

Inference of analytical flow duration curves in Swiss alpine environments

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The supplementary material contains 3 tables, 2 figures and graphics showing the cdf model performance for all catchments including the linear and nonlinear model. Additional shape files with the catchments contour can also be found attached. The tables and figures show:

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Table 1. Percentge of land use per catchment. Data was obtained from the dataset associated to the “hydrological study area” (Aschwanden, 1996) except for the catchments: Areuse, Rhône-Gletch and Venoge, for which data was obtained from spatial data (Statistics, 2001), see Tab. 2. Each column is identified by a letter that correspond to a type of land use, identified on Fig. 1.

Catchment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Rein da Sumvitg	0,14	1,66	0,09	0,00	0,00	19,26	0,00	23,49	0,00	0,00	0,00	47,01	0,09	1,61	6,65
Dischmabach	2,38	1,87	0,23	0,00	0,46	37,80	0,00	20,89	0,05	0,00	0,28	33,50	0,13	0,35	2,06
Goldach	29,64	0,00	4,37	3,04	51,06	0,80	0,46	0,14	5,97	0,60	3,44	0,08	0,02	0,38	0,00
Necker	33,61	0,00	3,80	0,50	47,63	10,14	0,06	0,57	1,65	0,07	1,38	0,14	0,00	0,45	0,00
Sitter	25,13	0,13	2,94	0,05	24,08	31,84	0,04	4,99	1,30	0,03	1,16	7,24	0,19	0,80	0,08
Murg	30,58	0,00	2,87	3,83	51,62	0,82	0,26	0,00	4,64	0,71	4,07	0,24	0,13	0,23	0,00
Scheulte	47,75	0,00	3,97	1,00	26,59	17,81	0,07	0,14	1,31	0,00	1,17	0,07	0,00	0,12	0,00
Gürbe	21,95	0,28	2,55	2,69	53,84	7,75	0,11	2,00	3,69	0,28	2,40	1,43	0,28	0,75	0,00
Rotenbach	12,12	0,00	12,12	0,00	0,00	71,51	0,00	0,61	0,61	0,00	0,00	1,82	0,00	1,21	0,00
Sense	32,34	0,06	3,65	1,17	36,38	17,94	0,07	2,07	1,84	0,10	1,51	1,56	0,14	1,17	0,00
Areuse	44,02	0,00	4,04	0,14	26,51	20,15	0,16	0,25	0,67	2,07	0,17	0,17	1,53	0,13	0,00
Ilfis	44,27	0,14	4,45	0,55	31,46	14,07	0,06	0,87	1,21	0,09	1,26	0,71	0,00	0,86	0,00
Sellenbodenbach	10,66	0,00	3,52	5,14	72,69	0,00	0,19	0,00	4,47	0,29	3,04	0,00	0,00	0,00	0,00
Alpbach	1,51	6,56	0,15	0,00	0,00	5,73	0,00	10,20	0,00	0,00	0,00	46,97	0,22	0,99	27,67
Grosstalbach	17,89	1,48	2,71	0,00	4,73	25,26	0,00	9,55	0,23	0,05	0,09	28,01	0,00	0,75	9,25
Alp	48,51	0,00	3,62	0,00	30,56	9,94	0,19	1,29	2,59	0,41	1,36	0,84	0,00	0,69	0,00
Rhone	0,00	2,81	0,13	0,00	0,00	8,79	0,00	0,51	9,42	0,03	0,00	29,69	0,43	0,05	48,15
Massa	0,68	0,03	0,15	0,00	0,00	2,87	0,00	3,52	0,00	0,00	0,00	26,74	0,01	0,07	65,93
Venoge	31,04	0,00	1,88	1,74	54,20	2,30	0,83	0,16	0,18	4,17	0,28	0,09	3,12	0,02	0,00
Melera	86,27	0,00	0,99	0,00	0,00	10,78	0,00	1,96	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Verzasca	28,78	12,67	3,31	0,00	0,80	8,02	0,02	25,04	0,30	0,01	0,10	18,95	0,06	1,94	0,00
Riale di Calneggia	6,87	6,71	3,94	0,00	0,05	8,93	0,00	18,23	0,04	0,00	0,00	52,51	1,40	1,32	0,00
Krummbach	0,25	0,00	1,01	0,00	0,00	55,89	0,00	12,15	0,05	0,00	0,66	25,25	0,50	1,21	3,03
Poschiavino	6,35	1,07	2,14	0,00	0,00	48,50	0,00	12,62	0,30	0,00	1,85	25,18	0,10	1,54	0,35
Ova da Cluozza	5,07	12,78	0,60	0,00	0,00	0,00	0,00	12,07	0,00	0,00	0,00	66,91	0,01	0,33	2,23

