

Supporting Information for “Setting the Flow Accumulation Threshold Based on Environmental, and Morphological Features to Extract River Networks from Digital Elevation Models”

Contents of this file

Table S1

Table S2

Table S3

Table S4

Table S1. The land use types of MCD12Q1 products.

Order	Land Use Type	Order	Land Use Type
1	Evergreen needleleaf forests	10	Urban and built-up lands
2	Evergreen broadleaf forests	11	Cropland/natural vegetation mosaics
3	Deciduous broadleaf forests	12	Water bodies
4	Mixed forests	13	Deciduous needleleaf forests
5	Woody savannas	14	Permanent snow and ice
6	Savannas	15	Barren
7	Grasslands	16	Closed shrublands
8	Permanent wetlands	17	Open shrublands
9	Croplands		

Table S2. The full name and corresponding abbreviation of lithology datasets.

Full name	Abbreviation	Full name	Abbreviation
Unconsolidated sediments	su	Basic plutonic rocks	pb
Siliciclastic sedimentary rocks	ss	Acid volcanic rocks	va
Mixed sedimentary rocks	sm	Intermediate volcanic rocks	vi
Carbonate sedimentary rocks	sc	Water bodies	wb
Metamorphic rocks	mt	Intermediate plutonic rocks	pi
Acid plutonic rocks	pa	Ice and glaciers	ig
Pyroclastics	py		

Table S3. All factors extracted from the original data (/= dimensionless).

Category	Brief description	Year	Symbol	Unit
Meteorological factors	Average monthly precipitation	2001-2018 (5-9)	PRE	mm
	Average monthly surface runoff	2001-2018 (5-9)	ROF	mm
	Average monthly evapotranspiration	2001-2018 (5-9)	EVP	mm
	Average surface temperature	2001-2018	LTD	°C

(5-9)				
Topographical factors	Maximum terrain altitude	2018	ALT_{max}	m
	Mean terrain altitude	2018	$\overline{ALT}$	m
	Maximum slope	2018	SLP_{max}	°
	Mean slope	2018	$\overline{SLP}$	°
	Maximum surface roughness	2018	SR_{max}	/
	Mean surface roughness	2018	$\overline{SR}$	/
Vegetation factors	Normalized Difference Vegetation Index	2001-2018	NDVI	/
(5-9)				
Anthropogenic factors	Population ratio	2018	Q	%
	Basin light area	2018	L1	/
	Basin light intensity	2018	L2	/
Landscape factors	Landscape percentage of evergreen needleleaf forests	2018	PLAND_1	%
	Landscape percentage of evergreen broadleaf forests	2018	PLAND_2	%
	Landscape percentage of deciduous broadleaf forests	2018	PLAND_3	%
	Landscape percentage of mixed forests	2018	PLAND_4	%
	Landscape percentage of woody savannas	2018	PLAND_5	%
	Landscape percentage of savannas	2018	PLAND_6	%
	Landscape percentage of grasslands	2018	PLAND_7	%
	Landscape percentage of permanent wetlands	2018	PLAND_8	%
	Landscape percentage of croplands	2018	PLAND_9	%
	Landscape percentage of urban and built-up lands	2018	PLAND_10	%
	Landscape percentage of cropland/natural vegetation mosaics	2018	PLAND_11	%
	Landscape percentage of water bodies	2018	PLAND_12	%
	Landscape percentage of deciduous needleleaf forests	2018	PLAND_13	%
	Landscape percentage of permanent snow and ice	2018	PLAND_14	%
	Landscape percentage of barren land	2018	PLAND_15	%
	Landscape percentage of closed shrublands	2018	PLAND_16	%
	Landscape percentage of open shrublands	2018	PLAND_17	%
	Shannon's diversity index	2018	SHDI	%
	Species evenness	2018	SEI	%
	Patch density of evergreen needleleaf forests	2018	PD_1	number/km ²
	Patch density of evergreen broadleaf forests	2018	PD_2	number/ km ²
	Patch density of deciduous broadleaf forests	2018	PD_3	number/ km ²
	Patch density of mixed forests	2018	PD_4	number/ km ²

