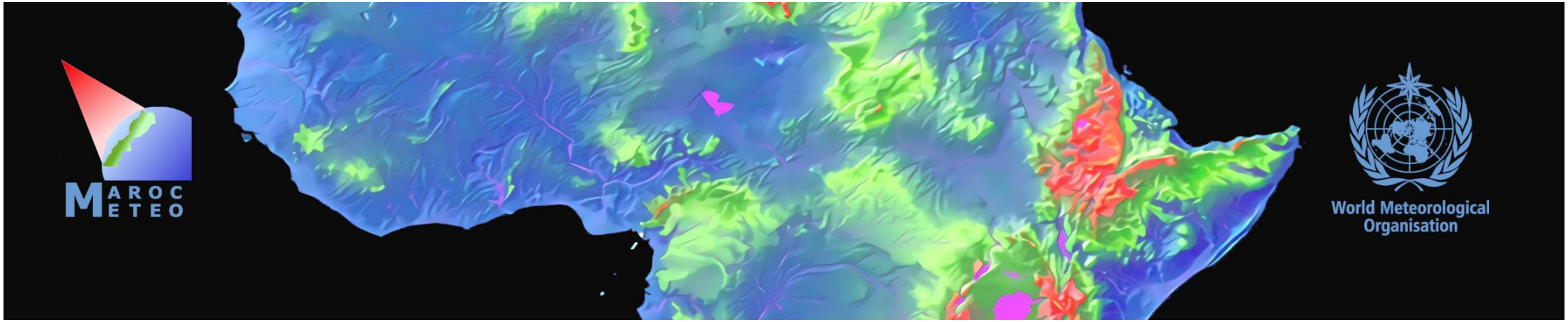

National Climate Monitoring Products calculation

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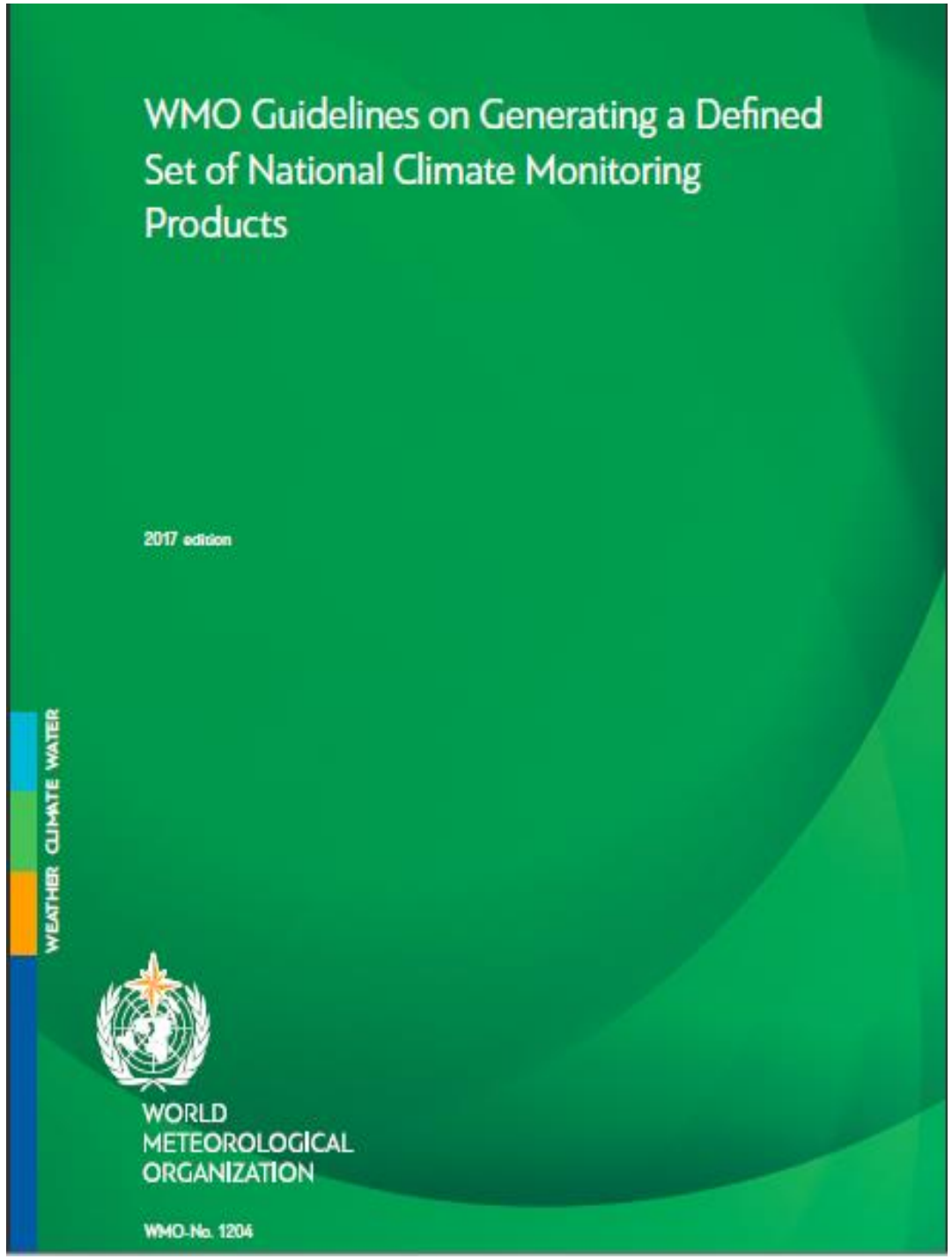
Training session on National Climate Monitoring Products generation

DGM-WMO, 18-19 January 2022



National Climate Monitoring Products software :
https://github.com/ET-NCMP/NCMP

1. Introduction

2. National climate monitoring products

   a) NCMP1 : Mean temperature anomaly
   b) NCMP2 : Total rainfall anomaly
   c) NCMP3 : Standardized precipitation index
   d) NCMP4 : Warm days
   e) NCMP5 : Cold nights
   f) NCMP6 : Temperature and precipitation records

Introduction

Owing to the impact of varying and changing climatic conditions on society and ecosystems, countries around the world have created a variety of climate monitoring products at different spatial and temporal scales. National climate monitoring products (NCMPs) are products that specifically summarize climatic conditions at a national scale and show how current conditions compare with those in the past.

