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Table 1. Lists the sites' characteristics including their identification name, location, climate, soil type, dominant vegetation and species, corresponding PFT fractions we used for the ORCHIDEE simulations, and reference studies for more details. The spatial distribution of the sites is represented in Fig. B1 in Appendix B.

	Grassland	Savannah-like grassland	Deciduous broadleaf forest	Agricultural soybean field	Evergreen needleleaf forest	Boreal evergreen needleleaf forest	Temperate deciduous broadleaf forest
Country	Austria	Spain	Denmark	Italy	Estonia	Finland	United States
Sampling site	Neustift	Las Majadas del Tiétar CE9	Sorø	Rivignano	Järvselja	Hyytiälä	Harvard
ID	AT-NEU	ES-LMA	DK-SOR	IT-CRO	ET-JA	FI-HYY	US-HA
Coordinates CE10	47°07′ N, 11°19′ E	39°56′ N, 5°46′ W	55°29′ N, 11°38′ E	45°52′ N, 13°05′ E	58°16′ N, 27°18′ E	61.85° N, 24.29° E	42.54° N, 72.17° W
Climate	Humid continental	Mediterranean	Temperate maritime	Humid subtropical	Temperate	Boreal	Cool, moist temperate
Soil type	Fluvisol	Abruptic Luvisol	Luvisols or Chernozems	Silt loam	Haplic Gleysol	Haplic Podzol	Podzol and Regosol
Dominant vegetation	Graminoids: *Dactylis glomerata*, *Festuca pratensis* Forbs: *Ranunculus acris*, *Taraxacum officinale*	Tree: *Quercus ilex* Grass: *Vulpia bromoides*	European beech (*Fagus sylvatica)*	Soybean	Norway spruce (*Picea abies)*	Scots pine (*Pinus sylvestris*)	Red oak (*Quercus rubra*), red maple *(Acer rubrum*), hemlock (*Tsuga canadensis*)
ORCHIDEE PFT representation	100 % temperate natural grassland (C_3) (PFT 10)	20 % temperate broadleaf evergreen (PFT 5), 80 % temperate natural grassland (C_3) (PFT 10)	80 % boreal broadleaf summergreen (PFT 8), 20 % boreal natural grassland (C_3) (PFT 15)	100 % C_3 TS8 crops (PFT 12)	50 % boreal needleleaf evergreen (PFT 7), 40 % boreal broadleaf summergreen (PFT 8), 10 % boreal natural grassland (C_3) (PFT 15)	80 % boreal needleleaf evergreen (PFT 7), 20 % boreal natural grassland (C_3) (PFT 15)	80 % temperate broadleaf summergreen (PFT 6), 20 % of temperate natural grassland (C_3) (PFT 10)
References	Hörtnagl et al. (2011), Hörtnagl and Wohlfahrt (2014), Spielmann et al. (2019), Kitz et al. (2020)	Lopez-Sangil et al. (2011), El-Madany et al. (2018), Weiner et al. (2018), Spielmann et al. (2019), Kitz et al. (2020)	Pilegaard et al. (2011), Wu et al. (2013), Brændholt et al. (2018), Spielmann et al. (2019), Kitz et al. (2020)	Spielmann et al. (2019)	Noe et al. (2011, 2015), Kitz et al. (2020)	Kolari et al. (2009), Sun et al. (2018)	Urbanski et al. (2007), Wehr et al. (2017)