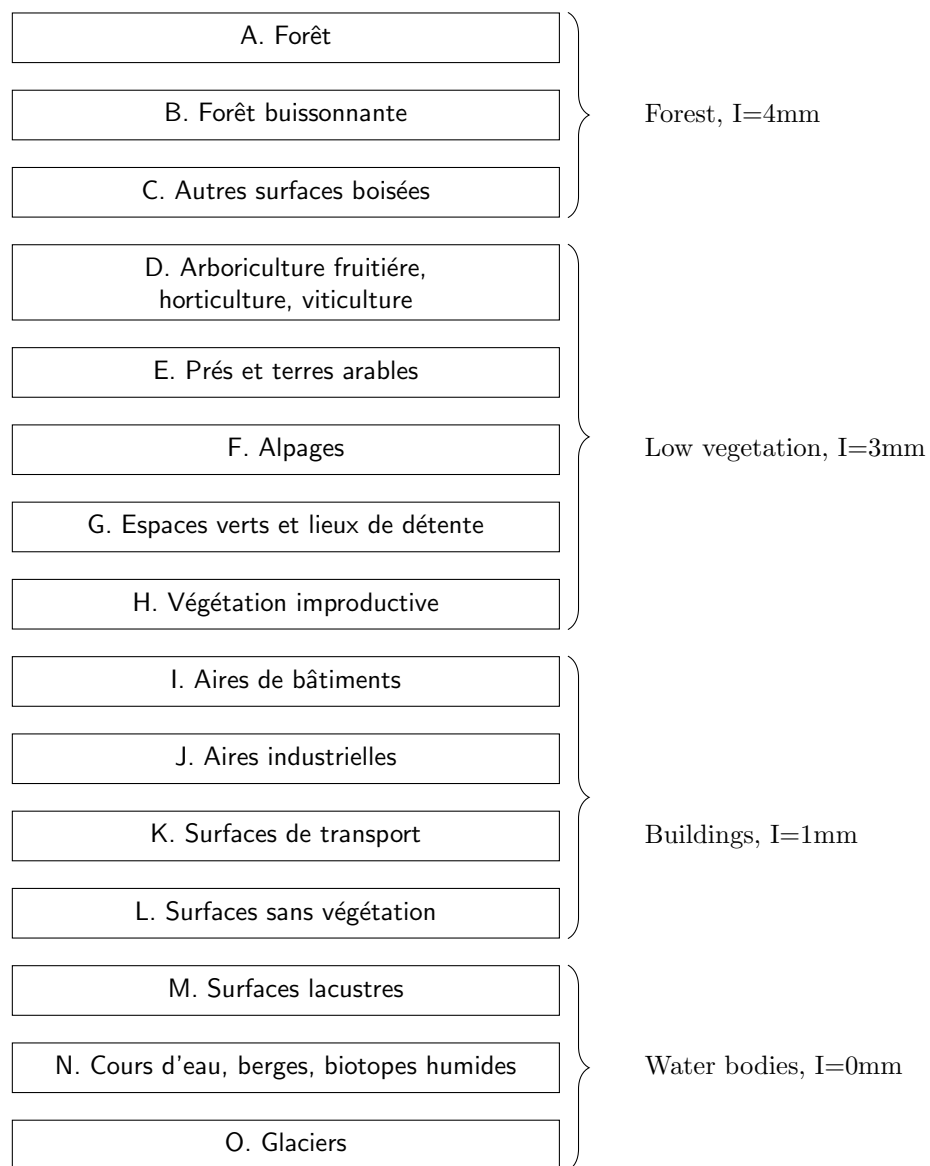


Figure 1. Equivalence between the land use categories proposed by the FOEN and the ones adopted to calculate interception, followed by the value of interception for each category.

