

SUPPORTING INFORMATION TO ARTICLE:

Towards a hydrological classification of European soils: Preliminary test of its predictive power for the base flow index using river discharge data

Manuel K. Schneider^{1*}, Florian Brunner¹, John M. Hollis², Christian Stamm¹

¹ Eawag, Swiss Federal Institute of Aquatic Science and Technology, 8600 Dübendorf, Switzerland;

² Independent consultant, 58 St.Annes Rd., London Colney, St. Albans, AL2 1LJ, UK

* corresponding author: manuel.schneider@eawag.ch

Phone: +41 44 823 51 18; Fax: +41 44 823 54 71

Contents:

SI-1: Logical decision tree to classify Soil type units in the SGDBE into HOST	2
SI-2: List of discharge stations used in the analysis	4
SI-3: List of explanatory variables used in the evaluation	7

SI-1: Logical decision tree to classify Soil type units in the SGDBE into HOST

Logical operators

Rules are formulated as ***if - then*** clauses with operators ***and*** and ***or***
in means "is one of the items in the following list", e.g. IN (A5,A6) = either A5 or A6
":" means "all in between", e.g. 212:214 = 212, 213, 214

Attributes of SGDBE used:

MAT1: Dominant parent material
WR: Water Regime
HG: Hydrological Class
IL: Impermeable Layer
DGH: Depth to Gleyed Layer
TEXT1: Dominant surface textural class
TEXT2: Secondary surface textural class
USE1: Primary land use

I. Reclassification of parent material (PMnew):

<i>If</i> MAT1 =	<i>then</i> PMnew =
220, 330	A1
200, 209, 210, 212:214, 216:219, 250	A2
311, 410:419, 450, 454, 457	A3
211, 215, 333, 451, 452, 454:456, 825, 830	A4
111, 112, 140, 400, 420:442	A5
150, 500:523	A6
100, 110, 113:120	E2
130, 131, 230:234, 314:324, 331, 332, 340, 350, 453, 530, 600:640, 749	H1
240, 459, 539, 700, 709, 710, 711:732, 739, 740:745, 750:824, 900:902	H2
300, 310, 312:313	H3
910	H4

II. Reclassification of soil type units into HOST classes:

<i>If</i>	<i>then</i> HOST class =
(IL <= 1 or DGH = V) and PMnew = A1	1
(IL <= 1 or DGH = V) and PMnew = A2	2
(IL <= 1 or DGH = V) and PMnew = A3	3
(IL <= 1 or DGH = V) and PMnew = A4	4
(IL <= 1 or DGH = V) and PMnew = A5	5
(IL <= 1 or DGH = V) and PMnew = A6	6
IL > 1 or DGH = M	13
DGH = S	14
(HG = 2 or WR >= 4) and PMnew = A5	7
((HG = 2 or WR >= 4) and D (PMnew = A6)) or PMnew = E2	8
(HG = 2 or WR >= 4) and DGH = S and (PMnew in (A5,A6))	10
DGH = S and (PMnew in (E1,E2))	10
(IL <= 1 or DGH = V) and PMnew = H1	16
(IL <= 1 or DGH = V) and PMnew in (H2,H3)	17
PMnew = H1 and (DGH = M or IL >=2) and (TEXT1 <= 3 and TEXT2 <= 3)	18
PMnew = H2 and (DGH = M or IL >=2) and (TEXT1 <= 3 and TEXT2 <= 3)	19
PMnew = H3 and (DGH = M or IL >=2) and (TEXT1 <= 3 and TEXT2 <= 3)	20
PMnew = H1 and (DGH = M or IL >=2) and (TEXT1 >= 4 or TEXT2 >= 4)	21
PMnew = H2 and (DGH = M or IL >=2) and (TEXT1 >= 4 or TEXT2 >= 4)	22
PMnew = H3 and (DGH = M or IL >=2) and (TEXT1 >= 4 or TEXT2 >= 4)	23
PMnew = H1 and DGH = S	24
PMnew IN (H2,H3) and DGH = S	25
TEXT1 >= 9 or (TEXT1 = 0 and TEXT2 >= 9)	15
(TEXT1 >= 9 or (TEXT1 = 0 and TEXT2 >= 9)) and (HG = 2 or WR >= 4) and (PMnew in (A5,A6,E1,E2))	12
(TEXT1 >= 9 or (TEXT1 = 0 and TEXT2 >= 9)) and (HG = 2 or WR >= 4) and (PMnew in (A5,A6,E1,E2)) and USE1 in (1,3,6,7,12:17)	11
(TEXT1 >= 9 or (TEXT1 = 0 and TEXT2 >= 9)) and PMnew = H1	26
(TEXT1 >= 9 or (TEXT1 = 0 and TEXT2 >= 9)) and PMnew IN (H2,H3)	27
PMnew = H4	29

