

Climatic Variability/Change over Jammu Province



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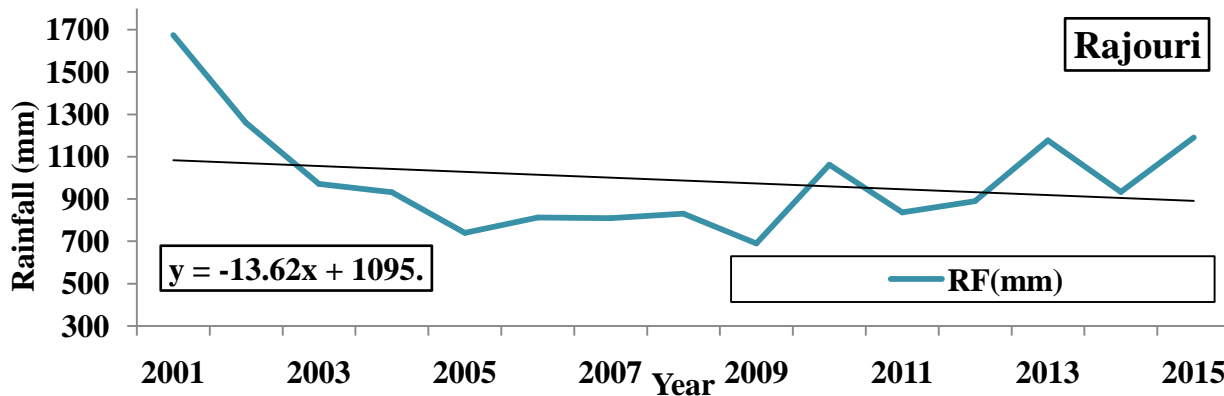
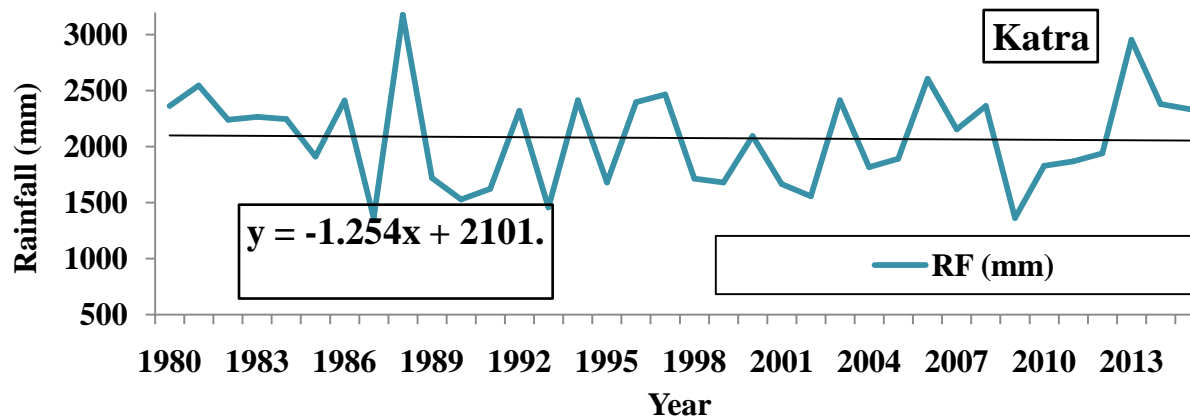
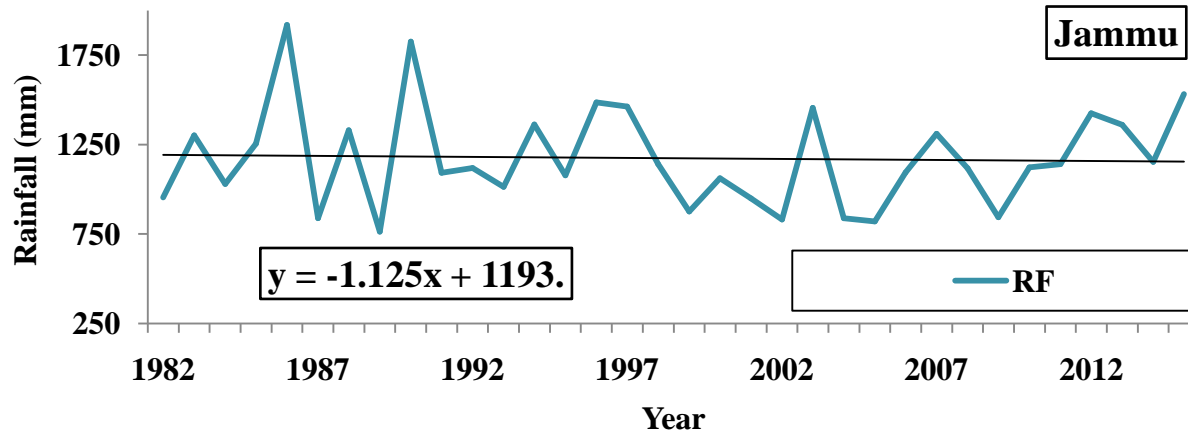
Meteorological data available with Agromet Research Centre, SKUAST-J, Chatha

