The dynamics of the urban streams contamination

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Objective

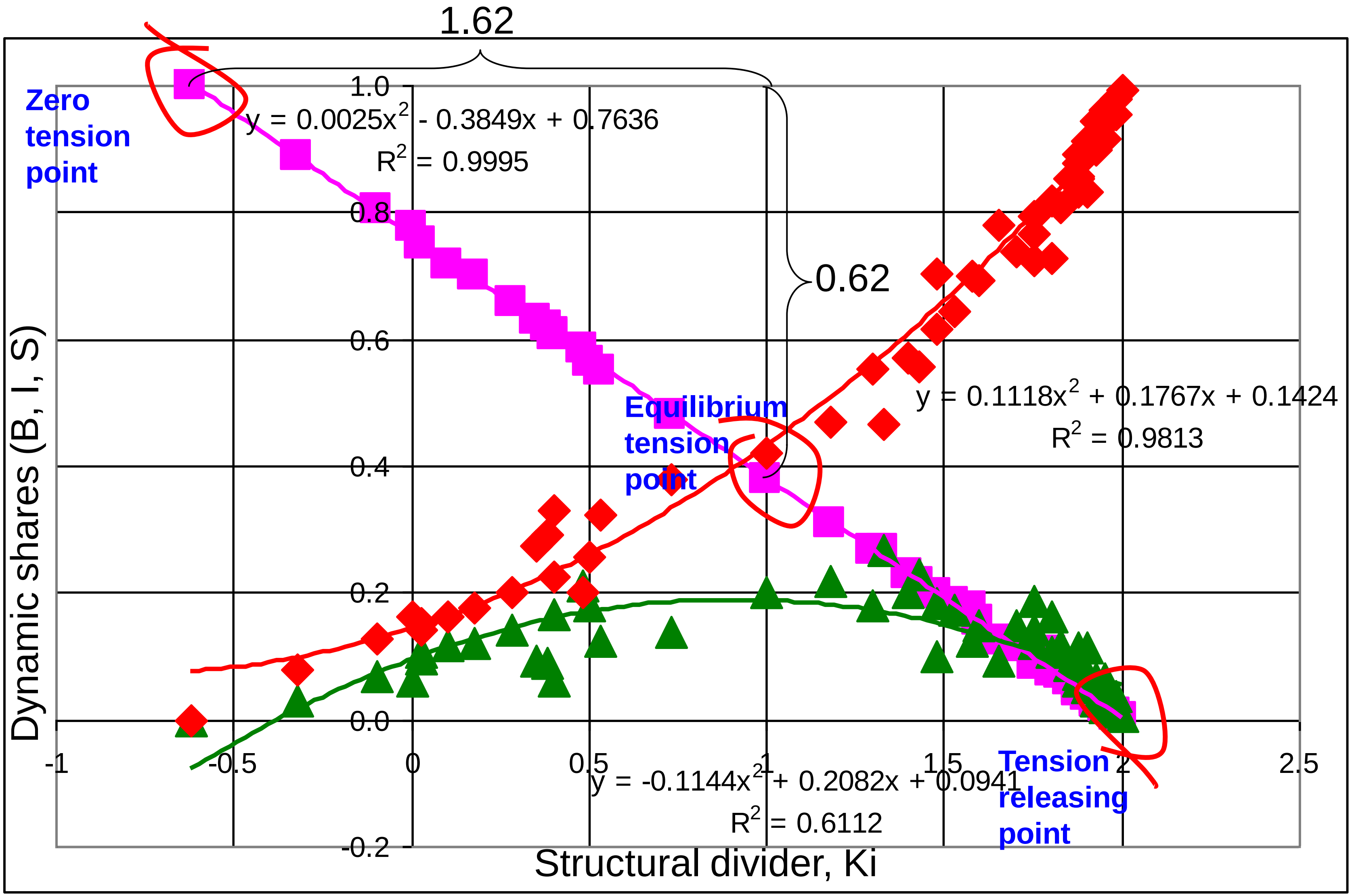
- To analyze the dynamics of water quality of the streams with different degrees of urbanization considering them as the dynamic and structural parts of the entire water cycle
- To introduce a new multi-stream application of the Harmonized Frequencies Analysis (HFA) – the hydrological analytical tool based on the water cycle dynamic integrity

HFA

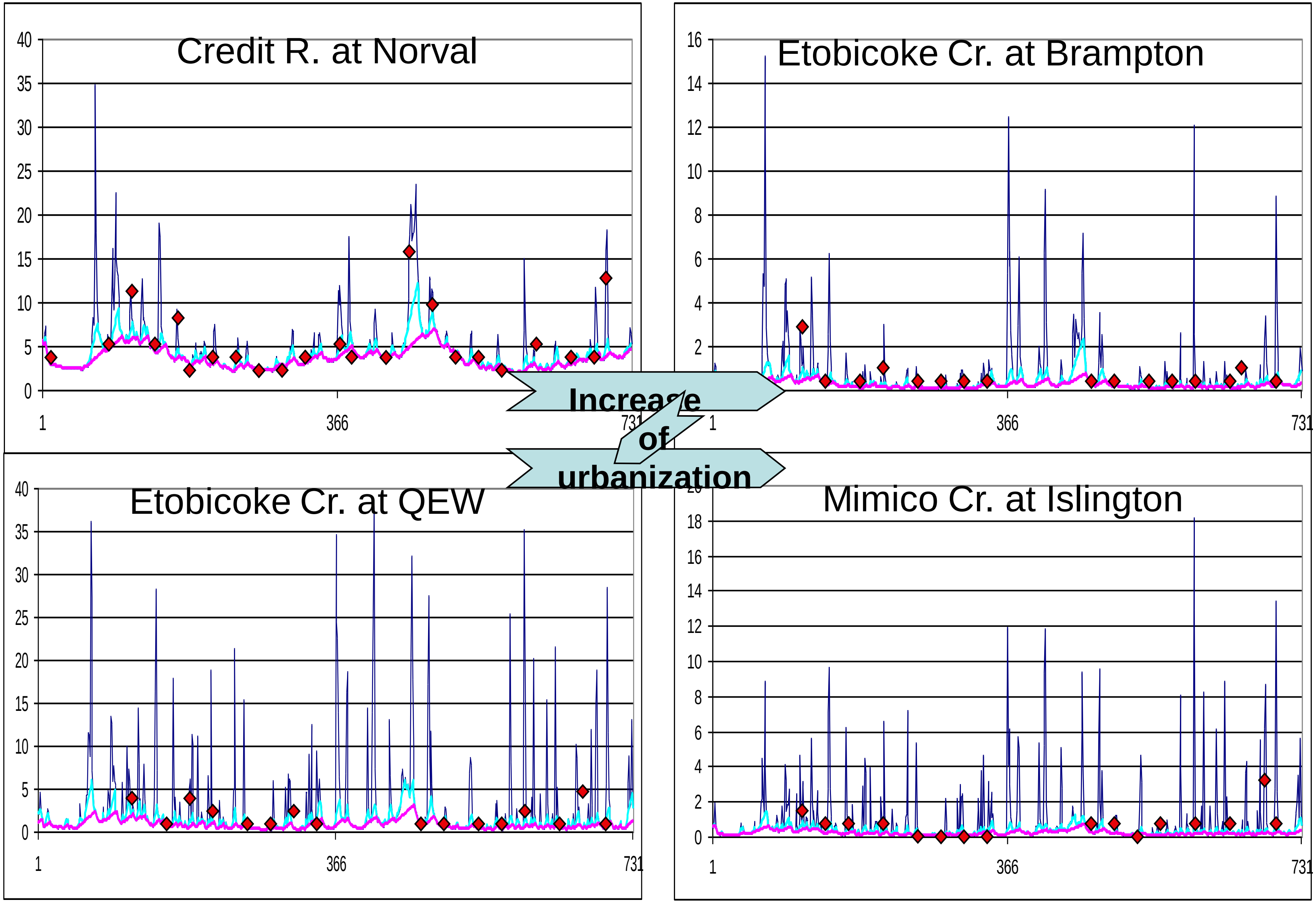
- **Technically**: a universal solution for the water, matter and energy cycles dynamic integrity/indivisibility, functionality, and scale-invariance;
- **Mathematically**: combination of asymptotic, uniformly bounded, and structural stabilities of the dynamic water system;
- **Statistically**: manifestation of the “componential” independency of the system’s variables
- **Socially**: the universal facilitator of the interdisciplinary collaboration
- **Methodically:** the parametrical and statistical analysis of a special way processed and structured data into a single dynamic system of the water cycle

Signal processing → harmonization → parametrical/statistical analysis

Harmonization:
the Structural Harmony Chart of Hydrosphere (SHC) for Etobicoke, Mimico and Credit R., 2004-2005



Structured/harmonized flow, 2004-05



Increase of urbanization

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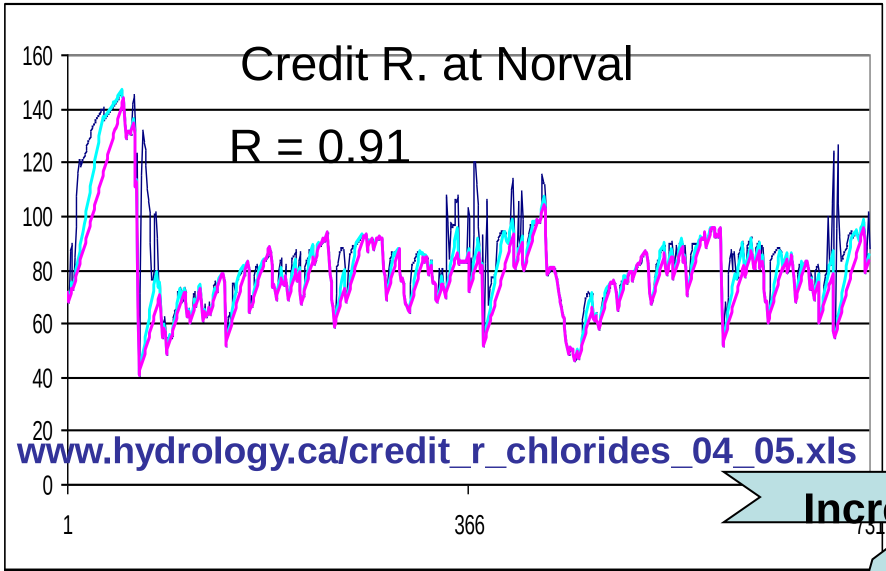
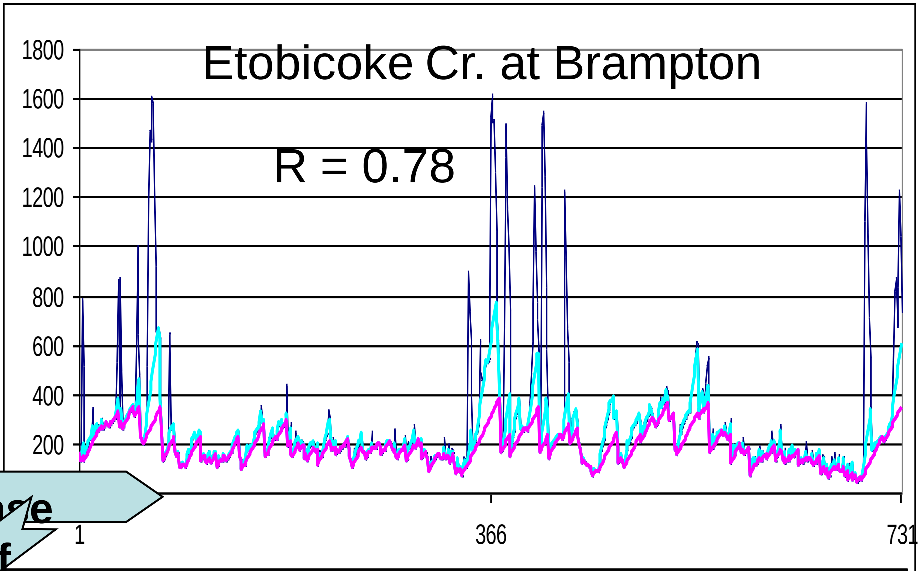
Chlorides, 2004-05

