

## Supplement Material

Table S1: List of meteorological stations included in the study.

Station name	Federal state <sup>1</sup>	Station index	Start of recording	Longitude	Latitude	Elevation in m
Andau	BGL	7955	1995/07/01	17,0333	47,7725	118
Bruckneudorf	BGL	6102	2007/10/01	16,845	48,0128	166
Eisenstadt-Nordost	BGL	7704	1989/01/01	16,5386	47,8539	184
Neusiedl am See	BGL	7906	2004/08/04	16,8417	47,9508	148
Podersdorf	BGL	7912	2014/07/17	16,8344	47,8661	116
Bad Deutsch-Altenburg	LAT	6111	2010/05/11	16,9067	48,1364	169
Brunn am Gebirge	LAT	5820	2008/09/25	16,27	48,1070	291
Gänserndorf-Stadt	LAT	4224	2004/01/01	16,7136	48,3378	163
Gross-Enzersdorf	LAT	5972	1983/07/01	16,5592	48,1997	154
Gumpoldskirchen	LAT	5881	1990/11/01	16,2822	48,0403	219
Hohenau	LAT	2601	2007/07/01	16,9044	48,6164	154
Laa/Th. Kläranlage	LAT	2401	2006/12/18	16,3897	48,7314	184
Langenlebern	LAT	4081	1992/08/01	16,1181	48,3239	175
Leiser Berge	LAT	2415	1998/04/01	16,3717	48,5589	457
Mistelbach	LAT	2430	2004/07/01	16,61	48,5708	191
Poysdorf-Ost	LAT	2503	1991/12/01	16,6375	48,669	198
Retz/Windmühle	LAT	905	1993/12/01	15,9417	48,7611	320
Schöngraben	LAT	2207	2007/04/01	16,0617	48,6033	253
Schwechat	LAT	5990	1940/08/01	16,5697	48,1103	183
Stockerau	LAT	4030	1997/06/01	16,1925	48,3969	203
Wolkersdorf	LAT	4125	2008/07/23	16,5075	48,3803	185
Zwerndorf	LAT	4305	1996/12/17	16,8314	48,3381	144

<sup>1</sup>BGL = Burgenland; LAT = Lower Austria

Table S2: Soil erodibility classes (0-5; in boldface) of DIN 19706 subject to soil texture and organic content of dry soil according to DIN German Institute for Standardisation [29]

German textural classes	Soil texture		Organic content of dry soil		
	Description	Composition	<1%	1 to 15%	>15 to 30%
Tt	Clay	65-100% Cl, 0-35% Si, 0-35% Sa			
Tu4	Very silty clay	25-45% Cl, 65-75% Si, 0-10% Sa			
Tu3	Medium silty clay	30-45% Cl, 50-65% Si, 0-20% Sa			
Tu2	Low silty clay	45-65% Cl, 30-55% Si, 0-25% Sa			
Tl	Loamy clay	45-65% Cl, 15-30% Si, 5-40% Sa	<b>1</b>	<b>0</b>	<b>1</b>
Ts2	Low sandy clay	45-65% Cl, 0-15% Si, 20-55% Sa			
Ts3	Medium sandy clay	35-45% Cl, 0-15% Si, 40-65% Sa			
Ts4	Very sandy clay	25-35% Cl, 0-15% Si, 50-75% Sa			
Lts	Sandy-clay loam	25-45% Cl, 15-30% Si, 25-60% Sa			
Ls4	Very sandy loam	17-25% Cl, 15-30% Si, 45-68% Sa			
Ls3	Medium sandy loam	17-25% Cl, 30-40% Si, 35-53% Sa			
Ls2	Low sandy loam	17-25% Cl, 40-50% Si, 25-43% Sa			
Lt2	Low clay loam	25-35% Cl, 30-50% Si, 15-45% Sa			
Lt3	Medium clay loam	35-45% Cl, 30-50% Si, 5-35% Sa			
Lu	Silty loam	17-30% Cl, 50-65% Si, 5-33% Sa			
Uu	Silt	0-8% Cl, 80-100% Si, 0-20% Sa	<b>2</b>	<b>1</b>	<b>2</b>
Ut2	Low clay silt	8-12% Cl, 65-92% Si, 0-27% Sa			
Ut3	Medium clay silt	12-17% Cl, 65-88% Si, 0-23% Sa			
Ut4	Very clay silt	17-25% Cl, 65-83% Si, 0-18% Sa			
Uls	Sandy-loamy silt	8-17% Cl, 50-65% Si, 18-42% Sa			
Sl4	Very loamy sand	12-17% Cl, 10-40% Si, 43-78% Sa			
St3	Medium clay sand	17-25% Cl, 0-15% Si, 60-83% Sa			

