Indices of Daily Temperature and Precipitation Extremes

TEMPERATURE INDICES

	Index	Description	Formula	ClimDex	Frich	ECA	KT&K	Kiktev	STARDEX	Osborn	Bonsal	APN	RClimDex	Interpretation
2	ID or TXice	Ice days or days without defrost	No. days TX < 0°C			☻			☻				☻	Day count; fixed threshold
3	FD or TNFD	Frost days	No. days TN < 0°C	☻	☻	☻	☻	☻	☻				☻	Day count; fixed threshold
4	CFD	Consecutive FD	Greatest no. consec. days TN < 0°			☻								Maximum span of days
5	TNFSL	Frost season length	No. days between first and last frost (Jan-Dec for SH; July-June for NH)						☻					Annual span of days
6	GSL or TGSL	Growing season length	Count of days between first span of at least 6 days TG > 5°C and first span in second half of the year of 6 days TG < 5°C (Jan-Dec for SH; July-June for NH)	☻	☻	☻			☻				☻	Span of days for thermal growing season
7	GD4	Growing degree days	Sum of TG > 4°C			☻								Temperature sum
8	HD17	Heating degree days	Sum of 17°C - TG			☻								Temperature sum
9	SU	Summer days	No. days TX > 25°C			☻	☻						☻	Day count; fixed threshold
10	TR	Tropical nights	No. days TN > 20°C			☻							☻	Day count; fixed threshold
11	TNx (also for TX)	Monthly highest daily minimum temp.	Monthly highest daily minimum temp.										☻	Temperature value
12	TNn (also for TX)	Monthly lowest daily minimum temp.	Monthly lowest daily minimum temp.										☻	Temperature value
13	TN10p (also 90p and also for TX)	Cold (warm) nights	Percentage or no. days TN < 10ptile calculated for each calendar day (on basis of 1961-90) using running 5 day window	☻	☻	☻	☻	☻					☻	Day count; percentile threshold following smoothed annual cycle
14	TG10p (also 90p)	Cold (warm) days	See TN10p, but TG < 10ptile			☻								See TN10p
15	TNf10 (also f90 and also for TX)	Cold (warm) nights	No. days TN < 10ptile calculated for each season (on basis of 1961-90)						☻					Like TN10p, but using seasonal thresholds

A	B	C	D	E	F	G	H	I	J	K	L	N	M	O
1	**Index**	**Description**	**Formula**	ClimDex	Frich	ECA	KT&K	Kiktev	STARDEX	Osborn	Bonsal	APN	RClimDex	**Interpretation**
16	TNq10 (also q90 and also for TX)	Seasonal percentile	10ptile calculated for daily TN						☻					Seasonal percentile temperature value
17	Cold Nights TN (also Cool days TX)	Cold nights	No. days below average 1ptile of TN (on basis of 1961-90)									☻		Like TN10p, but using annual thresholds for 1ptile
18	Warm Nights TN (also Hot days TX)	Warm nights	No. days above average 99ptile of TN (on basis of 1961-90)									☻		Like TN90p, but using annual thresholds for 99ptile
19	1st percentile TN (also 5, 10, 25, 50, 75, 90, 95, 99 and also for TX)	Percentile values	1ptile calculated for daily TN distribution on a seasonal basis (3 months)								☻			Percentile temperature values
20	HWDI or TXHWD	Heat wave duration index	No. days in intervals of at least 6 days with TX > mean+5°C calculated for each calendar day (on basis of 1961-90) using running 5 day window	☻	☻	☻			☻					Count of days in runs of 6 or more days; smoothed annual cycle mean+5°C threshold
21	CWDI or TNCWD	Cold wave duration index	See HWDI, but TN < mean-5°C			☻			☻					Like HWDI
22	HWFI (also CWFI for TG<10ptile)	Warm (cold) spell days	No. days in intervals of at least 6 days with TG > 90ptile calculated for each calendar day (on basis of 1961-90) using running 5 day window			☻								Count of days in runs of 6 or more days; smoothed annual cycle percentile threshold
23	WSDI (also CSDI for TN<10ptile)	Warm (cold) spell duration index	No. days in intervals of at least 6 days with TX > 90ptile calculated for each calendar day (on basis of 1961-90) using running 5 day window			☻							☻	Like HWFI
24	TXHW90	90 ptile of heat wave duration	Max. no. consecutive days with TX > 90ptile calculated for each calendar day (on basis of 1961-90) using running 5 day window						☻					Length of maximum string of days; smoothed annual cycle percentile threshold
25	TNCW10	10 ptile of cold wave duration	See TXHW90						☻					Like TXHW90
26	ETR or TIAETR	Extreme temperature range	Difference: max(TX)-min(TN)	☻	☻	☻			☻					Temperature difference