They are useful within a country because they raise awareness and understanding of the effects of climate variability and change, as well as demonstrate the importance of national monitoring networks and services.

At regional and international levels, NCMPs aid the synthesis of information from different countries to provide a broader, regional or global view of climate variability and change. Such summaries are routinely published in high-profile annual publications such as the WMO statement on the state of the global climate and others.

National climate monitoring products

Base period :

To ensure that national climate monitoring products (NCMPs) are comparable among countries, it is essential to have a consistent base period. A base period can also facilitate calculation of NCMPs and provide a fixed period against which changes in the climate can be assessed.

For operational climate monitoring, WMO guidance on the calculation of standard climatological normals recommends a rolling 30- year period, updated every 10 years (WMO, 2017). The most-recent period at the time of writing this publication is 1981–2010, which will be followed by 1991–2020 from 2021 and so on.

National climate monitoring products

Base period :

The table below indicates the number of heat waves according to different base period.

Tableau 2. Nombre de vagues de chaleur identifiées selon la période de référence utilisée pour la sélection des paramètres de la méthode (centiles).

Référence	1951-1980	1961-1990	1971-2000	1976-2005	1981-2010
Moyenne	11,98°C	11,83°C	12,16°C	12,37°C	12,55°C
Seuil Spic	24,06°C	24,39°C	24,76°C	24,98°C	25,28°C
Number of heat waves	56	50	41	24	18

Ref: Recensement des vagues de chaleur en France à différentes échelles spatiales et évolution en contexte de changement climatique

National climate monitoring products

Area averaging :

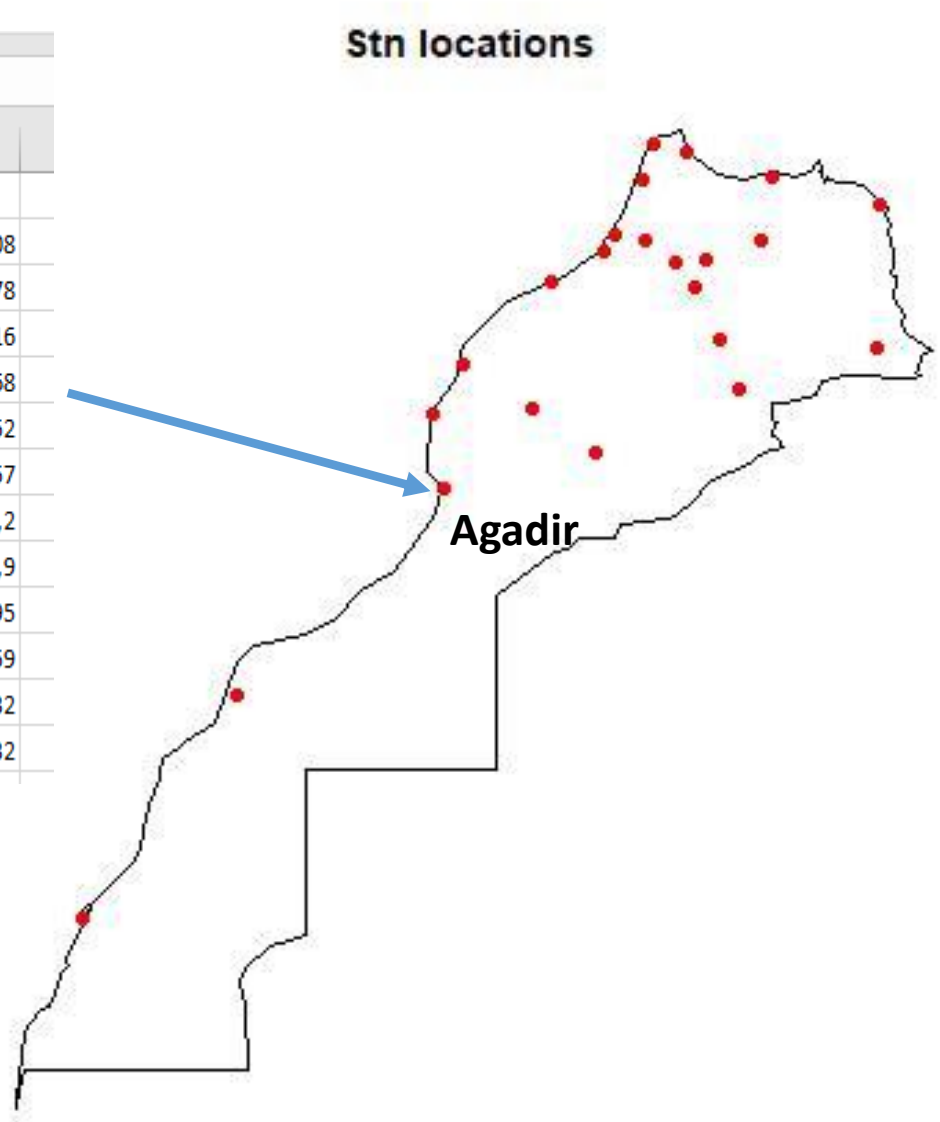
Indices are calculated for each station, and the values of the indices are then interpolated onto a regular grid, which is then used to calculate the area average of that index for the country

Produits nationaux de surveillance de climat

Area averaging :