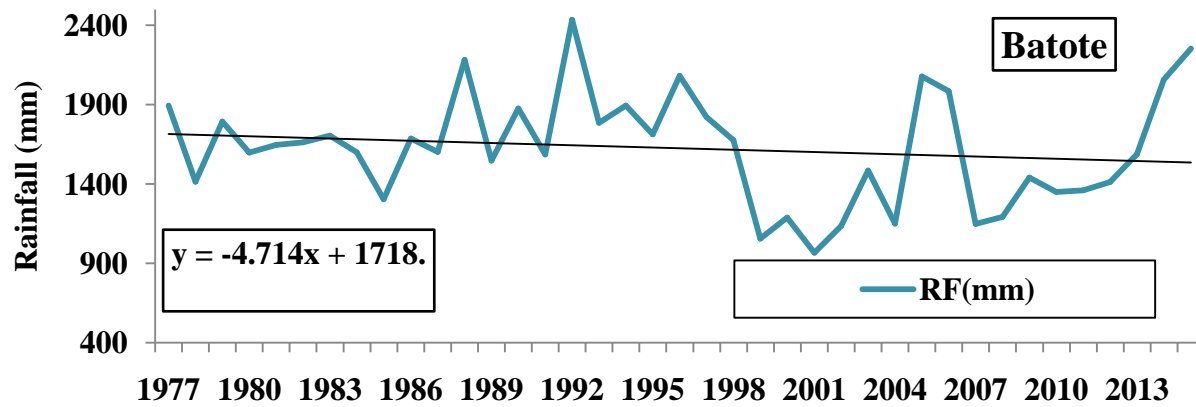
S.No.	Station	Period of data	Met. Parameters	Source
1.	Jammu 32.73,74.86, 308 m	1982-2015	Max. Temp., Min. Temp & Rainfall	After Establishment of Agromet Observatory in 2004 at SKUAST-J, Chatha
		1984-2015	RH (M&E)	
		2004-2015	WS, EP, BSS	
2.	Katra 33.08, 74.83, 867 m	1980-2015	Max. Temp., Min. Temp & Rainfall	IMD observatory data
3.	Rajouri 33.38,74.26, 1000 m	1994-2015	Rainfall	RARS, Rajouri
		2001-2015	Max. & min. Temp	
		2011-2015	RH (M &E)	
4.	Batote 33.12,75.32, 1487 m	1977-2015	Max. Temp., Min. Temp & Rainfall	IMD observatory data
5.	Banihal 33.42,75.20, 1637 m	1972-2015	Max. Temp., Min. Temp & Rainfall	IMD observatory data
6.	Bhaderwah 32.98,75.71, 1660 m	1978-2015	Max. Temp., Min. Temp & Rainfall	IMD observatory data



Rainfall variability over Jammu Region

Rainfall Trends (Annual)





