Hydrothermal conditions at the south of East Siberia during the ongoing warming

Voropay N.N.[1,2], Maksyutova E.V.[1], Ryazanova A.A.[2]

[1] *V.B. Sochava Institute of Geography SB RAS, Irkutsk*
[2] *Institute of monitoring of climatic and ecological systems SB RAS, Tomsk*
voropay_nn@mail.ru, emaksyutova@yandex.ru, raa@scert.ru

Ped' landscape index of drought [1975]

$$S = \frac{T}{T} \quad \frac{R}{R}$$

$T, \quad R$ - monthly anomaly of temperature and precipitation

$T, \quad R$ - standard deviation of monthly temperature and precipitation

Drought

ΔT>0* and** $\frac{T}{T}$ **>0, *ΔR<0* and** $\frac{R}{R}$ **<0, than *Si>0

Excessive moistening conditions

ΔT<0* и** $\frac{T}{T}$ **<0, *ΔR*>0 и** $\frac{R}{R}$ **>0, than *Si<0

Intensity:

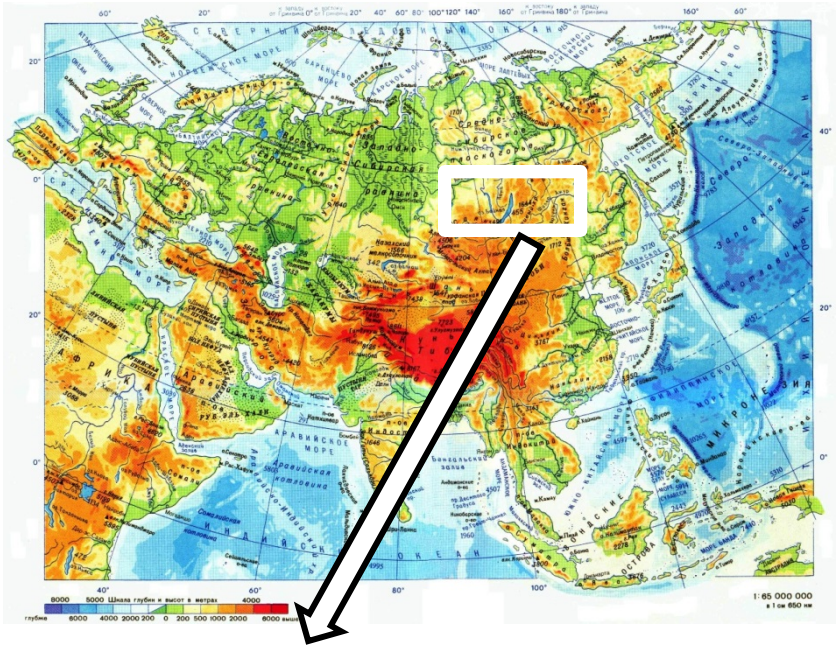
Drought

Weak	$1,0 < Si < 2,0$
Medium	$2,0 \leq Si < 3,0$
Severe	$Si \geq 3,0$

Excessive moistening

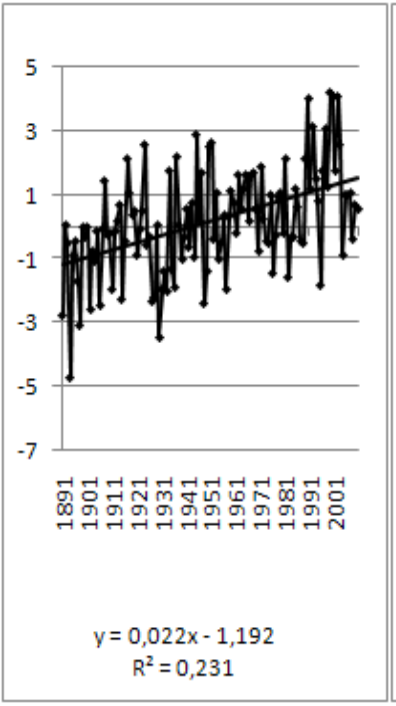
Weak	$-2,0 < Si < -1,0$
Medium	$-3,0 < Si \leq -2,0$
High	$Si \leq -3,0$

