

Quality Control of a Global Sub-daily Precipitation Dataset and Derived Extreme Precipitation Indices

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Extremes of precipitation can cause flooding and droughts which can lead to substantial damages to infrastructure and ecosystems and can result in loss of life. It is still uncertain how hydrological extremes will change with global warming as we do not fully understand the processes that cause extreme precipitation under current climate variability. The INTENSE project is using a novel and fully-integrated data-modelling approach to provide a step-change in our understanding of the nature and drivers of global precipitation extremes and change on societally relevant timescales, leading to improved high-resolution climate model representation of extreme rainfall processes. The INTENSE project is in conjunction with the World Climate Research Programme (WCRP)'s Grand Challenge on 'Understanding and Predicting Weather and Climate Extremes' and the Global Water and Energy Exchanges Project (GEWEX) Science questions.

Progress has been limited so far in this area due to the lack of data available to researchers. The first step towards achieving this was therefore to construct a new global sub-daily precipitation dataset. Data collection is ongoing and already covers North America, Europe, Asia and Australasia. The dataset currently contains hourly rainfall data from 23,687 gauges across 200 territories from a wide range of sources. A rigorous, flexible quality control algorithm has been developed to ensure that the data collected is as accurate as possible. The QC methodology combines a number of checks against neighbouring gauges, known biases and errors and thresholds based on the Expert Team on Climate Change Detection and Indices (ETCCDI) Climate Change Indices. The quality control software has been developed and made open source to set a new standard for verifying sub-daily precipitation data. A set of global hydroclimatic indices have been produced (and will be made freely available) based upon stakeholder recommendations including indices that describe maximum rainfall totals and timing, the intensity, duration and frequency of storms, frequency of storms above specific thresholds and information about the diurnal cycle.