Batote

Mean Annual
Rainfall=1624.2 mm

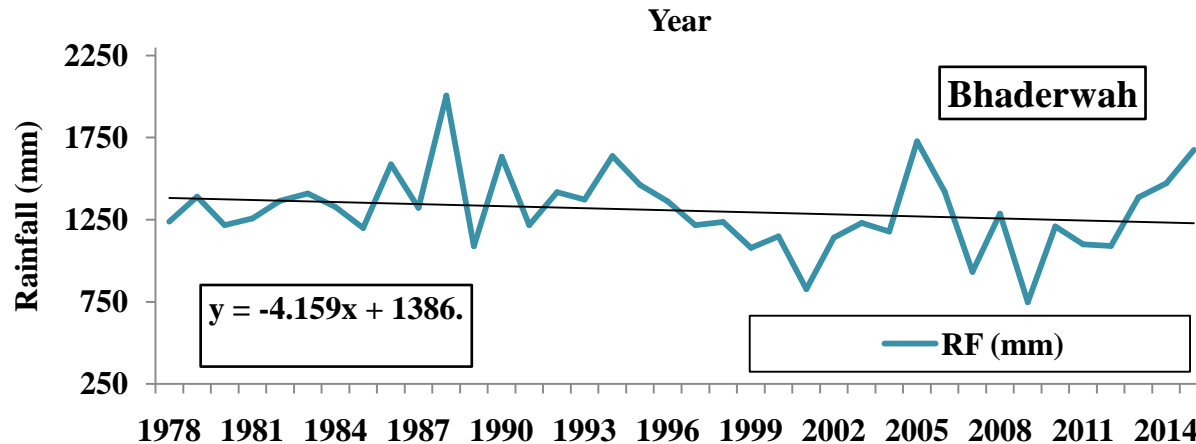
Decrease

@4.71 mm/year

Projected

2020= 1.45%

2030= 4.35%



Bhaderwah

Mean Annual
Rainfall=1305.7 mm

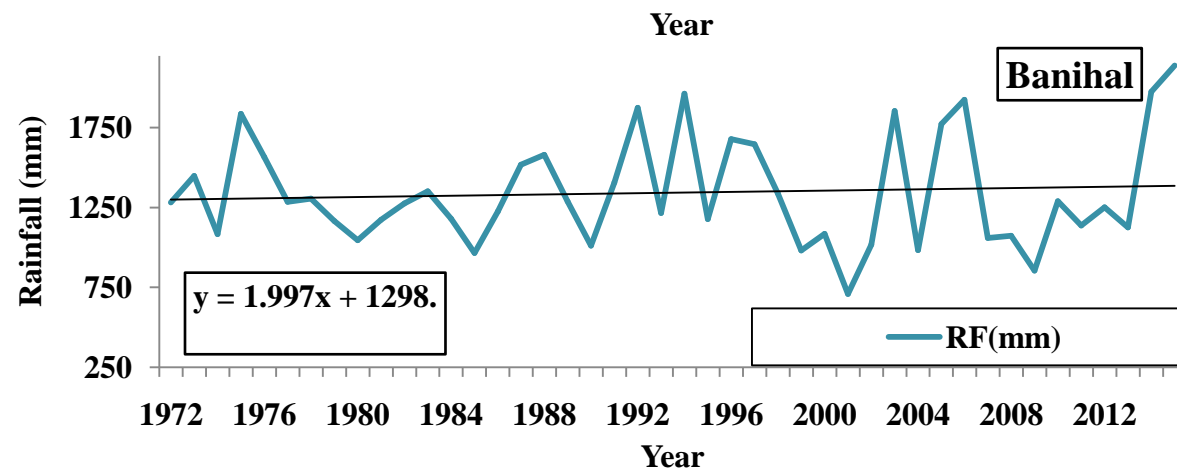
Decrease

@4.16 mm/year

Projected

2020= 1.59%

2030= 4.78%



Banihal

Mean Annual
Rainfall=1343.6

Increase

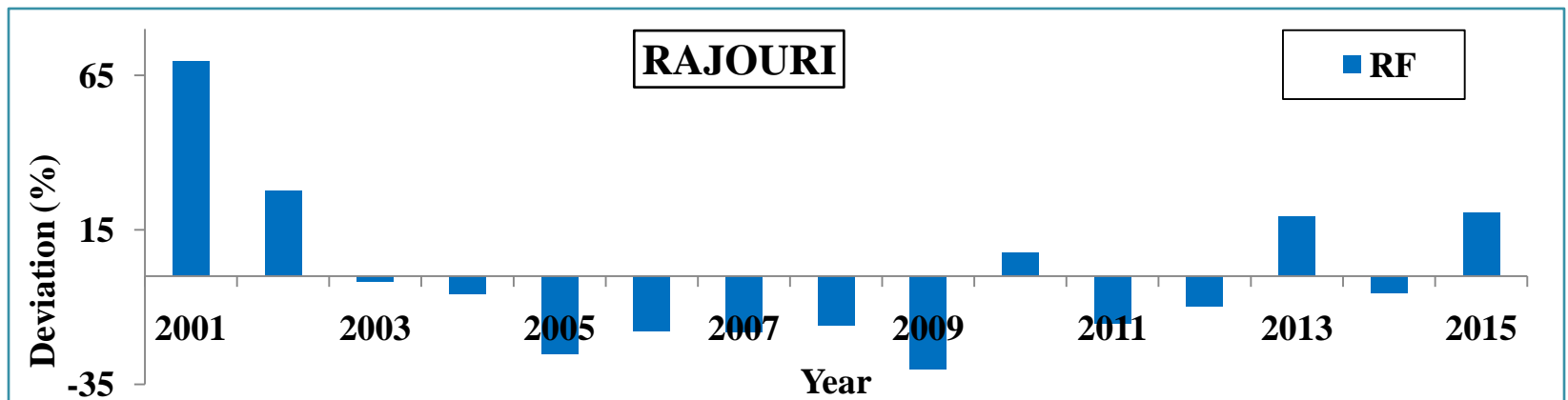
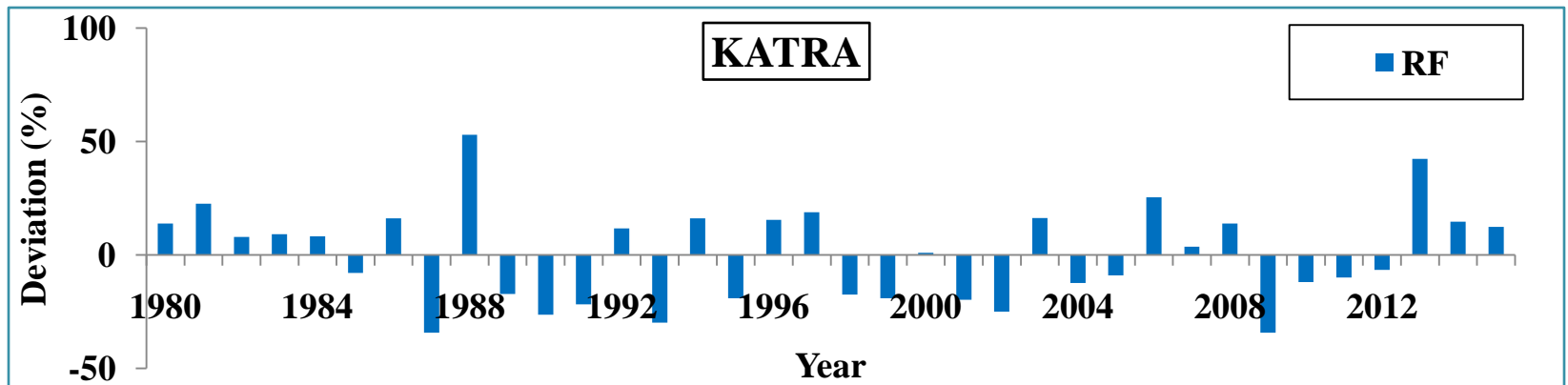
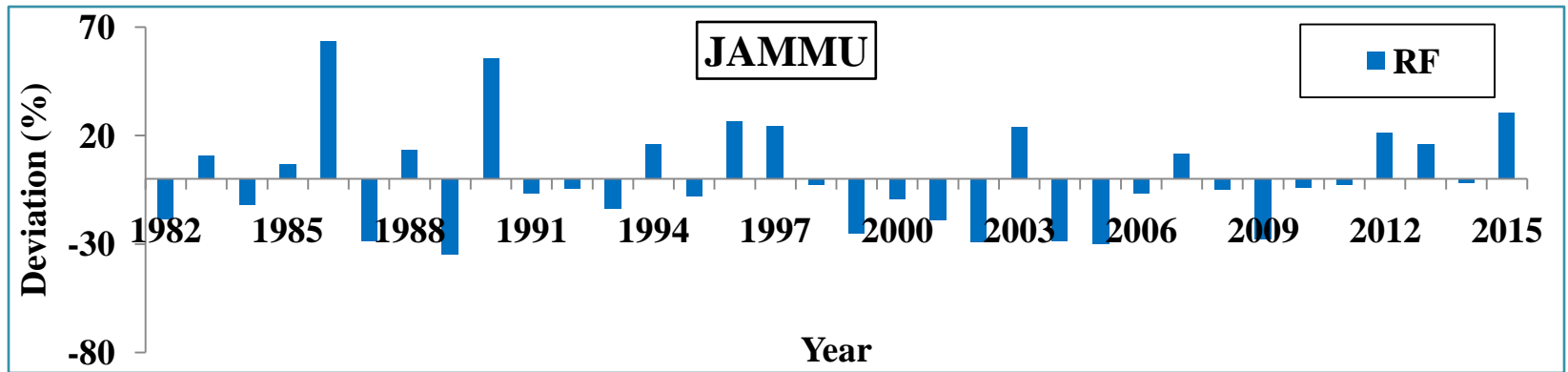
@2.0 mm/year