Weather stations

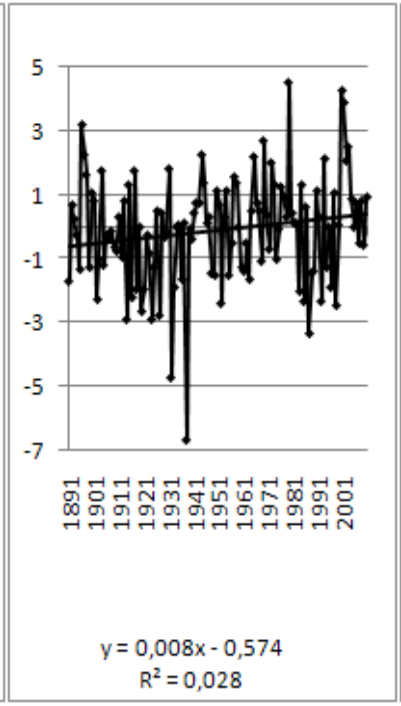


Long-term changes of Ped' index S_i at Irkutsk weather station

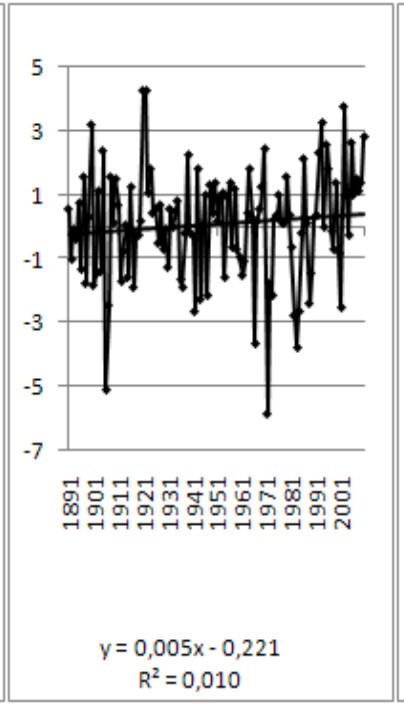
May



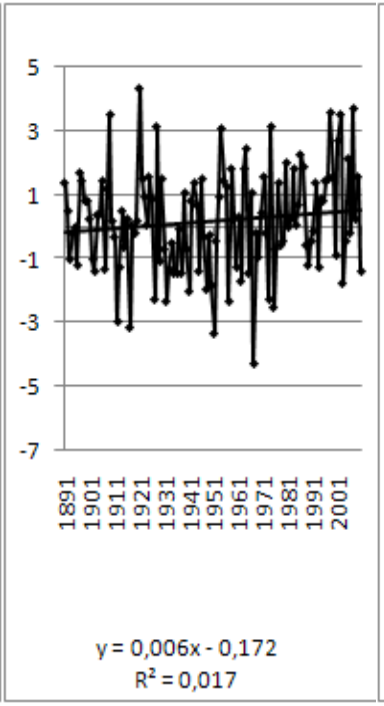
June



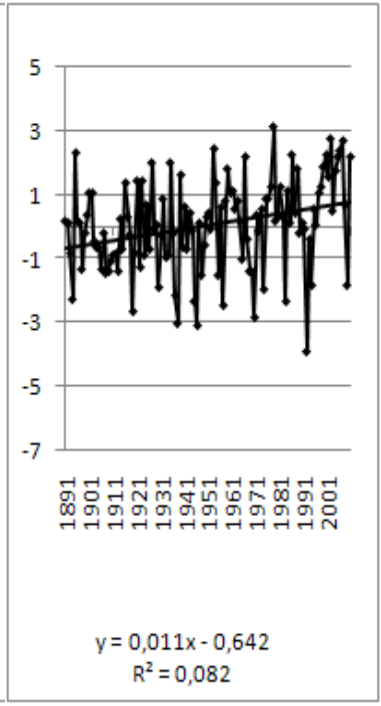
July



August



September

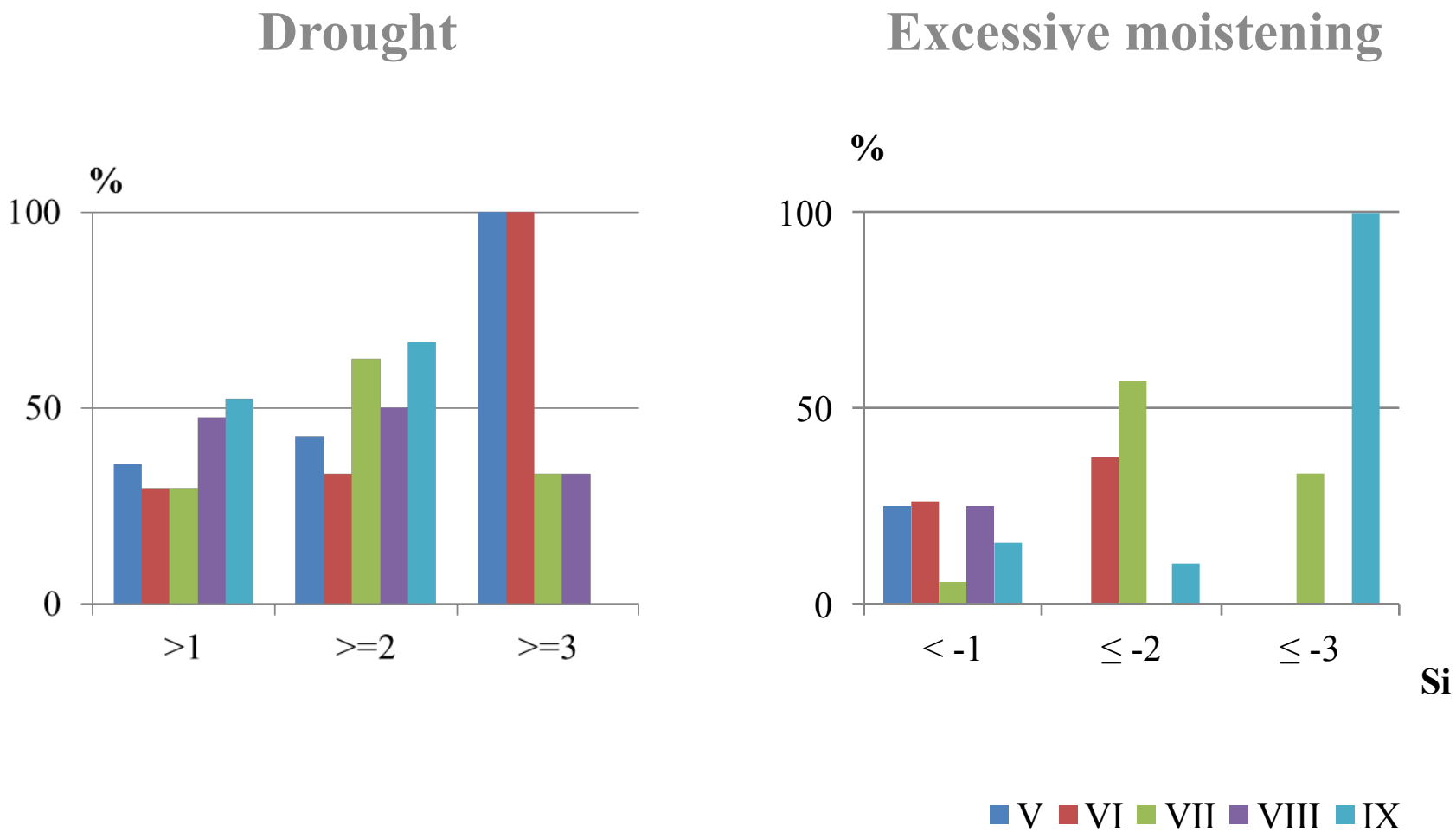


Repeatability S_i index (number of cases) in Irkutsk for different periods

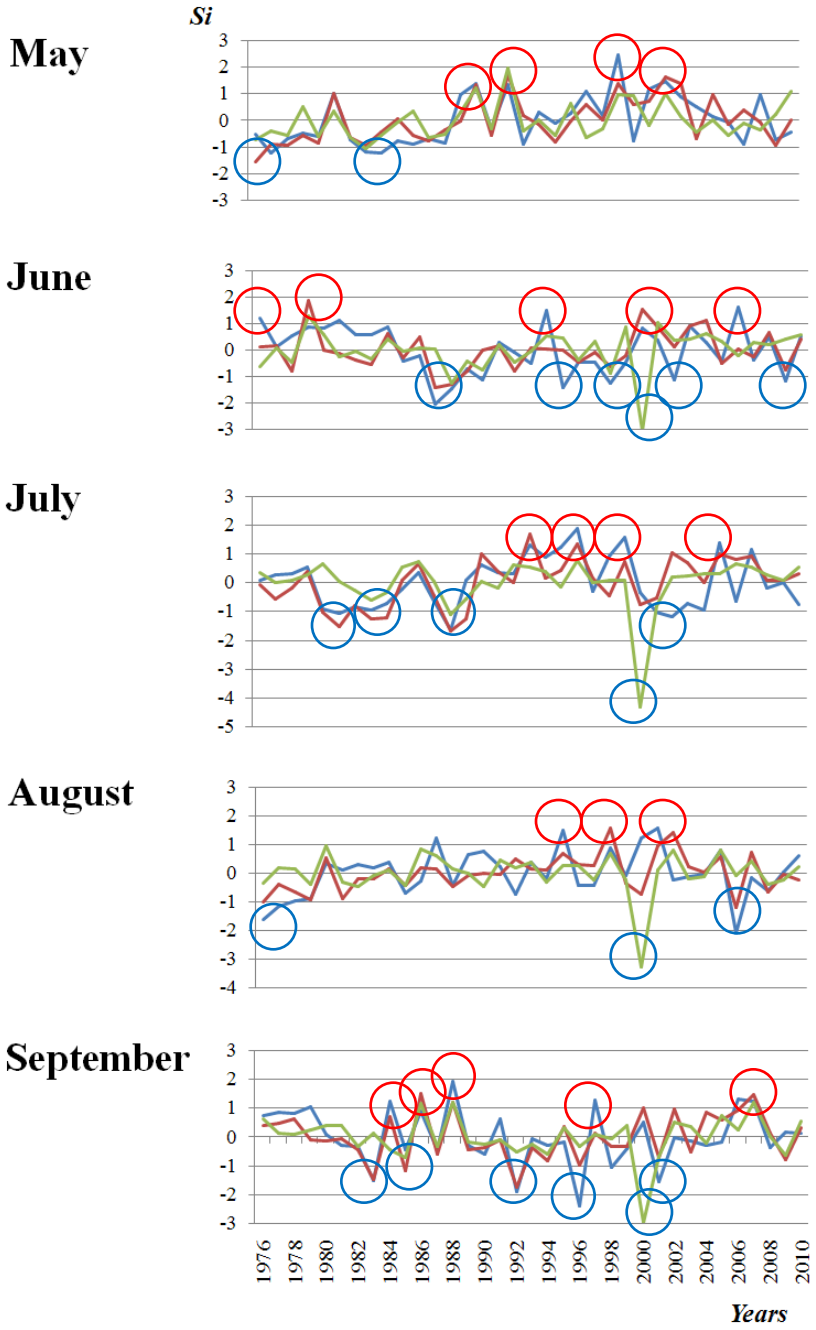
Period	**Drought**														
	1<Si<2 - Weak					2≤Si<3 - Medium					Si ≥ 3,0 - Severe				
	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX
1891-2010	14	17	17	21	21	7	6	8	6	6	4	3	3	3	0
1976-2010	5	5	5	10	11	3	2	5	3	4	4	3	1	1	0

Period	**Excessive moistening**														
	1<Si<2 - Weak					2≤Si<3 - Medium					Si ≥ 3,0 - High				
	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX	V	VI	VII	VIII	IX
1891-2010	16	19	18	20	13	8	8	7	9	10	2	0	3	1	1
1976-2010	4	5	1	5	2	0	3	4	0	1	0	0	1	0	1