R7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Year**	**Annual**	January	February	March	April	May	June	July	August	September	October	November	December
2	**1971**	**18**	14,88	15,5	14,93	15,63	17,03	19,11	20,89	22,03	20,6	23,59	18,51	13,08
3	**1972**	**17,35**	13,48	13,88	13,85	16,53	17,72	18,65	20,06	21	20,1	21,49	17,04	14,78
4	**1973**	**18,31**	13,16	14,76	16,93	17,98	20,02	20,16	21,83	21,64	20,59	19,25	20,07	13,16
5	**1974**	**17,74**	13,07	13,92	15,01	15,44	18,49	20,15	23,15	23,13	21,02	18,27	16,37	14,68
6	**1975**	**18,41**	15,12	15,7	15,16	16,69	18,35	19,9	25,12	22,08	21,41	19,28	16,39	15,52
7	**1976**	**18,34**	13,83	14,73	16,6	16,02	17,9	20,04	22,08	25,8	22,39	19,4	15,49	15,57
8	**1977**	**18,55**	14,44	14,82	19,38	19,95	18,84	19,24	20,86	20,11	21,25	19,43	16,77	17,2
9	**1978**	**18,45**	14,51	15,84	16,05	15,74	17,41	19,57	22,69	20,39	23,68	20,27	19,08	15,9
10	**1979**	**18,16**	16,41	16,12	15,42	16,12	19,81	20,03	22,03	20,97	20,68	18,86	16,93	13,95
11	**1980**	**18,75**	14,57	14,76	17,4	18,16	18,29	20,31	21	23,84	23,95	21,04	18	13,59
12	**1981**	**18,67**	13,5	15,81	17,62	16,45	17,86	20,15	21,06	21,53	20,78	21,13	22,7	15,32
13	**1982**	**17,99**	14,83	16,21	16,26	17,64	19,4	19,83	22,12	20,87	21	18,65	16,74	12,32



Annual mean= Mean(Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec)

Produits nationaux de surveillance de climat

Area averaging :

Presse-papiers | Police | Alignement | Nombre | Style

AD11

	O	P	Q	R	S	T	U
1	Year	Annual	January	February	March	April	May
2	1971	-1,51	0,11	-0,56	-2,92	-3,05	-3,04
3	1972	-2,16	-1,29	-2,18	-4	-2,15	-2,35
4	1973	-1,2	-1,61	-1,3	-0,92	-0,7	-0,05
5	1974	-1,77	-1,7	-2,14	-2,84	-3,24	-1,58
6	1975	-1,1	0,35	-0,36	-2,69	-1,99	-1,72
7	1976	-1,17	-0,94	-1,33	-1,25	-2,66	-2,17
8	1977	-0,96	-0,33	-1,24	1,53	1,27	-1,23
9	1978	-1,06	-0,26	-0,22	-1,8	-2,94	-2,66
10	1979	-1,35	1,64	0,06	-2,43	-2,56	-0,26
11	1980	-0,76	-0,2	-1,3	-0,45	-0,52	-1,78
12	1981	-0,84	-1,27	-0,25	-0,23	-2,23	-2,21
13	1982	-1,52	0,06	0,15	-1,59	-1,04	-0,67

R7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Year	Annual	January	February	March	April	May	June	July	August	September	October	November	December
2	1971	18	14,88	15,5	14,93	15,63	17,03	19,11	20,89	22,03	20,6	23,59	18,51	13,08
3	1972	17,35	13,48	13,88	13,85	16,53	17,72	18,65	20,06	21	20,1	21,49	17,04	14,78
4	1973	18,31	13,16	14,76	16,93	17,98	20,02	20,16	21,83	21,64	20,59	19,25	20,07	13,16
5	1974	17,74	13,07	13,92	15,01	15,44	18,49	20,15	23,15	23,13	21,02	18,27	16,37	14,68
6	1975	18,41	15,12	15,7	15,16	16,69	18,35	19,9	25,12	22,08	21,41	19,28	16,39	15,52
7	1976	18,34	13,83	14,73	16,6	16,02	17,9	20,04	22,08	25,8	22,39	19,4	15,49	15,57
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10	1979	18,16	16,41	16,12	15,42	16,12	19,81	20,03	22,03	20,97	20,68	18,86	16,93	13,95
11	1980	18,75	14,57	14,76	17,4	18,16	18,29	20,31	21	23,84	23,95	21,04	18	13,59
12	1981	18,67	13,5	15,81	17,62	16,45	17,86	20,15	21,06	21,53	20,78	21,13	22,7	15,32
13	1982	17,99	14,83	16,21	16,26	17,64	19,4	19,83	22,12	20,87	21	18,65	16,74	12,32

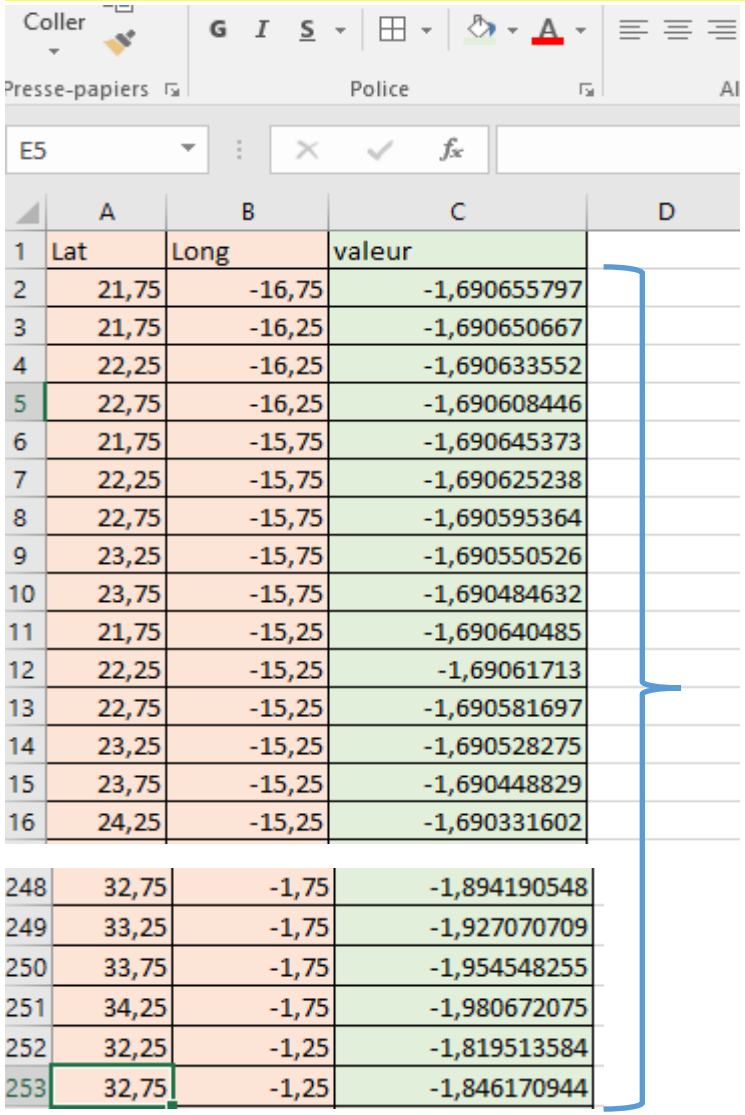
Stn locations

Year anomaly = Year mean – Climate normal

-1,51 = 18 - 19,51

Produits nationaux de surveillance de climat

Calcul de la moyenne zonale :