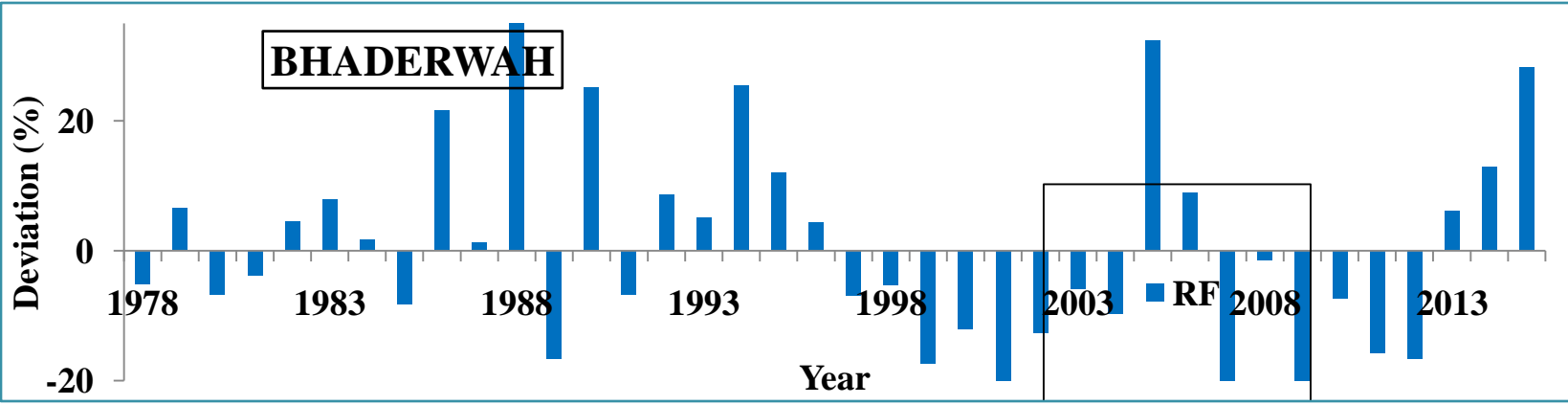
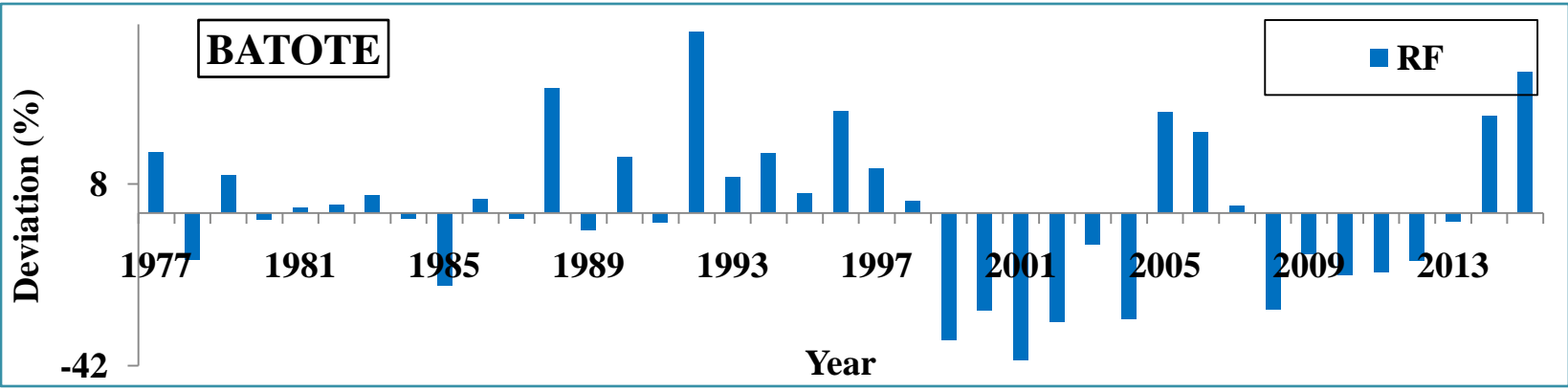
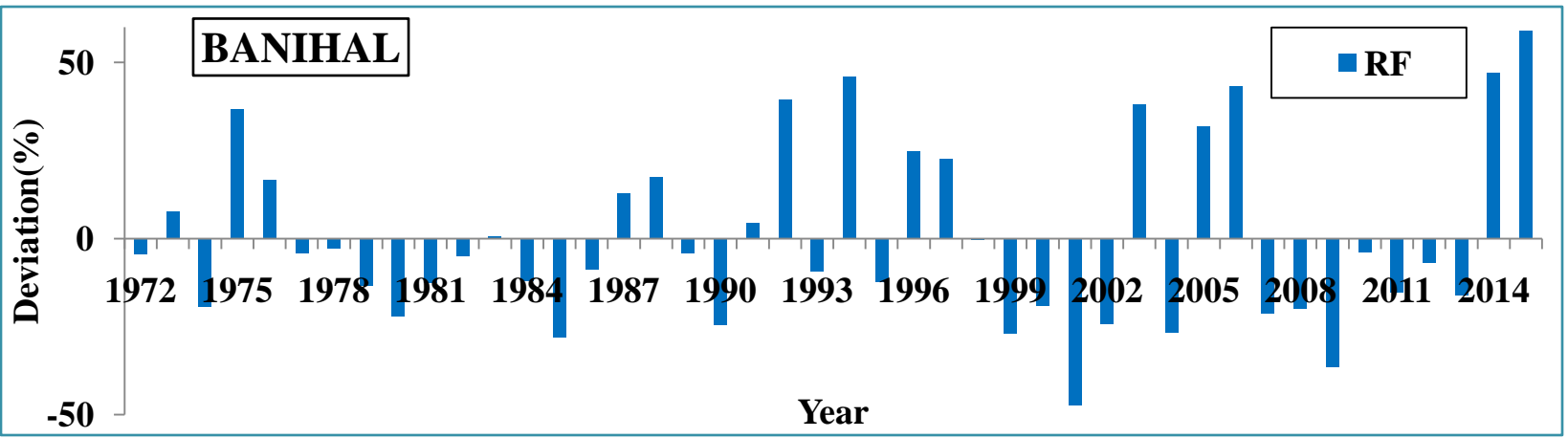
Projected