S_i index (Irkutsk) for the 1976-2010 in% of the 1891-2010's



Long-term changes of Ped' index S_i



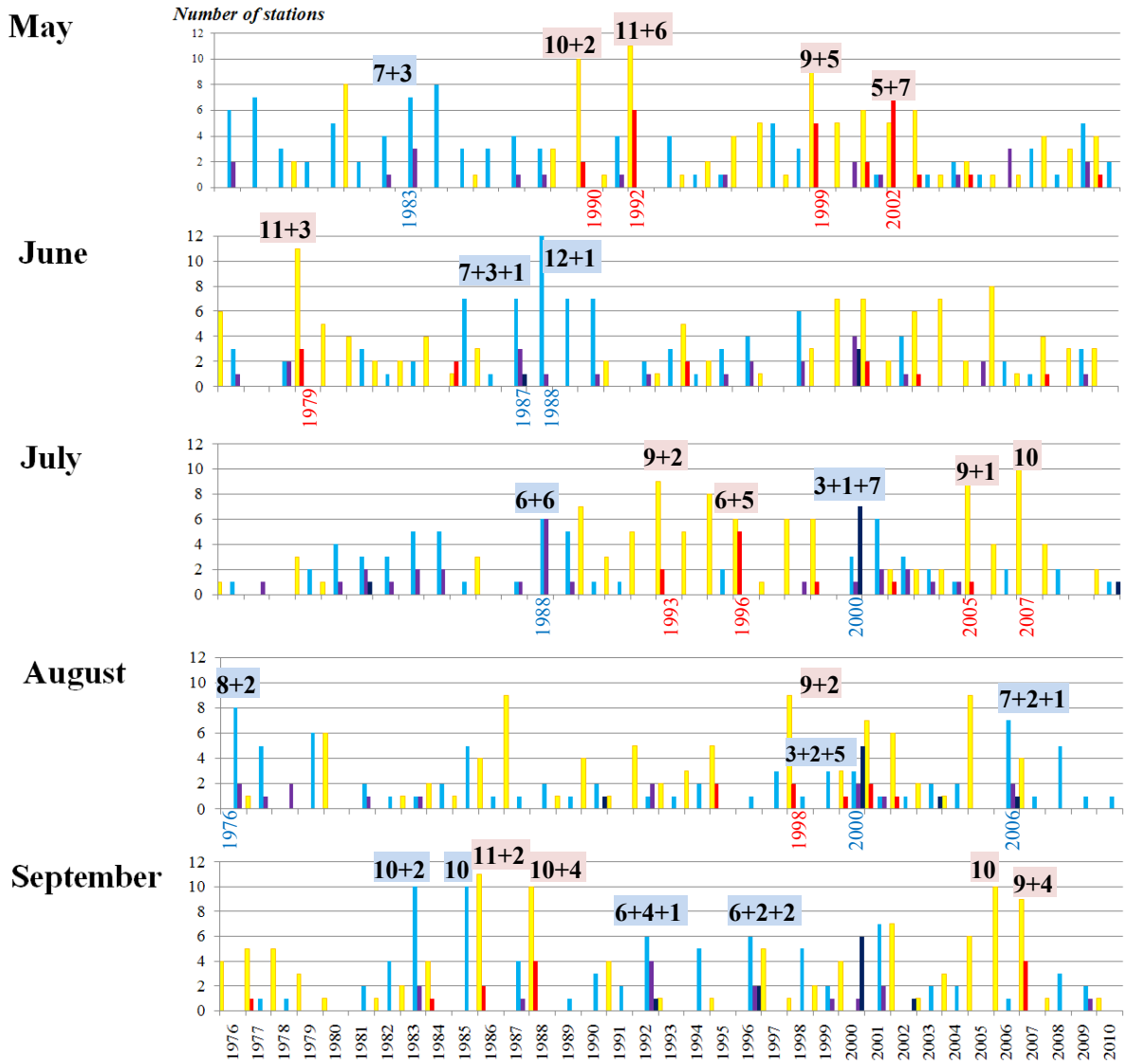
Southwest of Central Siberian Plateau
Predbaikalie
Zabaikalie

Trend of S_i index (per 10 years)

	Southwest of Central Siberian Plateau	Predbaikalie	Zabaikalie
May	0,34	0,35	0,18
June	0,14	0,09	0,09
July	0,09	0,38	0,00
August	0,17	0,20	0,03
September	-0,12	0,10	-0,05

$p < 0,05$

Number of stations with drought and excessive moistening with different intensity



Intensity:

Drought

- Weak $1,0 < Si < 2,0$
- Medium $2,0 \leq Si < 3,0$
- Severe $Si \geq 3,0$

Excessive moistening

- Weak $-2,0 < Si < -1,0$
- Medium $-3,0 < Si \leq -2,0$
- High $Si \leq -3,0$

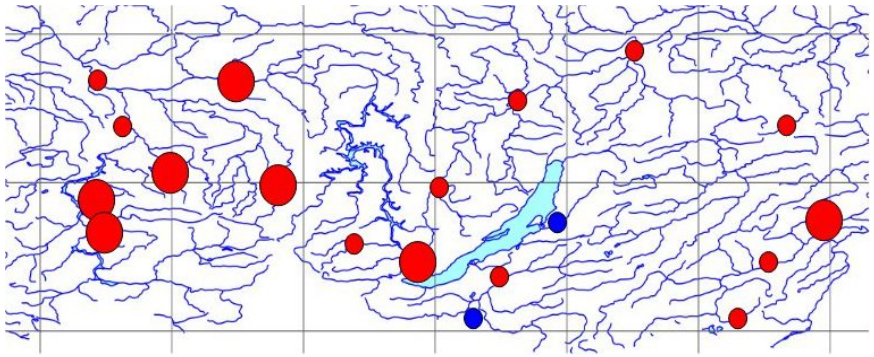
Trend of S_i index (per 10 years)

	May	June	July	August	September
Idrinskoe	0, 42	-0,03	0,15	0,08	-0,23
Eniseisk	0,17	-0,11	0,09	0,38	-0,12
Ermakovskoe	0,45	-0,17	0,17	0,06	-0,14
Bolshaya Murta	0,26	-0,28	-0,08	0,27	-0,14
Aginskoe	0,39	-0,26	0,05	0,07	-0,06
Boguchany	0,34	-0,02	0,17	0,15	-0,01
Nizhneudinsk	0,4	-0,11	0,48	0,37	0
Inga	0,2	-0,16	0,03	0	0,09
Irkutsk	0,59	0,37	0,65	0,26	0,29
Zhigalovo	0,27	0,13	0,32	0,21	-0,02
Kirensk	0,3	0,23	0,43	0,15	0,14
Vitim	0,3	0,17	-0,06	-0,07	-0,17
Chara	0,22	0,27	0,01	-0,13	-0,01
Barguzin	-0,19	-0,22	-0,21	-0,32	-0,23
Kyahta	-0,01	-0,05	0,13	-0,11	0,04
Ivolginsk	0,21	0,01	0,02	-0,13	0
Borzya	0,18	0,09	0,16	0,27	0,14
Shelopugino	0,29	0,09	-0,07	0,11	-0,04
Mogocha	0,45	0,38	-0,01	0,11	-0,09

