



## **An Assessment of Algorithm Choice on the Calculation of Daily Mean Air Temperature in Ireland**

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Mean monthly and annual air temperatures are important as they are used for the assessment of Climate Change and by many industries such as the energy industry (to estimate demand for heating), construction regulations and agriculture (e.g. to optimise time of sowing and harvesting crops). Mean monthly air temperatures are derived from daily mean values. Daily mean temperature, calculated from the average of 24 hourly values, is generally regarded as an accurate and representative measure of the mean daily temperature and is referred to as the 'true daily mean'. However as many stations worldwide are operated by volunteers who do not take readings every hour numerous algorithms have been developed to get an approximate of the true daily mean.

In Ireland it is possible to calculate the true daily mean temperatures at synoptic stations where traditionally manual observations were made every hour. In the last decade or so the synoptic network has been automated and the data is now available for each minute. However Met Éireann also operates a climate station network. These stations are currently operated by volunteers and observations are only made once a day, therefore it is not possible to calculate the true daily mean at these stations. Since the 1950s this daily observation is generally made at 9UTC however prior to this the observation time varied, with observations occurring a number of times throughout the day, or just once daily during the morning, afternoon or evening, depending on the station. As the mean daily values are calculated from the arithmetic mean of the daily maximum and minimum temperature it is important to know how the time of observation and algorithm choice affect the mean temperature calculated

In this work, the hourly observations for 10 synoptic stations have been used to assess the effect that algorithm choice and the time of observation have on the daily and monthly air temperatures over the period 1950 to 2010. The 'true daily mean' was compared with the daily means calculated using different algorithms and the deviation from the true daily mean was calculated for each month. The average annual anomalies were also determined over the period 1950 to 2010 and the difference between the annual anomalies for manual and automatic stations were examined. The results of the study will be presented in this paper.