2020= 0.74%

2030= 2.23%

Rainfall deviation from Normal





Seasonal rainfall trends

Season/ Stations	Winter (Jan-Feb)	Pre monsoon (Mar-May)	Monsoon (Jun-Sept)	Post monsoon (Oct-Dec)	Kharif (Jun-Sept)	Rabi (Oct-Mar)
Jammu	+0.732	-2.077	+1.945	-1.725	+1.945	-1.246
Katra	+0.081	-0.491	-0.205	-0.641	-0.205	-0.137
Banihal	+3.024	-0.993	+0.530	-0.564	+0.121*	+1.223**
Batote	+0.110	-2.710	+3.899	-1.734	+1.503*	-6.010**
Bhaderwah	+0.124	-1.361	+5.658	-1.913	+2.803*	-7.256**
Rajouri	+4.274	-1.557	-18.520	+2.178	-18.52	-0.129

* Kharif season extends from May-Sept. ; ** Rabi season extends from Oct.- Apr.

- Winter and monsoon season rainfall has shows increasing trends at all locations (Sowing time & application of fertilizer in different *rabi crop* (fertilizer use efficiency)
- Pre Monsoon & post monsoon season showed the decreasing trends (adjustment of sowing time so that moisture sensitive stages do not fall in this areas
- Kharif season rainfall has increasing trends except Katra & Rajouri (Basmati in irrigated & maize
- Rabi season rainfall deceasing except Banihal (low water requiring crops in rainfed areas of different region)

Projected Met. Seasonal Rainfall (mm) in 2020 & 2030

Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Winter	3.66	10.98	0.41	1.22	21.37	64.11
Pre monsoon	-10.39	-31.16	-2.46	-7.37	-7.79	-23.36
Monsoon	9.73	29.18	-1.03	-3.08	-92.60	-277.80
Post monsoon	-8.63	-25.88	-3.20	-9.60	10.89	32.67
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Winter	15.10	45.30	0.55	1.65	0.62	1.86
Pre monsoon	-4.97	-14.90	-13.55	-40.65	-6.81	-20.42
Monsoon	2.65	7.95	19.50	58.49	28.29	84.87
Post monsoon	-2.82	-8.46	-8.67	-26.01	-9.57	-28.70

Projected Crop Seasonal Rainfall (mm) in 2020 & 2030

Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Rainfall (Kharif)	9.73	29.18	-1.03	-3.08	-92.60	-277.80
Rainfall (Rabi)	-6.23	-18.69	-0.69	-2.06	-0.65	-1.94
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Rainfall (Kharif)	0.61	1.82	7.52	22.55	14.02	42.05
Rainfall (Rabi)	6.12	18.35	-30.05	-90.15	-36.28	-108.84

Monthly Rainfall Trends

Stations /Month	Jammu	Katra	Banihal	Batote	Baderwah
January	+0.263	-1.021	-0.180	-0.685	-1.229
February	+0.468	+1.103	+3.205	+1.151	+0.977
March	-0.427	+1.168	-0.497	-4.775	-3.123
April	-0.714	-0.772	-0.087	+0.017	-1.544
May	-0.935	-0.887	-0.408	-0.793	-0.446
June	-1.616	+1.094	+0.784	+0.389	+0.501
July	-2.243	-5.403	-1.049	-1.611	-0.631
August	+1.965	-0.019	-1.622	+1.021	+1.034
September	-0.606	+4.124	+2.418	+2.200	+2.374
October	-0.248	+0.793	+0.311	+0.232	+0.377
November	-0.579	-0.247	-0.615	-1.048	-1.433
December	-0.897	-1.185	-0.261	-0.813	-1.017

- **January, July, November & December months showed decreasing trends at all the locations.** Kharif (sowing & transplanting) and rabi sowing, Wheat & rabi oilseed (moisture sensitive stages suffer water stress)
- **February, June, September & October months showed increasing trends at all the locations** (Kharif harvesting & threshing), Rabi rainfed crop sowing (cereal barley, pulses, oilseed, fodder)

Projected monthly rainfall (mm) in 2020 & 2030

Station/ Months	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
January	1.3	3.9	-5.1	-15.3	8.5	25.6
February	2.3	7.0	5.5	16.5	12.8	38.5
March	-2.1	-6.4	5.8	17.5	-4.4	-13.2
April	-3.6	-10.7	-3.9	-11.6	-4.5	-13.5
May	-4.7	-14.0	-4.4	-13.3	1.1	3.4
June	8.1	24.2	5.5	16.4	27.4	82.2
July	-11.2	-33.6	-27.0	-81.0	-86.2	-258.6
August	9.8	29.5	-0.1	-0.3	-41.1	-123.2
September	3.0	9.1	20.6	61.9	7.3	21.8
October	-1.2	-3.7	4.0	11.9	6.3	19.0
November	-2.9	-8.7	-1.2	-3.7	3.2	9.5
December	-4.5	-13.5	-5.9	-17.8	1.4	4.2

Projected Monthly Rainfall (mm) in 2020 & 2030

Station/ Months	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
January	-0.9	-2.7	-3.4	-10.3	-6.1	-18.4
February	16.0	48.1	5.8	17.3	4.9	14.7
March	-2.5	-7.5	-23.9	-71.6	-15.6	-46.8
April	-0.4	-1.3	0.1	0.3	-7.7	-23.2
May	-2.0	-6.1	-4.0	-11.9	-2.2	-6.7
June	3.9	11.8	1.9	5.8	2.5	7.5
July	-5.2	-15.7	-8.1	-24.2	-3.2	-9.5
August	-8.1	-24.3	5.1	15.3	5.2	15.5
September	12.1	36.3	11.0	33.0	11.9	35.6
October	1.6	4.7	1.2	3.5	1.9	5.7
November	-3.1	-9.2	-5.2	-15.7	-7.2	-21.5
December	-1.3	-3.9	-4.1	-12.2	-5.1	-15.3

Seasonal trends of rainy days

Season/ Station	Winter (Jan- Feb)	Pre monsoon (Mar-May)	Monsoon (Jun- Sept)	Post monsoon (Oct-Dec)	Kharif (Jun- Sept)	Rabi (Oct- Mar)
Jammu	▲	▼	▲	▼	▲	▼
Batote	▼	▼	▼	▼	▼	▼
Banihal	▼	▼	▼	▼	▼	▼
Bhaderwah	▼	▼	▲	▼	▲	▼
Katra	▲	▼	▲	▼	▲	▼
Rajouri	▲	▲	▲	▲	▲	▲

Increasing trend

Decreasing trend

➤ The number of rainy days gives the idea of distribution of rainfall in the particular area. These are helpful in scheduling of irrigation and other likes soil moisture conservation practices, Excess rain water harvesting (Runoff).

