longitude | Altitude<br>(m asl) | MAT<br>(°C) | MAP<br>(mm) | Biome                         | Type of biotope                                                                    | Contact               |
|---------|------------------------------------------|-------------|----------|-----------|---------------------|-------------|-------------|-------------------------------|------------------------------------------------------------------------------------|-----------------------|
| 344.2   | ES-CPY-CUS                               | Spain       | 42.65    | 0.03      | 2519                | 4.90        | 1576        | Temperate climate             | Alpine (inferior)                                                                  | Juan J. Jiménez       |
| 344.3   | ES-CPY-TOB                               | Spain       | 42.66    | -0.01     | 2779                | 4.90        | 1590        | Temperate climate             | Alpine                                                                             | Juan J. Jiménez       |
| 344.4   | ES-CPY-OLA                               | Spain       | 42.66    | 0.05      | 3022                | 3.40        | 1621        | Temperate climate             | Subnival rock                                                                      | Juan J. Jiménez       |
| 440.01  | E. Llebrete_ PN. Aiguestortes            | Spain       | 42.92    | 1.48      | 1683                | 8.80        | 980         | Temperate climate             | Mountain grass                                                                     | Esperança Gacia       |
| 440.02  | Aiguadasi_ PN. Aiguestortes              | Spain       | 42.95    | 1.55      | 1898                | 10.50       | 871         | Temperate climate             | Peatland forest                                                                    | Esperança Gacia       |
| 440.03  | Portarró_ PN. Aiguestortes               | Spain       | 42.96    | 1.60      | 2046                | 10.50       | 871         | Temperate climate             | Mountain grass                                                                     | Esperança Gacia       |
| 460     | Ayora                                    | Spain       | 39.12    | -0.95     | 1050                | 15.10       | 457         | Mediterranean climate         | Mediterranean mixed shrub                                                          | Alejandro Valdecantos |
| 461     | San Vicente Del Raspeig                  | Spain       | 38.38    | -0.58     | 158                 | 18.00       | 306         | Mediterranean climate         | Mediterranean mixed shrub                                                          | Alejandro Valdecantos |
| 462     | Albatera                                 | Spain       | 38.23    | -0.91     | 212                 | 18.20       | 278         | Mediterranean climate         | Mediterranean mixed shrub                                                          | David Fuentes         |
| 463     | Crevillente                              | Spain       | 38.24    | -0.87     | 208                 | 18.20       | 278         | Mediterranean climate         | Mediterranean mixed shrub                                                          | David Fuentes         |
| 228     | Aneboda IM                               | Sweden      | 57.11    | 14.55     | 240                 | 5.80        | 750         | Temperate climate             | Coniferous forest                                                                  | Stefan Löfgren        |
| 229     | Kindla IM                                | Sweden      | 59.75    | 14.91     | 320                 | 4.20        | 900         | Boreal climate                | Coniferous forest                                                                  | Stefan Löfgren        |
| 354     | Uppsala -ECOLINK-Salix                   | Sweden      | 60.44    | 18.08     | 22                  | 5.60        | 470         | Temperate climate             | Arable Land                                                                        | Martin Weih           |
| 429     | Latnjajaure Climate change               | Sweden      | 68.21    | 18.29     | 1000                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.01  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 900                 | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.02  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 1000                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.03  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 1100                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.04  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 1200                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.05  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 1300                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 430.06  | Latnjajaure height transect<br>900-1400m | Sweden      | 68.21    | 18.29     | 1400                | -2.70       | 659         | Arctic climate                | Alpine tundra                                                                      | Juha Alatalo          |