SI-2: List of discharge stations used in the analysis

Information on the Nr. of years used in the analysis and the group association is given:

A. Catchments governed by major artificial influences, large lake fractions, subsurface water sources or extreme climatic conditions

B. Catchments whose coefficient of variation of the annual BFI was larger than 0.18

C. Catchments in England and Wales

D. Remaining catchments outside England and Wales

¹ Catchments excluded because of insufficient flow data

² Catchment excluded because of more than 60% soil information lost in AIC procedure

River	Station	Country	Latitude	Longitude	Nr of Years	Group
Mondego	Ponte de Ioncais	PT	40.61	-7.52	37	B
Odelouca	M. dos Pachecos	PT	37.3	-8.47	21	B
Le Tholon	Champvallon	FR	47.56	3.21	23	D
L' Ouanne	Toucy	FR	47.44	3.18	23	D
La Dragne	Vandenesse	FR	46.55	3.46	22	D
L' Aussonnelle	Seilh	FR	43.42	1.21	21	B
Le Dadou	St Jean de Jeanne	FR	44.4	2.26	21	D
Le Roubion	Soyans	FR	44.37	5.1	27	D
Le Jabron	Souspierre	FR	44.32	4.58	25	D
La Galaure	St Uze	FR	45.11	4.51	11	D
La Guisane	Casset	FR	44.59	6.29	10	D
La Reyssouze	Montagnat	FR	46.1	5.17	25	B
Sazava	Zruc Nad Sazavou	CZ	49.74	15.1	24	D
Jizera	Zelezny Brod	CZ	50.64	15.28	24	D
Loucna	Dasice	CZ	50.04	15.91	79	D
Divoka Orlice	Nekor	CZ	50.07	16.55	83	A
Morava	Moravicany	CZ	49.76	16.98	88	D
Becva	Teplice	CZ	49.53	17.75	24	D
Kysuca	Kysucke Nove Mesto	SK	49.2978	18.786	71	D
Turiec	Martin	SK	49.0694	18.9125	71	D
Vah	Liptovsky Mikulas	SK	49.0873	19.606	81	D
Slana	Lenartovce	SK	48.3055	20.314	71	D
Torysa	Kosicke Olsany	SK	48.7326	21.3377	71	D
Udava	Adidovce	SK	49.02	22.04	3	D
Poprad	Chmelnica	SK	49.289	20.7316	71	D
Esla	Benamariel	ES	42.37	-5.57	6	D
Arlanza	Peral De Arlanza	ES	42.08	-4.07	6	D
Tajo	Peralejos	ES	40.6	-1.93	6	B
Dyle	Sint-Joris-Weert	BE	50.8	4.63	6	D
Portanete	Pitarque	ES	40.63	-0.6	5	B
Guadalhorce	Bobadilla	ES	37.05	-4.7	6	B
Nedre Bullaren	Vassbotten	SE	58.88	11.54	26	A
Fylleaeen	Simlaengen	SE	56.72	13.12	26	A
Ilzbach	Neudorf bei Ilz	AT	47.0828	15.9436	41	B
Krems	Imbach	AT	48.4458	15.5681	51	D
Venter Ache	Vent	AT	46.8628	10.9186	51	D
Antiesen	Haging	AT	48.2736	13.4511	51	D
Muerz	Kindthal	AT	47.5261	15.4731	36	D
Acheloos	Avlaki	GR	39.18	21.38	3	D