Annual and Monthly Rainy Days Trend Analysis

Station/ Month	Jammu	Batote	Banihal	Bhaderwah	Katra	Rajouri
January	▼	▼	▼	▼	▼	▼
February	▲	▼	▲	▲	▲	▲
March	▼	▼	▼	▼	▼	▲
April	▼	▲	▲	▲	▼	▲
May	▼	▼	▲	▼	▼	▲
June	▲	▲	▲	▲	▲	▲
July	▲	▼	▼	▼	▼	▼
August	▲	▲	▼	▲	▼	▲
September	▼	▼	▲	▲	▲	▲
October	▲	▼	▲	▼	▲	▲
November	▼	▼	▼	▼	▲	▲
December	▼	▼	▼	▼	▼	▼
Annual	▼	▼	▼	▼	▼	▲

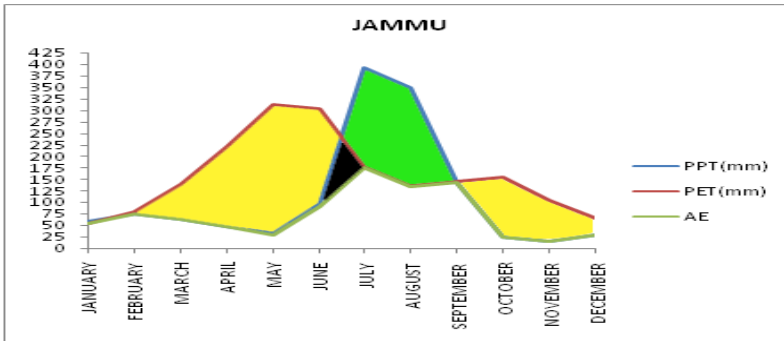
Increasing trend

Decreasing trend

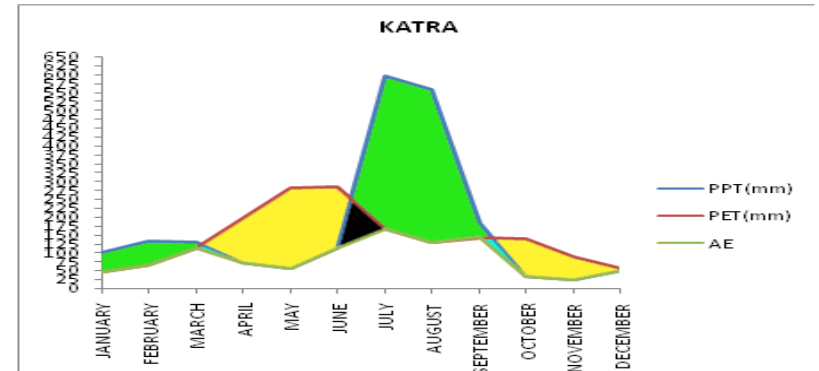
Monthly PET (mm) at various locations across Jammu region

Station/ Month	Jammu	Katra	Banihal	Batote	Bhaderwah
JAN	60.7	54.2	41.4	40.8	47.3
FEB	76.2	65.9	48.5	47.3	54.4
MAR	130.0	107.9	86.9	81.9	97.4
APR	179.0	149.8	125.1	118.8	137.4
MAY	230.4	193.1	159.8	154.2	175.1
JUN	220.8	196.7	172.3	161.2	191.4
JUL	175.8	158.5	159.2	136.8	177.6
AUG	152.7	135.6	144.3	125.1	161.7
SEP	136.2	127.2	128.5	111.3	137.4
OCT	120.5	106.0	103.1	93.5	107.2
NOV	86.1	72.4	64.9	61.3	68.7
DEC	63.7	56.0	45.8	43.8	50.0
ANNUAL	1632.0	1423.4	1279.8	1176.0	1405.6

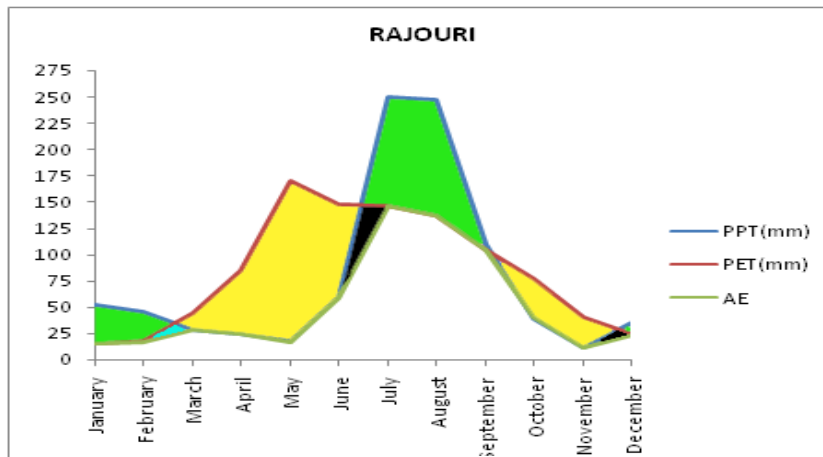
Monthly Water Balance of various stations of Jammu Region