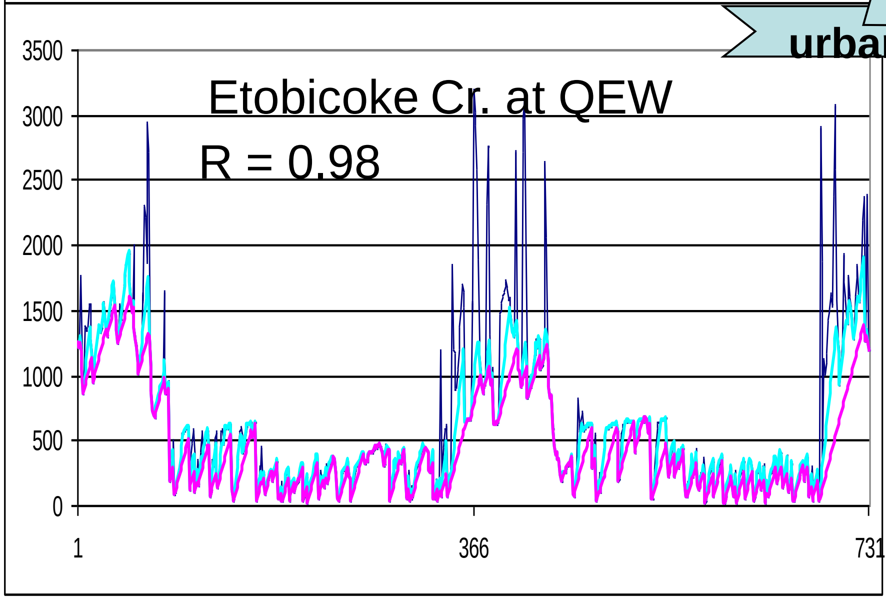

Credit R. at Norval

R = 0.91

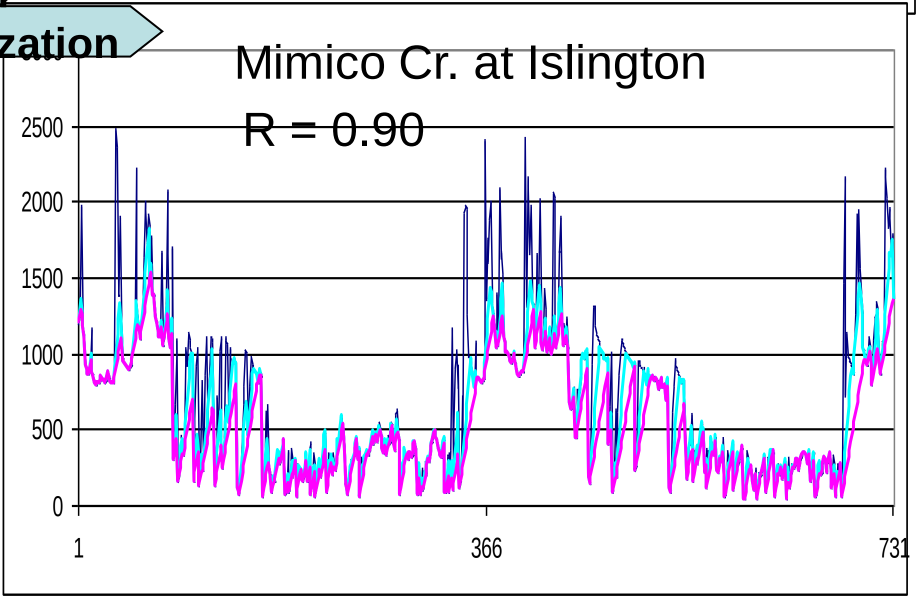
www.hydrology.ca/credit_r_chlorides_04_05.xls