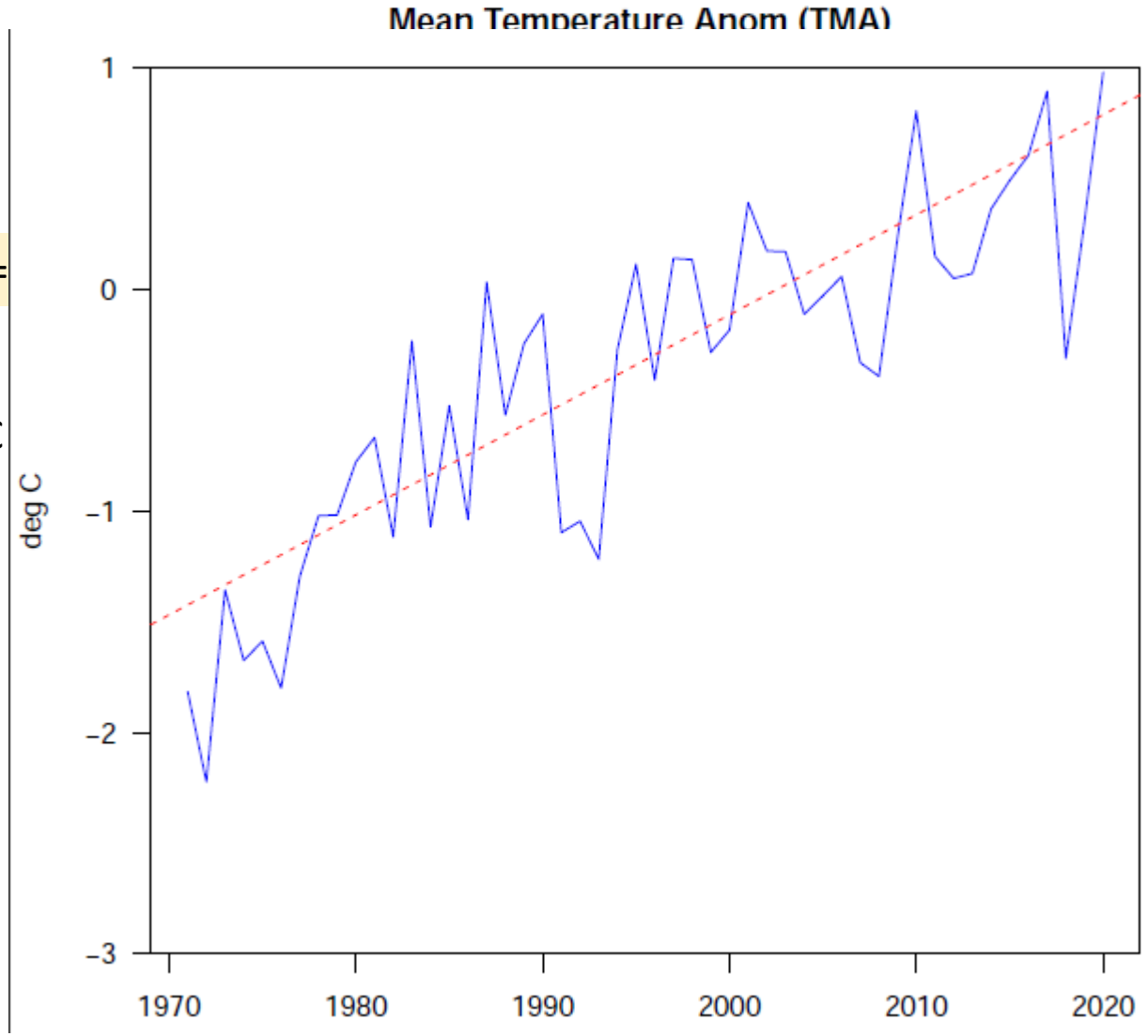
	A	B	C	D
1	Lat	Long	valeur	
2	21,75	-16,75	-1,690655797	
3	21,75	-16,25	-1,690650667	
4	22,25	-16,25	-1,690633552	
5	22,75	-16,25	-1,690608446	
6	21,75	-15,75	-1,690645373	
7	22,25	-15,75	-1,690625238	
8	22,75	-15,75	-1,690595364	
9	23,25	-15,75	-1,690550526	
10	23,75	-15,75	-1,690484632	
11	21,75	-15,25	-1,690640485	
12	22,25	-15,25	-1,69061713	
13	22,75	-15,25	-1,690581697	
14	23,25	-15,25	-1,690528275	
15	23,75	-15,25	-1,690448829	
16	24,25	-15,25	-1,690331602	
248	32,75	-1,75	-1,894190548	
249	33,25	-1,75	-1,927070709	
250	33,75	-1,75	-1,954548255	
251	34,25	-1,75	-1,980672075	
252	32,25	-1,25	-1,819513584	
253	32,75	-1,25	-1,846170944	

Anomaly for each grid point (1971)

