



## **Handling instrumental homogeneity of precipitation measurements when climate change is a major objective of research**

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Using daily and synoptic data of four countries, Russia, Kazakhstan, Canada, and the United States as well as stations' metadata, we show how changes in observational practice and gauge type affect precipitation climatology and trends. At this time, we focus on the most insidious issues of precipitation measurements related (a) to the impact of blowing snow events, (b) the discontinuity of precipitation records across the US - Canadian border due to different gauges and observing practice, (c) changes in observers' diligence, and (d) the changes of gage precision with time. For example, changes in observers' diligence along with changes to different instrumentation and units resulted in a systematic and significant increase in the number of days with precipitation in Norway, Canada, and the United States. This artificial increase, in turn, created havoc in statements about changes in the mean daily precipitation intensity, duration of no-rain periods, etc. Therefore, methods to quantify effects of the instability of reporting of the lowest non-zero precipitation values are presented as well as the recommendations on how to mitigate the impact of these problems in analyses of precipitation trends.