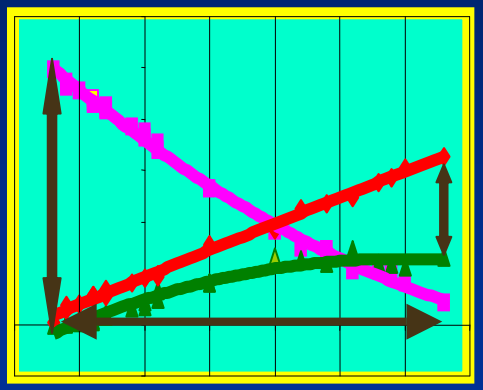
The Hydrosphere Elasticity Index



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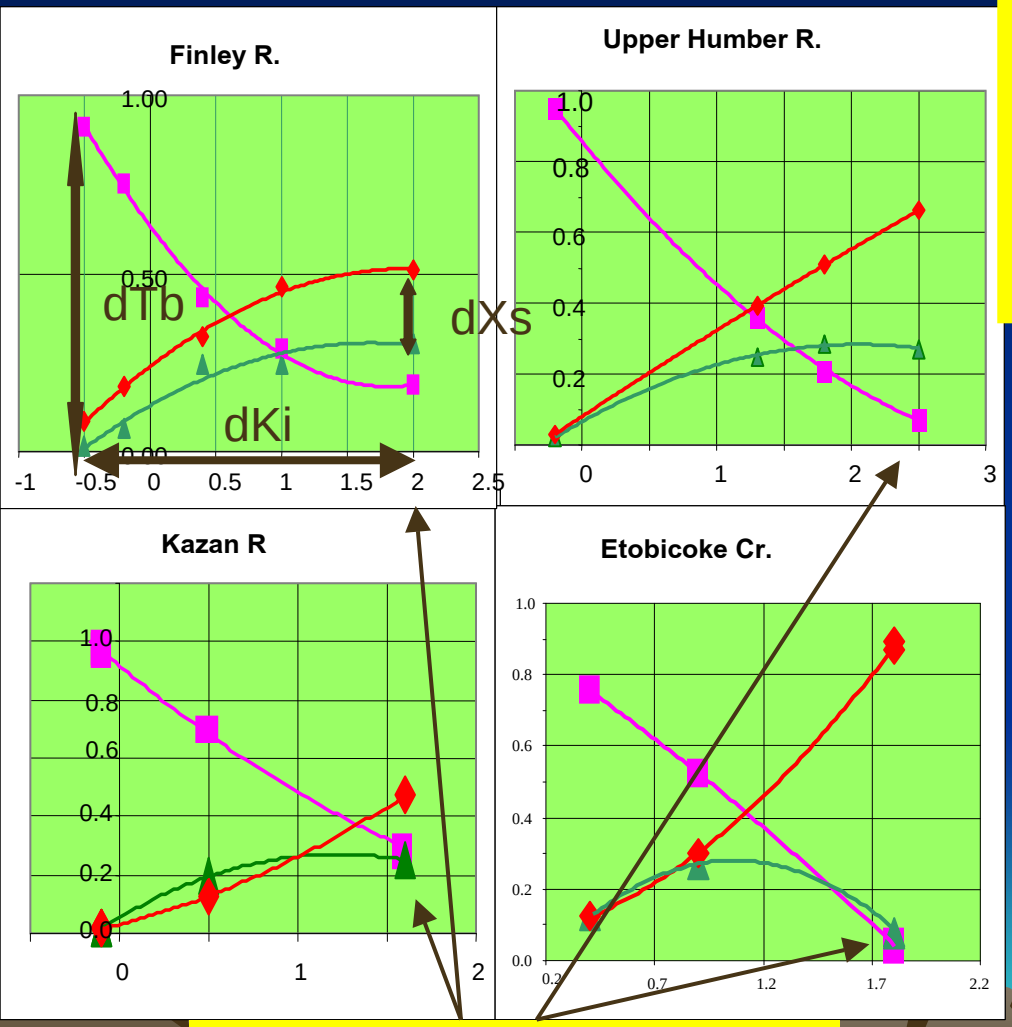
What is the hydrosphere elasticity index (HEI)?



Tension releasing parameter

The Hydrosphere Elasticity Index is the quantitative estimate of the elasticity tension or, based on the elasticity definition, FUNCTIONAL tension

HEI = (dTb/dXs)*(Kx-Kt)

- The Structural Harmony Chart of Hydrosphere (SHC) is the graphical interpretation of hydrosphere entirety and uniqueness, i.e. the illustration of the Einstein's spacetime absolute
- Each hydrosphere **spacetime,** depending on its geo-bio-chemical conditions, has its own Structural Harmony Chart
- The qualitative and quantitative charts of the same spacetimes coincide

Objectives

- To visualize the elasticity of hydrosphere as its functional ability to keep life-sustaining thermo-regime and possibility to assess this ability numerically.
- To find a partner and funding for publication, further development of the approach and experiments in its frame

Questions to answer

- If the function of hydrosphere is to keep the life-sustaining thermo-regime within its boundaries and
- The condition of any natural system stability is the consistency (harmony) between its structure and functionality,

Why our activity is malfunctioning within the existing structure of hydrosphere?

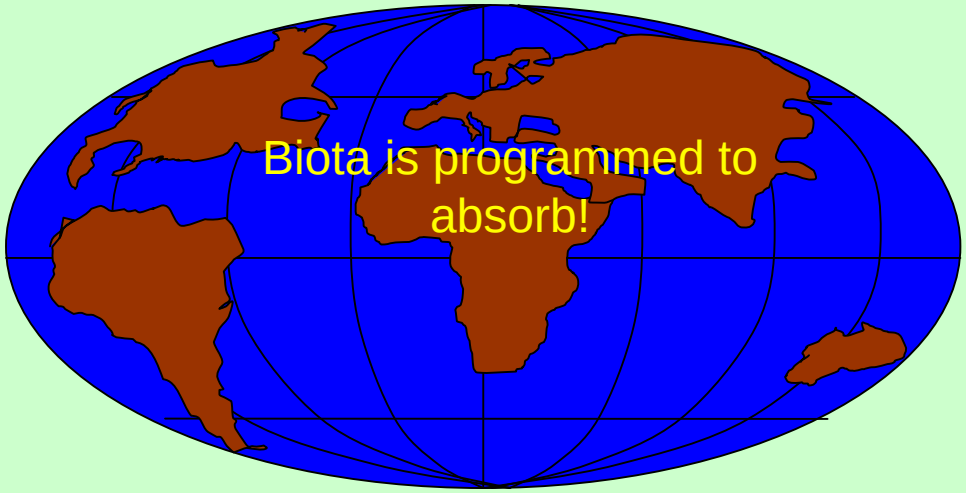
In order to find the answer to that question, we have to answer the other questions first:

- What is the hydrosphere structure?
- How does it correspond to the function?
- What is the natural mechanism of the structure “adjustment”?
- What is the anthropogenic twist of the “adjustment”?

