Predictability of seasonal temperature anomalies in the North Eurasian regions in the La Niña conditions

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The impact of the El Niño / La Niña events is significant on a global scale, including North Eurasian regions [1-5]. In [3] estimates of possible anomalies in Russian regions in spring-summer months were obtained, taking into account the La Niña phase and the forecasts of its transformation by the end of the year. Similar estimations are presented here for 2021 with the beginning in the La Niña phase with negative anomalies of sea surface temperature in the central and eastern equatorial regions of the Pacific Ocean. According to CPC/IRI official probabilistic ENSO forecast at the beginning of May on the basis of ensemble model simulations the probability of the *L*-phase continuation to the end of 2021 (*L*→*L* transition) is expected about 50%. The corresponding probability for *N*-phase (*L*→*N* transition) is expected less than 40% and about 10% for *E*-phase (*L*→*E* transition).

Here, the May-June-July anomalies of surface air temperature (SAT) δT and precipitation δP for European (ER) and Asian (AR) Russian regions in mid-latitudes based on observations since 1891 [6] are analyzed. For estimation of the El Niño / La Niña effects, we used their indices characterized by the sea surface temperature in the Niño3, Nino3,4 and Nino4 regions in the equatorial latitudes of the Pacific Ocean. The El Niño (*E*), La Niña (*L*) and neutral (*N*) phases are defined similar to [1].

Table 1. Probability of positive and negative surface air temperature anomalies (δT) in the ER (and AR) in May-June-July for different transitions from La-Nina conditions at the beginning of the year (characterized by indices Nino3, Nino3,4 and Nino4) from observations since 1891.

δT, K		Nino3 n=29			Nino3.4 n=36			Nino4 n=28		
		$L\to E$ n=7	$L\to L$ n=9	$L\to N$ n=13	$L\to E$ n=11	$L\to L$ n=14	$L\to N$ n=11	$L\to E$ n=4	$L\to L$ n=10	$L\to N$ n=14
>0	>0	0.41 (0.62)			0.50 (0.56)			0.43 (0.54)		
		0.57 (0.71)	0.33 (0.56)	0.38 (0.62)	0.55 (0.64)	0.36 (0.64)	0.64 (0.36)	0.50 (0.50)	0.40 (0.50)	0.43 (0.57)
	>1K	0.17 (0.21)			0.25 (0.25)			0.21 (0.25)		
		0.29 (0.14)	0.11 (0.22)	0.15 (0.23)	0.27 (0.18)	0.21 (0.21)	0.27 (0.36)	0.25 (0.25)	0.20 (0.20)	0.21 (0.29)
≤0	≤0	0.59 (0.38)			0.50 (0.44)			0.57 (0.46)		
		0.43 (0.29)	0.67 (0.44)	0.62 (0.38)	0.45 (0.36)	0.64 (0.43)	0.36 (0.64)	0.50 (0.50)	0.60 (0.50)	0.57 (0.43)
	≤-1K	0.14 (0.10)			0.08 (0.11)			0.07 (0.07)		
		0.29 (0.29)	0 (0)	0.15 (0.08)	0.18 (0.18)	0.07 (0)	0 (0.18)	0 (0.25)	0.10 (0)	0.07 (0.07)

Table 1 shows the estimates for probability of the May-June-July temperature anomalies δT in the ER (and AR) for different transitions from the *L*-phase at the beginning of the year with

the use of different El Niño indices. According to these May-June-July estimates in general there are more probable positive temperature anomalies in the AR and negative temperature anomalies in the ER.

Table 2. Probability of positive and negative precipitation anomalies (δP) in the ER (and AR) in May-June-July for different transitions from La-Nina conditions at the beginning of the year.

δP [%]		Nino3 *n*=29			Nino3.4 *n*=36			Nino4 *n*=28		
		L→E *n*=7	*L→L* *n*=9	*L→N* *n*=13	*L→E* *n*=11	*L→L* *n*=14	*L→N* *n*=11	*L→E* *n*=4	*L→L* *n*=10	*L→N* *n*=14
<0	<0	0.41 (0.45)			0.56 (0.36)			0.50 (0.46)		
		0.43 (0.57)	0.56 (0.56)	0.31 (0.31)	0.64 (0.45)	0.43 (0.36)	0.64 (0.27)	0.50 (0.75)	0.60 (0.50)	0.43 (0.36)
	<-20%	0.10 (0.14)			0.11 (0.11)			0.11 (0.14)		
		0.14 (0.29)	0.22 (0.11)	0 (0.08)	0.09 (0.18)	0.14 (0.07)	0.09 (0.09)	0 (0.25)	0.20 (0.10)	0.07 (0.14)
≥0	≥0	0.59 (0.55)			0.44 (0.64)			0.50 (0.54)		
		0.57 (0.43)	0.44 (0.44)	0.69 (0.69)	0.36 (0.55)	0.57 (0.64)	0.36 (0.73)	0.50 (0.25)	0.40 (0.50)	0.57 (0.64)
	>20%	0.03 (0.10)			0.03 (0.08)			0.04 (0.04)		
		0 (0.14)	0 (0)	0.08 (0.15)	0 (0.09)	0 (0)	0.09 (0.18)	0 (0)	0 (0)	0.07 (0.07)

Table 2 shows corresponding estimates for probability of positive and negative precipitation anomalies (δP) in the ER (and AR) in May-June-July for different transitions from La-Nina conditions at the beginning of the year.

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