Etobicoke Cr. at Brampton

R = 0.78


Etobicoke Cr. at QEW

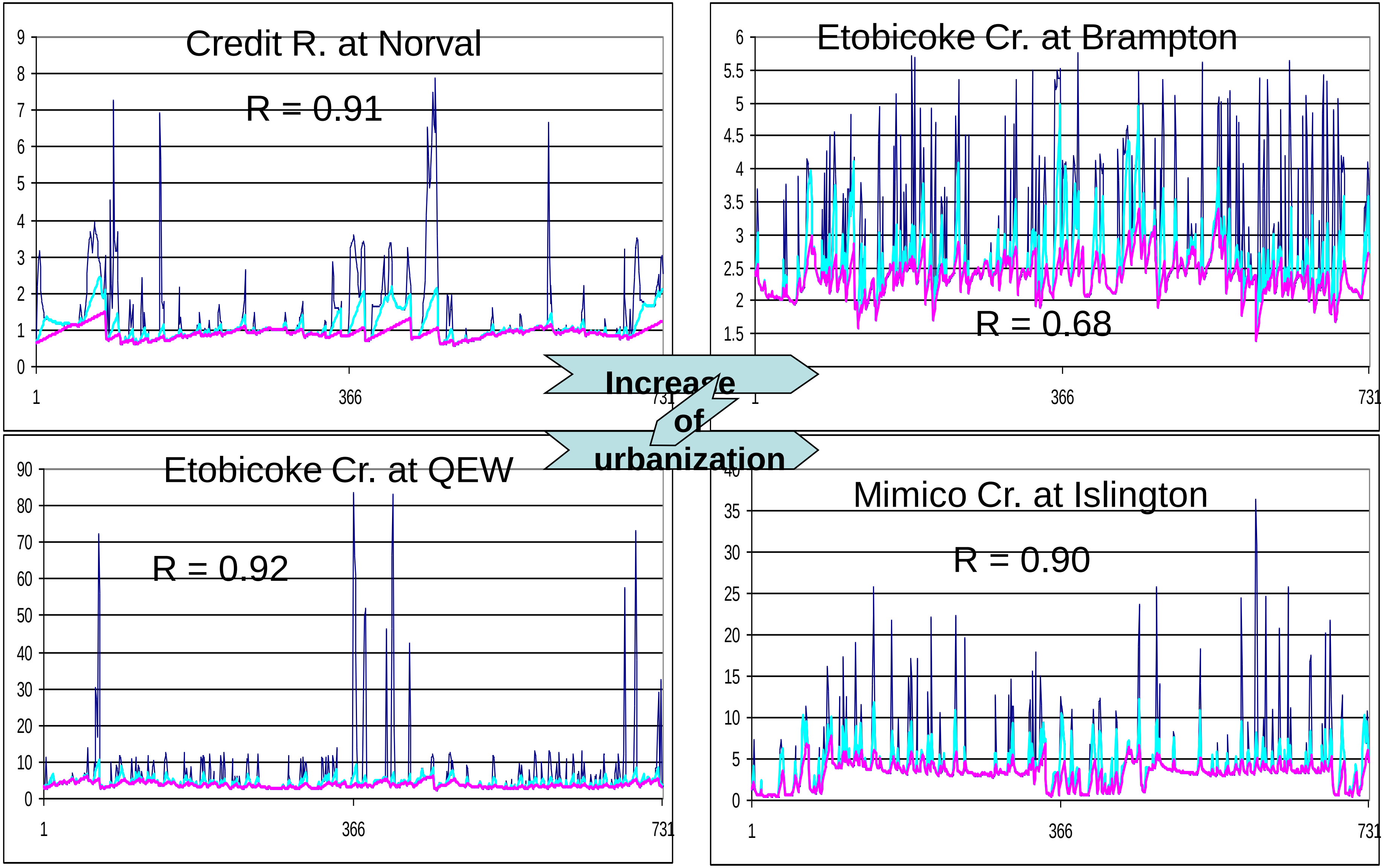
R = 0.98


Mimico Cr. at Islington

R = 0.90

Increase of urbanization

Copper, 2004-05



Credit R. at Norval

R = 0.91

Etobicoke Cr. at Brampton

R = 0.68

Etobicoke Cr. at QEW

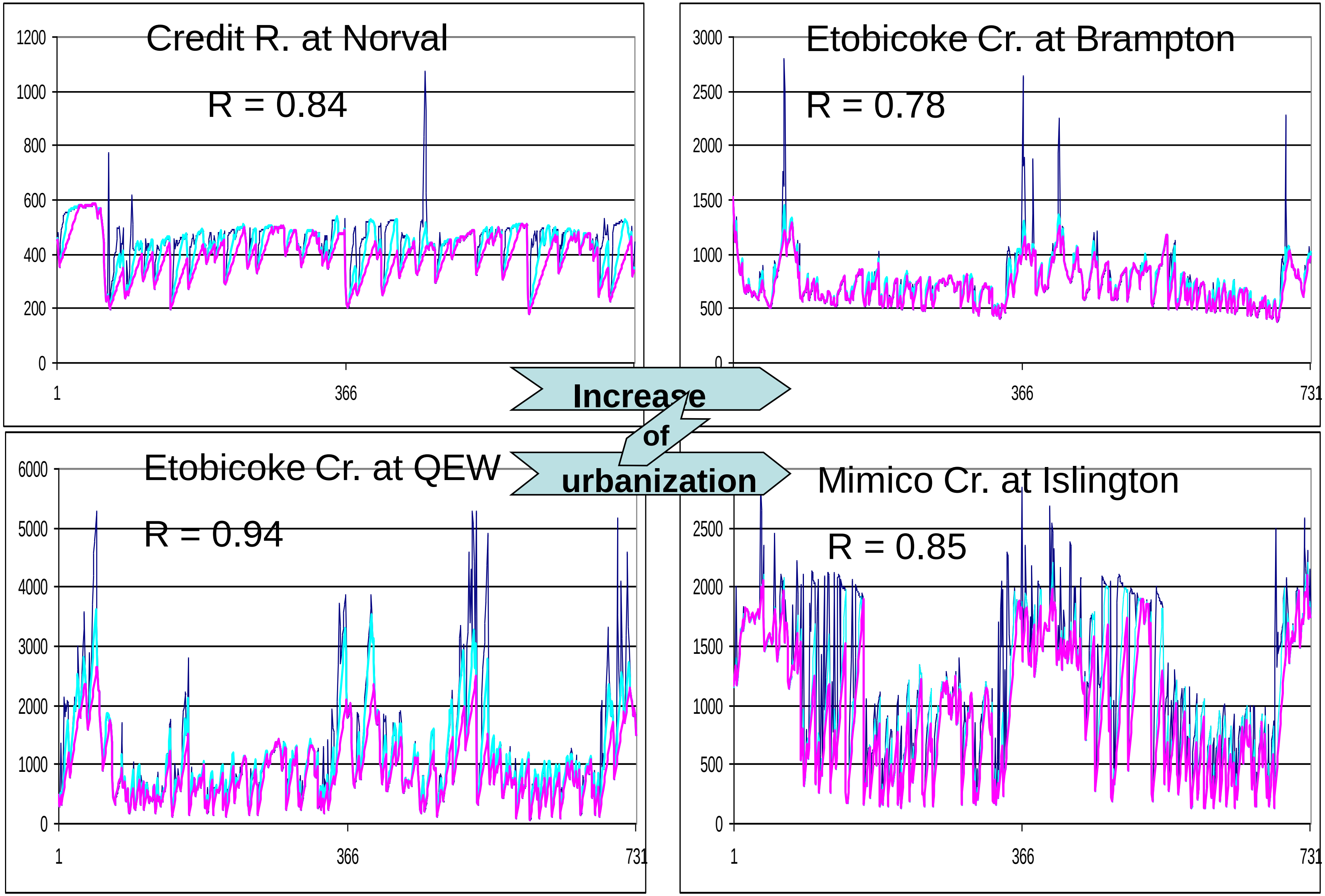
R = 0.92

Mimico Cr. at Islington

R = 0.90

Increase of urbanization

Total Dissolved Solids, 2004-05



Credit R. at Norval

R = 0.84

Etobicoke Cr. at Brampton

R = 0.78

Etobicoke Cr. at QEW

R = 0.94

Mimico Cr. at Islington

R = 0.85

Increase of urbanization

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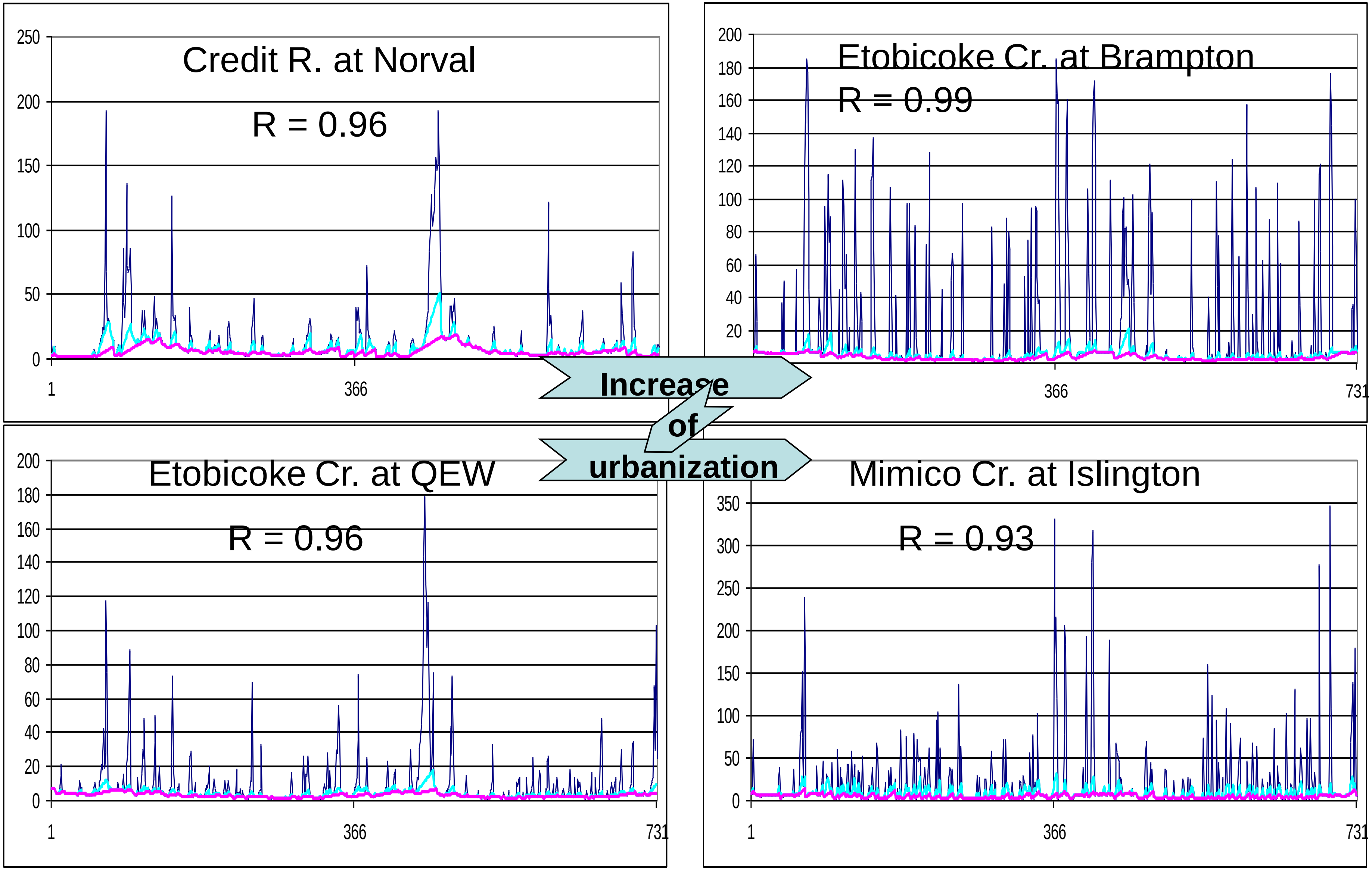
Turbidity, 2004-05



Parametrical analysis: the dynamic structure

Increase of urbanization

Watershed	Area, km^2	Dynamic structure										
		Dynamic component	Flow, m3/s		Chlorides, mg/L		Copper, mkg/L		TDS, Mg/L		Turbidity, mg/L	
			Ampl.	Avrg.	Ampl.	Avrg.	Ampl.	Avrg.	Ampl.	Avrg.	Ampl.	Avrg.
Credit R.	402				**R = 0.91**		**R = 0.91**		**R = 0.84**		**R = 0.96**	
		Total	**8.7**	**4.72**	**37.2**	**85.5**	**2.9**	**1.45**	**281**	**463**	**59.8**	**13.8**
		Base, B	0.15	0.77	0.78	0.91	0.11	0.64	0.63	0.85	0.09	0. 41
		Inter, I	0.15	0.10	0.06	0.03	0.16	0.12	0.09	0.07	0.14	0.18
		Storm, S	0.70	0.13	0.16	0.06	0.73	0.24	0.28	0.08	0.77	0.41
Etobicoke Cr. 2 (head-water)	62.3				**R = 0.78**		**R = 0.68**		**R = 0.78**		**R = 0.99**	
		Total	**4.31**	**0.65**	**572**	**269**	**3.14**	**2.78**	**1597**	**862**	**123**	**19.8**
		Base, B	0.06	0.34	0.27	0.65	0.27	0.82	0.61	0.93	0.02	0.17
		Inter, I	0. 09	0.16	0.18	0.14	0.27	0.07	0.06	0.03	0.04	0.06
		Storm, S	0.85	0.50	0.55	0.21	0.46	0.11	0.33	0.04	0.94	0.77
Etobicoke Cr. (mouth)	204				**R = 0.98**		**R = 0.92**		**R = 0.94**		**R = 0.96**	
		Total	**18.3**	**2.72**	**1054**	**664**	**22.1**	**6.18**	**2146**	**1269**	**60.5**	**10.3**
		Base, B	0.05	0.31	0.48	0.69	0.07	0.57	0.59	0.70	0.04	0.31
		Inter, I	0.09	0.15	0.14	0.15	0.11	0.09	0.21	0.16	0.06	0.11
		Storm, S	0.86	0.54	0.38	0.16	0.82	0.34	0.20	0.14	0.90	0.58
Mimico Cr.	70.6				**R = 0.90**		**R = 0.90**		**R = 0.85**		**R = 0.93**	
		Total	**6.79**	**0.89**	**1014**	**712**	**14.8**	**4.75**	**1450**	**1239**	**121**	**18.2**
		Base, B	0.04	0.24	0.55	0.74	0.22	0.67	0.72	0.77	0.05	0.22
		Inter, I	0.05	0.11	0.13	0.11	0.23	0.14	0.12	0.09	0.10	0.15
		Storm, S	0.91	0.65	0.32	0.15	0.55	0.19	0.16	0.14	0.85	0.63