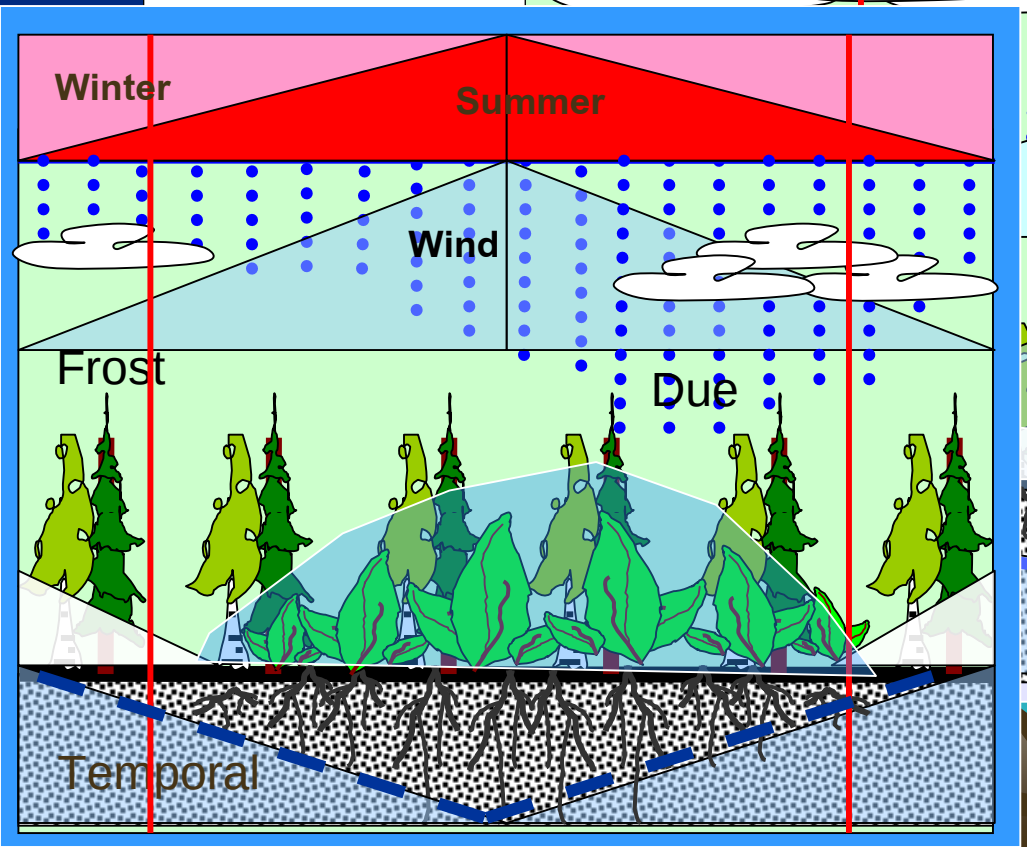
Global structure and function of hydrosphere

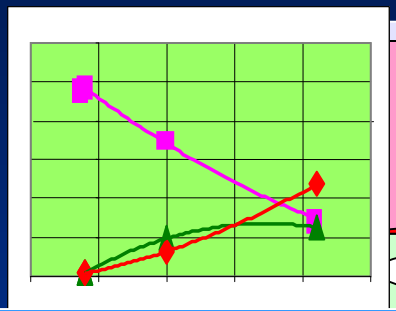
Dissolving and water cycling have began since the first drop of water on Earth… In order to keep the ocean water mineralization level that has provided a stable rate of evaporation, the allocation of excessive dissolved matter is needed… The biosphere as the dynamic buffer was born in the ocean and has developed over continents…

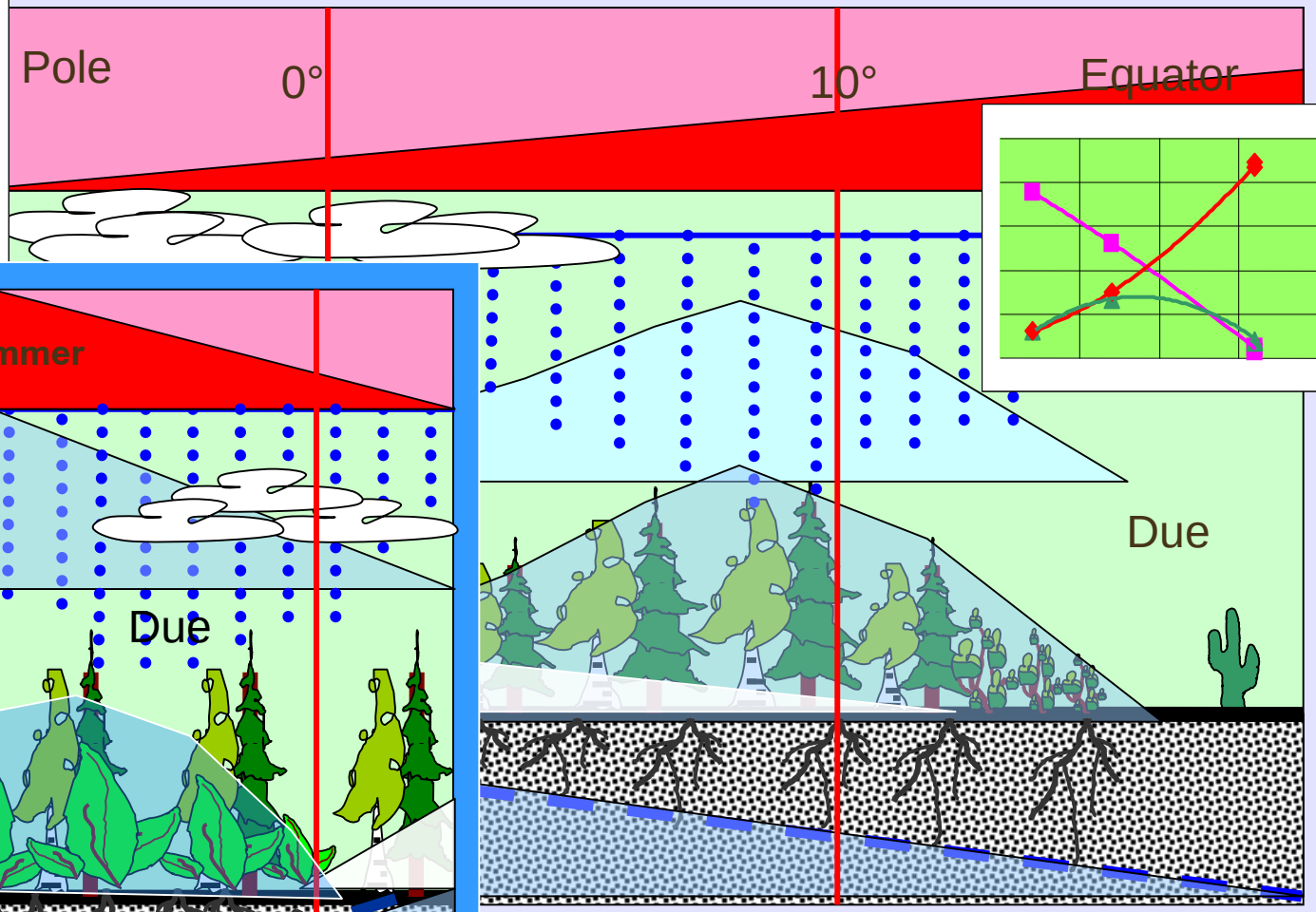
Aerial structure of hydrosphere 250 million years ago: too uneven tension on a single continent