Regional annual anomaly=

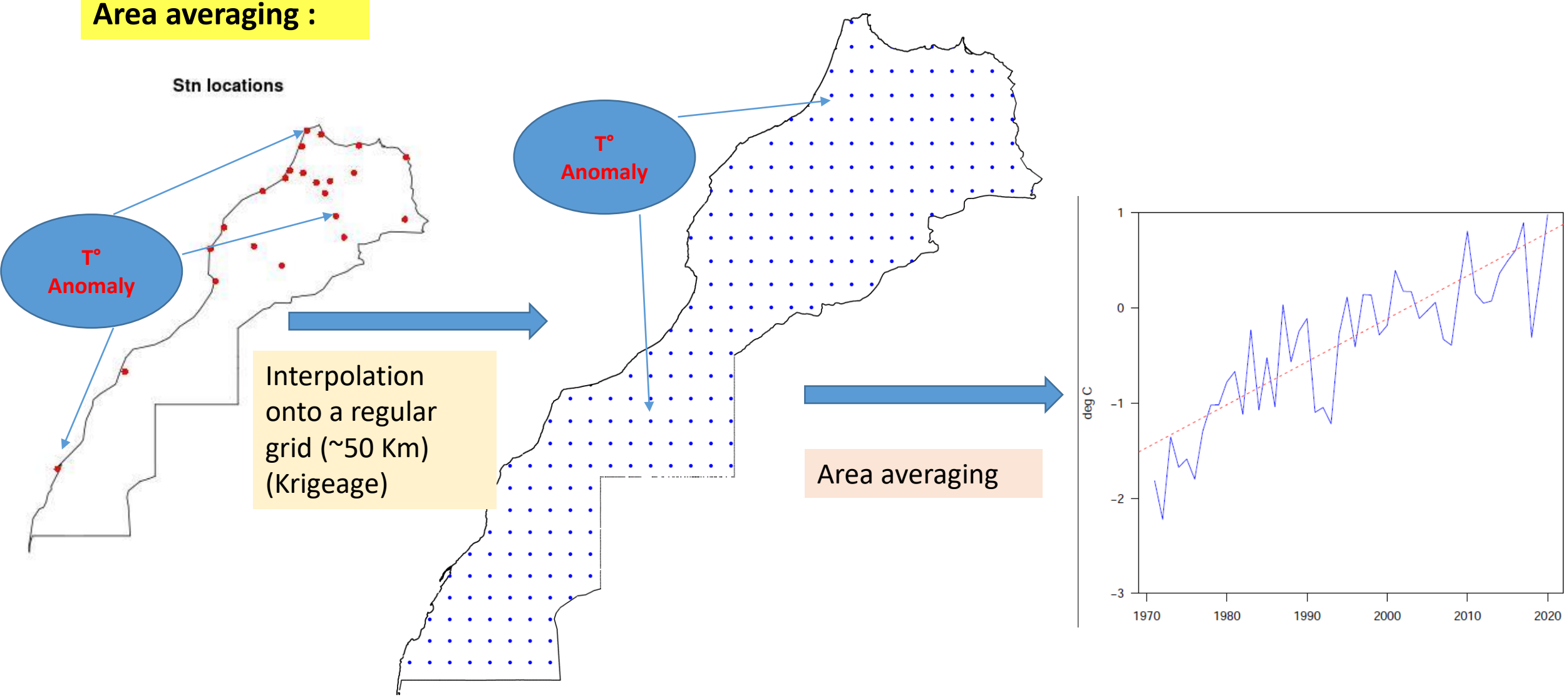
T-Anomaly (1971): -1.8°C

253 grid points



National climate monitoring products

Area averaging :



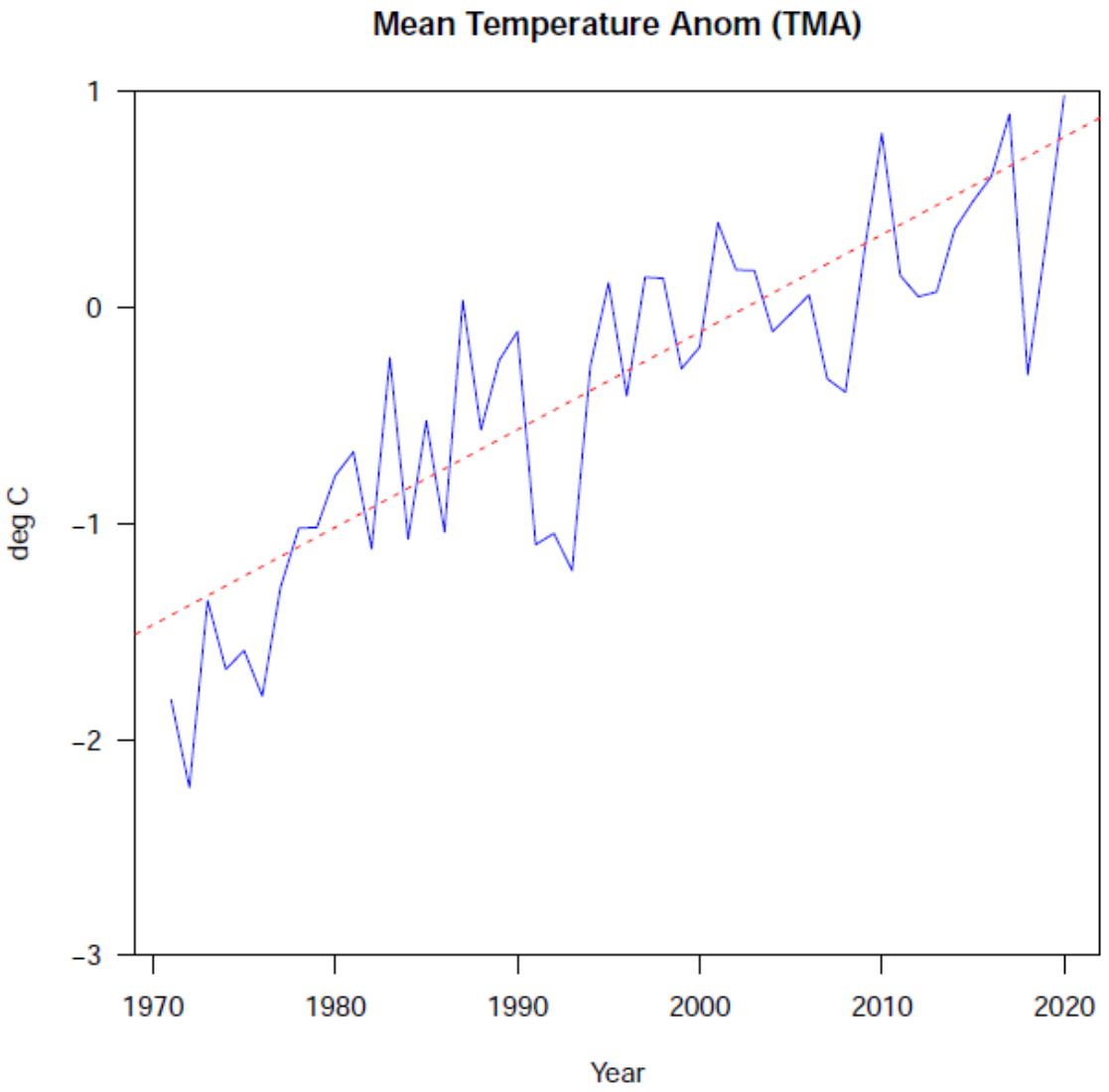
Example of annual mean temperature anomaly area averaging over 1971-2020 period.

