Regional temperature anomalies and accompanying processes

in connection with the longest La Niña in 1908-1911

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The strongest interannual variations of global temperature at the surface are associated with the El Niño and La Niña events. Differences in the probabilities of anomalously warm and anomalously cold winters in the El Niño and La Niña phases for the North Eurasia regions are noted (Mokhov, 2020). Significant changes are noted for El Niño and La Niña frequency and duration during past decades (Mokhov, 2022; Mokhov and Medvedev, 2022).

Figure 1 shows estimates of the El Niño/La Niña periods by the data for the Nino3 index (https://psl.noaa.gov/gcos_wgsp/Timeseries/) for the period 1870–2020 with the largest variations at the beginning of the 20th century (Mokhov and Medvedev, 2022). According to (Wolter and Timlin, 2011) La Niña events can last longer than El Niño, exceeding 40 months for the 1908-1911 La Niña.

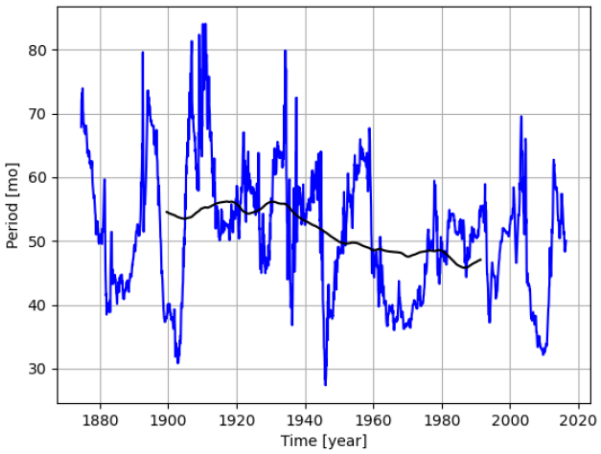

Figure 1. Estimates of the length of El Niño/La Niña periods (months) on moving intervals I_0 = 84 months for the period 1870–2020 using the Niño3 index, smoothed with a window length I_s = 24 months. The black curve corresponds to a 50-year moving average periods.

Figure 2 shows annual-mean anomalies for the temperature near surface in the eastern part of the Northern Hemisphere in 1909 and 1910 by GISS data (https://data.giss.nasa.gov/gistemp/) during the longest La Niña 1908-1911. The largest negative anomalies were noted for northern Asian regions, especially in 1910.

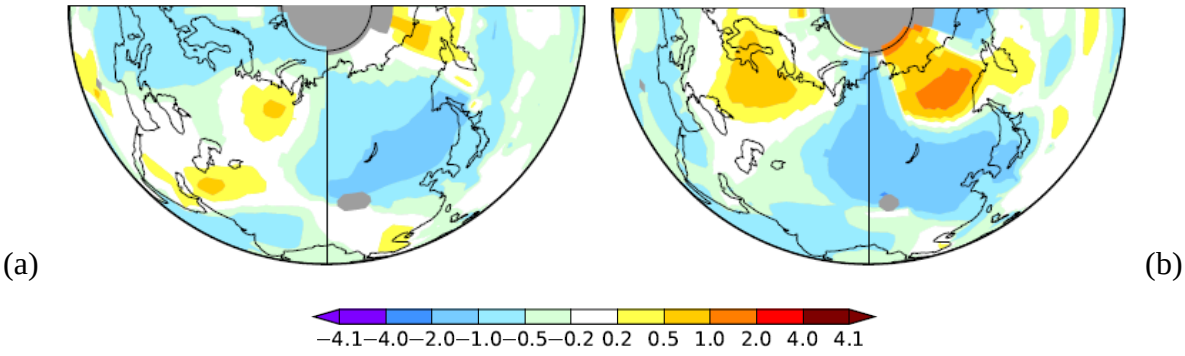

Figure 2. Annual-mean temperature anomalies (ºC) in 1909 (a) and 1910 (b) relative the 1951-1980 period.