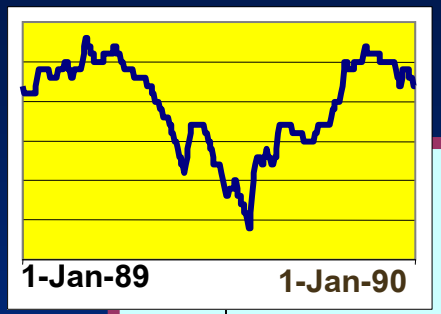
Spatial and temporal structures of hydrosphere

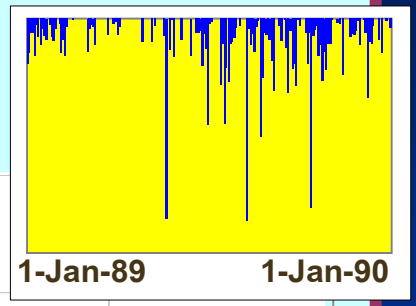




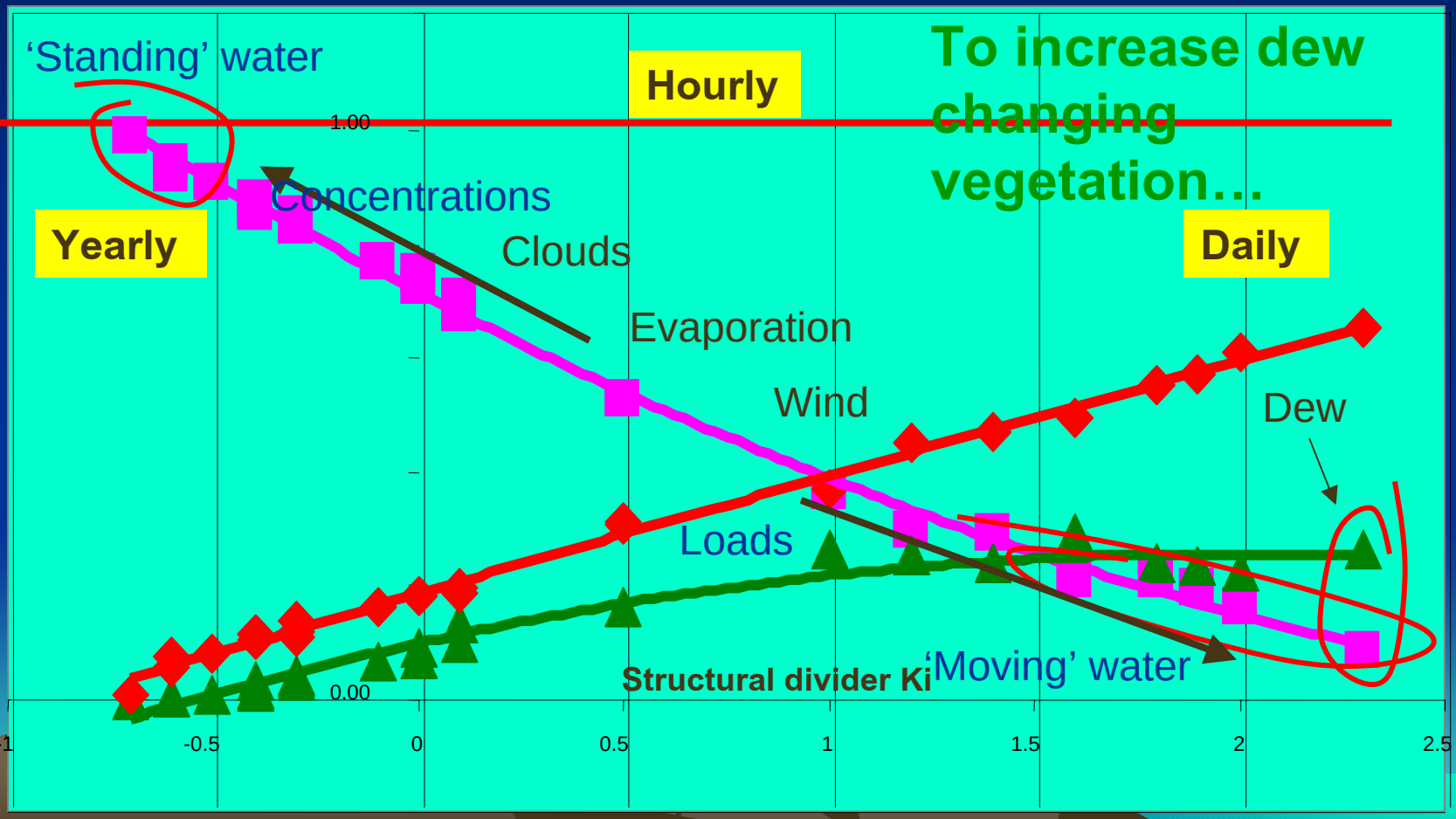


Graphical structure and function of hydrosphere





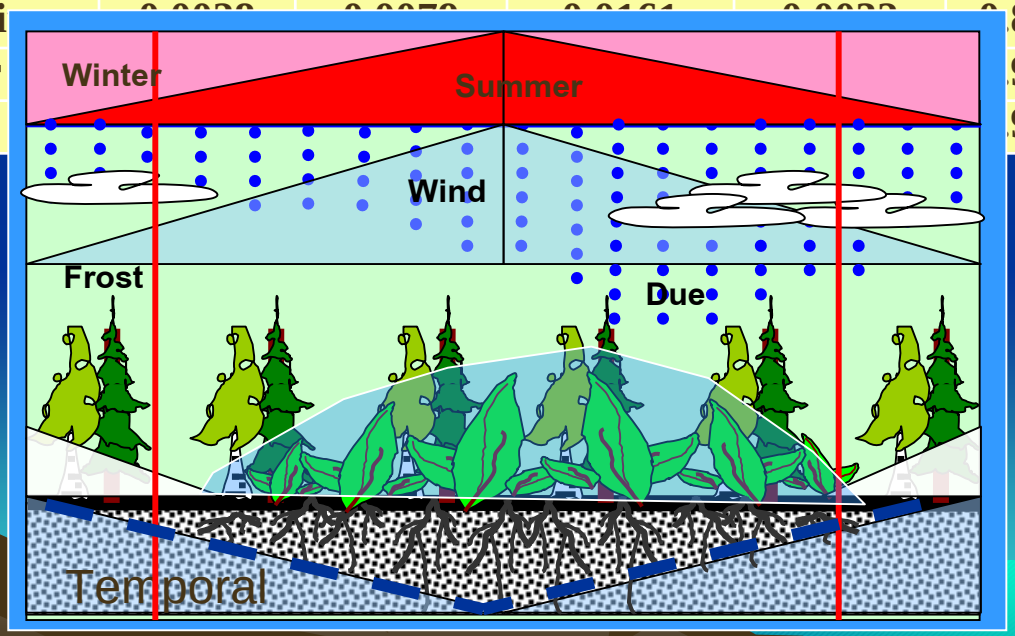
Mechanism of climate stabilization



The overall biosphere functions are to consume energy and dissolved matter in order to provide clean liquid water for a stable rate of water cycling for each spacetime