Us	Sandy silt	0-8% Cl, 50-80% Si, 12-50% Sa			
Slu	Silty-loamy sand	8-17% Cl, 40-50% Si, 33-52% Sa	3	2	3
Sl3	Medium loamy sand	8-12% Cl, 10-40% Si, 48-82% Sa			
St2	Low clay sand	5-17% Cl, 0-10% Si, 73-95% Sa			
Sl2	Low loamy sand	5-8% Cl, 10-25% Si, 67-85% Sa			
Su2	Low silty sand	0-5% Cl, 10-25% Si, 70-90% Sa	4	3	4
Su3	Medium silty sand	0-8% Cl, 25-40% Si, 52-75% Sa			
Su4	Very silty sand	0-8% Cl, 40-50% Si, 42-60% Sa			
mS	Medium sand	<5% Cl, <10% Si, <20% FS, >70% MS, <15% CS			
gS	Coarse sand	<5% Cl, <10% Si, <20% FS, <30% MS, >40% CS			
mSgs	Coarse sandy medium sand	<5% Cl, <10% Si, 0-40% FS, 25-70% MS, 20-50% CS	5	4	5
gS	Coarse sand	<5% Cl, <10% Si, 0-50% FS, 0-50% MS, 50-100% CS			
fSms	Medium sandy fine sand	<5% Cl, <10% Si, 20-50% FS, 40-70% MS, <10% CS			
fS	Fine sand	<5% Cl, 10% Si, >75% FS, <15% MS, few grains CS	5	5	5
mSfs	Fine sandy medium sand	<5% Cl, <10% Si, 50-75% FS, 15-50% MS, <5% CS			
fSgs	Coarse sandy fine sand	<5% Cl, <10% Si, 25-70% FS, 0-40% MS, 20-50% CS			

Cl = Clay, Si = Silt, Sa = Sand, FS = fine Sand, MS = Medium sand, CS = Coarse Sand

0 = no soil erodibility, 1 = very low soil erodibility, 2 = low soil erodibility, 3 = medium soil erodibility, 4 = high soil erodibility, 5 = very high soil erodibility

Note 1: Composition is based on the German textural class breaks: Cl < 2.0 µm, Si 2.0-63 µm, Sa 63-2000 µm, FS 63-200 µm, MS 200-630 µm, CS 630-2000 µm

Note 2: Upper boarders of composition are always meant to be “less than”. We avoid to use < due to better readability.

Table S3: Assignment of protection classes to different types of fruits. Protection classes: 1 (very low), 2 (low), 3 (moderate), 4 (high), 5 (very high), n.c. (not considered)

Type of fruit	Class	Type of fruit	Class
amaranth	1	wheatgrass	2
berries	1	winter caraway (carum carvi)	2
buckwheat (fagopyrum)	1	winter triticale	2
chickpea	1	oil flax	3
corncob	1	green rye	3
field bean (vicia faba)	1	winter wheat (genus triticum)	3
field bean (vicia faba), cereal mixture	1	clover	3
field bean (vicia faba), pea mixture	1	emmer wheat (Triticum dicoccum), einkorn wheat (Triticum monococcum)	3
field vegetable	1	winter canola (brassica rapa subsp. Sylvestris)	3
field vegetables	1	winter corn mixture	3
field vegetables, cucumber	1	winter durum (triticum durum)	3
flower and ornamental plant	1	winter poppy	3
forage beet	1	winter spelt (triticum spelta)	3
forage potatoes	1	giant miscanthus (Miscanthus × giganteus)	4
fruits, hop	1	green fallow	4
grain maize	1	mustard	4
grain pea	1	sudan grass (sorghum × drummondi, sorghum sudanense)	4
green maize	1	winter barley (hordeum vulgare)	4
hemp	1	winter oat (avena sativa)	4
holy thistle (silybum marianum)	1	winter rape (brassica napus)	4
lentil	1	winter rye (secale cereale)	4
lupin (genus Lupinus)	1	winter vetch (genus vicia)	4
maize	1	abandoned land (20 years)	5
millet	1	annually meadow	5
nectar source fallow	1	annually tree nursery	5
new potatoes	1	apricot	5
new potatoes, buckwheat	1	arbotetum (multiannual)	5
new potatoes, field vegetable	1	bedding meadow	5
new potatoes, maize	1	cherry	5
peas, mixed cereals	1	chestnut (castanea sativa)	5
peas, mixed cereals, buckwheat	1	clover, field vegetable	5
peas, mixed cereals, field vegetables	1	conservation area	5
potatoes	1	copses	5
quinoa (chenopodium quinoa)	1	dessert apple	5