National climate monitoring products

NCMP 1: mean temperature anomaly

NCMP 1 is the mean temperature anomaly. It is the mean temperature anomaly across the country.

The mean temperature anomaly is a measure of overall warmth or cold relative to normal conditions. It is a standard metric used to monitor climate change and is widely used in monitoring reports .



National climate monitoring products

NCMP 2: total rainfall anomaly

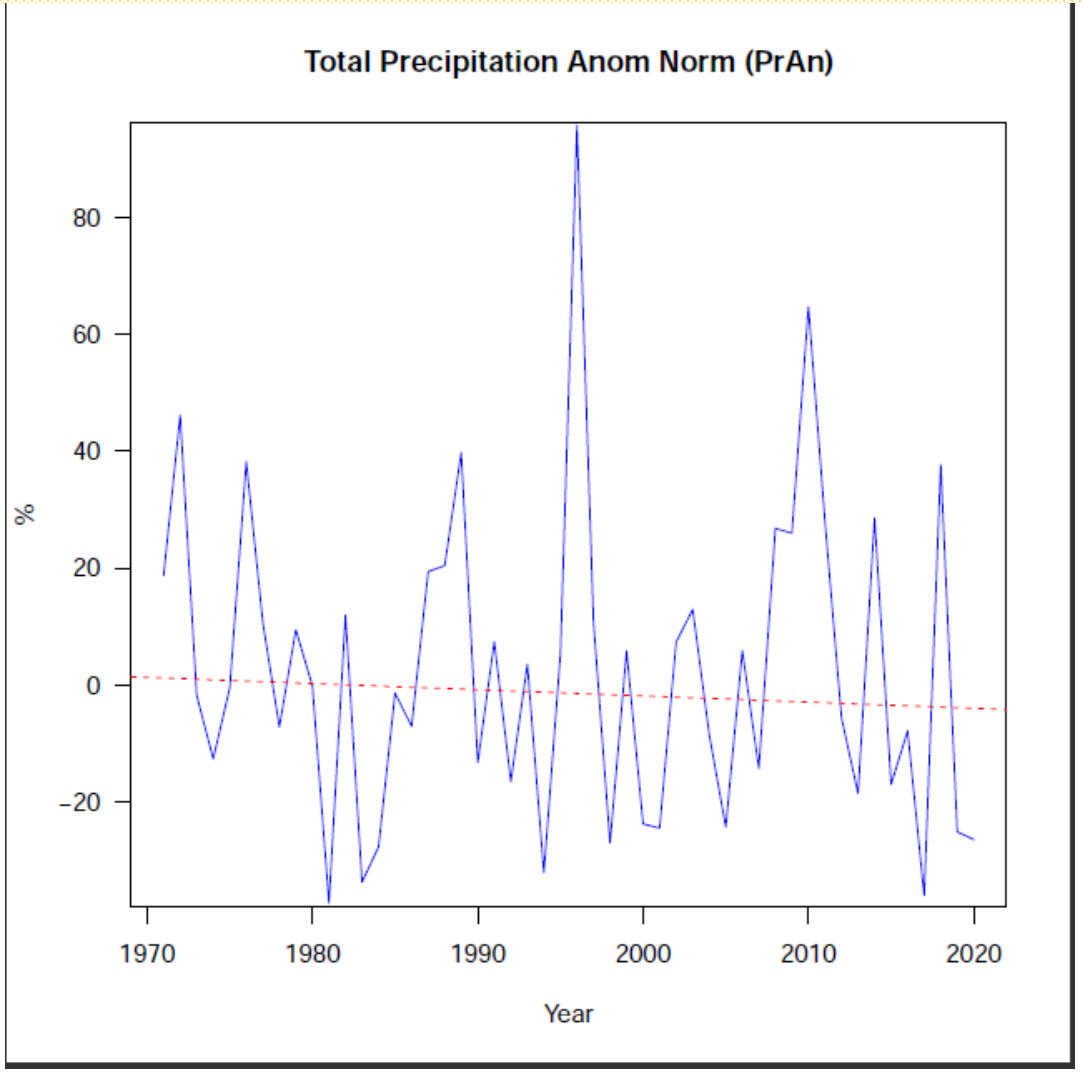
NCMP 2 is the rainfall anomaly calculated in two ways:

- **As a simple difference from the base-period average averaged across the country ;**

Anomaly = Total rainfall - rainfall normal

- **As a simple difference from the base-period average expressed as a percentage of the base-period average averaged across the country;**