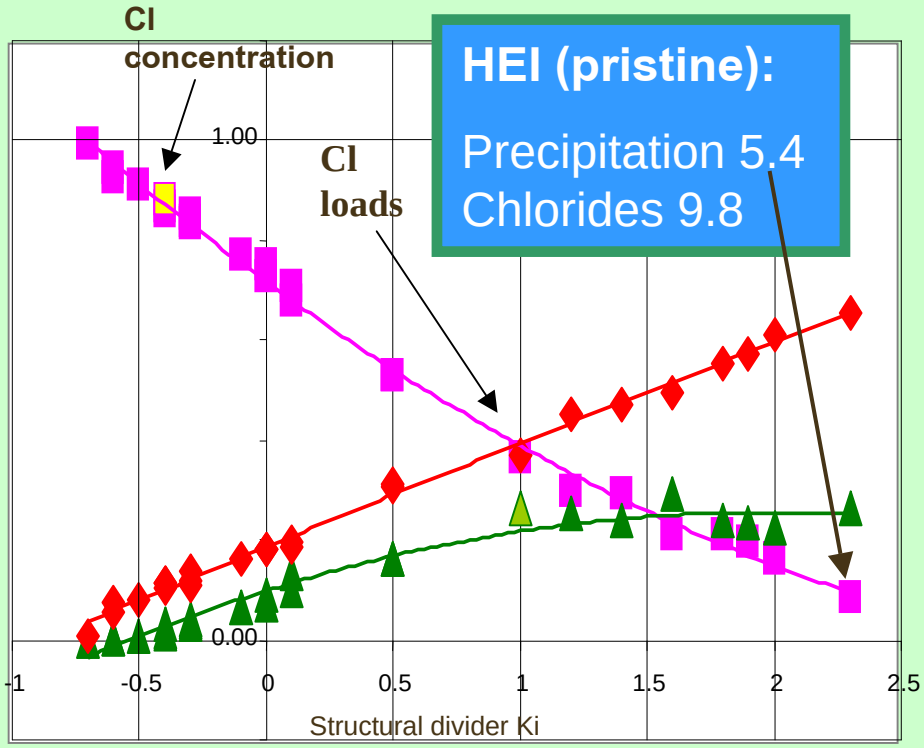
Stream	Parameter	Average concentrations for the 1990-93 , mg/L				r
		Base	Inter	Storm	Total	
Linnussaare Str. (pristine)	chlorides	3.08	0.09	1.23	2.88	0.55
Etobicoke Cr. at QEW	chlorides	461	574	290	450	0.7
"	arsenic	0.001	0.0011	0.0012	0.001	0.34
"	cadmium	0.0002	0.0006	0.026	0.0004	0.93
"	chromi					83
	copper					94
	lead					97