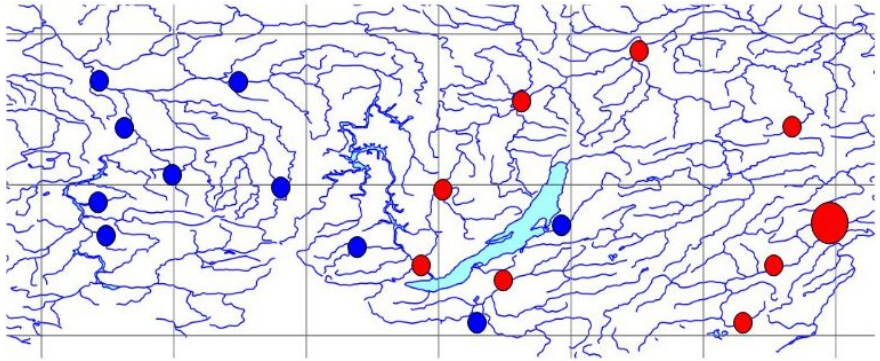
$p < 0,05$

Trend of S_i index

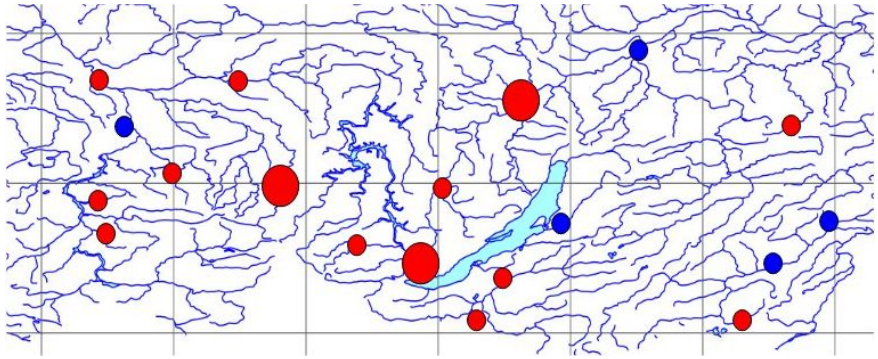
May



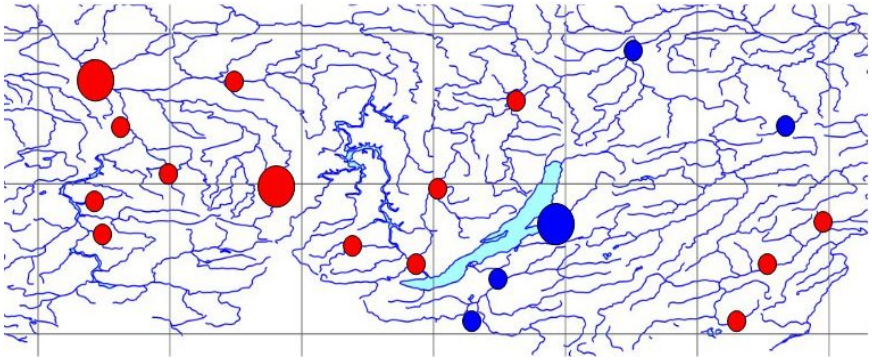
June



July



August



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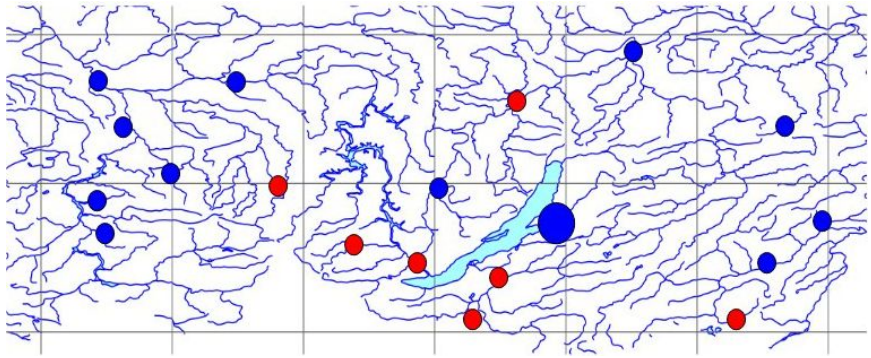
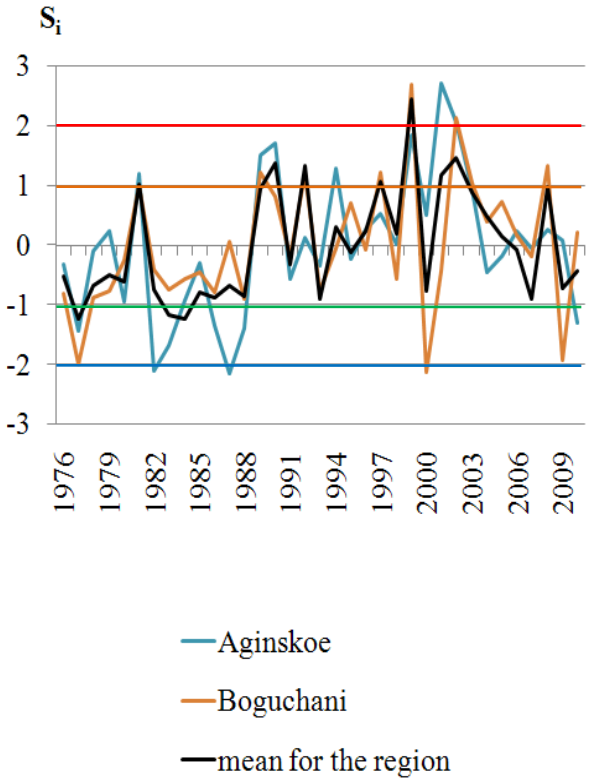
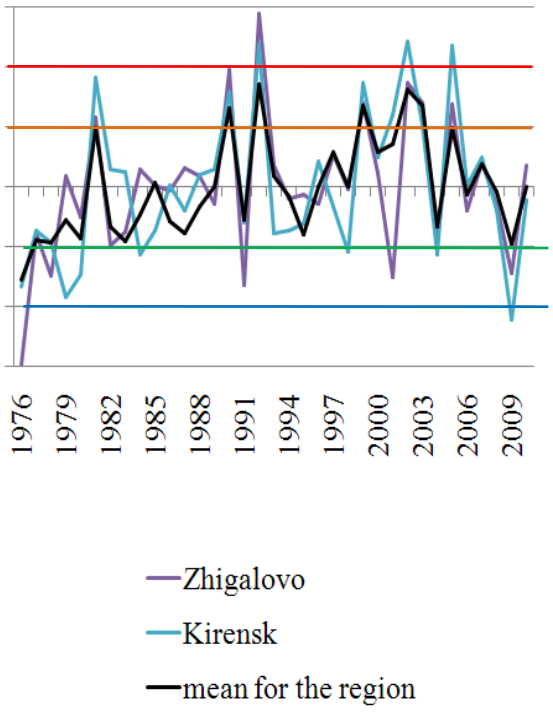