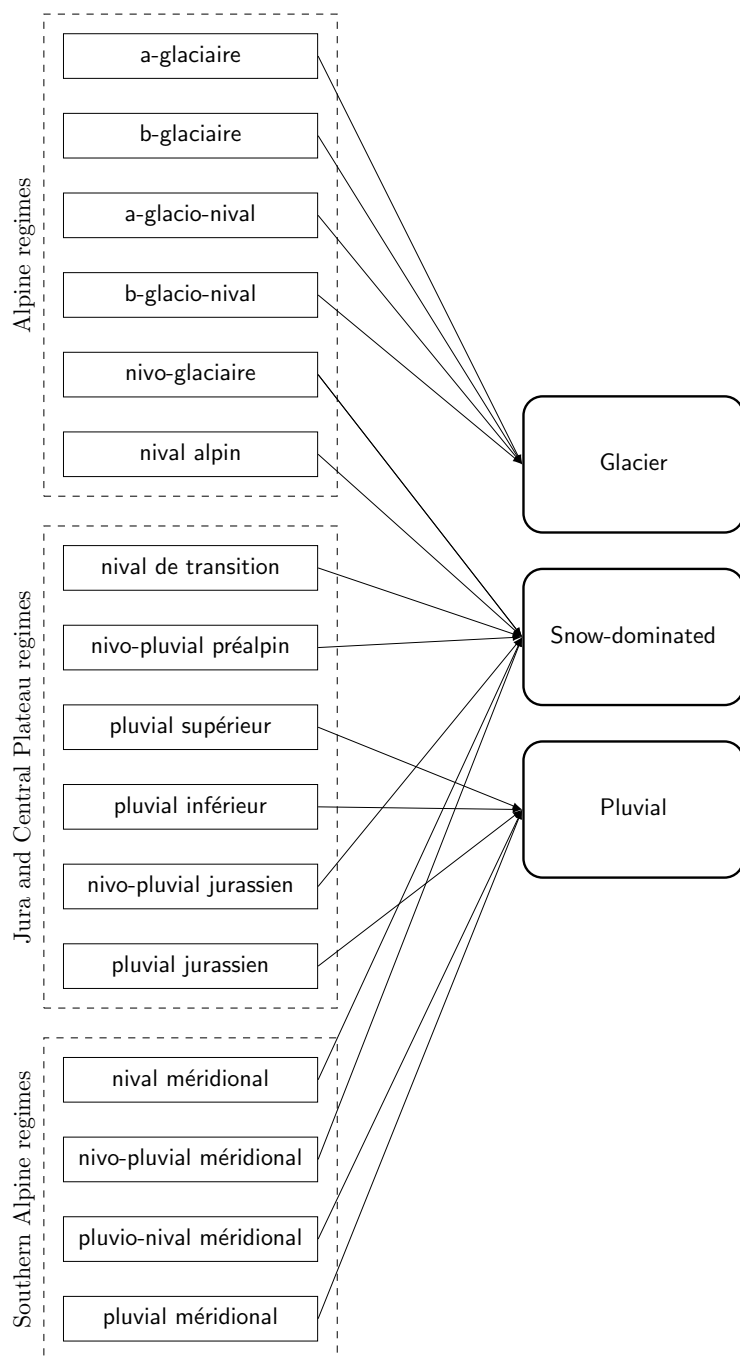


Figure 2. Equivalence between the 16 discharge regimes from the Hydrological Atlas of Switzerland and the simplified classification in 3 types of regimes adopted in this work.

Table 2. Spatial data classes (FSO, 2001) associated to FOEN land use classes (Aschwanden, 1996).