Anomaly =100*(Total rainfall - rainfall normal)/ rainfall normal



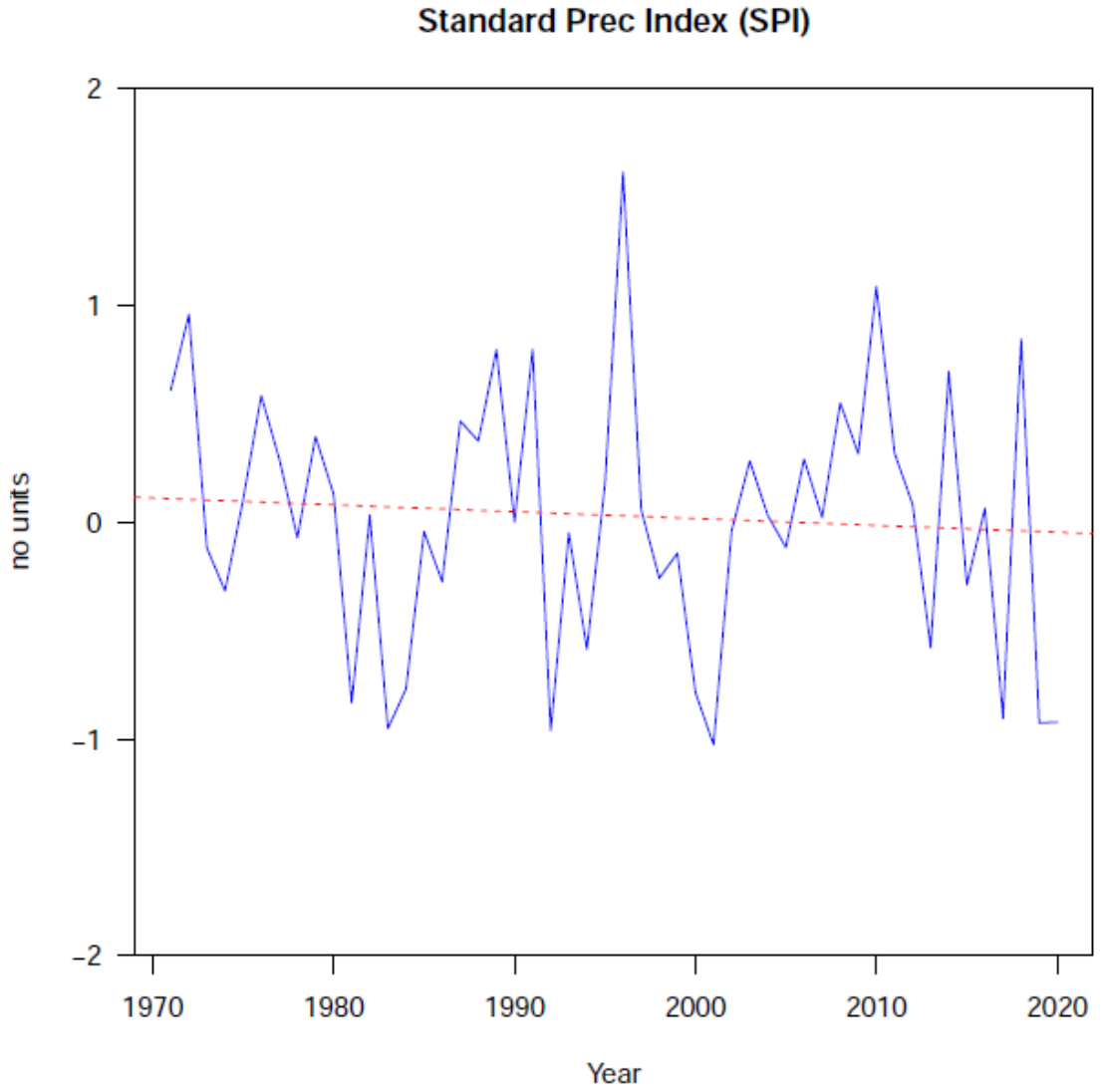
National climate monitoring products

NCMP 3: standardized precipitation index

NCMP 3 is the standardized precipitation index SPI. NCMP 3 is dimensionless, so it does not have units This index is a standard metric used to monitor rainfall and drought.

Table 1. SPI values

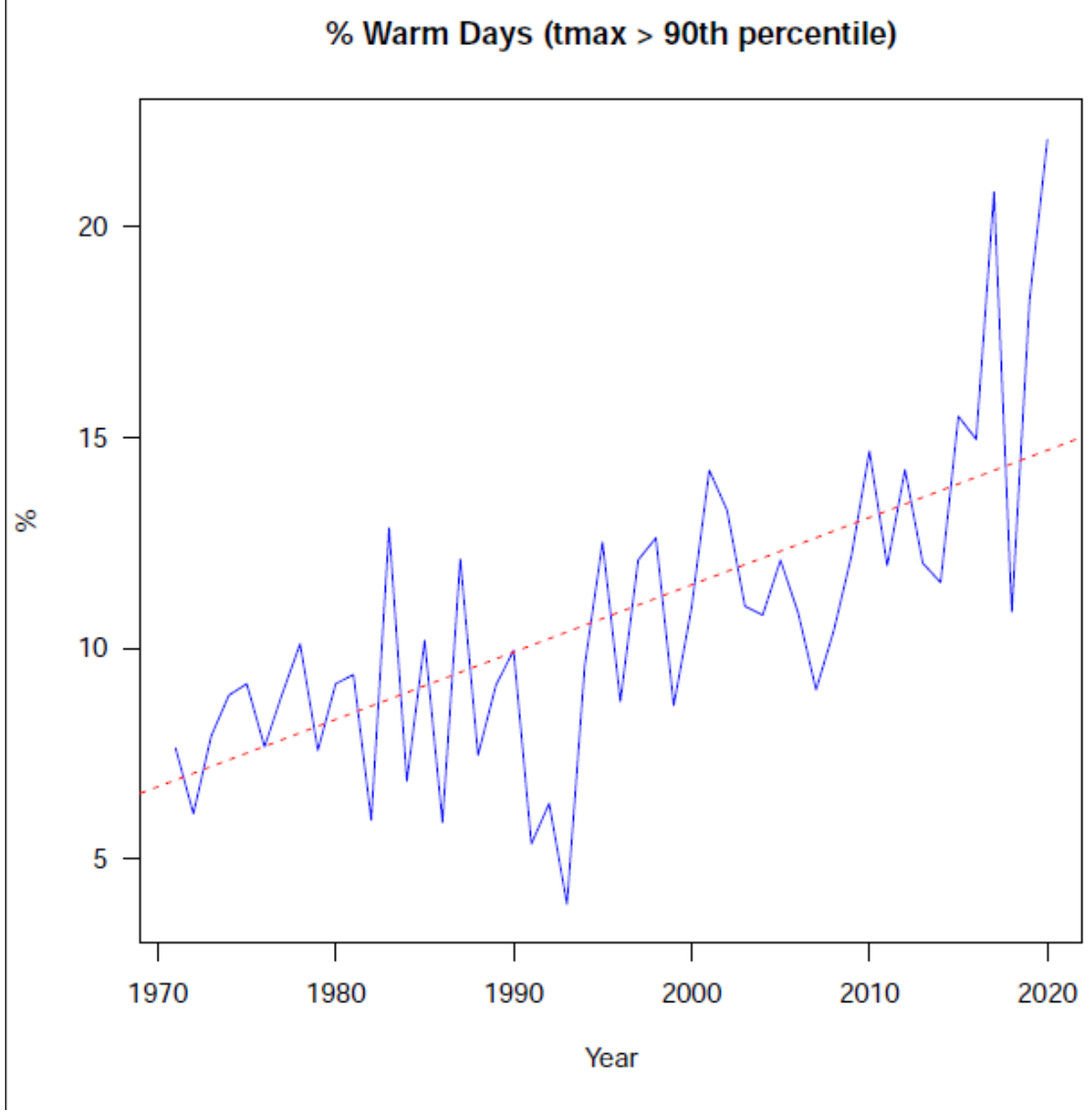
2.0+	extremely wet
1.5 to 1.99	very wet
1.0 to 1.49	moderately wet
-.99 to .99	near normal
-1.0 to -1.49	moderately dry
-1.5 to -1.99	severely dry
-2 and less	extremely dry