Parametrical analysis of levels and concentrations: the power of dynamics

Variables	K	dQb	Nb	dQi	Ni	dQs	Ns	HEI	PBD	PID	PSD	Total
Credit R. at Norval level	1.18	0.01	82	0.03	60	0.5	1	0.44	0.4	0.9	0.2	1.5
Etobicoke level, m	1.4	0.01	89	0.04	75	0.54	2	0.77	0.6	2.1	0.8	3.6
Etobicoke 2 level, m	1.48	0.007	91	0.03	70	0.54	2	0.95	0.6	2.0	1.0	3.6
Mimico level, m	1.53	0.006	104	0.03	85	0.54	2	1.08	0.7	2.4	1.2	4.3
Chlorides_conc_Credit	0	1.55	62	2.4	57	38.1	1	0.00	-0.5	-0.6	-0.2	-1.3
Chlorides_conc_Etb	0.73	33	89	84	60	1737	1	0.26	757	1300	448	2505
Chlorides_conc_Etb2	1.3	9.5	103	36	72	812	1	0.70	685	1810	569	3063
Chlorides_conc_Mim	0.53	45	108	100	87	5487	1	0.15	734	1311	829	2874
Copper_conc_Credit	1.8	0.01	78	0.06	52	6.2	1	1.53	1	5	9	16
Copper_conc_Etb	1.8	0.2	101	1.8	91	53	1	1.92	33	315	102	450
Copper_conc_Etb2	1.33	0.1	100	0.33	100	4	1	0.39	3	13	1	18
Copper_conc_Mim	1.43	0.6	88	2.5	65	23	1	0.70	37	114	16	167
TDS_conc_Credit	0.35	8.7	57	17	43	263	1	0.09	44	65	23	133
TDS_conc_Etb	0.48	94	94	201	73	2308	1	-0.01	-74	-123	-19	-216
TDS_conc_Etb2	0.4	47	75	95	46	3750	1	0.15	540	670	574	1784
TDS_conc_Mim	0.1	87	111	143	105	1145	2	0.00	46	72	11	129
Turbidity_conc_Credit	1.75	0.39	59	2.0	51	108	2	1.64	38	168	355	561
Turbidity_conc_Etb	1.93	0.1	82	1.9	73	86	1	2.42	22	341	209	571
Turbidity_conc_Etb2	1.95	0.2	86	1.4	85	157	1	2.64	52	306	415	774
Turbidity_conc_Mim	1.88	0.9	110	5.1	102	268	1	2.14	212	1108	573	1892

$PBD_i = dQb_i * Nb_i * HEI_i$

$PID_i = dQi_i * Ni_i * HEI_i$

$PSD_i = dQs_i * Ns_i * HEI_i$

PBD_i, PID_i, PSD_i – power of base, inter and storm dynamics of each variable and their corresponding frequencies (N)

dQb_i, dQi_i, dQs_i – base, inter and storm dynamic limits

$HEI_i = (S_i-I_i)(K_i-K_t)/(B_t-I_t)$

HEI_i – hydrosphere elasticity index of each variable

B_i, I_i, S_i – base, inter and storm shares of each variable

B_t, I_t – base and inter shares of temperature

K_i, K_t – structural dividers of each variable and temperature

Statistical analysis: cross correlation between the quality **totals**

Warm period of 2004 (March 23-Sept 23)

Warm044	Cl_Cr	Cu_Cr	TDS_Cr	Turbo_Cr	Cl_Et2	Cu_Et2	TDS_Et2	Turbo_Et2	Cl_Et	Cu_Et	TDS_Et	Turbo_Et	Cl_Mim	Cu_Mim	TDS_Mim	Turb_Mim	Temp
Cl_	1	-0.59	0.68	-0.79	0.53	-0.22	0.47	-0.46	0.01	-0.47	0.40	-0.50	-0.20	-0.36	-0.01	-0.14	0.56
Cu_	-0.59	1	-0.56	0.94	-0.40	0.05	-0.15	0.55	-0.28	0.40	-0.23	0.37	-0.19	0.38	-0.27	0.06	-0.28
TDS r	0.68	-0.56	1	-0.63	0.44	-0.12	0.53	-0.67	0.28	-0.63	0.42	-0.24	0.09	-0.54	0.22	-0.18	0.28
Turl Cr	-0.79	0.94	-0.63	1	-0.49	0.09	-0.27	0.58	-0.18	0.45	-0.29	0.47	-0.03	0.41	-0.14	0.07	-0.45
Cl_I	0.53	-0.40	0.44	-0.49	1	-0.01	0.59	-0.45	0.31	-0.43	0.53	-0.39	0.14	-0.41	0.23	-0.11	0.28
Cu_	-0.22	0.05	-0.12	0.09	-0.01	1	-0.49	-0.11	-0.16	0.17	-0.09	0.44	-0.07	0.01	-0.21	0.38	0.06
TDS 2	0.47	-0.15	0.53	-0.27	0.59	-0.49	1	-0.42	0.44	-0.61	0.56	-0.29	0.22	-0.44	0.36	-0.41	0.05
Turl Et2	-0.46	0.55	-0.67	0.58	-0.45	-0.11	-0.42	1	-0.49	0.83	-0.45	0.25	-0.37	0.83	-0.46	0.06	-0.22
Cl_I	0.01	-0.28	0.28	-0.18	0.31	-0.16	0.44	-0.49	1	-0.62	0.51	-0.21	0.93	-0.56	0.93	-0.32	-0.39
Cu_	-0.47	0.40	-0.63	0.45	-0.43	0.17	-0.61	0.83	-0.62	1	-0.61	0.27	-0.45	0.91	-0.59	0.24	-0.08
TDS	0.40	-0.23	0.42	-0.29	0.53	-0.09	0.56	-0.45	0.51	-0.61	1	-0.10	0.31	-0.51	0.46	-0.24	0.18
Turl Et	-0.50	0.37	-0.24	0.47	-0.39	0.44	-0.29	0.25	-0.21	0.27	-0.10	1	-0.10	0.21	-0.23	0.24	-0.25
	-0.20	-0.19	0.09	-0.03	0.14	-0.07	0.22	-0.37	0.93	-0.45	0.31	-0.10	1	-0.45	0.94	-0.25	-0.50
C	-0.36	0.38	-0.54	0.41	-0.41	0.01	-0.44	0.83	-0.56	0.91	-0.51	0.21	-0.45	1	-0.55	0.04	-0.04
TD n	-0.01	-0.27	0.22	-0.14	0.23	-0.21	0.36	-0.46	0.93	-0.59	0.46	-0.23	0.94	-0.55	1	-0.39	-0.38
Turb im	-0.14	0.06	-0.18	0.07	-0.11	0.38	-0.41	0.06	-0.32	0.24	-0.24	0.24	-0.25	0.04	-0.39	1	0.05
Temp	0.56	-0.28	0.28	-0.45	0.28	0.06	0.05	-0.22	-0.39	-0.08	0.18	-0.25	-0.50	-0.04	-0.38	0.05	1

Warm period of 2005 (March 23-Sept 23)

Warm05	Cl_Cr	Cu_Cr	TDS_Cr	Turbo_Cr	Cl_Et2	Cu_Et2	TDS_Et2	Turbo_Et2	Cl_Et	Cu_Et	TDS_Et	Turbo_Et	Cl_Mim	Cu_Mim	TDS_Mim	Turb_Mim	Temp
Cl_Cr	1	-0.69	0.12	-0.81	0.32	-0.30	-0.03	-0.28	-0.10	-0.28	0.22	-0.40	-0.47	-0.21	-0.22	0.11	0.74
Cu_Cr	-0.69	1	0.27	0.97	-0.37	0.22	0.06	0.21	-0.04	0.19	-0.28	0.23	0.20	0.19	-0.08	-0.06	-0.45
TDS_Cr	0.12	0.27	1	0.27	0.15	-0.19	0.09	-0.36	0.32	-0.42	0.07	-0.18	0.21	-0.41	0.15	-0.05	0.03
Turbo_Cr	-0.81	0.97	0.27	1	-0.35	0.22	0.07	0.21	0.05	0.19	-0.26	0.25	0.33	0.17	0.04	-0.09	-0.57
Cl_Et2	0.32	-0.37	0.15	-0.35	1	-0.08	0.62	-0.43	0.52	-0.48	0.50	-0.39	0.23	-0.35	0.39	-0.03	0.27
Cu_Et2	-0.30	0.22	-0.19	0.22	-0.08	1	-0.19	-0.04	-0.21	0.20	-0.17	0.31	0.02	-0.05	-0.14	0.33	-0.18
TDS_Et2	-0.03	0.06	0.09	0.07	0.62	-0.19	1	-0.32	0.54	-0.46	0.45	-0.03	0.43	-0.27	0.53	-0.31	-0.08
Turbo_Et2	-0.28	0.21	-0.36	0.21	-0.43	-0.04	-0.32	1	-0.55	0.81	-0.33	0.39	-0.31	0.79	-0.42	0.07	-0.21
Cl_Et	-0.10	-0.04	0.32	0.05	0.52	-0.21	0.54	-0.55	1	-0.73	0.69	-0.23	0.84	-0.55	0.90	-0.35	-0.12
Cu_Et	-0.28	0.19	-0.42	0.19	-0.48	0.20	-0.46	0.81	-0.73	1	-0.48	0.23	-0.48	0.86	-0.61	0.25	-0.17
TDS_Et	0.22	-0.28	0.07	-0.26	0.50	-0.17	0.45	-0.33	0.69	-0.48	1	-0.13	0.44	-0.34	0.61	-0.21	0.15
Turbo_Et	-0.40	0.23	-0.18	0.25	-0.39	0.31	-0.03	0.39	-0.23	0.23	-0.13	1	0.18	0.07	0.02	0.01	-0.45
Cl_Mim	-0.47	0.20	0.21	0.33	0.23	0.02	0.43	-0.31	0.84	-0.48	0.44	0.18	1	-0.45	0.92	-0.34	-0.44
Cu_Mim	-0.21	0.19	-0.41	0.17	-0.35	-0.05	-0.27	0.79	-0.55	0.86	-0.34	0.07	-0.45	1	-0.51	0.02	-0.07
TDS_Mim	-0.22	-0.08	0.15	0.04	0.39	-0.14	0.53	-0.42	0.90	-0.61	0.61	0.02	0.92	-0.51	1	-0.44	-0.24
Turb_Mim	0.11	-0.06	-0.05	-0.09	-0.03	0.33	-0.31	0.07	-0.35	0.25	-0.21	0.01	-0.34	0.02	-0.44	1	0.12
Temp	0.74	-0.45	0.03	-0.57	0.27	-0.18	-0.08	-0.21	-0.12	-0.17	0.15	-0.45	-0.44	-0.07	-0.24	0.12	1

Cold period of 2004-05 (Sept 24-March 22)