Long-term changes of Ped' index S_i at weather stations

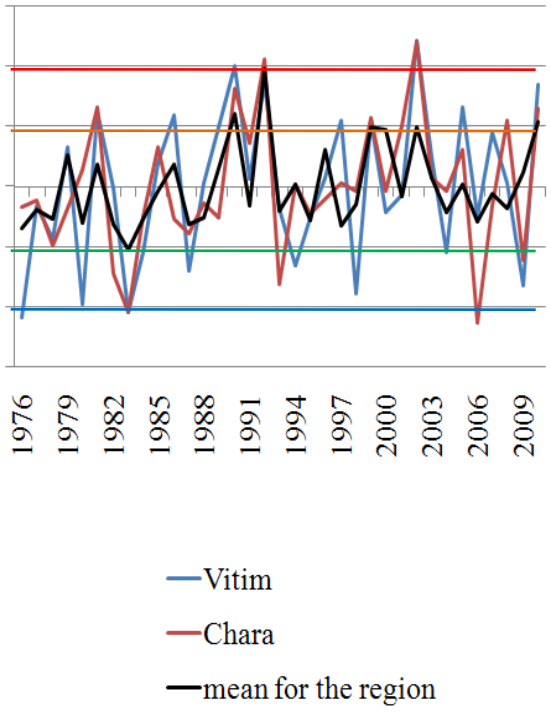
Southwest of Central Siberian Plateau



Predbaikalie



Zabaikalie



The climatic characteristics of the cold period, which preceding the vegetation period

Precipitation in November-March, mm

April Precipitation, mm

May Precipitation, mm

March temperature, °C

April temperature, °C

May temperature, °C

The sum of air temperatures above 0 °C in March, ° C

The sum of air temperatures above 0 °C in April, °C

The sum of air temperatures above 0 °C in May, °C

The number of days with temperatures above 0 °C in March

The number of days with temperatures above 0 °C in April

The number of days with temperatures above 0 °C in May

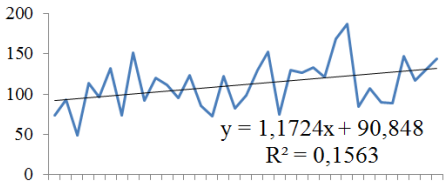
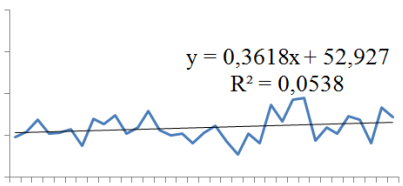
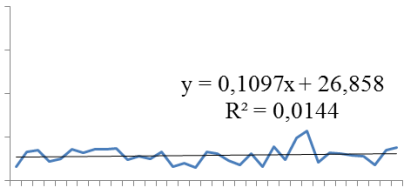
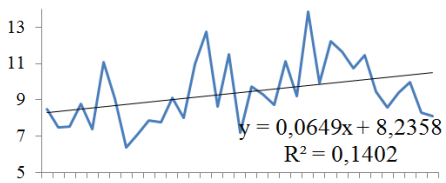
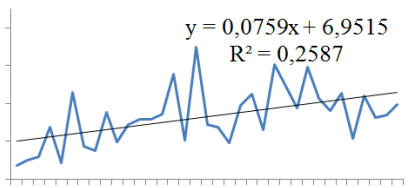
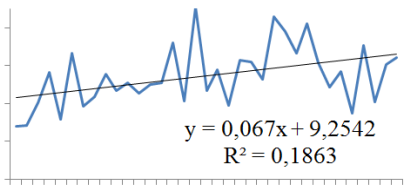
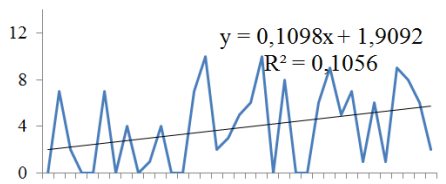
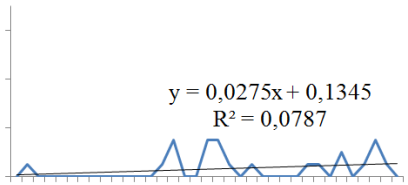
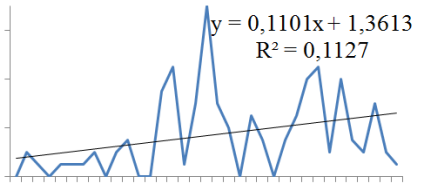
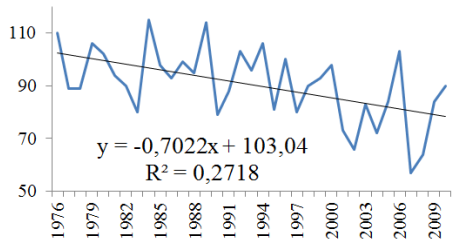
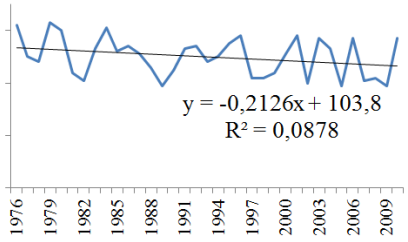
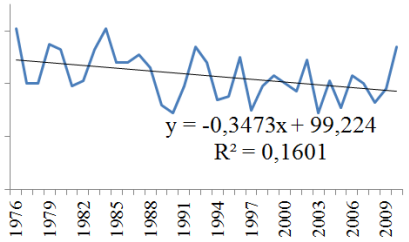
Date of transition of air temperature through 0 °C