ID own	FOEN land use hydrological study areas	Geostat1997 classes associated to this FOEN class
A	Forêt	9, 10, 11, 12, 13, 14
B	Forêt buissonnante	15
C	Autres surfaces boisées	17, 18, 19
D	Arboriculture fruitière, horticulture, viticulture	71, 72, 75, 76, 77, 78
E	Prés et terres arables	73, 81, 82, 83, 84
F	Alpages	85, 86, 87, 88, 89
G	Végétation improductive	16, 95, 96, 97, 98
H	Aires de bâtiments	25,26, 27, 28, 29, 45, 46, 47, 48, 49
I	Aires industrielles	21, 41
J	Espaces verts et lieux de détente	23, 51, 52, 53, 54, 56, 59
K	Surfaces de transport	31, 32, 33, 34, 35, 36, 37, 38, 68, 67
L	Surfaces lacustres	91
M	Cours d'eau, berges, biotopes humides	92, 93, 69
N	Surfaces sans végétation	99
O	Glaciers	90

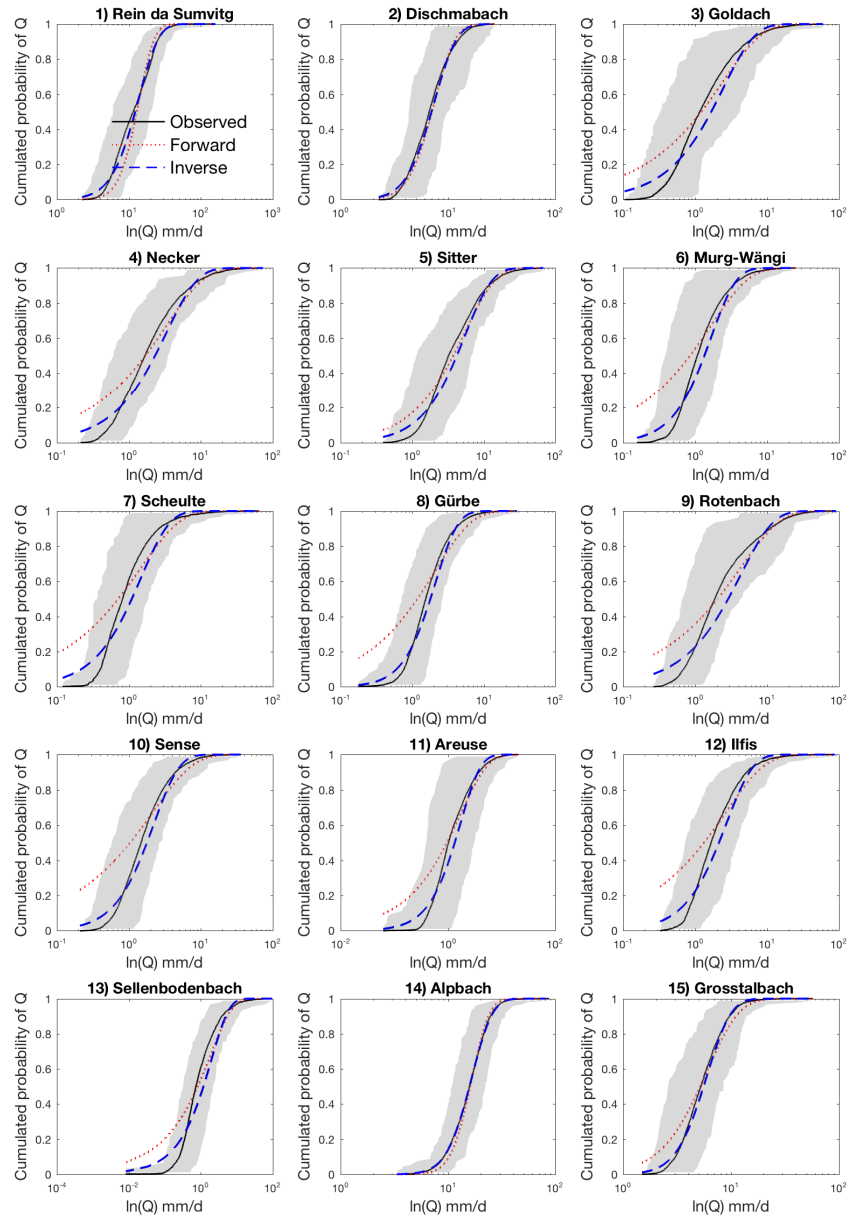
Table 3. Selected precipitation grid cells of the MeteoSwiss RhiresData (MeteoSwiss, 2014a) per catchment.