rolled sod	1	dessert pear	5
sainfoin	1	dry stone wall	5
seed corn mixture	1	edible nut	5
seed potatoes	1	elder	5
silage maize	1	forage grass	5
sorghum	1	forest conservation	5
sorghum (genus sorghum)	1	fruit	5
soybean in separate rows	1	grassland natural monument	5
squash (curcubita maxima)	1	grassland pile of stones	5
strawberries	1	grassland pond	5
strawberries, field vegetables	1	grassland riparian margin	5
sugar beet	1	hedges	5
summer caraway (carum carvi)	1	lucerne	5
summer poppy	1	mature reforestation	5
summer vetch (genus vicia)	1	nectarine	5
sunchoke (helianthus tuberosus)	1	other field forage	5
sweet lupins (Lupinus alba)	1	other grasslands	5
sweetcorn	1	other pasture lands	5
table potatoes	1	other vineyards	5
turnip mixture	1	pasture land	5
vetch (genus Vicia)	1	peach	5
vetchlings (genus Lathyrus)	1	permanent crop	5
emmer wheat (Triticum dicoccum), einkorn	2	permanent pasture	5
wheat (Triticum monococcum), summer		plum	5
gold of pleasure	2	primal reforestation	5
medical plant	2	quince	5
oil radish (raphanus sativus var. oleiformis)	2	sour cherry (prunus ceasus)	5
oil squash	2	vine	5
other oil seeds	2	vine nursery	5
peluskins (pisum sativum subsp. sativum var. arvense)	2	vineyard	5
phacelia (genus Phacelia)	2	wood fuel robinia	5
roman fennel	2	wood fuel without robinia	5
soybean	2	flower and ornamental plant covered by foil	n.c.
spice plant	2	flower and ornamental plant in greenhouse	n.c.
St. John's wort	2	fruits in polytunnel	n.c.
summer barley (hordeum vulgare)	2	fruits in greenhouse	n.c.
summer bread wheat (triticum aestivum)	2	other arable fruits	n.c.
summer corn mixture	2	other arable lands	n.c.
summer durum (triticum durum)	2		

summer oat ( <i>avena sativa</i> )	2	other conservation areas	n.c.
summer rape ( <i>brassica napus</i> )	2	other fruits in polytunnel	n.c.
summer rye ( <i>secale cereale</i> )	2	other special frutis	n.c.
summer spelt ( <i>triticum spelta</i> )	2	spice plant in greenhouse	n.c.
summer triticale	2	spice plant in polytunnel	n.c.
summer wheat ( <i>genus triticum</i> )	2	vegetable in greenhouse	n.c.
sunflower ( <i>helianthus annuus</i> )	2	vegetable in polytunnel	n.c.