A	B	C	D	E	F	G	H	I	J	K	L	N	M	O
1	**Index**	**Description**	**Formula**	**ClimDex**	**Frich**	**ECA**	**KT&K**	**Kiktev**	**STARDEX**	**Osborn**	**Bonsal**	**APN**	**RClimDex**	**Interpretation**
27	DTR or TRav	Mean of Diurnal Temperature Range	Average of daily TX-TN values	☻		☻			☻			☻	☻	Temperature difference
28	TRQ10 (also TRQ90)	10ptile diurnal temperature range	10ptile of daily TX-TN values						☻					Temperature difference
29	vDTR	Mean absolute day-to-day difference in DTR	Mean absolute day-to-day difference in DTR			☻								Temperature difference used for homogeneity testing

PRECIPITATION INDICES

A	B	C	D	E	F	G	H	I	J	K	L	N	M	O
	Index	Description	Formula	ClimDex	Frich	ECA	KT&K	Kiktev	STARDEX	Osborn	Bonsal	APN	RClimDex	Interpretation
2	R10mm or PN10mm	Heavy precipitation days	No. days RR $\geq$ 10mm	☺	☺	☺	☺	☺	☺				☺	Day count; fixed threshold
3	R20mm	Very heavy precipitation days	No. days RR $\geq$ 20mm			☺	☺						☺	Day count; fixed threshold
4	Rnnmm	User defined precipitation days	No. days RR $\geq$ nn mm	☺									☺	Day count; fixed threshold
5	RX1day	Highest 1 day precipitation amount	Greatest RR sum for 1 day interval			☺	☺						☺	Precip amount
6	R5D or RX5day or PX5day	Highest 5 day precipitation amount	Greatest RR sum for 5 day interval	☺	☺	☺	☺	☺	☺				☺	Precip amount
7	PX3day (also 10day)	Highest 3 day precipitation amount	Greatest RR sum for 3 day interval						☺					Precip amount
8	CDD or PXCDD	Consecutive dry days	Greatest no. consec. days RR < 1mm	☺	☺	☺		☺	☺				☺	Maximum span of days
9	CWD or PXCWD	Consecutive wet days	Greatest no. consec. days RR $\geq$ 1mm			☺			☺				☺	Maximum span of days
10	R75p (also 95p and 99p)	Moderate (very, extremely) wet days	No. days RR > 75ptile calculated for wet days (on basis of 1961-90)			☺	☺							Day count; percentile threshold of amounts on wet days only
11	Extreme Frequency	Rainfall extreme frequency	No. days above long-term 99ptile calculated using all days in a year									☺		No. of days with rainfall above average rank 4 event
12	Extreme Intensity	Rainfall extreme intensity	Average magnitude of top 4 events									☺		Average magnitude of top 4 events
13	Extreme Proportion	Rainfall extreme proportion	Proportion of annual rainfall from top 4 events									☺		Proportion of annual rainfall from top 4 events
14	R90N or PNL90	No. of events > long-term 90th percentile of raindays	No days > 90th percentile of all wet days for 1961-90						☺					No days above a fixed (station dependent) threshold
15	R95pTOT or R95T	Precipitation fraction due to R95p	Quotient of amount on R95p days and total amount	☺	☺	☺	☺							Fraction of total amount due to am. on R95p days
16	R75pTOT (also 99p)	Precipitation fraction due to R75p	See R95pTOT			☺								Like R95pTOT
17	R90T or PFL90	% of total rainfall from events > long-term P90	See R95pTOT						☺					Like R95pTOT

A	B	C	D	E ClimDex	F Frich	G ECA	H KT&K	I Kiktev	J STARDEX	K Osborn	L Bonsal	N APN	M RClimDex	O
1	**Index**	**Description**	**Formula**											**Interpretation**
18	R95p (also R99p)	Precipitation total when RR > 95ptile											☺	Note disagreement with other R95p index
19	PRCPTOT	Precipitation total in wet days (RR >= 1mm)											☺	Used as denominator to R95p
20	SDII or PINT	Simple daily intensity index	Quotient of amount on days RR ≥ 1mm and no. days RR ≥ 1mm	☺	☺	☺		☺	☺				☺	Mean precip amount per wet day
21	Prec90p or Pq90 (also 20, 40, 50, 60, 80, 95)	90th percentile of rainday amounts (mm/day)	90ptile calculated for wet days						☺					90ptile in distribution at wet days
22	Frac90p or Pf90 (also 20, 40, 50, 60, 80, 95)	Fraction of total precip above annual 90ptile	Fraction of total precip. above annual 90ptile calculated for wet days						☺					Fraction of total precipitation from events above annual percentile – not long-term percentile

SOURCES

ClimDex: NCDC software used in ETCCDMI workshops until 2003 (www.ncdc.noaa.gov/oa/wmo/ccl)
Frich: Frich et al., Climate Research, 2002
ECA: European Climate Assessment (www.knmi.nl/samenw/eca)
KT&K: Klein Tank and Können, J. Climate, 2003
Kiktev: Kiktev et al., J. Climate, 2003
STARDEX: Stardex EU project (www.cru.uea.ac.uk/projects/stardex)
Osborn: Osborn et al., Int. J. Climatol., 2000
Bonsal: Bonsal et al., J. Climate, 2001
APN: Asian Pacific Network (www.bom.gov.au/bmrc/csr/apn)
RClimDex: CCC software used in ETCCDMI workshops from 2004 (www….)