River	Station	Country	Latitude	Longitude	Nr of Years	Group
Kinzig	Schwaibach	DE	48.392	8.033	80	D
Kocher	Neuenstadt	DE	49.23	9.343	.	A ¹
Diemel	Helminghausen	DE	51.381	8.731	63	A
Eder	Schmittlotheim	DE	51.156	8.898	73	D
Fulda	Rotenburg	DE	51.004	9.72	83	D
Ilmenau	Bienenbuettel	DE	53.15	10.464	48	A
Spree	Spremberg	DE	51.577	14.37	28	A
Iller	Kempten	DE	47.732	10.317	38	D
Aterno Sagittario	Alloggiamento Idraulico	IT	42.17	13.83	8	D
Ofanto	S. Samuele di Cafiero	IT	41.3	16.14	4	A ¹
Platani	Passofonduto	IT	37.47	13.67	3	B ²
Imera Merid.	Drasi	IT	37.17	13.94	3	B
Simeto	Ponte Maccarrone	IT	37.65	14.79	3	B
Zala	Zalaapati	HU	46.75	17.17	13	D
Kapos	Kurd	HU	46.45	18.33	16	D
Bodva	Szendor	HU	48.4	20.67	16	D
Gwda	Ptusza	PL	53.3667	16.8	19	D
Flinta	Ryczywol	PL	52.8167	16.8333	19	D
Brosna	Ferbane	IE	53.2694	-7.8269	44	A
Moy	Rahans	IE	54.11	-9.15	28	D
Bonet	Dromahair	IE	54.23	-8.3	39	D
Boyne	Trim	IE	53.555	-6.7917	26	A
Savinja	Veliko Sirje	SI	46.1	15.2	43	D
Lim	Prijepolje	CS	43.38	19.63	13	D
Ibar	Leposavic	CS	43.1	20.8	11	D
Soca	Solkan I	SI	45.98	13.66	58	D
Ewe	Poolewe	GB	57.76	-5.6	33	A
Carron	New Kelso	GB	57.43	-5.43	25	C
Clyde	Daldowie	GB	55.83	-4.12	37	C
Annan	Brydekirk	GB	55.02	-3.27	36	C
Tweed	Boleside	GB	55.59	-2.8	41	C
Ribble	Samlesbury	GB	53.77	-2.62	43	C
Leven	Leven Bridge	GB	54.5	-1.31	44	C
Greta	Rutherford Bridge	GB	54.5	-1.95	43	C
Wharfe	Addingham	GB	53.94	-1.86	26	C
Ure	Westwick Lodge	GB	54.1	-1.46	45	C
Swale	Crakehill	GB	54.15	-1.35	43	C
Browney	Burn Hill	GB	54.74	-1.6	41	C
Bedburn Beck	Bedburn	GB	54.68	-1.82	44	C
Ise Brook	Harrowden Old Mill	GB	52.33	-0.68	58	C
Bedford Ouse	Bedford	GB	52.13	-0.46	71	C
Chelmer	Springfield	GB	51.74	0.48	37	C
Stour	Langham	GB	51.97	0.94	41	C
Colne	Lexden	GB	51.9	0.85	44	C
Taw	Umberleigh	GB	51	-3.98	45	C
Exe	Thorverton	GB	50.8	-3.51	47	C
Itchen	Highbridge-Allbrook	GB	50.99	-1.33	45	C
Thames	Eynsham	GB	51.77	-1.36	48	C
Mimram	Panshanger Park	GB	51.8	-0.14	51	A
Beult	Stile Bridge	GB	51.2	0.52	42	C
Great Stour	Horton	GB	51.26	1.03	39	C
Dee	Manley Hall	GB	52.96	-2.96	66	C
Wye	Ddol Farm	GB	52.3	-3.5	66	C

River	Station	Country	Latitude	Longitude	Nr of Years	Group
Cynon	Abercynon	GB	51.65	-3.33	40	C
Dowles	Brook Dowles	GB	52.38	-2.34	32	C
Roden	Rodington	GB	52.72	-2.61	42	C
Avon	Stareton	GB	52.34	-1.51	41	C
Lygna	Tingvatn	NO	58.4	7.23	71	A
Austena	Austena	NO	58.85	8.1	76	A
Gudena	Aastedbro	DK	55.9	9.62	85	D
Uggerby A	Asted Bro	DK	57.45	10.13	85	D
Ribe A	Stavnager	DK	55.32	8.88	66	D
Brede A	Bredebro	DK	55.06	8.83	80	D
Minija	Kartena	LT	55.9333	21.4833	60	D

SI-3: List of explanatory variables used in the evaluation

Variable	Unit	Data source
Coverage of HOST class	%	reclassified SGDBE
Mean altitude	m	90 m SRTM DEM ¹
Mean slope	°	90 m SRTM DEM ¹
Mean topographic index	ln (m)	90 m SRTM DEM ¹
Latitude	°	GRDC ²
Longitude	°	GRDC ²
Area	km ²	Catchment delineated from 90 m SRTM DEM ¹
Mean annual precipitation sum	mm	New et al. (2002) ³
Mean precipitation intensity	mm / wet day	New et al. (2002) ³

¹ Void-filled seamless SRTM data V2, 2005, International Centre for Tropical Agriculture, available from <http://www.srtm.csi.cgiar.org>)

² Global Runoff Data Centre, Federal Institute of Hydrology, Koblenz, Germany

³ New, M.; Lister, D.; Hulme, M.; Makin, I. A high-resolution data set of surface climate over global land areas. *Climate Research* **2002**, *21*, 1-25.