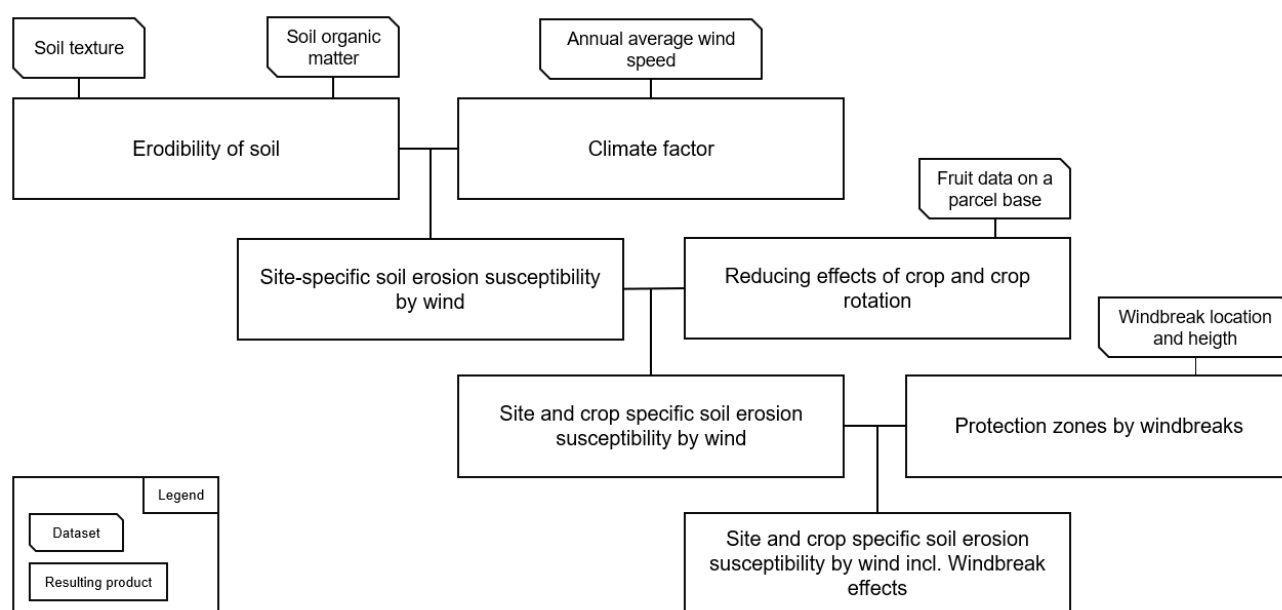


Figure S1: Flow chart of the qualitative wind erosion evaluation scheme DIN 19706 [29]

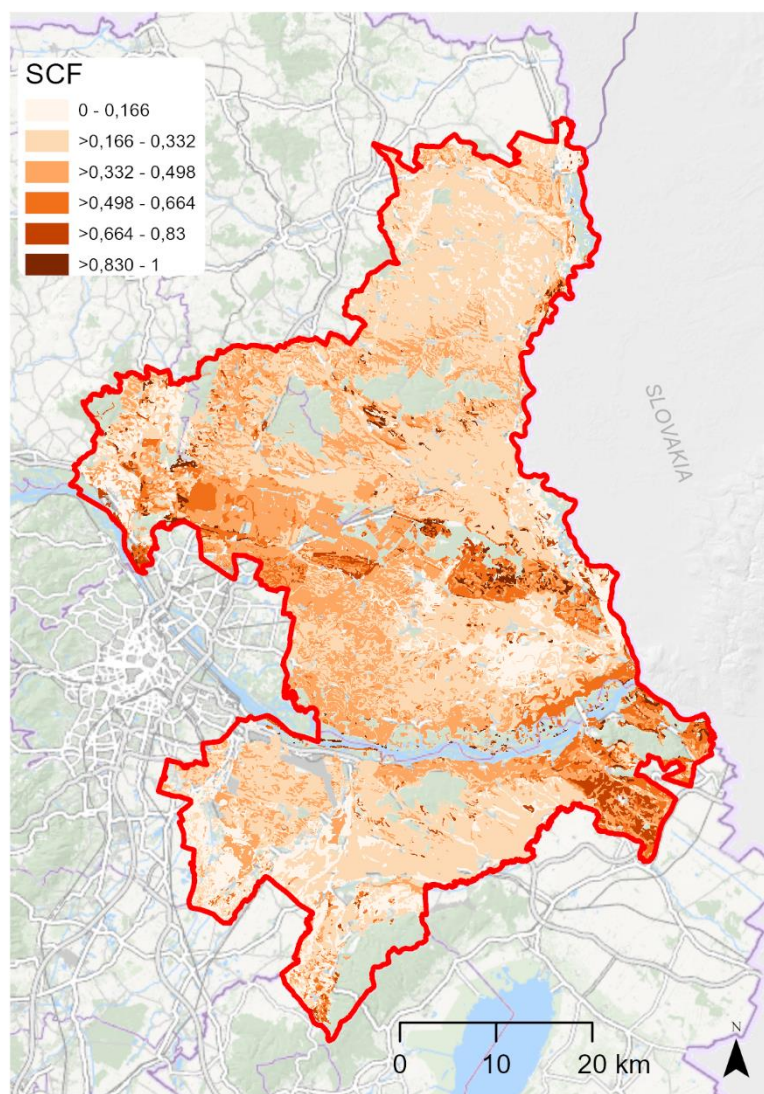


Figure S2: Soil crust factor (SCF) of the revised wind erosion equation for the study region in eastern Austria.