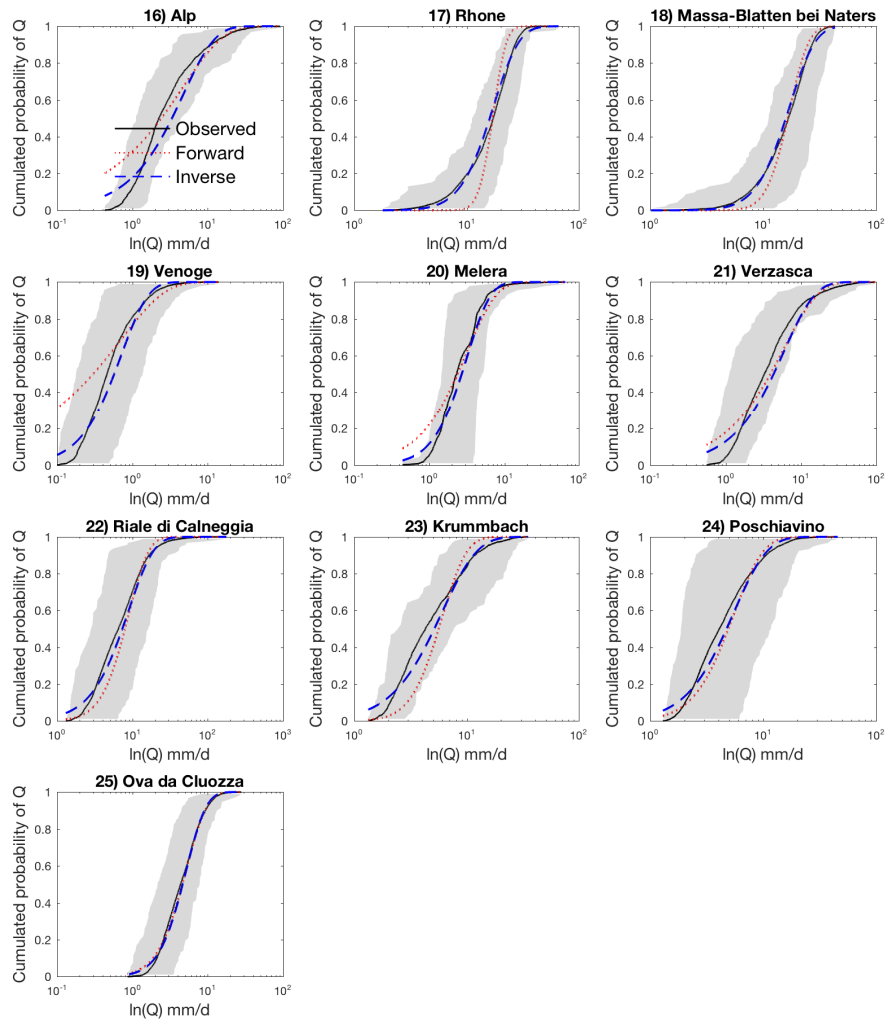
Catchment	Cells
Rein da Sumvitg	15923; 16026; 16128; 16129; 16231; 16232; 16233
Dischmabach	20448; 20449; 20551; 20552; 20553; 20655; 20657; 20759; 20760
Goldach	18150; 18252; 18253; 18254; 18355; 18356; 18357; 18358; 18459; 18460; 18461; 18562; 18563; 18564; 18666
Necker	16712; 16713; 16816; 16817; 16818; 16919; 16920; 16921; 17022; 17023; 17024; 17025; 17125; 17126; 17127; 17128; 17228; 17229; 17230; 17231; 17331; 17333; 17334; 17437
Sitter	17745; 17746; 17848; 17849; 17850; 17951; 17952; 17953; 18054; 18055; 18156; 18157; 18158; 18258; 18259; 18260; 18361; 18362; 18363; 18465; 18466
Murg	15679; 15782; 15783; 15882; 15883; 15884; 15885; 15886; 15887; 15984; 15985; 15986; 15987; 15988; 15989; 16088; 16089; 16090; 16091; 16191; 16193; 16294; 16396
Scheulte	8370; 8371; 8472; 8473; 8474; 8575; 8576; 8577; 8678; 8679; 8680; 8681; 8781; 8782; 8783; 8885; 8886; 8988; 8989
Gürbe	8502; 8503; 8598; 8599; 8600; 8601; 8602; 8604; 8605; 8606; 8701; 8702; 8703; 8704; 8705; 8706; 8707; 8708; 8709; 8805; 8806; 8807; 8808; 8809; 8810; 8811; 8812; 8909; 8911; 8912; 8913; 8914; 8915
Rotenbach	7577
Sense	7475; 7476; 7477; 7574; 7575; 7576; 7577; 7578; 7579; 7676; 7677; 7678; 7679; 7680; 7681; 7682; 7776; 7777; 7778; 7779; 7780; 7781; 7782; 7783; 7784; 7877; 7878; 7879; 7880; 7881; 7882; 7883; 7884; 7885; 7886; 7887; 7980; 7981; 7982; 7983; 7984; 7985; 7986; 7987; 7988; 7989; 7990; 8082; 8083; 8084; 8085; 8086; 8087; 8088; 8089; 8090; 8091; 8092; 8185; 8186; 8187; 8188; 8189; 8190; 8191; 8192; 8193; 8194; 8195; 8391; 8392; 8393; 8394; 8395; 8396; 8397; 8398; 8399; 8400; 8495; 8496; 8497; 8498; 8499; 8500; 8501; 8603
Areuse	3346; 3348; 3445; 3451; 3452; 3451; 3452; 3453; 3454; 3455; 3651; 3652; 3653; 3657; 3753; 3754; 3757; 3758; 3856; 3857; 3858; 3859; 3860; 3861; 3959; 3960; 3961; 3962; 3963; 3964; 4061; 4062; 4063; 4064; 4065; 4066; 4164; 4165; 4166; 4167; 4168; 4169; 4267; 4268; 4269; 4270; 4271; 4272; 4369; 4370; 4371; 4372; 4373; 4374; 4471; 4472; 4473; 4474; 4475; 4476; 4477; 4574; 4575; 4576; 4577; 4578; 4579; 4677; 4678; 4679; 4680; 4681; 4681; 4780; 4781; 4782; 4783; 4784; 4883; 4884; 4885; 4886; 4887; 4986; 4987; 4988; 4989; 4990; 5089; 5090; 5091; 5092; 5191; 5192; 5195; 5294; 5298; 5396; 5397