| 230     | Vordemwald                               | Switzerland | 47.27    | 7.89      | 480                 | 8.80        | 1028        | Temperate climate             | Temperate mixed forest                                                             | Marcus Schaub         |
| 231     | Bettlachstock                            | Switzerland | 47.23    | 7.42      | 1149                | 7.40        | 1113        | Temperate climate             | Temperate deciduous forest                                                         | Marcus Schaub         |
| 232     | Pfynwald                                 | Switzerland | 46.30    | 7.61      | 615                 | 3.60        | 1418        | Temperate climate             | Xeric mature Scots pine forest                                                     | Marcus Schaub         |
| 233     | Novaggio                                 | Switzerland | 46.02    | 8.84      | 950                 | 9.90        | 1272        | Temperate climate             | Unmanaged former coppice forest                                                    | Marcus Schaub         |
| 234     | Beatenberg                               | Switzerland | 46.70    | 7.76      | 1511                | 6.20        | 1235        | Temperate climate             | Temperate spruce forest                                                            | Marcus Schaub         |
| 235     | Schänis                                  | Switzerland | 47.17    | 9.07      | 733                 | 6.00        | 1364        | Temperate climate             | Temperate beech forest                                                             | Marcus Schaub         |
| 236     | Birmensdorf                              | Switzerland | 47.36    | 8.45      | 550                 | 8.80        | 1103        | Temperate climate             | Temperate mixed forest                                                             | Marcus Schaub         |
| 237     | Salgesch                                 | Switzerland | 46.32    | 7.58      | 805                 | 3.60        | 1418        | Temperate climate             | Xeric mature Scots pine forest                                                     | Marcus Schaub         |
| 340.01  | La Ly                                    | Switzerland | 46.03    | 7.25      | 2351                | 2.60        | 1544        | Temperate climate             | Dry subalpine-alpine grassland and<br>heath, historical grazing but no more<br>now | Jean-Paul Theurillat  |
| 340.02  | Mt Brülé                                 | Switzerland | 46.02    | 7.20      | 2547                | 2.60        | 1544        | Temperate climate             | Dry alpine grassland, no grazing                                                   | Jean-Paul Theurillat  |
| 406.01  | SN1-MBU                                  | Switzerland | 46.64    | 10.24     | 2423                | 0.20        | 1143        | Temperate climate             | Grassland, rock and scree, no landuse                                              | Sonja Wipf            |
| 406.02  | SN1-MCH                                  | Switzerland | 46.64    | 10.23     | 2532                | 0.20        | 1143        | Temperate climate             | Grassland, rock and scree, no landuse                                              | Sonja Wipf            |
| 406.03  | SN1-CUO                                  | Switzerland | 46.72    | 10.17     | 2804                | 0.80        | 1146        | Temperate climate             | Nival rock and scree, no landuse                                                   | Sonja Wipf            |
| 407.01  | SN2-MCS                                  | Switzerland | 46.74    | 10.43     | 2412                | 0.10        | 1179        | Temperate climate             | Grassland, rock and scree, low intensity<br>cow grazing                            | Sonja Wipf            |
| 407.02  | SN2-MIN                                  | Switzerland | 46.65    | 10.34     | 2507                | 0.40        | 1105        | Temperate climate             | Grassland, some low shrubs, some cow<br>grazing                                    | Sonja Wipf            |
| 407.03  | SN2-MDG                                  | Switzerland | 46.69    | 10.33     | 2785                | 0.80        | 1146        | Temperate climate             | Grassland, rock and scree, low intensity<br>cow grazing                            | Sonja Wipf            |
| 238     | Fushan                                   | Taiwan      | 24.76    | 121.60    | 720                 | 21.00       | 3025        | Warm-temperate, humid climate | Natural subtropical mixed broadleaf rain<br>forest                                 | Chiao-Ping Wang       |