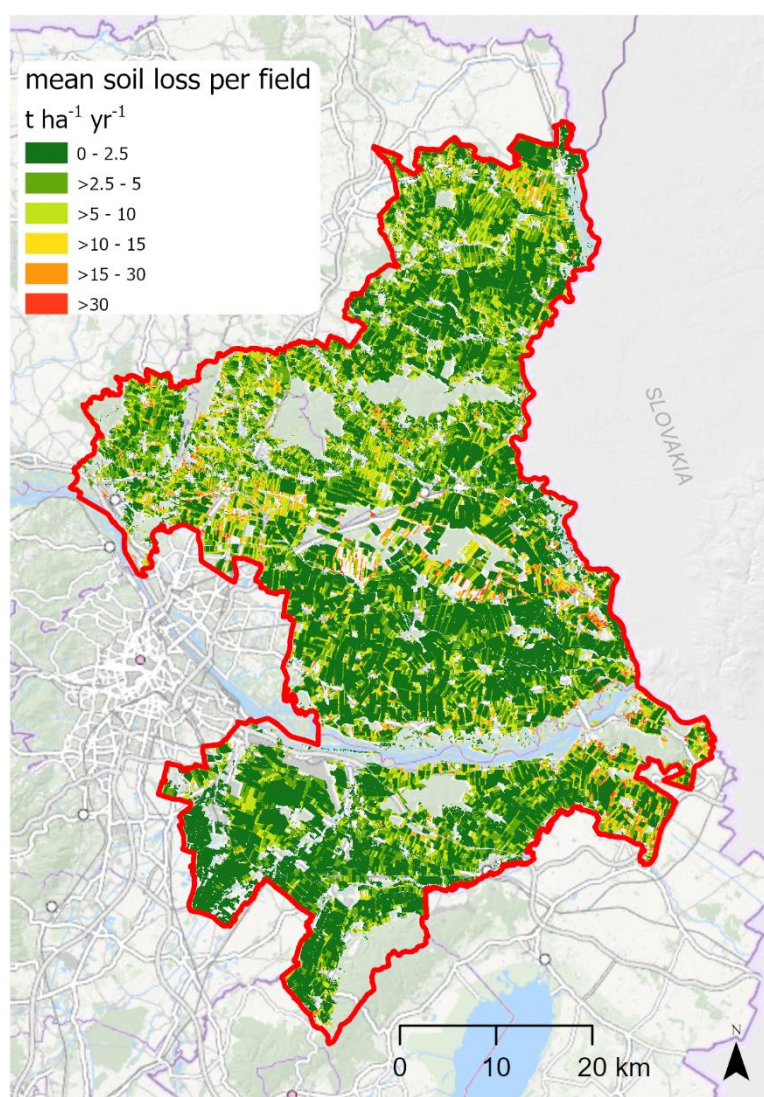


Figure S3: Mean soil loss per field in  $\text{t ha}^{-1} \text{ yr}^{-1}$  based on the revised wind erosion equation modeling.