Ilfis	10241; 10242; 10243; 10244; 10343; 10344; 10345; 10346; 10347; 10348; 10447; 10448; 10449; 10450; 10451; 10549; 10550; 10551; 10552; 10553; 10554; 10555; 10556; 10557; 10652; 10653; 10654; 10655; 10656; 10657; 10658; 10659; 10660; 10755; 10756; 10757; 10758; 10759; 10760; 10761; 10762; 10763; 10858; 10859; 10863; 10864; 10865; 10866; 10966; 10967; 10968; 11070; 11071
Sellenbodenbach	12090; 12192; 12193
Alpbach	13854; 13855; 13957; 13958; 14060; 14061
Grosstalbach	13541; 13542; 13644; 13645; 13646; 13746; 13747; 13748; 13749; 13849; 13852
Alp	14564; 14664; 14665; 14666; 14667; 14766; 14767; 14768; 14769; 14770; 14868; 14869
Rhone	13039; 13040; 13041; 13042; 13141; 13142; 13143; 13144; 13145; 13244; 13245; 13248
Massa	10783; 10882; 10885; 10886; 10985; 10986; 10987; 10988; 10989; 11086; 11087; 11088; 11089; 11090; 11091; 11092; 11189; 11190; 11191; 11192; 11193; 11194; 11195; 11196; 11292; 11293; 11294; 11295; 11296; 11297; 11298; 11299; 11395; 11396; 11397; 11398; 11399; 11400; 11401; 11402; 11498; 11499; 11500; 11501; 11502; 11503; 11504; 11603; 11604; 11605; 11606; 1709
Venoge	2844; 2946; 2947; 2948; 3048; 3049; 3050; 3051; 3150; 3152; 3153; 3154; 3253; 3254; 3255; 3256; 3355; 3356; 3357; 3358; 3458; 3459; 3460; 3461; 3561; 3562; 3563; 3564; 3565; 3665; 3666; 3667; 3668; 3669; 3670; 3768; 3769; 3770; 3771; 3772; 3773; 3871; 3872; 3873; 3874; 3875; 3979; 3974; 3975; 3976; 3977; 3978; 3979; 4077; 4078; 4079; 4080; 4082
Melera	16562
Verzasca	14701; 14702; 14803; 14804; 14805; 14904; 14905; 14906; 14907; 14908; 14909; 15007; 15008; 15009; 15010; 15011; 15012; 15111; 15112; 15113; 15114; 15115; 15116; 15117; 15214; 15215; 15216; 15217; 15218; 15219; 15220; 15318; 15319; 15320; 15321; 15322; 15323; 15423; 15424; 15425; 15526; 15527; 15528; 15529; 15630; 15631; 15632; 15735
Riale di Calneggia	13566; 13567; 13669; 13670; 13773; 13876
Krummbach	11203; 11204; 11205; 11306; 11307
Poschiavino	21288; 21289; 21392
Ova da Cluozza	21586; 21587; 21588; 21689; 21690; 21691