| 239     | YYL                                      | Taiwan      | 24.59    | 121.42    | 1650                | 15.10       | 2659        | Warm-temperate, humid climate | Subtropical mountain cloud coniferous<br>forest                                    | Chiao-Ping Wang       |

|        |                                                             |          |        |         |      |        |      |                            |                                     |                      |
|--------|-------------------------------------------------------------|----------|--------|---------|------|--------|------|----------------------------|-------------------------------------|----------------------|
| 410    | Kenting Karst Forest Dynamics Plot                          | Taiwan   | 21.97  | 120.82  | 260  | 24.00  | 2637 | Equatorial humid climate   | Natural tropical rain forest        | Chiao-Ping Wang      |
| 415    | Chia-Yi Litchi Orchard                                      | Taiwan   | 23.15  | 120.47  | 48   | 23.40  | 2338 | Semi-arid tropical climate | Agriculture(Orchard)                | Chi-Ling Chen        |
| 416    | Gu-Keng Litchi Orchard                                      | Taiwan   | 23.62  | 120.62  | 400  | 21.60  | 2637 | Semi-arid tropical climate | Agriculture(Orchard)                | Chi-Ling Chen        |
| 417    | Min-jian Tea Garden                                         | Taiwan   | 23.82  | 120.65  | 413  | 22.60  | 2000 | Semi-arid tropical climate | Agriculture(Tea Garden)             | Chi-Ling Chen        |
| 240    | 12 experimental sites                                       | UK       | 0.00   | 0.00    | NA   | NA     | NA   | Temperate climate          | NA                                  | Jill Thompson        |
| 357    | Bangor Diverse                                              | UK       | 53.23  | -4.13   | 10   | 9.00   | 1045 | Temperate climate          | NA                                  | Andy Smith           |
| 360    | Climate-match (Hucking, Kent, UK)                           | UK       | 53.40  | -0.30   | 44   | 9.30   | 763  | Temperate climate          | Formerly Arable; Ungrazed pasture   | Nadia Barsoum        |
| 241    | Harvard Forest                                              | USA      | 42.00  | -73.20  | 310  | 7.30   | 1246 | Temperate climate          | Temperate forest                    | Jim Tang             |
| 242    | Toolik Station                                              | USA      | 68.63  | -149.60 | 760  | -11.70 | 229  | Arctic climate             | Arctic tundra                       | Jim Tang             |
| 243    | Waquoit Bay salt marsh                                      | USA      | 41.37  | -70.50  | 1    | 10.00  | 1138 | Temperate climate          | Salt marsh                          | Jim Tang             |
| 244    | H.J. Andrews Forest                                         | USA      | 44.37  | 122.37  | 162  | 7.90   | 1663 | Temperate climate          | Old-growth forest                   | Kate Lajtha          |
| 245    | Central Arizona-Phoenix LTER                                | USA      | 33.60  | -112.50 | 448  | 21.10  | 198  | Arid-temperate climate     | Desert                              | Sally Wittlinger     |
| 246    | Mansfield_SC1                                               | USA      | 44.51  | -72.84  | 565  | 5.20   | 1070 | Temperate climate          | Mixed forest                        | Carol Adair          |
| 247    | Smithsonian Environmental Research Center                   | USA      | 38.88  | -76.55  | 1    | 13.30  | 1091 | Temperate climate          | Deciduous forest                    | Katalin Szlavecz     |
| 248    | Smithsonian Global Change Research Wetland                  | USA      | 38.89  | -77.03  | 1    | 12.90  | 1035 | Temperate climate          | Salt marsh                          | Thomas J. Mozdzer    |
| 249    | PIE-LTER (TIDE Project)                                     | USA      | 42.72  | 70.85   | 2    | 9.50   | 1191 | Temperate climate          | Salt marsh                          | Thomas J. Mozdzer    |
| 250    | Reynolds Creek CZO                                          | USA      | 43.21  | -116.75 | 1200 | 7.70   | 330  | Arid-temperate climate     | Sagebrush steppe                    | Marie-Anne de Graaff |
| 251    | Cedar Point Biological Station                              | USA      | 41.21  | -101.67 | 982  | 9.10   | 447  | Arid-temperate climate     | Short Grass Prairie                 | Johannes M H Knops   |
| 252.01 | Bartlett Experimental Forest Site C6                        | USA      | 44.04  | -71.28  | 460  | 5.50   | 1270 | Temperate climate          | Northern hardwood forest            | Ruth Yanai           |
| 252.02 | Bartlett Experimental Forest Site C8                        | USA      | 44.05  | -71.30  | 330  | 5.50   | 1270 | Temperate climate          | Northern hardwood forest            | Ruth Yanai           |
| 253    | Hubbard Brook Experimental Forest (MELNHE)                  | USA      | 43.93  | -71.73  | 500  | 7.40   | 1123 | Temperate climate          | Northern hardwood forest            | Matt Vadeboncoeur    |
