

Mapping trends of 30 temperature indices at high spatial resolution for Alberta, Canada, for the period 1950 – 2010

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The changes of 30 temperature indices were mapped for the Province of Alberta. The research is aimed at providing systematic knowledge to satisfy the recognized requirement for “Better climate information for a better future”, as coined by The Third World Climate Conference. With the recent advent of a Canada-wide climate time series, spanning the period 1950-2010 at a spatial resolution of 10km by 10km, a complete, long-term, and spatially consistent climate dataset became available (Tmin, Tmax, P). This database served as a keystone in the calculation of a wide range of temperature indices. To cover the entire Province of Alberta, 6833 time series were analysed to detect trends for 30 temperature indices using the nonparametric Mann–Kendall and Sen Slope tests. Many climate indices exhibit trends with confidence levels exceeding 99%. Results provide a compelling picture of overall warming and changes of weather extremes. It could be confirmed that Alberta’s climate is warming stronger than the global average: annual average temperatures have increased by 1 to 2°C in the South and by 2 to 4°C in the North, with the strongest warming during winter of up to 8°C, and the weakest warming during summers of often 1°C or less. The growing season has lengthened by two to five weeks, while the number of frost days is declining, the number of very cold days has about halved, and the proportion of precipitation falling as snow has severely declined since the 1950s. All indices are available for visualization and download at albertaclimaterecords.com.