Table 4. Sources of the data used in this work.

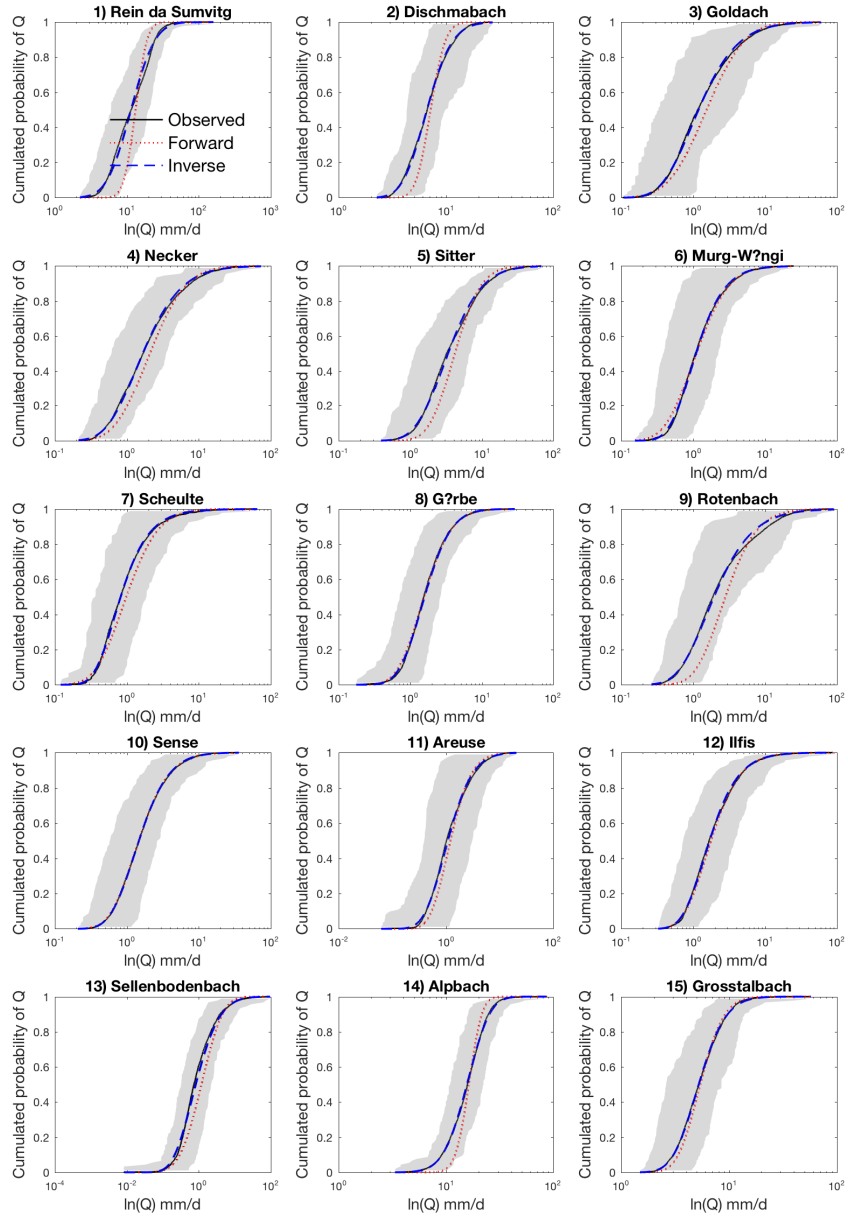
Type of data	All catchments	Source
Daily discharge	All catchments	FOEN (on demand)
Daily precipitation	All catchments	MeteoSwiss (Rhires D) (www.meteoswiss.admin.ch - requires contract)
Daily temperature	All catchments	MeteoSwiss (Tabs D) (www.meteoswiss.admin.ch - requires contract)
Elevations of catchments	All catchments	FOEN (www.hydrodaten.admin.ch)
Land use	Study areas	Aschwanden, 1996
	Other catchments	FSO, 2001
Regimes	Study areas	Aschwanden, 1996
	Other catchments	FOEN (map.geo.admin.ch)