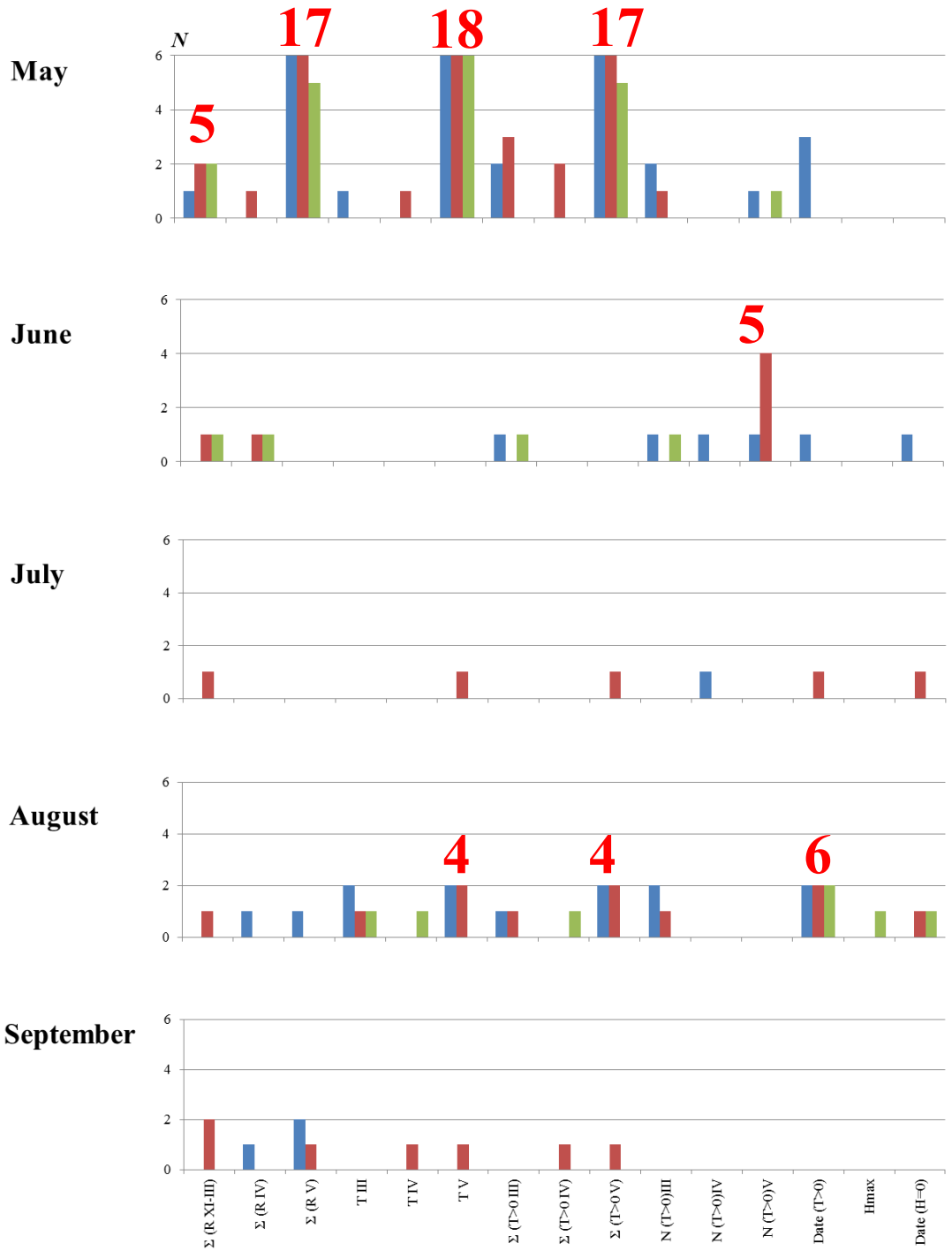
Maximal snow depth, cm

Date of final loss of snow

Trends of climatic characteristics, per 10 years

	$\Sigma (R_{XI-III})$	$\Sigma (R_{IV})$	$\Sigma (R_{V})$	T_{III}	T_{IV}	T_{V}	$\Sigma (T>0_{III})$	$\Sigma (T>0_{IV})$	$\Sigma (T>0_{V})$	$N (T>0)_{III}$	$N (T>0)_{IV}$	$N (T>0)_{V}$	Date (T>0)	H_{max}	Date (H=0)
Idrinskoe						0,5			16,1	1,4			-5,1		
Eniseisk						0,8			24,2				-2,7		
Ermakovskoe						0,6	7,5		17,0	2,7			-6,1		
Bolshaya Murta	11,7			1,3		0,6	6,6		20,1	1,1			-7,0		-4,0
Aginskoe	6,0					0,6			19,2	1,2			-9,6		
Boguchany						0,8			23,5				-3,7		
Nizhneudinsk	5,1					0,9			27,7				-3,5	3,6	
Inga		-4,2	-6,8		0,8			11,9				-1,7	-2,2		
Irkutsk						0,5			14,4	1,0			-2,7		
Zhigalovo				1,1	0,7	0,8			23,4				-2,1		
Kirensk				1,3		0,7			21,7				-1,1		
Vitim						0,6			17,5				-3,2	3,7	
Chara						0,6		4,6	17,4				-1,9		
Barguzin					0,9	0,9		14,3	26,1				-2,9		
Kyahta				0,8	0,7			16,3					-3,3		
Ivolginsk					0,6	0,7		12,5	20,7	1,1			-3,5		
Borzya						0,5		12,6	16,1				-3,1		3,6
Shelopugino						0,5		11,2	15,8				-4,5		
Mogocha						0,6		7,5	18,3				-4,1		
	3	1	1	4	5	17	2	8	17	6	-	1	11	2	2

	Bolshaya Murta	Zhigalovo	Ivolginsk
Precipitation (XI-III), mm			
May temperature, °C			
The number of days with T>0°C in May			
Date of transition of air temperature over 0 °C			

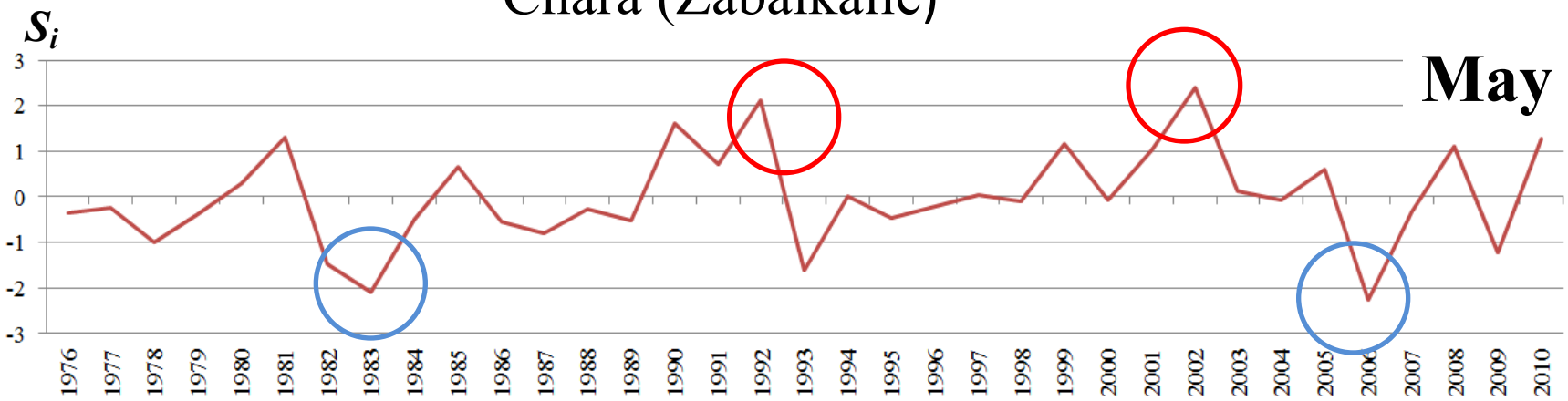