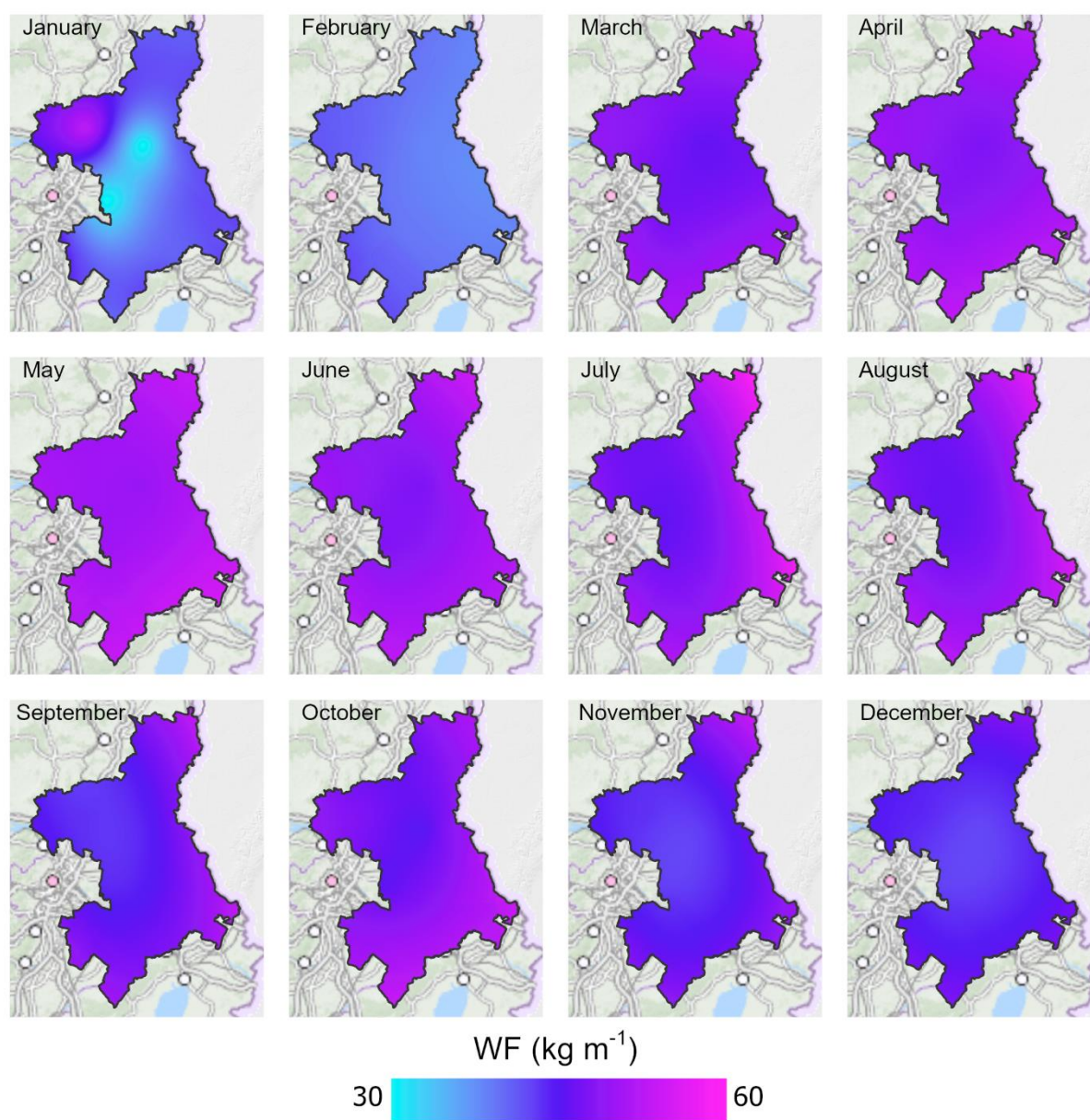


Figure S4: Interpolated weather factor (WF) of the revised wind erosion equation based on daily meteorological data of 22 stations (period 2010–2017).

