

## **STARDEX Core Indices**

The following 10 indices are the core set to be used in the STARDEX project for the analysis of observed changes in extremes, evaluation of the performance of downscaling models and quantifying expected changes in extremes in the future.

### ***Rainfall:***

- prec90p 90th percentile of rainday amounts (mm/day)
- 644R5d Greatest 5-day total rainfall
- 646SDII Simple Daily Intensity (rain per rainday)
- 641CDD Max no. consecutive dry days
- 691R90T % of total rainfall from events > long-term P90
- 692R90N No. of events > long-term 90th percentile of raindays

### ***Temperature:***

- tmax90p Tmax 90th percentile
- tmin10p Tmin 10th percentile
- 125Fd Number of frost days  $T_{min} < 0$  degC
- txhw90 Percentile-based Heat Wave Duration

The rainfall indices provide a good mix of measures of intensity (prec90p, 644R5d, 646SDII), frequency (R90N, CDD) and proportion of total (R90T). All thresholds are percentile-based and so can be used for a wide variety of climates. Some of the indices consider properties of just the rainday distribution (prec90p, SDII) while the others use the entire distribution.

The temperature indices include the important fixed threshold 0 deg but otherwise are applicable to all climates. There are 2 magnitude-based indices (tmax90p and tmin10p) and 2 frequency-based indices (Fd and txhw90). Both hot and cold extremes are analysed for frequency and magnitude.

Note that the indices software has been updated and now calculates all indices seasonally except for degree days, growing season length and frost season length which are all calculated for the appropriate hemisphere season.

A rainday threshold of 1mm will be used.

The percentile routine uses the 'Empirical Distribution Function' method with interpolation. A parameter needs to be set in the program file that sets the minimum no. of days for which a percentile can be calculated. This is set to 10 by default in 'station\_indices.f90'.

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