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# Assessment of snow data recorded by two independent meteorological networks in New Brunswick, Canada

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Snow cover is considered as an important factor influencing climate and hydrology. In the Northern Hemisphere, snow covers about 40% of the land area each year, and since the mid-20th century the snow depth on the ground has decreased by 1.6% per decade. In this regard understanding the spatial and temporal variability of snow cover is critical to study the climate-cryosphere interactions. In Canada, most studies related to snow and climate cover the entire country and only take into account a couple stations in the New Brunswick province.
In this study a thirty-years (1981-2010) analysis of snow depth was performed using climatic series belonging to two independent meteorological networks in the province of New Brunswick (Canada). The dataset consist of 32 manual snow depth (HS) series recorded six times per year by the New Brunswick Survey, and 20 snow depth, temperature and precipitation daily series observed by the National Climate Data Archive of Environment Canada (NCDAE). The main goal of this project is, starting from daily HS series, to lay the foundations for a new quality control methodology performed on manual series with few annual records.
Three snow depth climatic areas were defined by means of two geostatistical method (Kriging and Cluster analysis) applied on monthly snow depth, precipitation and temperature data series. The climatic characterization was then performed for each area, detecting maximum and minimum temperature and precipitation. The number of rainy ($\geq$1mm) and snowy ($\geq$1cm) days trends were studied, and the precipitation intensity was calculated.
Later an analysis was performed for each climatic area, and on the daily series (NCDAE) parametric (Student t-test) and non-parametric tests (Kolmogorov–Smirnov and Wilcoxon) were applied in order to study the monthly correlation between snow depth (HS) and the others climatic variables. Due to the high daily HS variability, for each daily series outlier values were detected checking both the daily difference amount in snow accumulation and the monthly extreme thresholds (95 and 99 percentiles). The observation of extreme snow depth values was useful to detect the monthly precipitation and temperature variation range for each climatic area, that characterise a snowfall event. The thresholds and climatic range observed were then applied to the manual series in order to check any systematic and random errors. The results showed that New Brunswick is characterized by a cold and dry hilly north-western zone characterize by positive and significant trends in the percentage of snowy days. In this climatic area the highest values of snow depth are recorded between mid-March and mid-April. In this regards the quality control also show that in this area the greater outlier values are recorded in mid-April, due to the effect of temperature and the snow melt.