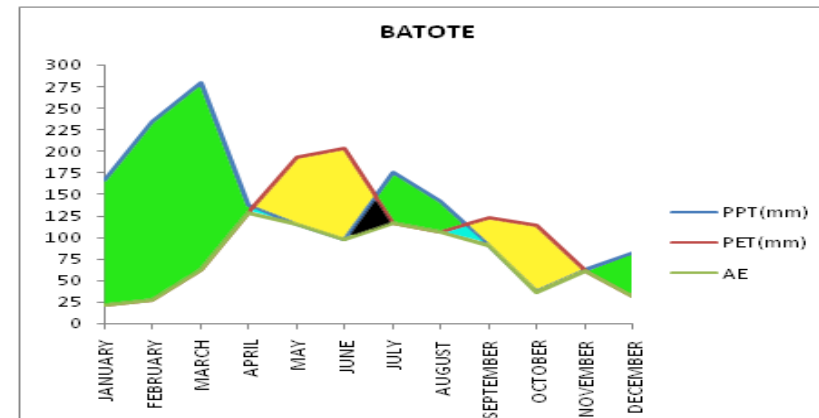
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■ SOIL MOISTURE UTILIZATION ■ SOIL MOISTURE RECHARGE



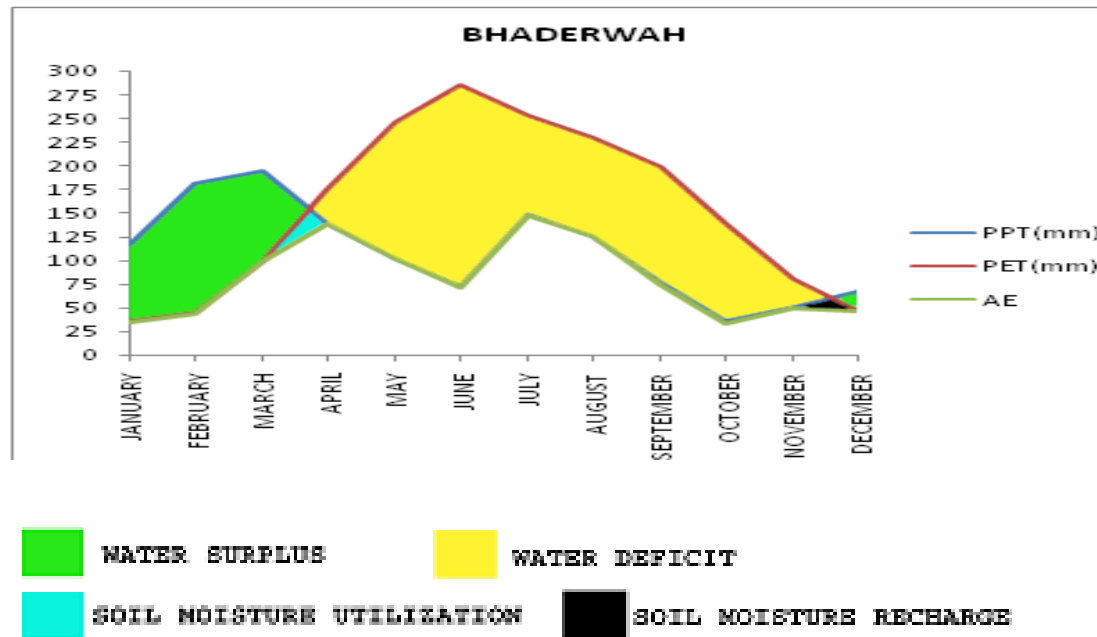
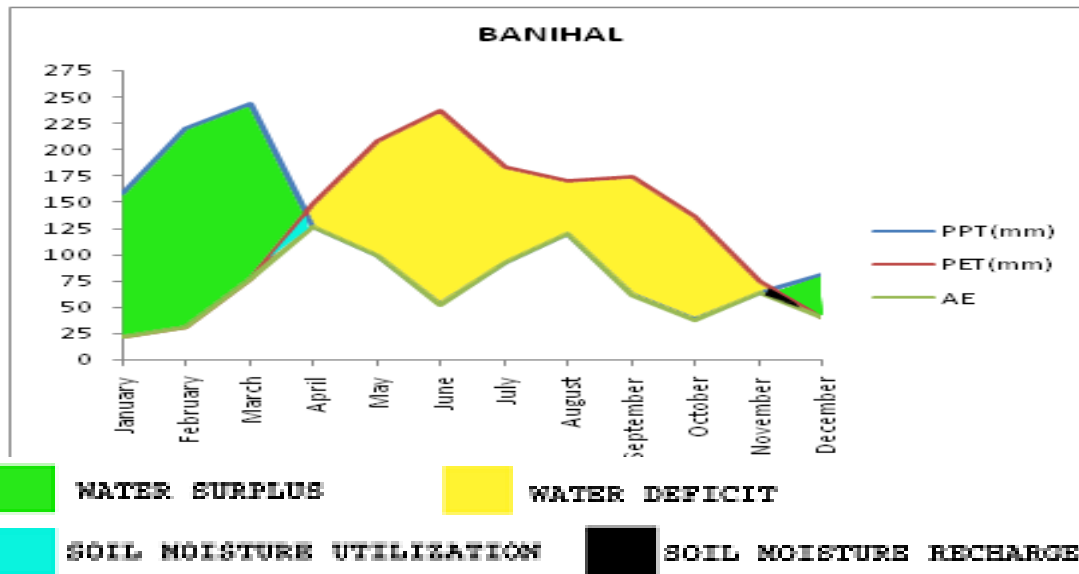
■ WATER SURPLUS ■ WATER DEFICIT
■ SOIL MOISTURE UTILIZATION ■ SOIL MOISTURE RECHARGE



