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MODIS-Derived Nighttime Arctic Land-Surface Temperature Nascent Trends and Non-Stationary Changes

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Arctic nighttime Land-Surface Temperatures (LST) derived by the Moderate Resolution Imaging Spectroradiometer (MODIS) sensors onboard the NASA Terra and Aqua satellites are investigated. We use the local equator crossing times of 22:30 and 01:30, respectively, in the analysis of changes, trends and variations on the Arctic region and within 120-degree sectors. We show increases in the number of days above 0C and significant LST increase over decades of March 2000 through 2010 (MODIS Terra) and July 2002 through 2012 (MODIS Aqua). The MODIS Aqua nighttime Arctic LST change, +0.2 +/- 0.2C with P-value of 0.01 indicates a reduction relative to the MODIS Terra nighttime Arctic land-surface temperature change, +1.8 +/- 0.3C with P-value of 0.01. This reduction is a decadal non-stationary component of the Arctic land-surface temperature changes. The reduction is greatest, -1.3 +/- 0.2C with P-value of 0.01 in the Eastern Russia – Western North American sector of the Arctic during the July 2002 through 2012.
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