Weather-climate anomalies in Russian regions:
El Niño-associated predictability

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Predictability for weather-climate anomalies in the Russian regions for different El Niño / Southern Oscillation (ENSO) phase transitions is assessed. In particular, probabilities of regional spring-summer (May-July) anomalies for surface air temperature (δT), precipitation (δP) and also drought (D) and excessive moisture (M) indices for European (ER) and Asian (AR) Russian regions in mid-latitudes from long-term data (1891-2015) [1] are estimated. ENSO dynamics is characterized by the sea surface temperature (SST) anomalies in different equatorial regions of the Pacific Ocean (Nino 3, Nino 3.4 and Nino 4). Different phase transitions (with total number n) between El-Nino (E), La-Nina (L) and neutral phase (N) are defined here similar to [2,3].

The beginning of 2016 was characterized by strong El Nino. According to early-April CPC/IRI official probabilistic ENSO forecast on the basis of ensemble model simulations the probability of the E-phase continuation to the end of this year is less than 5%. The corresponding probability for N-phase is about ¼, while it is larger than 70% for transition to L- phase.

Table 1

***δT*, K** ER		**Nino 3** n=28			**Nino 3.4** n=36			**Nino 4** n=29		
		\ ***E→E*** n=4	***E→L*** n=9	***E→N*** n=15	***E→E*** n=9	***E→L*** n=12	***E→N*** n=15	***E→E*** n=8	***E→L*** n=8	***E→N*** n=13
>0	>0	3/4	8/9	6/15	5/9	10/12	6/15	3/8	7/8	7/13
	>1K	1/4	5/9	2/15	1/9	5/12	3/15	2/8	4/8	4/13
≤0	≤0	1/4	1/9	9/15	4/9	2/12	9/15	5/8	1/8	6/13
	≤-1K	0/4	0/9	5/15	3/9	0/12	4/15	3/8	0/8	4/13

Table 1 shows the estimates for probability of spring–summer temperature anomalies δT in the ER for different transitions from the E-phase at the beginning of the year with the use different index. According to Table 1 the E→L transition expected in 2016 is characterized by the highest probability (up to 5/9) for extremely high temperature with $\delta T > 1K$ in spring-summer months for ER similar to 2010. The drought risk (for $D \geq 20\%$) for $E \rightarrow L$ transition is high, with probability estimate up to 6/9. Corresponding risk of severe drought (with $D \geq 30\%$) is characterized by probability estimate up to 4/9.

Table 2

δT, K / **AR**		**Nino 3** n=28			**Nino 3.4** n=36			**Nino 4** n=29		
		\ ***E→E*** n=4	***E→L*** n=9	***E→N*** n=15	***E→E*** n=9	***E→L*** n=12	***E→N*** n=15	***E→E*** n=8	***E→L*** n=8	***E→N*** n=13
>0	>0	2/4	4/9	6/15	5/9	8/12	7/15	6/8	5/8	5/13
	>1K	2/4	1/9	4/15	4/9	1/12	4/15	6/8	1/8	2/13
≤0	≤0	2/4	5/9	9/15	4/9	4/12	8/15	2/8	3/8	8/13
	≤-1K	1/4	2/9	4/15	3/9	2/12	2/15	1/8	1/8	3/13

Table 2 shows similar estimates for probability of spring–summer temperature anomalies δT in the AR. According to Table 2 the $E \rightarrow L$ transition expected in 2016 is characterized by the low probability (about 1/8 or less) for extremely high temperature with $\delta T > 1K$ (and with $D \geq 20\%$) in spring-summer months for AR.

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References

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