	Patch density of woody savannas	2018	PD_5	number/ km ²
	Patch density of savannas	2018	PD_6	number/ km ²
	Patch density of grasslands	2018	PD_7	number/ km ²
	Patch density of permanent wetlands	2018	PD_8	number/ km ²
	Patch density of croplands	2018	PD_9	number/ km ²
	Patch density of urban and built-up lands	2018	PD_10	number/ km ²
	Patch density of cropland/natural vegetation mosaics	2018	PD_11	number/ km ²
	Patch density of water bodies	2018	PD_12	number/ km ²
	Patch density of deciduous needleleaf forests	2018	PD_13	number/ km ²
	Patch density of permanent snow and ice	2018	PD_14	number/ km ²
	Patch density of barren land	2018	PD_15	number/ km ²
	Patch density of closed shrublands	2018	PD_16	number/ km ²
	Patch density of open shrublands	2018	PD_17	number/ km ²
Lithology factors	Lithology type	2012	LT	/

Table S4. All factors of Qinghai Province for estimating the river length and the FAT.

PRE	POF	EVP	LTD	ALT _{max}	ALT	SLP _{max}	SLP	SR _{max}	SR	NDVI	Q	PLAND_1	PLAND_5	PLAND_8	PLAND_9
78.7077	19.9647	36.8384	14.3721	6116	5079.5040	72.5853	12.2371	3.3413	1.0371	0.2219	0.0369	0	0	0	0
87.5602	34.3225	47.3496	14.1863	5968	5054.8970	66.0668	10.9417	2.4650	1.0295	0.2814	0.0679	0	0	0	0
96.4525	19.8800	87.1871	16.7525	5652	4481.3440	87.9081	20.2716	27.3944	1.0942	0.5158	0.5877	0.0297	0	0.3959	0
92.4165	17.9910	74.8127	16.4975	5848	4631.2280	87.5519	18.1799	23.4102	1.079	0.4316	1.2362	0	0	0	0
68.9586	14.3569	56.5054	18.2894	5262	4388.3710	62.0392	7.8566	2.1328	1.0152	0.2734	0.0965	0	0	0	0
69.5015	10.6634	60.3815	16.6756	5041	4513.5300	46.4602	7.5495	1.4517	1.0123	0.3783	0.0246	0	0	0	0
55.8817	6.1030	51.9057	19.5547	5330	4551.9880	54.1557	10.3212	1.7077	1.0246	0.2883	0.0148	0	0	0	0
66.0725	25.4738	31.8057	15.4316	6571	5060.2340	71.8585	10.3877	3.2117	1.0273	0.2245	0.0154	0	0	0	0
58.4548	13.9955	30.7770	16.0363	6538	4920.7060	71.2099	9.3943	3.1046	1.0215	0.1925	0.0834	0	0	0	0
91.0892	36.1716	61.7227	16.8300	5365	4785.4660	48.0627	6.5282	1.4963	1.0094	0.3849	0.0108	0	0	0	0
108.4026	14.6661	90.5755	17.2943	5325	4238.0880	74.0999	20.3935	3.6501	1.0916	0.5946	0.1080	0	0	0	0
85.6671	8.6306	75.2241	20.0245	4977	3574.1100	67.7345	19.5802	2.6392	1.0867	0.5664	1.5248	0	0.1333	0.3249	0
75.5293	15.7441	61.4764	17.0078	4973	4456.3990	59.7152	9.9230	1.9830	1.0217	0.3796	0.0279	0	0	0	0
94.1357	34.0929	61.2046	16.2843	5794	4882.9800	64.8890	9.8902	2.3564	1.0261	0.3504	0.0570	0	0	0	0
77.2537	19.4883	70.8093	15.9059	5106	4629.6720	50.9761	7.6505	1.5882	1.0127	0.4252	0.1068	0	0	0	0
70.5359	7.7185	47.8441	19.1200	5747	4726.2030	62.6838	9.9595	2.1791	1.0241	0.2638	0.0134	0	0	0	0
104.1282	12.9649	97.3160	16.4927	5522	4560.0480	68.6478	20.7240	2.7465	1.0944	0.5349	0.1680	0	0	0	0
85.6997	15.0137	83.6567	18.2145	5262	4575.6650	66.2482	11.0855	2.4828	1.0291	0.5040	0.4000	0	0	0	0.0074
52.1250	6.9084	33.4524	16.7830	6226	4676.6820	70.6488	8.3765	3.0179	1.0164	0.1873	0.089	0	0	0	0
93.6286	15.0455	77.2444	18.6116	4913	4154.0360	63.7772	19.4555	2.2631	1.0835	0.5780	0.3584	0	0	0	0
89.8734	31.1083	52.9638	14.5140	6282	4526.1960	69.0681	23.0294	2.7991	1.1151	0.3947	0.0080	0	0	0	0
96.3201	10.9544	82.2120	19.3553	4815	3891.4170	70.5371	21.7624	3.0012	1.0964	0.6138	0.1473	0	0	0.0279	0

