

Table S1. Biotope description

| Biotope         | Identification within the SBP-BioBlitz<br>(Nicolai et al., 2020) | Vegetation cover according to Louvel et al. (2013)                                                        |
|-----------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Meadow (MW)     | Z2_Pa2                                                           | Atlantic <i>Arrhenatherum</i> grassland                                                                   |
| Heathland (HL)  | Z2_La2                                                           | Anglo-Armorican <i>Erica cinerea</i> – <i>Agrostis curtisii</i> heaths                                    |
| Oak forest (OF) | Z2_Bo6                                                           | Mixed atlantic <i>Quercus petraea</i> - <i>Quercus robur</i> forest with <i>Hyacinthoides non-scripta</i> |

Louvel, J., Gaudillat, V., Poncet, L., 2013. EUNIS, European Nature Information System, Système d'information européen sur la nature. Classification des habitats. Traduction française. Habitats terrestres et d'eau douce. Paris.

Nicolai, A., Guernion, M., Guillocheau, S., Hoeffner, K., Le Gouar, P., Ménard, N., Piscart, C., Vallet, D., Hervé, M., Benezeth, E., Chedanne, H., Blémus, J., Vernon, P., Cyllly, D., Hotte, H., Loïs, G., Mai, B., Perez, G., Ouisse, T., Monard, C., Wiegand, C., Caudal, J.-P., Butet, A., Dahirel, M., Barbe, L., Balbi, M., Briand, V., Bormans, M., Charrier, M., Bouger, G., Jung, V., Le Lann, C., Pannard, A., Petillon, J., Rantier, Y., Marguerie, D., Tougeron, K., Devogel, P., Dugravot, S., Dubos, T., Garrin, M., Carnet, M., Gouraud, C., Chambet, A., Esnault, J., Poupelin, M., Welk, E., Bütof, A., Dubois, G., Humbert, G., Marie-Réau, O., Norvez, O., Richard, G., Froger, B., Rochais, C., Potthoff, M., Ayati, K., Bellido, A., Rissel, A., Santonja, M., Farcy, J.-O., Collias, E., Sene, L., Cluzeau, D., Supper, R., 2020. Transdisciplinary bioblitz: rapid biotic and abiotic inventory allows studying environmental changes over 60 years at the Biological Field Station of Paimpont (Brittany, France) and opens new interdisciplinary research opportunities. Biodiversity Data Journal 8, e50451. doi:10.3897/BDJ.8.e50451

Table S2. Soil temperatures and relative humidity measured during VOC samplings.

|     | Soil temperature (n = 3) | Relative humidity |
|-----|--------------------------|-------------------|
| MW1 | 26.3 ± 1.6               | 85.0              |
| MW2 | 22.3 ± 0.3               | 89.5              |
| MW3 | 20.8 ± 0.2               | 89.5              |
| MW4 | 21.2 ± 0.1               | 92.0              |
| HL1 | 25.0 ± 0.6               | 86.5              |
| HL2 | 20.9 ± 0.2               | 89.5              |
| HL3 | 19.3 ± 0.2               | 90.5              |
| HL4 | 19.8 ± 0.2               | 94.0              |
| OF1 | 19.7 ± 0.1               | 84.0              |
| OF2 | 19.0 ± 0.1               | 89.0              |
| OF3 | 18.7 ± 0.1               | 93.5              |
| OF4 | 17.9 ± 0.2               | 92.5              |

Table S3. VOCs molecule assignation for several masses detected by PTR-MS in this study and references in which the molecule assigned has already been described as emitted by soils.

| Protonated masses | Assignment                 | References                                                      |
|-------------------|----------------------------|-----------------------------------------------------------------|
| m33               | Methanol                   | Aaltonen et al., 2013; Warneke et al., 1999; Veres et al., 2014 |
| m43               | Acetic acid (fragment 30%) | McNeal & Herbert, 2009 ; Seewald et al., 2010                   |
| m45               | Acetaldehyde               | Aaltonen et al., 2013; Zhao et al., 2016                        |
| m59               | Acetone                    | Seewald et al., 2010; Veres et al., 2014 ; Zhao et al., 2016    |
| m61               | Acetic acid (fragment 70%) | McNeal & Herbert, 2009; Seewald et al., 2010                    |
| m69               | Isoprene                   | Veres et al., 2014                                              |
| m95               | Phenol                     | Feilberg et al., 2015                                           |