After the presentation at the 43rd Central CAWQ



Contribution of pollution to the hydrosphere destabilization

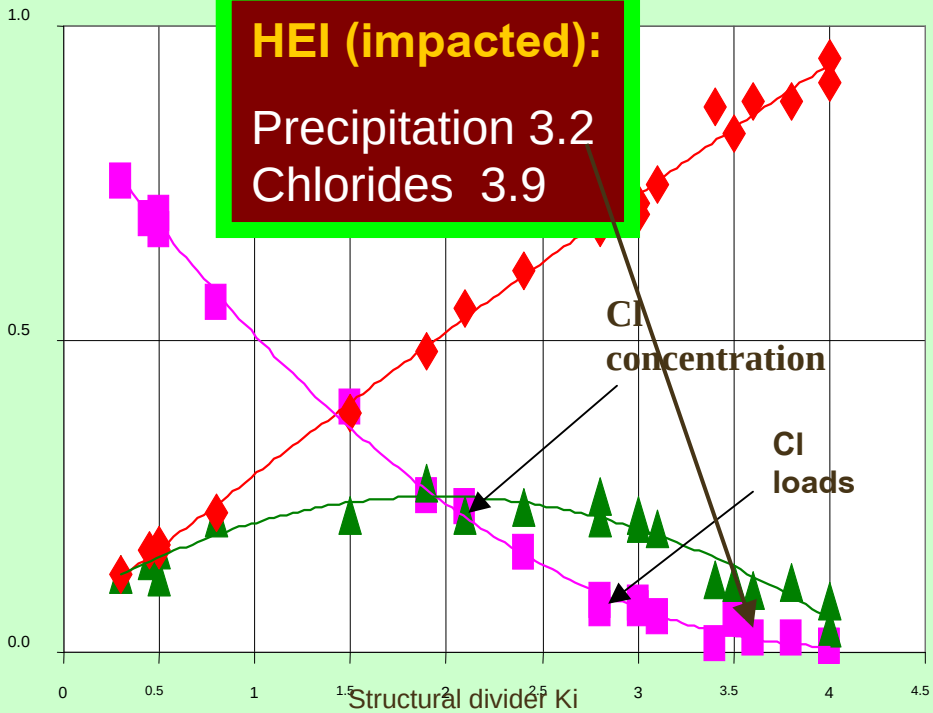
Linnussaare, 1984-90
(Estonia)



HEI (pristine):

Precipitation 5.4
Chlorides 9.8

Etobicoke Cr., 1990-93
(Canada)

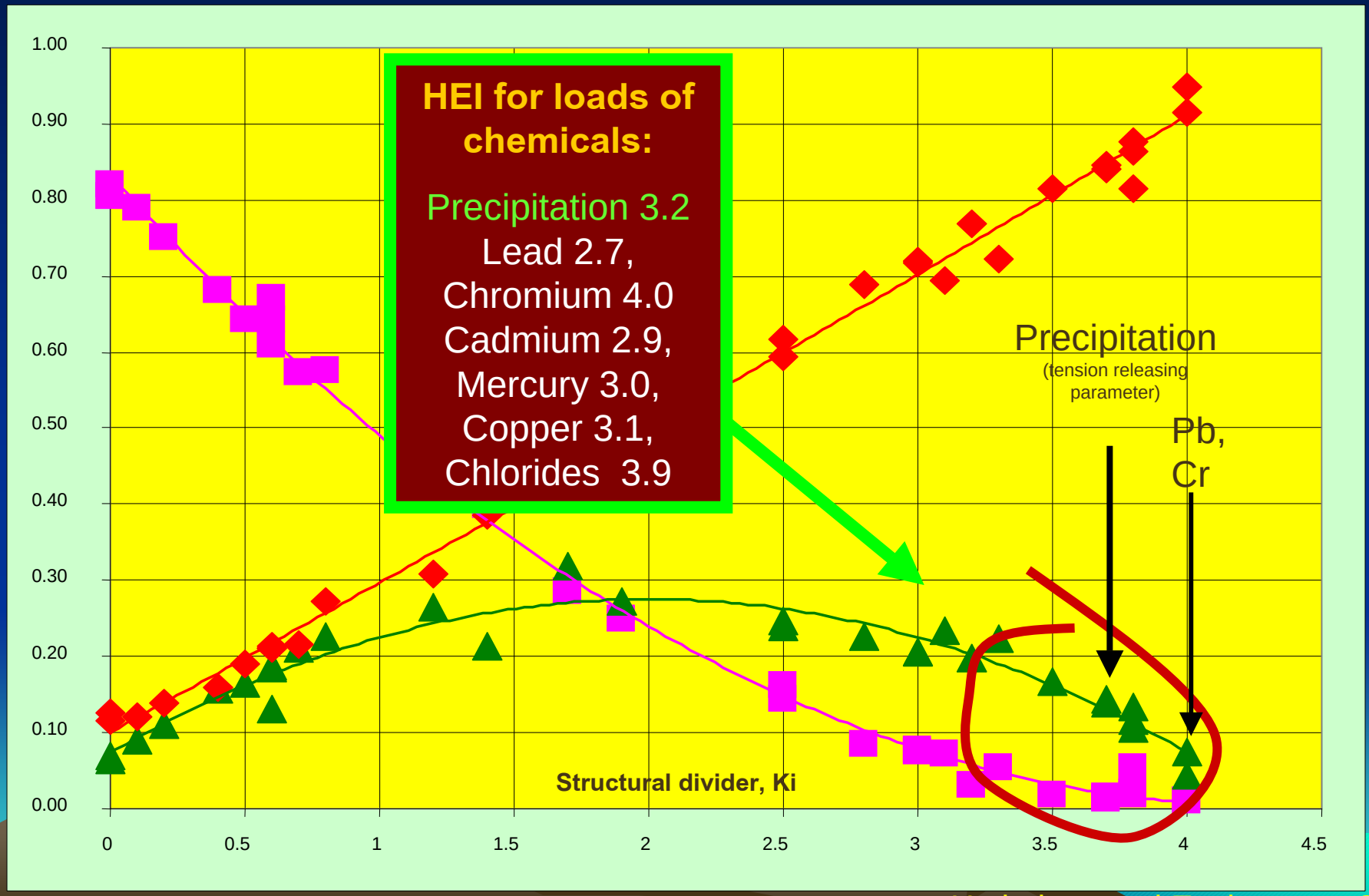


HEI (impacted):

Precipitation 3.2
Chlorides 3.9

In pristine environment bigger Ki means bigger dynamic buffer and lower tension; in the impacted one the buffer (biota) is declined without any functional consideration

