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The field of H_{500} geopotential height over the central part of the second natural synoptic region in January during 1950–2019 is analysed to determine regime characteristics of the Okhotsk tropospheric cyclone and its role in the formation of air temperature anomalies over the eastern coast of Asia. A mechanism of occurrence of extreme surface air temperatures using this technique is presented. Extremely low air temperature in the area of the minimum and related deep through are formed during the years when the H_{500} minimum is localized over the Sea of Okhotsk. A methodology for constructing ellipses approximating the H_{500} level lines in a small neighborhood of the H_{500} minimum is developed, the ellipse characteristics are calculated, and their relation to the tropospheric cyclone evolution is analysed. The characteristics of the ellipses constructed in the neighborhood of the geopotential height minimum outside the Sea of Okhotsk significantly differ from those of the ellipses over the Sea of Okhotsk. A high compression of the ellipses towards the major axis is reported when the Far Eastern through intensity is reduced. In this case, an outflow of warm oceanic air masses to the Sea of Okhotsk is observed. The location of the H_{500} minimum and the characteristics of the ellipses located within the center circle may be used to explain reasons for dramatic changes in air temperature in the study region.

Keywords: Okhotsk tropospheric cyclone, H_{500} minima centers, extreme surface air temperature, ellipse characteristics

Tab. 1. Fig. 5. Ref. 9.