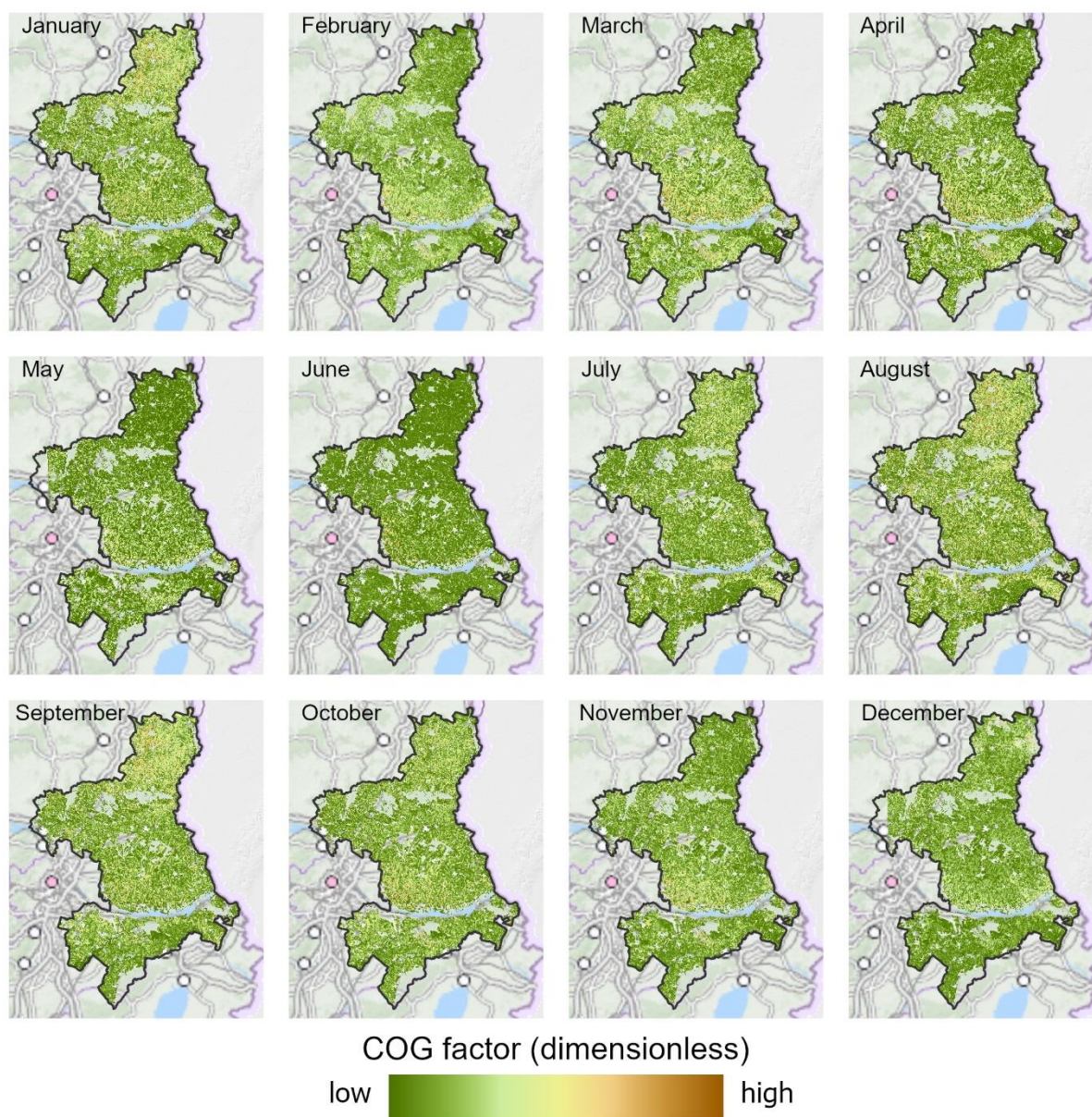


Figure S5: Monthly combined crop factor (COG) of the revised wind erosion equation (dimensionless) for the study region. The smaller the factor, the more soil erosion by wind is reduced. Please note data gaps in the western part of the study region in some months due to missing satellite imagery. Dots represent major cities.