Qualitative HEI-s, Etobicoke Cr. at QEW, 1990-93

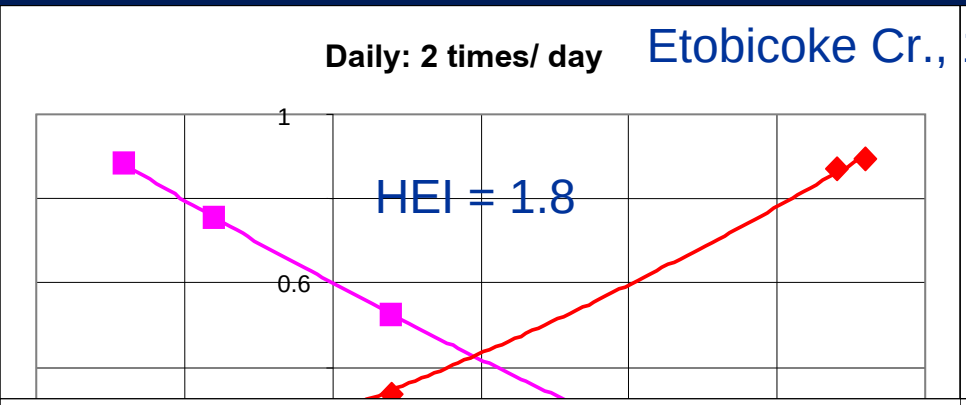


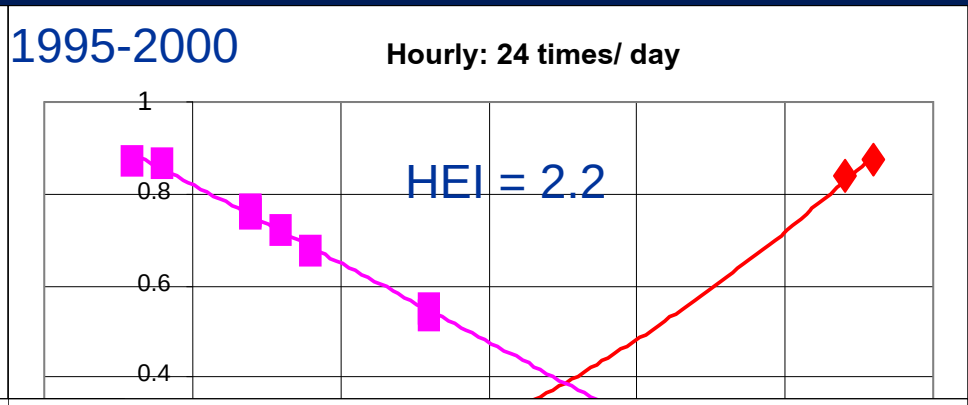
Daily tension releasing parameter (Max), specific size/structural divider (Ki), HEI

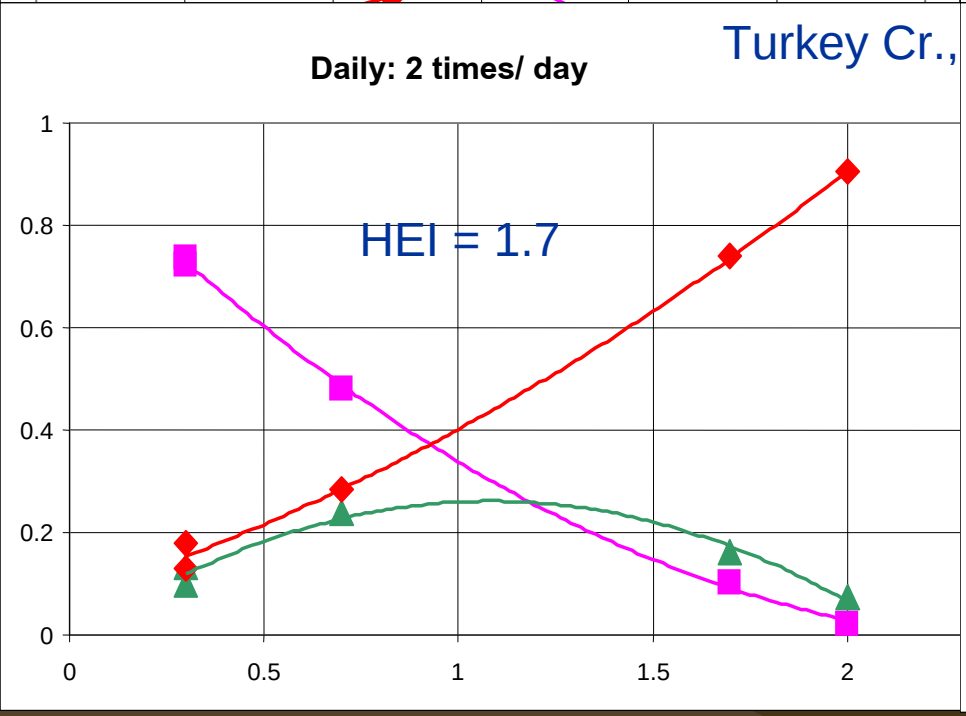
Canada, 1995-2000	F, km2	Ki	Max	HEI
British Columbia, Lake Williston watershed				
Finley R.	16000	2	P	7.36
Omineca R.	5490	2	P	4.82
Osilinka R.	1960	2.6	P	4.72
Nation R.	6720	2.8	F	4.4
Chuchinka Cr.	311	3.3	P	10.1
Dickebush Cr.	85.5	1.4	P	1.62
Newfoundland, continent, island				
Little Mecatina R.	4540	2.5	P	2.55
Harris R.	640	2	P	2.79
Upper Humber R.	471	2.1	S	2.76
Shoal Harbor R.	106	1.8	P	2
Virginia R	10.7	2.4	P	3.4
Nova Scotia, island				
MacAskills Brook	17.2	3.4	P	2.86
Nunavut				
Thelon R.	65400	1.5	P	2.45
Kazan R.	70000	1.6	P	1.86
Yukon, behind St. Elias Mountains				
Alsek R.	16000	1.6	P	2.85
Dezadeash R.	8500	1.7	P	3.27
Sekulmun R.	1250	4	P	17.4
Giltana Cr.	194	2.5	P	3.26
Takhanne R.	365	1.5	P	2.06