Cold 04-05	Cl_Cr	Cu_Cr	TDS_Cr	Turbo_Cr	Cl_Et2	Cu_Et2	TDS_Et2	Turbo_Et2	Cl_Et	Cu_Et	TDS_Et	Turbo_Et	Cl_Mim	Cu_Mim	TDS_Mim	Turb_Mim	Temp
Cl_Cr	1.00	0.50	0.08	-0.27	0.31	-0.22	0.21	-0.03	0.41	0.02	0.30	0.06	0.44	-0.19	0.40	0.05	-0.33
Cu_Cr	0.50	1.00	-0.60	0.53	0.80	0.09	0.68	0.58	0.72	0.52	0.13	0.36	0.68	0.22	0.40	0.49	-0.48
TDS_Cr	0.08	-0.60	1.00	-0.79	-0.67	-0.44	-0.47	-0.75	-0.33	-0.59	0.12	-0.47	-0.20	-0.55	0.03	-0.55	0.08
Turbo_Cr	-0.27	0.53	-0.79	1.00	0.56	0.38	0.44	0.63	0.30	0.50	-0.08	0.36	0.20	0.43	0.01	0.44	-0.05
Cl_Et2	0.31	0.80	-0.67	0.56	1.00	0.42	0.82	0.76	0.81	0.77	0.31	0.28	0.67	0.43	0.46	0.73	-0.38
Cu_Et2	-0.22	0.09	-0.44	0.38	0.42	1.00	0.21	0.32	0.15	0.32	0.13	0.26	0.10	0.31	0.07	0.33	0.01
TDS_Et2	0.21	0.68	-0.47	0.44	0.82	0.21	1.00	0.59	0.75	0.71	0.25	0.04	0.60	0.19	0.45	0.64	-0.35
Turbo_Et2	-0.03	0.58	-0.75	0.63	0.76	0.32	0.59	1.00	0.57	0.86	-0.01	0.30	0.31	0.77	0.00	0.78	-0.16
Cl_Et	0.41	0.72	-0.33	0.30	0.81	0.15	0.75	0.57	1.00	0.72	0.54	0.07	0.77	0.16	0.62	0.67	-0.53
Cu_Et	0.02	0.52	-0.59	0.50	0.77	0.32	0.71	0.86	0.72	1.00	0.11	0.08	0.35	0.62	0.09	0.96	-0.16
TDS_Et	0.30	0.13	0.12	-0.08	0.31	0.13	0.25	-0.01	0.54	0.11	1.00	-0.12	0.35	-0.24	0.58	0.07	-0.33
Turbo_Et	0.06	0.36	-0.47	0.36	0.28	0.26	0.04	0.30	0.07	0.08	-0.12	1.00	0.23	0.31	0.04	0.12	-0.21
Cl_Mim	0.44	0.68	-0.20	0.20	0.67	0.10	0.60	0.31	0.77	0.35	0.35	0.23	1.00	0.07	0.87	0.34	-0.64
Cu_Mim	-0.19	0.22	-0.55	0.43	0.43	0.31	0.19	0.77	0.16	0.62	-0.24	0.31	0.07	1.00	-0.23	0.58	-0.03
TDS_Mim	0.40	0.40	0.03	0.01	0.46	0.07	0.45	0.00	0.62	0.09	0.58	0.04	0.87	-0.23	1.00	0.08	-0.52
Turb_Mim	0.05	0.49	-0.55	0.44	0.73	0.33	0.64	0.78	0.67	0.96	0.07	0.12	0.34	0.58	0.08	1.00	-0.14
Temp	-0.33	-0.48	0.08	-0.05	-0.38	0.01	-0.35	-0.16	-0.53	-0.16	-0.33	-0.21	-0.64	-0.03	-0.52	-0.14	1.00

Cross correlation between obtained water quality daily **totals**:

🟦	$r \leq -0.7$	🟧	$r \geq 0.7$
🟪	$r \geq 0.8$	🟥	$r \geq 0.9$

Statistical analysis: cross correlation of **components** in the warm period of 2005 (March 23 –September 23)

