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Title: *Arctic low-level temperature inversions in spring and summer as observed during the transpolar drift of the ice station Tara*

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Stably stratified atmospheric boundary layer (ABL) is a common feature in the Arctic. Stability of the ABL is characterized by the low-level temperature inversions throughout most of the year. Although temperature inversions tend to be stronger and deeper in wintertime due to the largely negative radiation balance at the surface, they are also well presented in Arctic summer. In lower frequency of their presence, most summer inversions are elevated and their controlling mechanisms are somewhat different from winter ones. Arctic inversions may be geberated by surface cooling due to a negative radiation budget, warm air advection, and subsidence. The inversion strength, defined as the temperature difference across the inversion, plays an important role in regulating atmospheric processes including air pollution, ozone destruction, cloud formation, and negative long wave feedback mechanisms.

Meteorological observations were carried out in the central Arctic Ocean at the drifting ice station Tara from 25 April to 31 August 2007 (129 days). A Vaisala Digi-CORA tethersonde system was applied to measure high-resolution temperature profiles up to 2000 meters. A total of 96 profiles were taken on 40 days. 85 profiles (88,5%) included low-level temperature inversions; a total of 102 inversions were found, all less than 1100 meters in depth. Statistics of the main inversion features, like height of inversion base, height of inversion top, and inversion depth and strength, were analyzed. Most of the inversions were elevated with a median inversion base altitude of 280 meters. Only 12 profiles (12,5%) had surface based inversions. All the inversion parameters were examined based on the the three main controlling mechanisms: surface net radiation, warm air advection, and subsidence. European Centre for Medium-Range Weather Forecasts (ECMWF) operational analyses data were applied for the two latter cases. Moreover, the dependency of inversion parameters on the average sea ice concentration along the backward trajectories of the air mass was investigated. The inversion statistics, in comparison with the predominant generation mechanism, were analyzed with respect to possible seasonal changes during the study period. The period coincidentally covered the time prior to the previous Arctic sea ice extent minimum in autumn 2007.