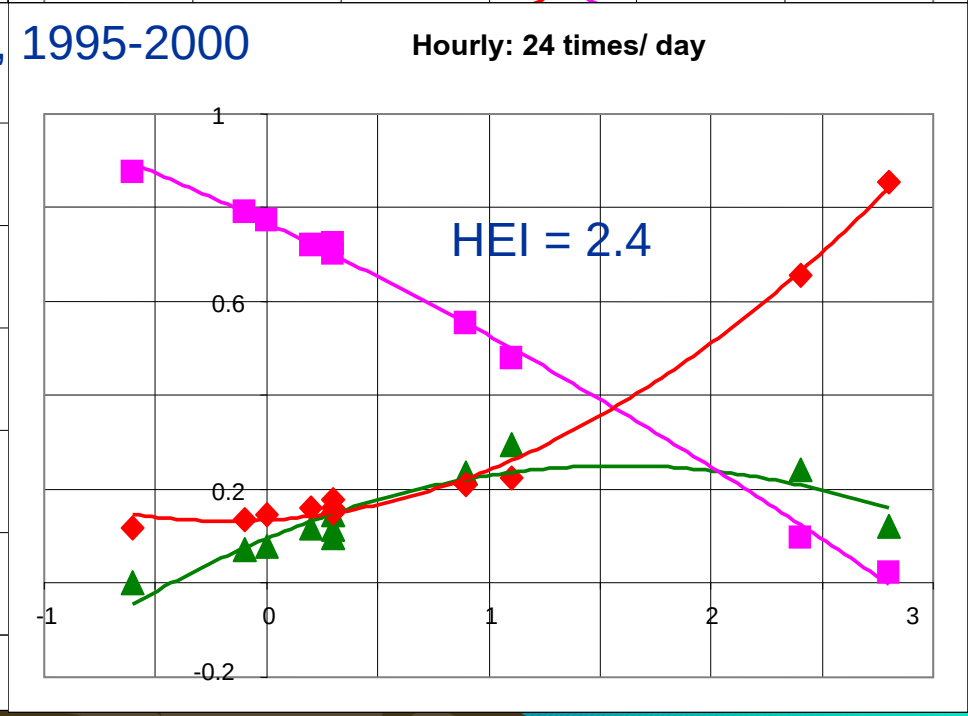
Ontario, the Great Lakes watershed (1995-2000)				
Black R.	1520	1.8	P	2.33
North R.	249	3.3	P	12.6
Coldwater R.	177	3.1	P	13.5
Sydenham R.	181	1	F	2.21
Stokes R.	50.5	3	F	25.8
Saugeen R.	3960	0.8	P	1.61
Saugeen R.	2150	0.8	P	1.45
Saugeen R.	329	1.8	P	2.67
Turkey Cr.	29.6	2	P	1.79
Canard R.	159	2.4	F	2.07
Sandusk Cr.	3.96	2.5	F	1.82
Spencer Cr.	132	1.8	P	1.65
Etobicoke Cr.	204	1.8	P	1.94
Estonia	**F, km2**	**Ki**	**Max**	**HEI**
Riga Bay, post-glacial plain (1981-90)				
Kasari	2640	2.1	P	3.78
Teenuse	634	2	P	3.52
Konuvere	618	2.3	P	4.8
Valgu	135	2	P	3.52
Narva R. basin, Tooma Bog Station (1984-90)				
Tooma Dr. (T4)	0.1	2.3	P	5.37
Podra Dr. (T5)	0.46	2.3	P	5.37
Tooma Dr. (T6)	0.035	2.3	P	5.37
Linnusaare	1.8	2.3	P	5.37
Koluvere	3.85	2.3	P	5.37