Increase of Urbanisation

Warm 05	Cl_Cr	Cl_Cr_B	Cl_Cr_I	Cl_Cr_S	Cu_Cr	Cu_Cr_B	Cu_Cr_I	Cu_Cr_S	TDS_Cr	TDS_Cr_B	TDS_Cr_I	TDS_Cr_S	Turbo_Cr	Turbo_Cr_B	Turbo_Cr_I	Turbo_Cr_S	Cl_Et2	Cl_Et2_B	Cl_Et2_I	Cl_Et2_S	Cu_Et2	Cu_Et2_B	Cu_Et2_I	Cu_Et2_S	TDS_Et2	TDS_Et2_B	TDS_Et2_I	TDS_Et2_S	Turbo_Et2	Turbo_Et2_B	Turbo_Et2_I	Turbo_Et2_S	Cl_Et	Cl_Et_B	Cl_Et_I	Cl_Et_S	Cu_Et	Cu_Et_B	Cu_Et_I	Cu_Et_S	TDS_Et	TDS_Et_B	TDS_Et_I	TDS_Et_S	Turbo_Et	Turbo_Et_B	Turbo_Et_I	Turbo_Et_S	Cl_Mim	Cl_Mim_B	Cl_Mim_I	Cl_Mim_S	Cu_Mim	Cu_Mim_B	Cu_Mim_I	Cu_Mim_S	TDS_Mim	TDS_Mim_B	TDS_Mim_I	TDS_Mim_S	Turb_Mim	Turb_Mim_B	Turb_Mim_I	Turb_Mim_S	Temp	Temp_B	Temp_I	Temp_S
Cl_Cr_B		1.00	-0.06	-0.23		0.28	-0.66	-0.62		0.59	0.02	-0.46		-0.75	-0.68	-0.62		0.49	-0.16	0.20		-0.13	-0.35	-0.12		-0.06	0.12	-0.01		-0.70	-0.28	-0.14		0.07	-0.19	-0.27		-0.52	-0.08	-0.03		0.29	0.18	0.18		-0.74	-0.48	-0.24		-0.09	-0.46	-0.41		-0.16	-0.16	-0.11		-0.02	-0.25	-0.25		-0.52	0.13	0.16		0.73	-0.01	-0.07
Cl_Cr_I		-0.06	1.00	0.43		-0.14	-0.25	-0.26		-0.31	0.59	0.06		-0.05	-0.27	-0.26		0.01	0.22	0.02		-0.07	-0.17	-0.03		-0.03	0.04	-0.08		-0.27	-0.24	-0.18		-0.03	0.27	-0.09		-0.16	-0.24	-0.07		-0.07	0.13	0.02		-0.18	-0.29	-0.23		-0.08	0.08	-0.13		-0.10	-0.18	-0.07		-0.07	0.20	0.02		-0.28	-0.05	0.04		0.08	-0.02	0.03
Cl_Cr_S		-0.23	0.43	1.00		0.08	-0.14	-0.18		-0.42	0.22	0.31		-0.06	-0.13	-0.17		-0.12	0.21	-0.01		-0.16	-0.08	-0.01		-0.07	0.10	-0.09		-0.17	-0.19	-0.19		-0.08	0.15	0.02		-0.13	-0.19	-0.15		-0.13	-0.01	-0.13		-0.13	-0.21	-0.16		-0.14	0.04	-0.06		-0.09	-0.15	-0.14		-0.13	0.14	0.07		-0.21	-0.11	-0.05		0.05	0.02	0.08
Cu_Cr_B		0.28	-0.14	0.08		1.00	0.21	0.18		-0.05	0.19	0.25		-0.68	0.21	0.20		-0.19	-0.25	0.14		-0.22	0.04	0.12		-0.29	0.18	0.11		-0.19	-0.05	0.04		-0.46	-0.19	-0.07		-0.28	0.16	0.12		-0.34	-0.28	-0.15		-0.16	0.06	-0.05		-0.51	-0.27	-0.17		-0.18	0.10	0.09		-0.47	-0.27	-0.28		0.10	0.24	0.13		0.36	0.08	0.14
Cu_Cr_I		-0.66	-0.25	-0.14		0.21	1.00	0.83		-0.20	0.10	0.60		0.44	0.99	0.84		-0.43	0.00	-0.09		0.21	0.29	0.06		0.09	-0.06	0.07		0.68	0.23	0.08		-0.11	0.16	0.28		0.31	0.10	-0.03		-0.27	-0.23	-0.14		0.77	0.56	0.23		0.01	0.38	0.40		-0.14	0.17	0.03		-0.03	0.14	0.09		0.59	-0.10	-0.12		-0.59	0.13	0.16
Cu_Cr_S		-0.62	-0.26	-0.18		0.18	0.83	1.00		-0.28	0.01	0.51		0.35	0.83	0.99		-0.44	-0.08	-0.10		0.16	0.33	0.06		0.09	-0.02	0.06		0.63	0.19	0.20		-0.16	0.07	0.29		0.30	0.09	0.12		-0.29	-0.24	-0.13		0.73	0.59	0.15		-0.02	0.22	0.38		-0.07	0.23	0.21		-0.06	0.03	-0.01		0.57	-0.12	-0.11		-0.52	0.11	0.15
TDS_Cr_B		0.59	-0.31	-0.42		-0.05	-0.20	-0.28		1.00	-0.37	-0.40		-0.12	-0.21	-0.28		0.55	0.19	0.18		0.43	-0.33	-0.27		0.37	0.02	0.03		-0.27	-0.18	-0.24		0.51	0.00	-0.12		-0.31	-0.27	-0.26		0.53	0.25	0.20		-0.22	-0.24	-0.07		0.42	0.01	-0.17		-0.31	-0.24	-0.29		0.43	0.11	-0.11		-0.35	-0.18	0.07		0.13	0.06	-0.01
TDS_Cr_I		0.02	0.59	0.22		0.19	0.10	0.01		-0.37	1.00	0.27		-0.15	0.07	0.02		-0.25	-0.03	-0.05		-0.25	-0.10	-0.01		-0.24	0.03	-0.09		-0.06	-0.19	-0.14		-0.28	0.34	0.06		-0.14	-0.10	-0.06		-0.32	-0.02	-0.06		0.01	-0.15	-0.18		-0.29	0.12	0.05		-0.21	-0.09	-0.05		-0.28	0.12	0.09		-0.04	0.03	-0.06		0.06	0.07	0.10
TDS_Cr_S		-0.46	0.06	0.31		0.25	0.60	0.51		-0.40	0.27	1.00		0.15	0.60	0.56		-0.31	-0.01	-0.09		-0.17	0.03	0.07		-0.16	0.02	0.01		0.25	-0.08	-0.10		-0.18	0.28	0.23		-0.04	-0.01	-0.09		-0.28	-0.16	-0.12		0.38	0.08	-0.06		-0.17	0.23	0.27		-0.31	0.00	-0.07		-0.17	0.08	0.09		0.29	-0.02	-0.07		-0.18	0.09	0.28
Turbo_Cr_B		-0.75	-0.05	-0.06		-0.68	0.44	0.35		-0.12	-0.15	0.15		1.00	0.46	0.34		-0.27	0.27	-0.22		0.25	0.18	-0.04		0.20	-0.23	-0.04		0.65	0.17	0.05		0.22	0.28	0.23		0.51	-0.01	-0.08		-0.05	-0.07	-0.13		0.69	0.29	0.16		0.35	0.54	0.44		0.14	0.06	-0.02		0.27	0.38	0.34		0.35	-0.20	-0.16		-0.76	-0.02	-0.03
Turbo_Cr_I		-0.68	-0.27	-0.13		0.21	0.99	0.83		-0.21	0.07	0.60		0.46	1.00	0.84		-0.45	-0.01	-0.11		0.22	0.30	0.07		0.06	-0.07	0.07		0.70	0.24	0.10		-0.13	0.15	0.29		0.33	0.12	-0.01		-0.29	-0.26	-0.16		0.79	0.57	0.24		0.01	0.40	0.41		-0.11	0.19	0.03		-0.04	0.14	0.10		0.60	-0.08	-0.12		-0.61	0.13	0.16
Turbo_Cr_S		-0.62	-0.26	-0.17		0.20	0.84	0.99		-0.28	0.02	0.56		0.34	0.84	1.00		-0.44	-0.07	-0.10		0.13	0.31	0.07		0.07	-0.03	0.06		0.61	0.18	0.20		-0.16	0.09	0.28		0.27	0.10	0.13		-0.30	-0.24	-0.13		0.72	0.56	0.14		-0.04	0.23	0.37		-0.10	0.23	0.22		-0.07	0.03	-0.01		0.56	-0.11	-0.10		-0.51	0.11	0.17
Cl_Et2_B		0.49	0.01	-0.12		-0.19	-0.43	-0.44		0.55	-0.25	-0.31		-0.27	-0.45	-0.44		1.00	0.28	0.36		0.41	-0.34	-0.20		0.45	0.21	0.11		-0.63	-0.37	-0.36		0.64	0.00	-0.13		-0.57	-0.34	-0.25		0.73	0.43	0.44		-0.60	-0.51	-0.34		0.40	-0.15	-0.25		-0.41	-0.27	-0.26		0.47	-0.05	-0.05		-0.59	-0.09	0.11		0.40	0.10	0.03
Cl_Et2_I		-0.16	0.22	0.21		-0.25	0.00	-0.08		0.19	-0.03	-0.01		0.27	-0.01	-0.07		0.28	1.00	0.28		0.40	-0.19	-0.21		0.56	-0.05	-0.06		-0.19	-0.29	-0.28		0.37	0.39	0.01		-0.23	-0.27	-0.25		0.14	0.19	0.09		-0.06	-0.29	-0.22		0.27	0.46	0.02		-0.30	-0.17	-0.18		0.25	0.44	0.21		-0.29	-0.26	-0.10		-0.10	-0.03	0.04
Cl_Et2_S		0.20	0.02	-0.01		0.14	-0.09	-0.10		0.18	-0.05	-0.09		-0.22	-0.11	-0.10		0.36	0.28	1.00		0.25	0.10	-0.04		0.18	0.38	0.08		-0.27	-0.09	-0.13		0.05	-0.10	-0.02		-0.22	-0.08	-0.08		0.06	-0.07	0.01		-0.23	-0.11	-0.10		-0.09	-0.10	-0.05		-0.15	-0.06	-0.07		-0.06	-0.18	0.04		-0.14	0.00	0.06		0.16	0.21	0.05
Cu_Et2_B		-0.13	-0.07	-0.16		-0.22	0.21	0.16		0.43	-0.25	-0.17		0.25	0.22	0.13		0.41	0.40	0.25		1.00	0.18	-0.13		0.58	0.10	0.11		0.19	0.12	-0.26		0.46	0.00	0.06		0.10	-0.28	-0.29		0.38	0.09	0.13		0.24	0.25	0.16		0.46	0.19	0.05		-0.13	-0.17	-0.30		0.42	0.14	0.02		0.06	-0.21	0.06		-0.34	0.16	0.09
Cu_Et2_I		-0.35	-0.17	-0.08		0.04	0.29	0.33		-0.33	-0.10	0.03		0.18	0.30	0.31		-0.34	-0.19	0.10		0.18	1.00	0.48		-0.16	0.01	-0.06		0.51	0.52	0.04		-0.25	-0.27	0.06		0.49	0.24	0.04		-0.24	-0.34	-0.16		0.36	0.56	0.39		-0.07	-0.05	0.21		0.36	0.07	-0.04		-0.13	-0.20	0.04		0.60	0.18	0.08		-0.25	0.01	-0.02
Cu_Et2_S		-0.12	-0.03	-0.01		0.12	0.06	0.06		-0.27	-0.01	0.07		-0.04	0.07	0.07		-0.20	-0.21	-0.04		-0.13	0.48	1.00		-0.44	-0.21	-0.02		0.11	0.24	0.00		-0.33	-0.26	0.05		0.11	0.48	0.18		-0.27	-0.25	-0.12		0.01	0.22	0.13		-0.29	-0.19	0.14		0.28	0.21	-0.04		-0.30	-0.31	-0.02		0.27	0.37	0.31		0.02	-0.01	0.01
TDS_Et2_B		-0.06	-0.03	-0.07		-0.29	0.09	0.09		0.37	-0.24	-0.16		0.20	0.06	0.07		0.45	0.56	0.18		0.58	-0.16	-0.44		1.00	-0.04	-0.06		-0.03	-0.13	-0.24		0.68	0.22	-0.06		-0.02	-0.50	-0.35		0.59	0.49	0.32		0.07	0.07	-0.03		0.62	0.30	-0.09		-0.24	-0.24	-0.15		0.62	0.42	0.04		-0.24	-0.52	-0.27		-0.16	-0.05	-0.04
TDS_Et2_I		0.12	0.04	0.10		0.18	-0.06	-0.02		0.02	0.03	0.02		-0.23	-0.07	-0.03		0.21	-0.05	0.38		0.10	0.01	-0.21		-0.04	1.00	0.43		-0.18	-0.16	-0.25		-0.07	0.00	0.13		-0.07	-0.17	-0.23		-0.04	-0.12	-0.05		-0.12	-0.02	-0.08		-0.11	-0.09	0.03		-0.11	-0.21	-0.17		-0.11	-0.16	0.19		-0.05	0.06	-0.03		0.20	0.14	0.06
TDS_Et2_S		-0.01	-0.08	-0.09		0.11	0.07	0.06		0.03	-0.09	0.01		-0.04	0.07	0.06		0.11	-0.06	0.08		0.11	-0.06	-0.02		-0.06	0.43	1.00		0.00	-0.02	-0.07		-0.07	-0.10	-0.03		0.09	0.10	-0.08		-0.06	-0.13	-0.08		0.02	0.14	0.04		-0.12	-0.09	0.10		0.06	-0.05	-0.07		-0.12	-0.16	0.10		0.08	0.20	0.09		-0.02	0.04	0.05
Turbo_Et2_B		-0.70	-0.27	-0.17		-0.19	0.68	0.63		-0.27	-0.06	0.25		0.65	0.70	0.61		-0.63	-0.19	-0.27		0.19	0.51	0.11		-0.03	-0.18	0.00		1.00	0.63	0.24		-0.17	0.00	0.25		0.80	0.18	0.01		-0.28	-0.29	-0.20		0.93	0.80	0.61		0.11	0.35	0.46		0.38	0.14	0.05		0.02	0.11	0.19		0.78	-0.07	-0.15		-0.76	-0.02	-0.04
Turbo_Et2_I		-0.28	-0.24	-0.19		-0.05	0.23	0.19		-0.18	-0.19	-0.08		0.17	0.24	0.18		-0.37	-0.29	-0.09		0.12	0.52	0.24		-0.13	-0.16	-0.02		0.63	1.00	0.43		-0.23	-0.38	-0.12		0.66	0.37	0.15		-0.14	-0.28	-0.12		0.46	0.63	0.88		0.03	0.02	-0.01		0.58	0.18	0.10		-0.06	-0.13	-0.09		0.56	0.11	0.02		-0.38	-0.12	-0.08
Turbo_Et2_S		-0.14	-0.18	-0.19		0.04	0.08	0.20		-0.24	-0.14	-0.10		0.05	0.10	0.20		-0.36	-0.28	-0.13		-0.26	0.04	0.00		-0.24	-0.25	-0.07		0.24	0.43	1.00		-0.43	-0.39	-0.15		0.33	0.47	0.77		-0.37	-0.31	-0.16		0.18	0.32	0.30		-0.32	-0.22	-0.09		0.47	0.58	0.77		-0.33	-0.32	-0.20		0.24	0.07	0.05		-0.16	0.03	-0.02
Cl_Et_B		0.07	-0.03	-0.08		-0.46	-0.11	-0.16		0.51	-0.28	-0.18		0.22	-0.13	-0.16		0.64	0.37	0.05		0.46	-0.25	-0.33		0.68	-0.07	-0.07		-0.17	-0.23	-0.43		1.00	0.19	-0.12		-0.24	-0.57	-0.50		0.90	0.64	0.46		-0.11	-0.27	-0.13		0.92	0.24	-0.16		-0.41	-0.43	-0.37		0.94	0.45	-0.09		-0.40	-0.43	-0.15		-0.09	0.03	-0.01