| 254    | Jeffers Brook                                               | USA      | 44.05  | -72.47  | 730  | 5.10   | 1077 | Temperate climate          | Northern hardwood forest            | Ruth Yanai           |
| 255    | Hubbard Brook Experimental Forest (ISE)                     | USA      | 43.94  | -71.76  | 500  | 7.40   | 1123 | Temperate climate          | Northern hardwood forest            | Matt Vadeboncoeur    |
| 256    | Hubbard Brook Experimental Forest (DroughtNet)              | USA      | 43.95  | -71.70  | 265  | 7.40   | 1123 | Temperate climate          | Northern hardwood forest            | Matt Vadeboncoeur    |
| 258    | Cummins Creek Wilderness Area, Oregon                       | USA      | 44.45  | -124.17 | NA   | 9.40   | 2555 | Temperate climate          | NA                                  | Andy Moldenke        |
| 259    | Mary's Peak, Oregon                                         | USA      | 44.83  | -123.93 | 98   | 10.40  | 2215 | Temperate climate          | NA                                  | Andy Moldenke        |
| 260    | Andrews Forest, LTER, Oregon                                | USA      | 44.37  | -122.42 | 564  | 8.60   | 2072 | Temperate climate          | NA                                  | Andy Moldenke        |
| 261    | Andrews Forest, LTER, Oregon                                | USA      | 44.37  | -122.22 | 628  | 6.80   | 2143 | Temperate climate          | NA                                  | Andy Moldenke        |
| 262    | Andrews Forest, LTER, Oregon                                | USA      | 44.37  | -122.22 | 628  | 6.80   | 2143 | Temperate climate          | NA                                  | Andy Moldenke        |
| 263    | Metolius River Natural Area, Oregon                         | USA      | 44.82  | -122.05 | 739  | 7.10   | 2123 | Temperate climate          | NA                                  | Andy Moldenke        |
| 264    | Sisters, Oregon                                             | USA      | 44.29  | -121.55 | 971  | 6.60   | 641  | Temperate climate          | NA                                  | Andy Moldenke        |
| 265    | Sky Oaks Field Station                                      | USA      | 33.35  | 116.63  | 1420 | 15.40  | 269  | Mediterranean climate      | Chaparral                           | George Vourlitis     |
| 266    | Santa Margarita Ecological Reserve                          | USA      | 33.48  | 117.18  | 254  | 16.60  | 396  | Mediterranean climate      | Coastal sage scrub (soft chaparral) | George Vourlitis     |
| 267    | Ten Thousand Islands National Wildlife Refuge               | USA      | 25.23  | -81.12  | 0    | 23.80  | 1219 | Semi-arid tropical climate | NA                                  | Sean Charles         |
| 278    | Eight Mile Lake, Healy, Alaska                              | USA      | 63.88  | -149.25 | 684  | -1.00  | 384  | Boreal climate             | Boreal-tundra ecotone               | Rebecca Hewitt       |
| 279    | Murphy Dome, Fairbanks, Alaska                              | USA      | 64.88  | -148.39 | 210  | -3.00  | 275  | Boreal climate             | Boreal forest                       | Rebecca Hewitt       |
| 280    | VCU_Rice_Rivers_Center_Swamp                                | USA      | 37.33  | -77.21  | 0    | 14.30  | 1123 | Temperate climate          | Tidal Swamp Wetland                 | Joe Morina           |
| 330    | US-PIO                                                      | USA      | 45.49  | -112.48 | 2865 | 10.00  | 330  | Temperate climate          | Northern coniferous forest          | Martha Apple         |
| 365    | IDENT-Cloquet                                               | USA      | 46.68  | -92.52  | 382  | 2.60   | 717  | Temperate climate          | Forest                              | Artur Stefanski      |
| 374    | Hwange                                                      | Zimbabwe | -19.01 | 26.30   | 1010 | 21.60  | 524  | Semi-arid tropical climate | Savannah                            | Hervé Fritz          |
| 393    | ZAHG-2 Hwange National Park – Fixed vegetation plots        | Zimbabwe | -19.01 | 26.50   | 1038 | 21.20  | 546  | Semi-arid tropical climate | Savannah                            | Hervé Fritz          |
| 394    | ZAHG-3 Hwange National Park – Sinamatella Mopane            | Zimbabwe | -19.01 | 26.50   | 1038 | 21.20  | 546  | Semi-arid tropical climate | Savannah                            | Hervé Fritz          |
| 395    | ZAHG-4 Hwange National Park - Main Camp Waterhole transects | Zimbabwe | -19.01 | 26.50   | 1038 | 21.20  | 546  | Semi-arid tropical climate | Savannah                            | Hervé Fritz          |
| 396    | ZAHG-5 Magoli Village – Hwange District                     | Zimbabwe | -19.01 | 26.50   | 1038 | 21.20  | 546  | Semi-arid tropical climate | Savannah                            | Hervé Fritz          |

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