74.5493	10.3171	58.9339	15.7161	5098	4664.4680	48.3983	8.0862	1.5061	1.0143	0.3855	0.0654	0	0	0	0
89.7952	27.8772	61.4126	16.5776	5358	4400.1020	70.3511	21.2276	2.9739	1.0966	0.5006	0.0355	0	0	0	0
77.9894	7.3212	63.9585	21.2166	4973	3913.4390	62.5876	19.9506	2.1721	1.0833	0.5045	0.0814	0	0	0	0
107.0049	11.4941	96.6405	17.8858	4847	4255.2390	70.8715	18.6557	3.0517	1.077	0.5842	0.1108	0	0	0	0
88.5164	8.7991	77.9205	22.6119	4812	3632.7680	69.1240	15.0725	2.8062	1.0554	0.5432	1.3577	0	0	0.0158	0

PLAND_10	PLAND_11	PLAND_12	PLAND_13	PLAND_15	PLAND_16	PLAND_17	PD_1	PD_5	PD_8	PD_9	PD_10	PD_11	PD_12	PD_13	PD_15
83.2109	0	0	0	1.8462	14.8772	0.0657	0	0	0	0	3.3284	0	0	0	0.0738
88.4966	0	0	0	1.3093	10.1129	0.0813	0	0	0	0	3.5399	0	0	0	0.0524
96.8475	0	0.0247	0.0148	0.0594	2.6279	0	0.0012	0	0.0158	0	3.8739	0	0.001	0.0006	0.0024
94.0469	0	0.2712	0.0299	0.3539	5.2981	0	0	0	0	0	3.7619	0	0.0108	0.0012	0.0142
89.9250	0.2769	0	0.0160	0	2.2068	7.5753	0	0	0	0	3.597	0.0111	0	0.0006	0
99.5686	0.1348	0	0	0	0.2966	0	0	0	0	0	3.9827	0.0054	0	0	0
94.9749	0	0.0486	0	0	4.9765	0	0	0	0	0	3.799	0	0.0019	0	0
83.7284	0	0	0	4.6546	11.6169	0	0	0	0	0	3.3491	0	0	0	0.1862
86.1821	0.0114	0	0	1.5039	11.2703	1.0324	0	0	0	0	3.4473	0.0005	0	0	0.0602
99.8870	0	0	0	0	0.1130	0	0	0	0	0	3.9955	0	0	0	0
99.4893	0	0	0	0	0.5107	0	0	0	0	0	3.9796	0	0	0	0
97.9753	0.0500	0.4583	0.0917	0	0.9665	0	0	0.0053	0.0130	0	3.919	0.002	0.0183	0.0037	0
99.9354	0	0	0.0323	0	0.0323	0	0	0	0	0	3.9974	0	0	0.0013	0
95.2204	0.0286	0	0	0.0572	4.3503	0.3434	0	0	0	0	3.8088	0.0011	0	0	0.0023
99.2446	0.0687	0	0	0	0.0343	0.6524	0	0	0	0	3.9698	0.0027	0	0	0
99.1911	0	0	0	0	0.8089	0	0	0	0	0	3.9676	0	0	0	0
97.6673	0	0	0.0761	0.1014	2.1552	0	0	0	0	0	3.9067	0	0	0.003	0.0041
99.4755	0	0.0813	0.0074	0	0.4285	0	0	0	0	0.0003	3.979	0	0.0033	0.0003	0