Cl_Et_I		-0.19	0.27	0.15		-0.19	0.16	0.07		0.00	0.34	0.28		0.28	0.15	0.09		0.00	0.39	-0.10		0.00	-0.27	-0.26		0.22	0.00	-0.10		0.00	-0.38	-0.39		0.19	1.00	0.23		-0.20	-0.46	-0.42		0.03	0.40	0.27		0.13	-0.28	-0.26		0.16	0.77	0.29		-0.46	-0.33	-0.27		0.13	0.66	0.52		-0.21	-0.39	-0.27		-0.05	0.00	0.02
Cl_Et_S		-0.27	-0.09	0.02		-0.07	0.28	0.29		-0.12	0.06	0.23		0.23	0.29	0.28		-0.13	0.01	-0.02		0.06	0.06	0.05		-0.06	0.13	-0.03		0.25	-0.12	-0.15		-0.12	0.23	1.00		-0.02	-0.12	-0.16		-0.13	-0.06	0.01		0.29	0.19	-0.07		-0.11	0.17	0.83		-0.23	-0.15	-0.10		-0.12	-0.04	0.58		0.21	-0.07	-0.11		-0.15	0.20	0.09
Cu_Et_B		-0.52	-0.16	-0.13		-0.28	0.31	0.30		-0.31	-0.14	-0.04		0.51	0.33	0.27		-0.57	-0.23	-0.22		0.10	0.49	0.11		-0.02	-0.07	0.09		0.80	0.66	0.33		-0.24	-0.20	-0.02		1.00	0.30	0.06		-0.27	-0.28	-0.22		0.69	0.79	0.64		0.02	0.12	0.20		0.75	0.18	0.11		-0.07	-0.03	0.19		0.67	0.05	-0.13		-0.60	-0.15	-0.11
Cu_Et_I		-0.08	-0.24	-0.19		0.16	0.10	0.09		-0.27	-0.10	-0.01		-0.01	0.12	0.10		-0.34	-0.27	-0.08		-0.28	0.24	0.48		-0.50	-0.17	0.10		0.18	0.37	0.47		-0.57	-0.46	-0.12		0.30	1.00	0.48		-0.49	-0.45	-0.22		0.07	0.30	0.20		-0.49	-0.29	0.02		0.61	0.60	0.29		-0.50	-0.49	-0.13		0.39	0.61	0.25		-0.06	-0.11	-0.01
Cu_Et_S		-0.03	-0.07	-0.15		0.12	-0.03	0.12		-0.26	-0.06	-0.09		-0.08	-0.01	0.13		-0.25	-0.25	-0.08		-0.29	0.04	0.18		-0.35	-0.23	-0.08		0.01	0.15	0.77		-0.50	-0.42	-0.16		0.06	0.48	1.00		-0.44	-0.36	-0.18		-0.05	0.10	-0.04		-0.47	-0.34	-0.18		0.36	0.76	0.82		-0.46	-0.43	-0.29		0.10	0.24	0.19		0.05	-0.03	-0.03
TDS_Et_B		0.29	-0.07	-0.13		-0.34	-0.27	-0.29		0.53	-0.32	-0.28		-0.05	-0.29	-0.30		0.73	0.14	0.06		0.38	-0.24	-0.27		0.59	-0.04	-0.06		-0.28	-0.14	-0.37		0.90	0.03	-0.13		-0.27	-0.49	-0.44		1.00	0.66	0.54		-0.29	-0.26	-0.04		0.80	0.03	-0.22		-0.32	-0.42	-0.37		0.84	0.23	-0.11		-0.42	-0.33	-0.07		0.11	0.01	-0.04
TDS_Et_I		0.18	0.13	-0.01		-0.28	-0.23	-0.24		0.25	-0.02	-0.16		-0.07	-0.26	-0.24		0.43	0.19	-0.07		0.09	-0.34	-0.25		0.49	-0.12	-0.13		-0.29	-0.28	-0.31		0.64	0.40	-0.06		-0.28	-0.45	-0.36		0.66	1.00	0.60		-0.27	-0.28	-0.16		0.51	0.22	-0.13		-0.28	-0.33	-0.24		0.53	0.51	0.02		-0.41	-0.34	-0.22		0.12	-0.11	-0.08
TDS_Et_S		0.18	0.02	-0.13		-0.15	-0.14	-0.13		0.20	-0.06	-0.12		-0.13	-0.16	-0.13		0.44	0.09	0.01		0.13	-0.16	-0.12		0.32	-0.05	-0.08		-0.20	-0.12	-0.16		0.46	0.27	0.01		-0.22	-0.22	-0.18		0.54	0.60	1.00		-0.22	-0.17	-0.09		0.40	0.07	-0.05		-0.18	-0.17	-0.12		0.47	0.06	0.04		-0.24	-0.16	-0.12		0.19	-0.10	-0.09
Turbo_Et_B		-0.74	-0.18	-0.13		-0.16	0.77	0.73		-0.22	0.01	0.38		0.69	0.79	0.72		-0.60	-0.06	-0.23		0.24	0.36	0.01		0.07	-0.12	0.02		0.93	0.46	0.18		-0.11	0.13	0.29		0.69	0.07	-0.05		-0.29	-0.27	-0.22		1.00	0.73	0.48		0.13	0.43	0.47		0.20	0.09	0.03		0.04	0.20	0.18		0.71	-0.17	-0.18		-0.81	0.03	0.00
Turbo_Et_I		-0.48	-0.29	-0.21		0.06	0.56	0.59		-0.24	-0.15	0.08		0.29	0.57	0.56		-0.51	-0.29	-0.11		0.25	0.56	0.22		0.07	-0.02	0.14		0.80	0.63	0.32		-0.27	-0.28	0.19		0.79	0.30	0.10		-0.26	-0.28	-0.17		0.73	1.00	0.60		-0.04	0.03	0.29		0.52	0.22	0.12		-0.11	-0.14	0.04		0.73	0.04	-0.06		-0.56	-0.02	-0.03
Turbo_Et_S		-0.24	-0.23	-0.16		-0.05	0.23	0.15		-0.07	-0.18	-0.06		0.16	0.24	0.14		-0.34	-0.22	-0.10		0.16	0.39	0.13		-0.03	-0.08	0.04		0.61	0.88	0.30		-0.13	-0.26	-0.07		0.64	0.20	-0.04		-0.04	-0.16	-0.09		0.48	0.60	1.00		0.13	0.12	0.06		0.50	-0.02	-0.04		0.04	-0.02	-0.01		0.51	0.00	-0.03		-0.39	-0.10	-0.06
Cl_Mim_B		-0.09	-0.08	-0.14		-0.51	0.01	-0.02		0.42	-0.29	-0.17		0.35	0.01	-0.04		0.40	0.27	-0.09		0.46	-0.07	-0.29		0.62	-0.11	-0.12		0.11	0.03	-0.32		0.92	0.16	-0.11		0.02	-0.49	-0.47		0.80	0.51	0.40		0.13	-0.04	0.13		1.00	0.32	-0.13		-0.25	-0.42	-0.35		0.98	0.51	-0.09		-0.19	-0.46	-0.23		-0.25	0.01	-0.04
Cl_Mim_I		-0.46	0.08	0.04		-0.27	0.38	0.22		0.01	0.12	0.23		0.54	0.40	0.23		-0.15	0.46	-0.10		0.19	-0.05	-0.19		0.30	-0.09	-0.09		0.35	0.02	-0.22		0.24	0.77	0.17		0.12	-0.29	-0.34		0.03	0.22	0.07		0.43	0.03	0.12		0.32	1.00	0.26		-0.25	-0.22	-0.23		0.24	0.74	0.49		0.08	-0.33	-0.26		-0.37	-0.01	0.00
Cl_Mim_S		-0.41	-0.13	-0.06		-0.17	0.40	0.38		-0.17	0.05	0.27		0.44	0.41	0.37		-0.25	0.02	-0.05		0.05	0.21	0.14		-0.09	0.03	0.10		0.46	-0.01	-0.09		-0.16	0.29	0.83		0.20	0.02	-0.18		-0.22	-0.13	-0.05		0.47	0.29	0.06		-0.13	0.26	1.00		-0.08	-0.15	-0.12		-0.16	-0.02	0.72		0.38	-0.06	-0.11		-0.32	0.18	0.09
Cu_Mim_B		-0.16	-0.10	-0.09		-0.18	-0.14	-0.07		-0.31	-0.21	-0.31		0.14	-0.11	-0.10		-0.41	-0.30	-0.15		-0.13	0.36	0.28		-0.24	-0.11	0.06		0.38	0.58	0.47		-0.41	-0.46	-0.23		0.75	0.61	0.36		-0.32	-0.28	-0.18		0.20	0.52	0.50		-0.25	-0.25	-0.08		1.00	0.45	0.26		-0.31	-0.32	-0.03		0.41	0.34	0.09		-0.23	-0.25	-0.15
Cu_Mim_I		-0.16	-0.18	-0.15		0.10	0.17	0.23		-0.24	-0.09	0.00		0.06	0.19	0.23		-0.27	-0.17	-0.06		-0.17	0.07	0.21		-0.24	-0.21	-0.05		0.14	0.18	0.58		-0.43	-0.33	-0.15		0.18	0.60	0.76		-0.42	-0.33	-0.17		0.09	0.22	-0.02		-0.42	-0.22	-0.15		0.45	1.00	0.58		-0.42	-0.35	-0.23		0.18	0.30	0.10		-0.09	-0.10	-0.04
Cu_Mim_S		-0.11	-0.07	-0.14		0.09	0.03	0.21		-0.29	-0.05	-0.07		-0.02	0.03	0.22		-0.26	-0.18	-0.07		-0.30	-0.04	-0.04		-0.15	-0.17	-0.07		0.05	0.10	0.77		-0.37	-0.27	-0.10		0.11	0.29	0.82		-0.37	-0.24	-0.12		0.03	0.12	-0.04		-0.35	-0.23	-0.12		0.26	0.58	1.00		-0.34	-0.29	-0.19		0.10	0.04	-0.07		-0.01	-0.03	0.00
TDS_Mim_B		-0.02	-0.07	-0.13		-0.47	-0.03	-0.06		0.43	-0.28	-0.17		0.27	-0.04	-0.07		0.47	0.25	-0.06		0.42	-0.13	-0.30		0.62	-0.11	-0.12		0.02	-0.06	-0.33		0.94	0.13	-0.12		-0.07	-0.50	-0.46		0.84	0.53	0.47		0.04	-0.11	0.04		0.98	0.24	-0.16		-0.31	-0.42	-0.34		1.00	0.43	-0.14		-0.26	-0.46	-0.22		-0.18	0.03	-0.04
TDS_Mim_I		-0.25	0.20	0.14		-0.27	0.14	0.03		0.11	0.12	0.08		0.38	0.14	0.03		-0.05	0.44	-0.18		0.14	-0.20	-0.31		0.42	-0.16	-0.16		0.11	-0.13	-0.32		0.45	0.66	-0.04		-0.03	-0.49	-0.43		0.23	0.51	0.06		0.20	-0.14	-0.02		0.51	0.74	-0.02		-0.32	-0.35	-0.29		0.43	1.00	0.13		-0.17	-0.47	-0.34		-0.22	-0.07	-0.06
TDS_Mim_S		-0.25	0.02	0.07		-0.28	0.09	-0.01		-0.11	0.09	0.09		0.34	0.10	-0.01		-0.05	0.21	0.04		0.02	0.04	-0.02		0.04	0.19	0.10		0.19	-0.09	-0.20		-0.09	0.52	0.58		0.19	-0.13	-0.29		-0.11	0.02	0.04		0.18	0.04	-0.01		-0.09	0.49	0.72		-0.03	-0.23	-0.19		-0.14	0.13	1.00		0.04	-0.17	-0.21		-0.10	0.07	0.06
Turb_Mim_B		-0.52	-0.28	-0.21		0.10	0.59	0.57		-0.35	-0.04	0.29		0.35	0.60	0.56		-0.59	-0.29	-0.14		0.06	0.60	0.27		-0.24	-0.05	0.08		0.78	0.56	0.24		-0.40	-0.21	0.21		0.67	0.39	0.10		-0.42	-0.41	-0.24		0.71	0.73	0.51		-0.19	0.08	0.38		0.41	0.18	0.10		-0.26	-0.17	0.04		1.00	0.39	-0.02		-0.51	-0.02	0.00
Turb_Mim_I		0.13	-0.05	-0.11		0.24	-0.10	-0.12		-0.18	0.03	-0.02		-0.20	-0.08	-0.11		-0.09	-0.26	0.00		-0.21	0.18	0.37		-0.52	0.06	0.20		-0.07	0.11	0.07		-0.43	-0.39	-0.07		0.05	0.61	0.24		-0.33	-0.34	-0.16		-0.17	0.04	0.00		-0.46	-0.33	-0.06		0.34	0.30	0.04		-0.46	-0.47	-0.17		0.39	1.00	0.36		0.19	-0.10	-0.04
Turb_Mim_S		0.16	0.04	-0.05		0.13	-0.12	-0.11		0.07	-0.06	-0.07		-0.16	-0.12	-0.10		0.11	-0.10	0.06		0.06	0.08	0.31		-0.27	-0.03	0.09		-0.15	0.02	0.05		-0.15	-0.27	-0.11		-0.13	0.25	0.19		-0.07	-0.22	-0.12		-0.18	-0.06	-0.03		-0.23	-0.26	-0.11		0.09	0.10	-0.07		-0.22	-0.34	-0.21		-0.02	0.36	1.00		0.14	0.02	0.05
Temp_B		0.73	0.08	0.05		0.36	-0.59	-0.52		0.13	0.06	-0.18		-0.76	-0.61	-0.51		0.40	-0.10	0.16		-0.34	-0.25	0.02		-0.16	0.20	-0.02		-0.76	-0.38	-0.16		-0.09	-0.05	-0.15		-0.60	-0.06	0.05		0.11	0.12	0.19		-0.81	-0.56	-0.39		-0.25	-0.37	-0.32		-0.23	-0.09	-0.01		-0.18	-0.22	-0.10		-0.51	0.19	0.14		1.00	-0.02	-0.06
Temp_I		-0.01	-0.02	0.02		0.08	0.13	0.11		0.06	0.07	0.09		-0.02	0.13	0.11		0.10	-0.03	0.21		0.16	0.01	-0.01		-0.05	0.14	0.04		-0.02	-0.12	0.03		0.03	0.00	0.20		-0.15	-0.11	-0.03		0.01	-0.11	-0.10		0.03	-0.02	-0.10		0.01	-0.01	0.18		-0.25	-0.10	-0.03		0.03	-0.07	0.07		-0.02	-0.10	0.02		-0.02	1.00	0.58
Temp_S		-0.07	0.03	0.08		0.14	0.16	0.15		-0.01	0.10	0.28		-0.03	0.16	0.17		0.03	0.04	0.05		0.09	-0.02	0.01		-0.04	0.06	0.05		-0.04	-0.08	-0.02		-0.01	0.02	0.09		-0.11	-0.01	-0.03		-0.04	-0.08	-0.09		0.00	-0.03	-0.06		-0.04	0.00	0.09		-0.15	-0.04	0.00		-0.04	-0.06	0.06		0.00	-0.04	0.05		-0.06	0.58	1.00