Influence of time resolution

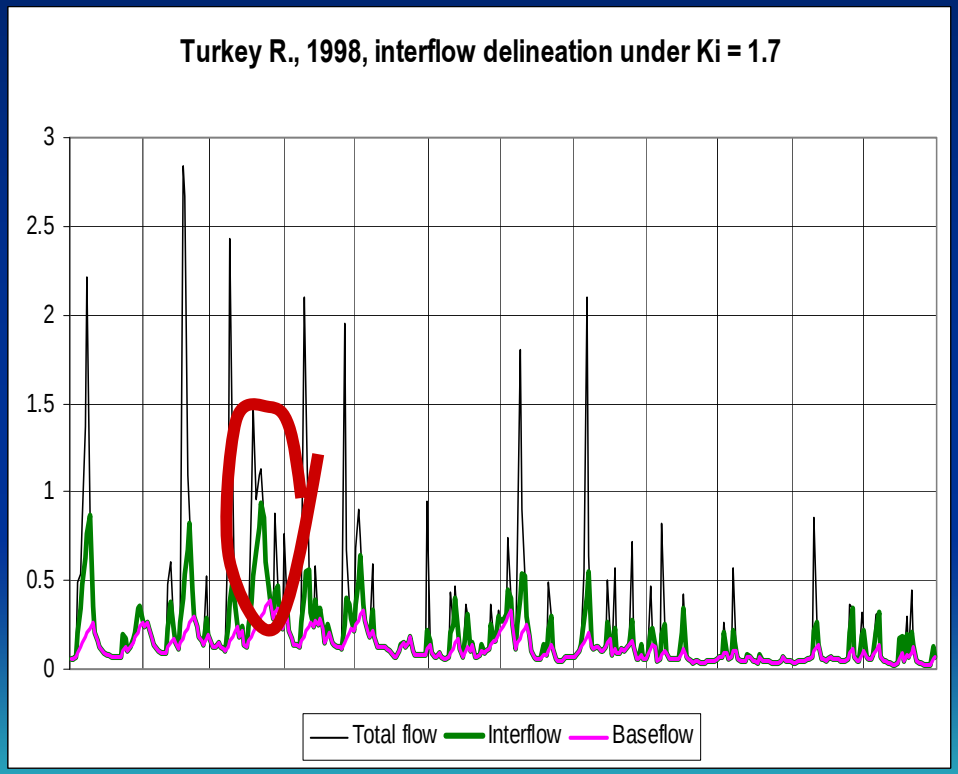


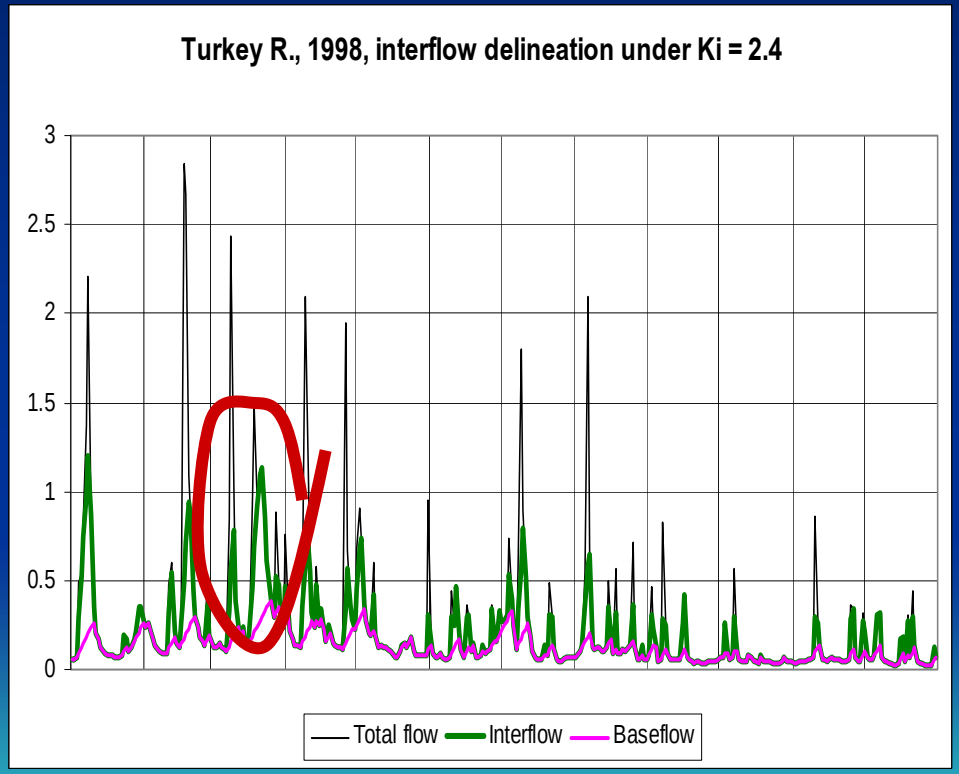




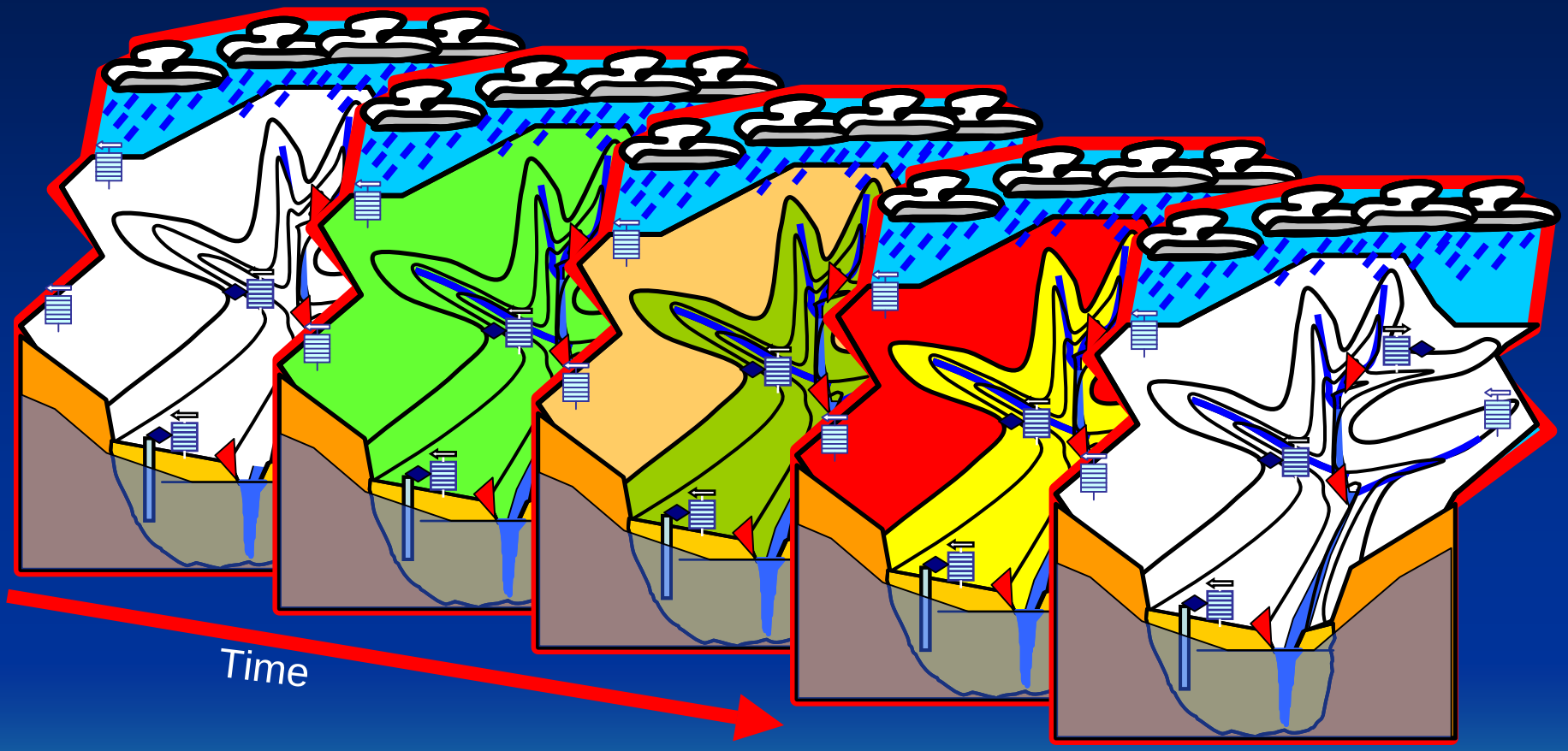


Comparison of dynamic buffers obtained from different sets of data using river flow





Hydrosphere spacetimes in terms of watershed datasets



Atmospheric element: Temperature, Precipitation and its quality, wind, humidity, Pressure, clouds, visibility, radiation, sun shine, AQI, any other qualitative or quantitative parameter

Groundwater element: Level, Temperature, pH, TDS, any other qualitative or quantitative parameter

Surface water element: Level, Temperature, velocity, cross-section, discharge, pH, TDS, turbidity, any other qualitative or quantitative parameter

The answer to the question

Being a part of biosphere, which function is to provide clean water for the water cycle and temperature control, we not only produce huge amount of contaminations and develop new ones, but reduce the physical size of the dynamic buffer that provides cleaning through consumption

It can be seen graphically on the Structural Harmony Chart and assessed numerically as The Hydrosphere Elasticity Index

In order to make the correct assessment it is necessary to adjust available quantitative and qualitative data to the same spacetime

Thank you!

Questions?