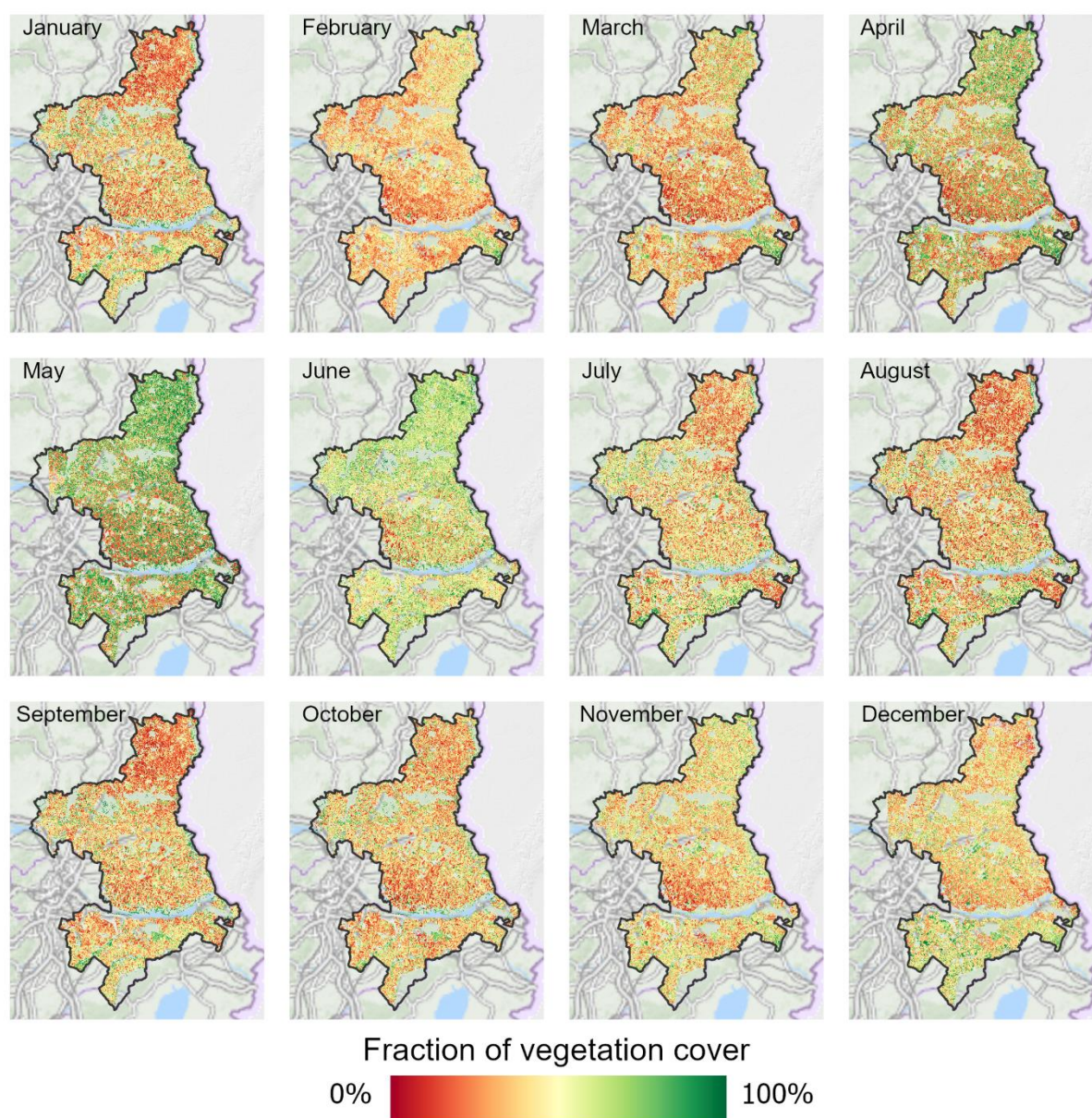


Figure S6: Monthly fraction of vegetation cover derived by Sentinel-2 data for each month (equation 18). Please note data gaps in the western part of the study region in some months (e.g., May, December) due to missing satellite imagery.

Table S4: Distribution of raster cells assigned to soil erosion severity classes according to different classification schemes based on the modeling of annual soil loss rates by revised wind erosion equation. The ranges in brackets below the verbal classification indicate the class borders in  $t\ ha^{-1}\ yr^{-1}$ .

Classification after Zachar [68]	%	Classification after Rezaei et al. [73]	%	Classification after Sharma [74]	%	Classification after Woldemariam et al. [75]	%
weak (0 - 0.5)	30.3	very low (0 - 2.5)	59.6	very low (0 - 5)	77.1	very low (0 - 5)	77.1
slight (>0.5 - 5)	46.8	low (>2.5 - 5)	17.5	low (>5 - 10)	14.3	low (>5 - 10)	14.3
moderate (>5 - 15)	18.8	medium (>5 - 15)	18.8	medium (>10 - 20)	6.3	low medium (>10 - 15)	4.5
severe (>15 - 50)	3.8	high (>15 - 60)	3.9	high (>20)	2.3	medium (>15 - 20)	1.8
very severe (>50 - 200)	0.3	very high (>60)	0.2			high medium (>20 - 25)	0.9
catastrophic (>200)	0.0					high (>25 - 35)	0.8
						very high (>35 - 50)	0.6
						extremely high (>50)	0.0