More detail seasonal features are presented on Fig. 3 for temperature anomalies in 1910. Negative temperature anomalies in all seasons were noted in the Far East with the strongest negative temperature anomalies in winter.

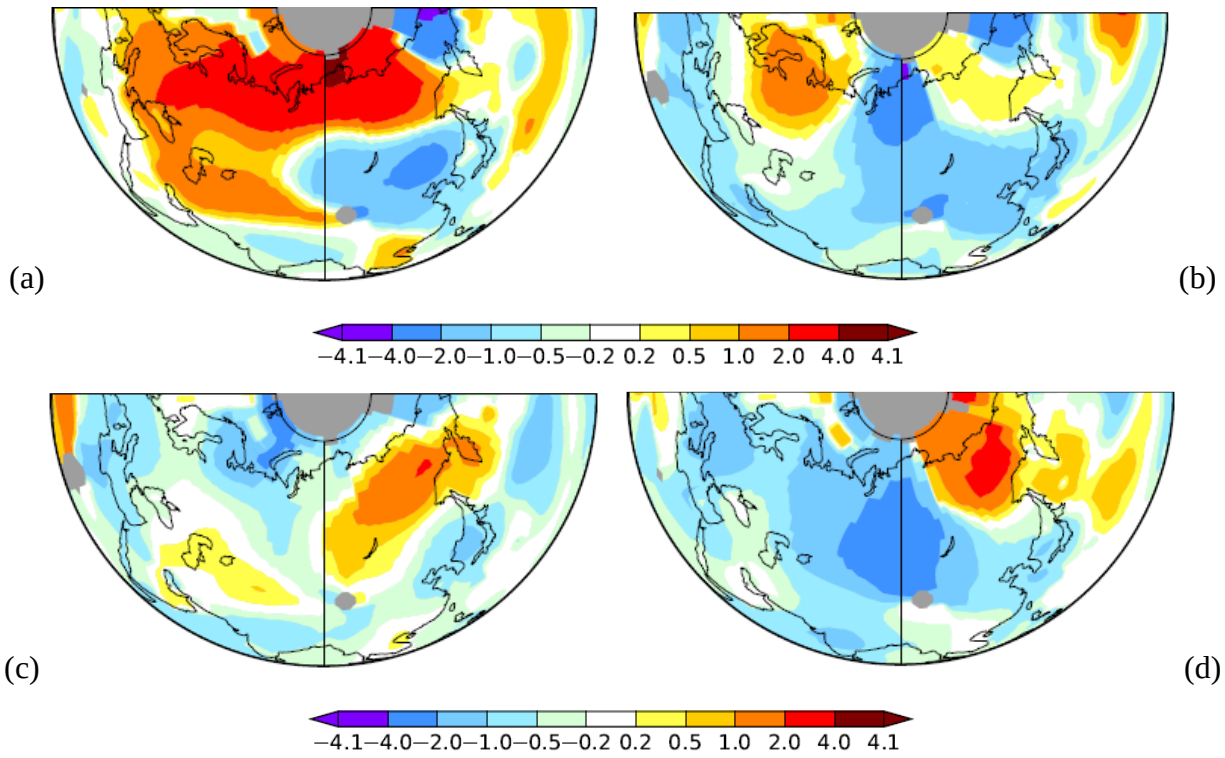

Figure 3. Seasonal temperature anomalies (°C) in 1910 (relative to 1951-1980): (a) Winter, (b) Spring, (c) Summer, (d) Autumn.

Regional temperature anomalies during the record-breaking La Niña in 1908-1911should be accompanied by significant consequences. It is worth noting that during the longest La Niña in 1910-1911, a plague epidemic broke out in the eastern Asian regions, in particular in the Far East (Kastorsky, 1911). According to (Suntsov, 2019), climate cooling with the deeper soil freezing affects ecological processes and the life cycle of potential plague pathogens, in particular in Asian regions.

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