81.1483	0	0	0	0.1040	18.3754	0.3723	0	0	0	0	3.2459	0	0	0	0.0042
99.5979	0	0.0874	0.3147	0	0	0	0	0	0	0	3.9839	0	0.0035	0.0126	0
78.3929	0	0	0	4.6726	16.9345	0	0	0	0	0	3.1357	0	0	0	0.1869
99.9441	0	0.0279	0	0	0	0	0	0	0.0011	0	3.9978	0	0.0011	0	0
99.6832	0	0	0	0	0.3168	0	0	0	0	0	3.9873	0	0	0	0
94.0091	0	0	0	0.0207	5.9701	0	0	0	0	0	3.7604	0	0	0	0.0008
99.5080	0	0	0.0164	0	0.4756	0	0	0	0	0	3.9803	0	0	0.0007	0
100	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
99.0577	0	0.7159	0.1421	0	0.0684	0	0	0	0.0006	0	3.9623	0	0.0286	0.0057	0

PD_16	PD_17	SHDI	SEI	L1	L2	River length
0.5951	0.0026	0.5149	0.0529	0.0410	11844179	282595.0
0.4045	0.0033	0.4024	0.0432	0.1050	32706982	353936.3
					244284294	
0.1051	0	0.1587	0.0160	0.1426		764123.2
0.2119	0	0.2518	0.0230	0.1485	1205394118	1088291.0
0.0883	0.303	0.3928	0.0388	0.0811	39938262	456822.9
0.0119	0	0.0305	0.0037	0	0	157425.9
0.1991	0	0.2020	0.0231	0.2196	56545038	199665.4
0.4647	0	0.5415	0.0573	0.0233	2350716	409505.4
0.4508	0.0413	0.4856	0.0440	0.0598	207190083	1270637.0
0.0045	0	0.0088	0.0013	0.0241	30147	54218.0
0.0204	0	0.0320	0.0037	0	0	168285.0
0.0387	0	0.1272	0.0135	0.0869	25206148	312774.7
0.0013	0	0.0058	0.0007	0.111	11350177	163044.9
0.174	0.0137	0.2091	0.0256	0	0	59945.4
0.0014	0.0261	0.0481	0.0055	0.0004	372	73485.8
0.0324	0	0.047	0.0055	0.0461	1334356	186087.1
0.0862	0	0.1182	0.0143	0.0411	1157736	230689.4
0.0171	0	0.0358	0.0038	0.0114	1257164	331916.2
0.7350	0.0149	0.5088	0.0494	0.0775	142181495	347553.2
0	0	0.0283	0.0033	0.0005	358	124959.4
0.6774	0	0.6347	0.0782	0.0426	534050	338327.5
0	0	0.0051	0.0005	0.0450	11069804	302294.3
0.0127	0	0.0214	0.0025	0.0543	2430864	182533.1
0.2388	0	0.2281	0.0269	0.0307	529705.9	198214.9
0.0190	0	0.0318	0.0036	0.0083	70777	479897.6
0	0	0	0	0.0165	269047	128697.1
0.0027	0	0.0604	0.0061	0.0420	18740823	378049.7