- Aaltonen, H., Aalto, J., Kolari, P., Pihlatie, M., Pumpanen, J., Kulmala, M., Nikinmaa, E., Vesala, T., Bäck, J., 2013. Continuous VOC flux measurements on boreal forest floor. *Plant Soil* 369, 241–256. doi:10.1007/s11104-012-1553-4
- Feilberg, A., Bildsoe, P., Nyord, T., 2015. Application of PTR-MS for measuring odorant emissions from soil application of manure slurry. *Sensors (Basel)*. 15, 1148–1167. doi:10.3390/s150101148
- McNeal, K.S., Herbert, B.E., 2009. Volatile organic metabolites as indicators of soil microbial activity and community composition shifts. *Soil Sci. Soc. Am. J.* 73, 579–588. doi:10.2136/sssaj2007.0245
- Seewald, M.S.A., Singer, W., Knapp, B.A., Franke-Whittle, I.H., Hansel, A., Insam, H., 2010. Substrate-induced volatile organic compound emissions from compost-amended soils. *Biol. Fertil. Soils* 46, 371–382. doi:10.1007/s00374-010-0445-0
- Veres, P.R., Behrendt, T., Klapthor, A., Meixner, F.X., Williams, J., 2014. Volatile Organic Compound emissions from soil: using Proton-Transfer-Reaction Time-of-Flight Mass Spectrometry (PTR-TOF-MS) for the real time observation of microbial processes. *Biogeosciences Discuss.* 11, 12009–12038. doi:10.5194/bgd-11-12009-2014
- Warneke, C., Thomas, K., Judmaier, H., Hansel, A., Jordan, A., Lindinger, W., 1999. Acetone, methanol, and other partially oxidized volatile organic emissions from dead plant matter by abiological processes: Significance for atmospheric HOx chemistry. *Global Biogeochem. Cycles* 13, 9–17. doi:10.1029/98GB02428
- Zhao, J., Wang, Z., Wu, T., Wang, X., Dai, W., Zhang, Yujie, Wang, R., Zhang, Yonggan, Shi, C., 2016. Volatile organic compound emissions from straw-amended agricultural soils and their relations to bacterial communities: A laboratory study. *J. Environ. Sci.* 45, 257–269. doi:10.1016/j.jes.2015.12.036

Table S4. Correlation coefficients of the VOC masses with the two constraint RDA axis.

| VOC MASSES        | RDA AXIS 1 | RDA AXIS 2   |
|-------------------|------------|--------------|
| M35               | 0.9530297  | -0.023768606 |
| M41               | 0.8440369  | 0.012148277  |
| M43               | -0.1334147 | 0.657952768  |
| M45/M33           | 0.8807039  | 0.084942990  |
| M47               | -0.2707166 | 0.336265995  |
| M54               | 0.9027322  | 0.003621637  |
| M59               | 0.7677341  | 0.088547465  |
| M61               | -0.5343021 | 0.529998278  |
| M63               | 0.9058259  | -0.089346408 |
| M65               | 0.2197493  | 0.301016098  |
| M69               | 0.6634564  | 0.075286079  |
| M73/M57           | 0.9308551  | -0.034642172 |
| M75               | 0.1865265  | 0.189143893  |
| M77               | 0.8024801  | -0.079978857 |
| M79               | -0.1538144 | 0.577961620  |
| M81/M71/M56/M51   | 0.7593600  | -0.034185531 |
| M83               | 0.8117048  | -0.035994041 |
| M89               | 0.3117661  | 0.228044894  |
| M93               | 0.4139291  | 0.496036978  |
| M95               | 0.4068913  | -0.114929046 |
| M101/M87          | 0.6537864  | 0.091433327  |
| M109              | 0.2355596  | 0.082113374  |
| M121/M107/M91/M60 | 0.4709930  | 0.067238805  |
| M126              | 0.4928505  | 0.320466896  |

Table S5. Correlation coefficients of the environmental variables with the two constraint RDA axis.

| PARAMETERS                       | RDA AXIS 1  | RDA AXIS 2  |
|----------------------------------|-------------|-------------|
| RH                               | -0.81305860 | -0.32784841 |
| RAINFALL/ATMOSPHERIC TEMPERATURE | 0.94338358  | -0.12210358 |
| CLAY                             | -0.28787925 | -0.46809160 |
| LOAM                             | -0.13878522 | -0.26024857 |
| N CONTENT/SAND                   | 0.10448653  | 0.20793596  |
| PH                               | 0.05567505  | 0.04521722  |
| BACTERIAL RICHNESS               | -0.03826312 | -0.01704568 |
| PLANT RICHNESS                   | 0.29350964  | 0.46417024  |
| OM/CEC/WC                        | -0.15959446 | -0.21709798 |

Figure S1. Site localisation within the area of the BioBlitz at the Biological Field Station of Paimpont, France (MW: Meadow, HL: Heathland, OF: Oak Forest)