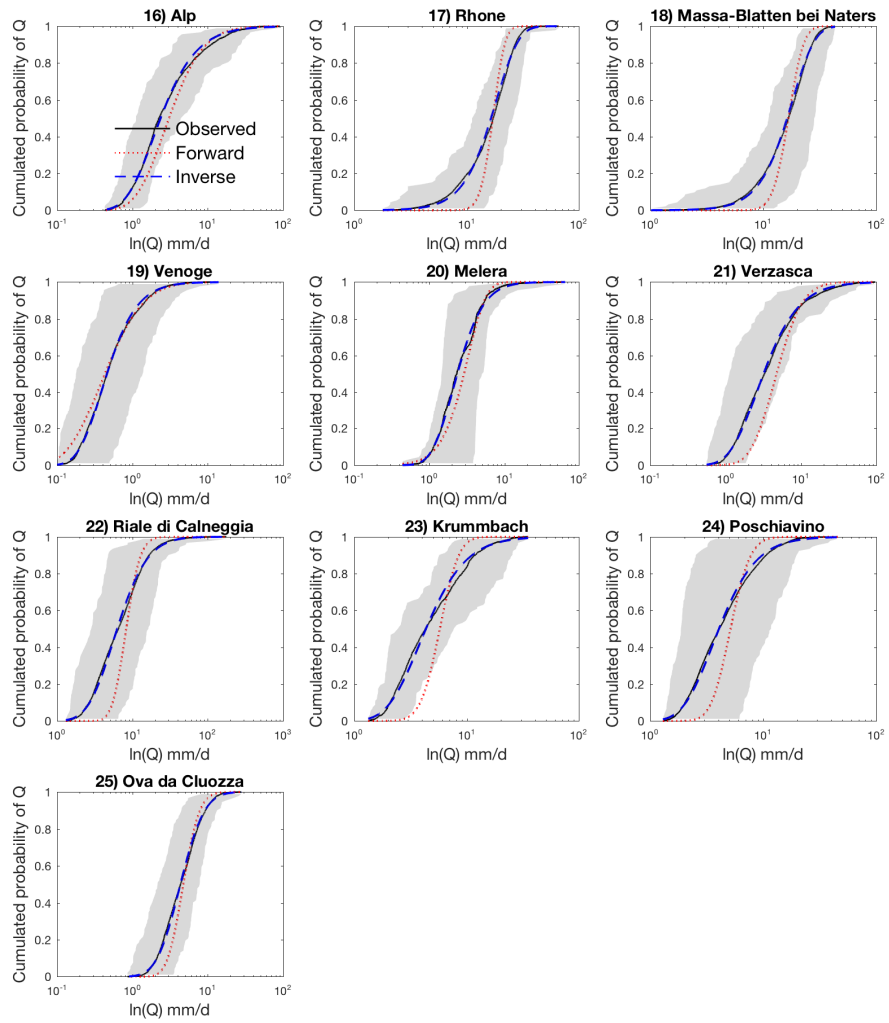
Results for all catchments for the linear model





Results for all catchments for the nonlinear model





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