National climate monitoring products

NCMP 4: warm days

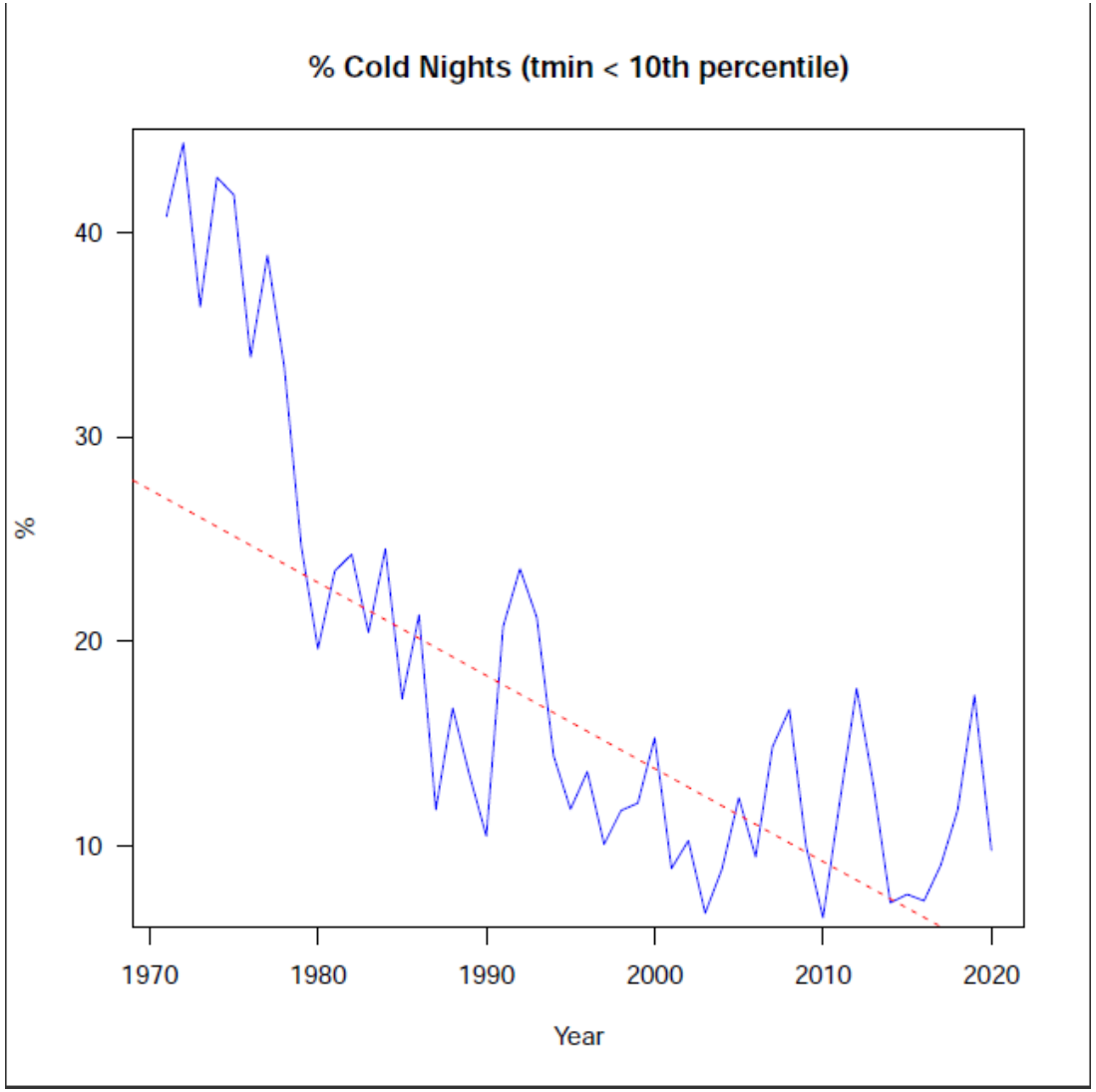
NCMP 4 is the warm days index. It is a measure of the percentage of days that exceeded the 90th percentile of the base-period distribution for maximum temperatures for the day averaged across the country.



National climate monitoring products

NCMP 5: cold nights

NCMP 5 is the cold nights index. It is a measure of the percentage that fall below the 10th percentile of the base-period distribution of minimum temperatures for the day averaged across the country.



National climate monitoring products

NCMP 6: temperature and precipitation records

NCMP 6 gives a simple count of the number of stations with records exceeding 30 years in length that report their highest recorded daily maximum temperature, lowest recorded daily minimum temperature and highest recorded daily precipitation total for each month and year. Records for each element are counted separately

The aim is to flag the exceptional events, that is, events that often have extreme impacts. Extremes of temperature – both hot and cold – can lead to a range of health problems and, in the most acute cases, death. High rainfall totals can lead to flooding and associated impacts including damage to crops, destruction of infrastructure, displacement of people and loss of life. Such extremes can be very localized, so this NCMP is based on records at stations, without aggregation

Many thanks for your attention