Number of stations with statistically significant coefficients of correlation between the index S_i and climatic characteristics

K = 0,40 …. 0,70

- Southwest of Central Siberian Plateau
- Predbaikalie
- Zabaikalie

Chara (Zabaikalie)



	S_i	R-XI-III	R-IV	R-V	T-III	T-IV	T-V	ΣT>0-IV	ΣT>0-V	n-T>0-IV	n-T>0-V	D-t-0	H	D-H-0
среднее		19,9	13,5	44,1	-16,8	-3,6	5,6	16,5	178,4	7,3	28,3	113,2	16,1	107,7
1983	-2,9	17,1	4,9	95,2	-14,9	-5,9	4,5	0,0	142,2	0,0	27,0	122,0	11,0	102,0
		2,8	***8,6***	***-51,1***	***-1,9***	***2,3***	***1,1***	***16,5***	***36,2***	***7,3***	***1,3***	***-8,8***	***5,1***	***5,7***
1992	2,12	25,7	10,7	14,7	-15,9	-4,1	8,3	2,6	256,0	3,0	31,0	120,0	14,0	90,0
		-5,8	***2,8***	***29,4***	***-0,9***	***0,5***	***-2,6***	***13,9***	***-77,7***	***4,3***	***-2,7***	***-6,8***	***2,1***	***17,7***
2002	2,4	20,8	11,8	21,5	-9,7	-1,5	9,3	24,1	289,8	9,0	30,0	113,0	2,0	96,0
		-0,9	***1,8***	***22,6***	***-7,1***	***-2,1***	***-3,7***	***-7,6***	***-111,4***	***-1,7***	***-1,7***	***0,2***	***14,1***	***11,7***
2006	-2,27	12,8	12,0	68,8	-18,1	0,2	4,6	54,8	145,2	18,0	28,0	105,0	18,0	100,0
		7,1	***1,5***	***-24,7***	***1,3***	***-3,9***	***1,0***	***-38,3***	***33,2***	***-10,7***	***0,3***	***8,2***	***-1,9***	***7,7***

Thank you for attention!

Dynamics of Si index in May at Irkutsk station, designed for different periods