Statistical analysis: ranged averages of cross correlation with different meteorological variables

Warm 2004	**Temperature**		**Precipitation**		**Humidity**		**Wind speed**		**Wind direction**		**Pressure**	
Between components	0.12	Turbo_Cr_**I**	0.14	Turbo_Et2_**B**	0.13	Turbo_Et2_**B**	0.14	Turbo_Et2_**B**	0.13	Turbo_Et2_**B**	0.13	Turbo_Cr_**I**
	0.12	Turbo_Et2_**B**	0.13	Turbo_Cr_**I**	0.13	Turbo_Cr_**I**	0.14	Turbo_Cr_**I**	0.13	Turbo_Cr_**I**	0.13	Turbo_Et2_**B**
	0.12	Cu_Cr_I	0.13	Cu_Cr_I	0.13	Cu_Cr_I	0.13	Cu_Cr_I	0.13	Cu_Cr_I	0.13	Cu_Cr_I
Within components	0.22	TDS_Mim_**B**	0.24	Cl_Mim_**B**	0.23	Cl_Mim_**B**	0.24	Cl_Mim_**B**	0.23	Cl_Mim_**B**	0.24	Cl_Mim_**B**
	0.22	Cl_Mim_**B**	0.24	Cl_Et_**B**	0.23	Cl_Et_**B**	0.24	TDS_Mim_**B**	0.23	TDS_Mim_**B**	0.24	TDS_Mim_**B**
	0.22	Cl_Et_B	0.24	TDS_Mim_B	0.23	TDS_Mim_B	0.24	Cl_Et_B	0.23	Cl_Et_B	0.23	Cl_Et_B
Totals	0.12	TDS_Et	0.09	Cl_Et	0.09	TDS_Et	0.10	Cl_Et	0.09	TDS_Et	0.10	TDS_Et
	0.07	Turbo_Et	0.09	TDS_Et	0.09	Cl_Et	0.10	Cl_Mim	0.09	Cl_Et	0.09	Cl_Et
	0.07	Cl_Et	0.09	Cl_Mim	0.08	Cl_Mim	0.09	TDS_Et	0.09	Cl_Mim	0.09	Cl_Mim
Warm 2005												
Between components	0.15	Turbo_Et_**B**	0.16	Turbo_Et_**B**	0.16	Turbo_Et_**B**	0.18	Turbo_Et_**B**	0.17	Turbo_Et_**B**	0.17	Turbo_Et_**B**
	0.15	Turbo_Cr_**I**	0.16	Turbo_Et2_**B**	0.16	Cu_Cr_**I**	0.17	Turbo_Et2_**B**	0.16	Turbo_Et2_**B**	0.17	Turbo_Et2_**B**
	0.15	Cu_Cr_I	0.15	Turbo_Cr_I	0.16	Turbo_Et2_B	0.17	Turbo_Cr_I	0.16	Turbo_Cr_I	0.16	Turbo_Cr_I
Within components	0.29	Cl_Mim_**B**	0.30	Cl_Mim_**B**	0.27	Cl_Mim_**B**	0.32	Cl_Mim_**B**	0.30	Cl_Mim_**B**	0.29	Cl_Mim_**B**
	0.28	TDS_Mim_**B**	0.28	TDS_Mim_**B**	0.26	TDS_Mim_**B**	0.30	TDS_Mim_**B**	0.28	TDS_Mim_**B**	0.27	TDS_Mim_**B**
	0.26	Cl_Et_B	0.27	Cu_Et2_B	0.25	Cu_Et2_B	0.27	Cl_Et_B	0.26	Cu_Et2_B	0.25	Cl_Et_B
Totals	0.13	Cl_Mim	0.16	Cl_Mim	0.14	Cl_Mim	0.17	Cl_Mim	0.16	Cl_Mim	0.15	Cl_Mim
	0.12	TDS_Et2	0.13	Turbo_Cr	0.13	TDS_Et2	0.15	Turbo_Cr	0.13	Turbo_Cr	0.14	Turbo_Cr
	0.12	Cl_Et	0.12	TDS_Et2	0.13	Turbo_Cr	0.13	TDS_Mim	0.12	TDS_Mim	0.12	Cu_Cr
Cold 2004-05												
Between components	0.32	Cl_Et2_**S**	0.33	Cl_Et2_**S**	0.32	Cl_Et2_**S**	0.33	Cl_Et2_**S**	0.33	Cl_Et2_**S**	0.32	Cl_Et2_**S**
	0.31	Cu_Cr_**S**	0.32	Cu_Cr_**S**	0.32	Cu_Cr_**S**	0.32	Cu_Cr_**S**	0.32	Cu_Cr_**S**	0.32	Cu_Cr_**S**
	0.28	Cl_Et_S	0.29	Cu_Mim_I	0.28	Cl_Et_S	0.29	Cu_Mim_I	0.29	Cl_Et_S	0.28	Cl_Et_S
Within components	0.49	Cl_Et2_**S**	0.48	Cl_Et2_**S**	0.47	Cl_Et2_**S**	0.48	Cl_Et2_**S**	0.48	Cl_Et2_**S**	0.47	Cl_Et2_**S**
	0.48	Cl_Et_**S**	0.47	Cl_Et_**S**	0.46	Cl_Et_**S**	0.47	Cl_Et_**S**	0.47	Cl_Et_**S**	0.47	Cl_Et_**S**
	0.45	Cu_Et_S	0.45	Cu_Et_S	0.44	Cu_Et_S	0.45	Cu_Et_S	0.44	Cu_Et_S	0.44	Cu_Et_S
Total	0.48	Cl_Et2	0.50	Cl_Et2	0.50	Cl_Et2	0.51	Cl_Et2	0.51	Cl_Et2	0.50	Cl_Et2
	0.44	Cl_Et	0.47	Cl_Et	0.48	Cl_Et	0.47	Cl_Et	0.47	Cl_Et	0.47	Cl_Et
	0.40	Cu_Et	0.42	TDS_Et2	0.43	Cu_Cr	0.43	TDS_Et2	0.42	TDS_Et2	0.42	Cu_Cr

Conclusions

- The dynamic of the dissolved and suspended contamination of the examined urban streams indicates
  - a very high its level, which allows simulating of dissolved substances based only on flow, which is not the case for pristine streams
  - There are different variables and different their components play different roles in different periods (warm and cold):
  - The least contaminated stream has stronger correlation between its own components (up to 0.99);
  - The most contaminated streams have stronger correlation between their corresponding components indicating its unified “urban” regime with a stable internal source;
- HFA is the perfect and resourceful tool, which can be used for urban impact assessment to the water quality of streams and interrelation between ground and surface water quality