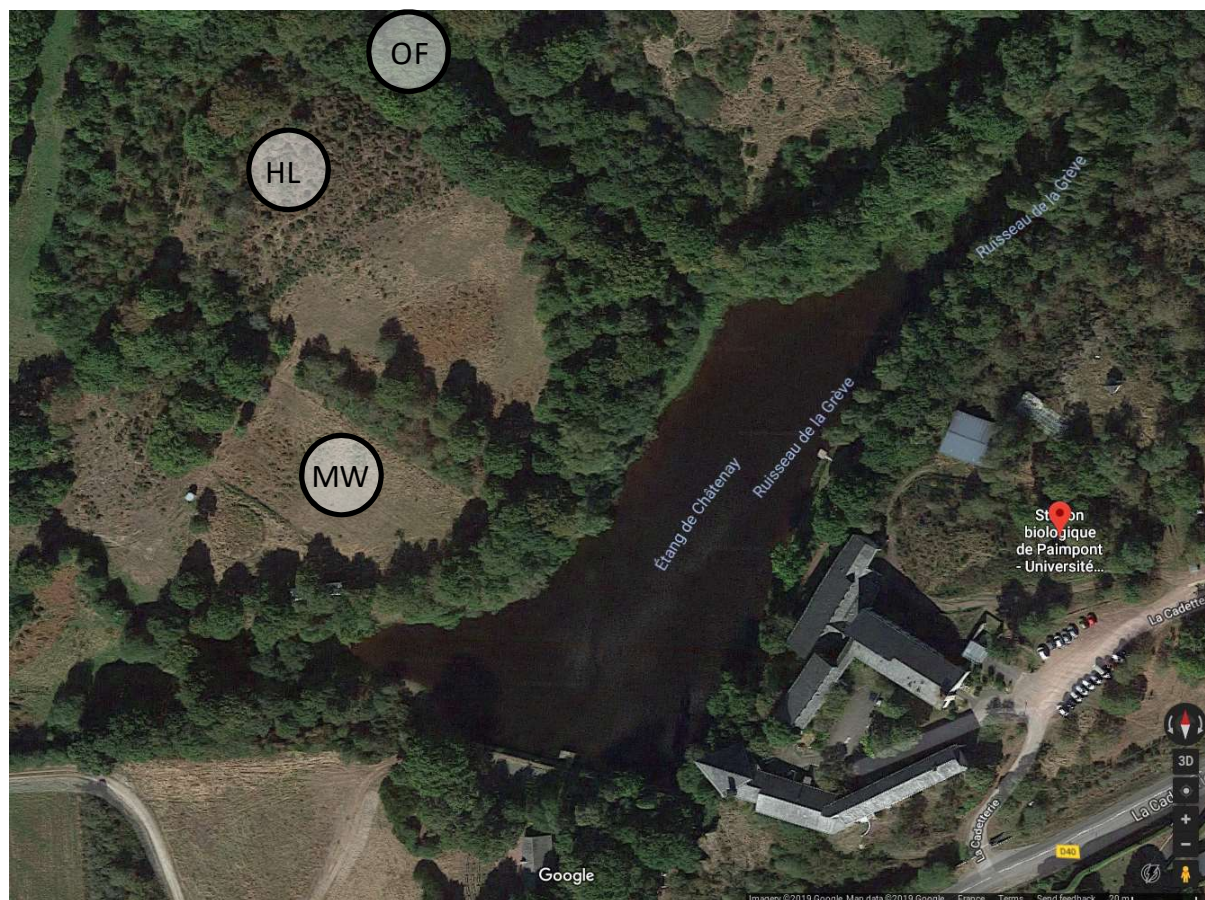


Figure S2. Plant species richness in the three biotopes

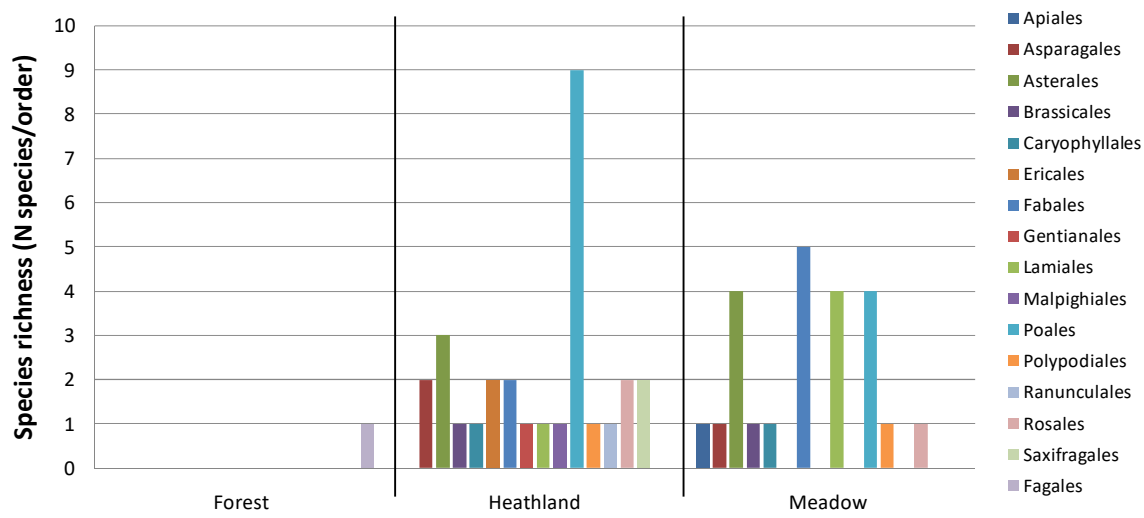


Figure S3. Vegetation cover in the collar on which the chamber was placed for VOCs sampling in A. the meadow, B. the heathland and C. the oak forest

A



B



C



Figure S4. Heatmap representation of Spearman correlations between fluxes of VOC masses and the presence of bacterial T-RFs