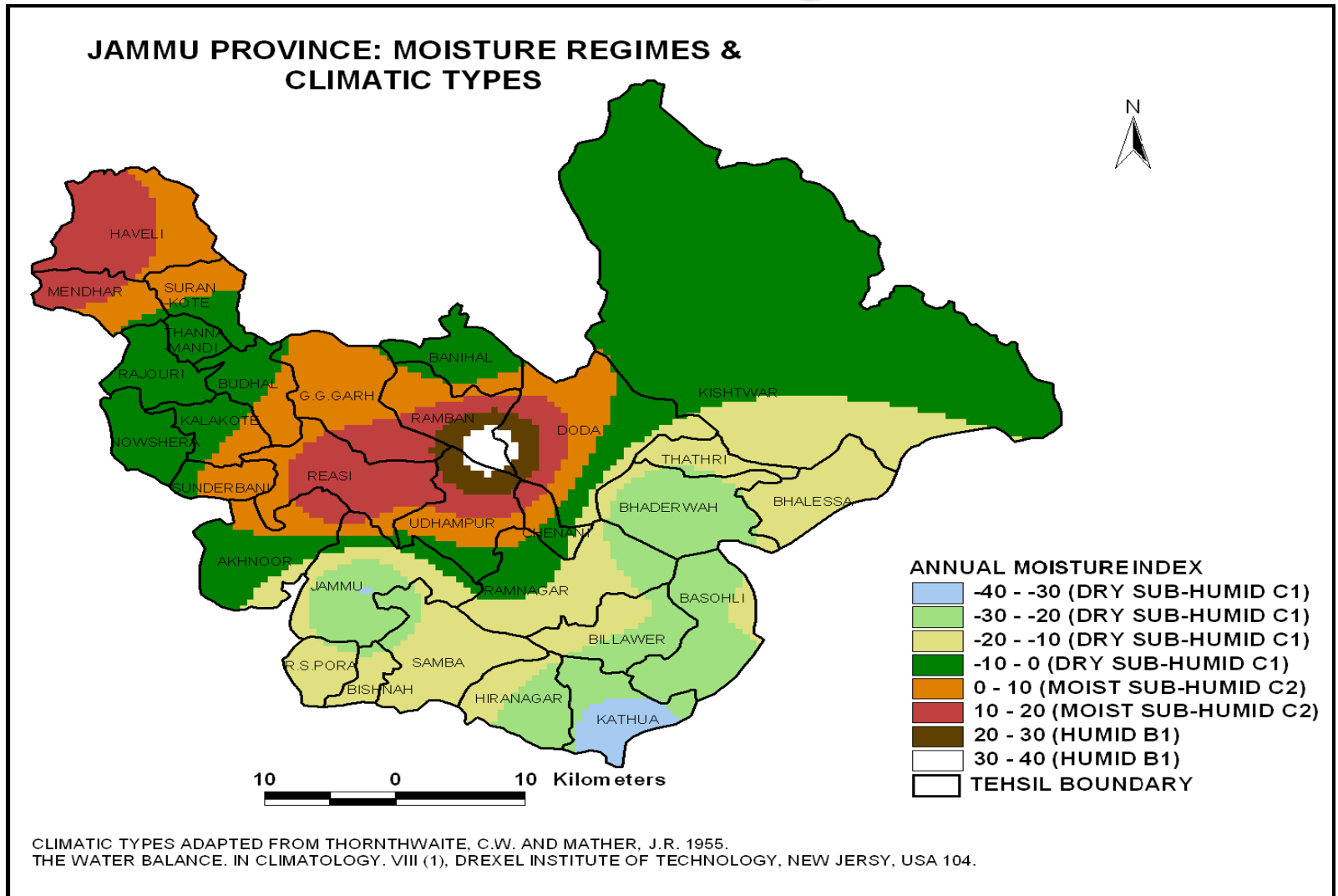
■ WATER SURPLUS ■ WATER DEFICIT
■ SOIL MOISTURE UTILIZATION ■ SOIL MOISTURE RECHARGE



■ WATER SURPLUS ■ WATER DEFICIT
■ SOIL MOISTURE UTILIZATION ■ SOIL MOISTURE RECHARGE

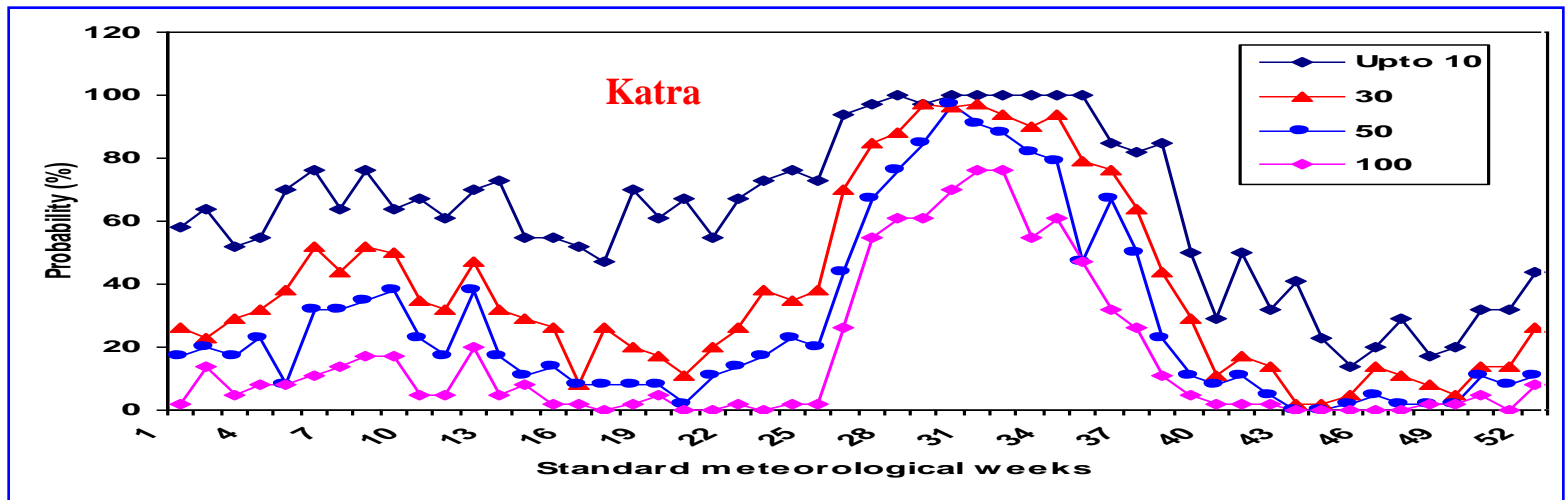
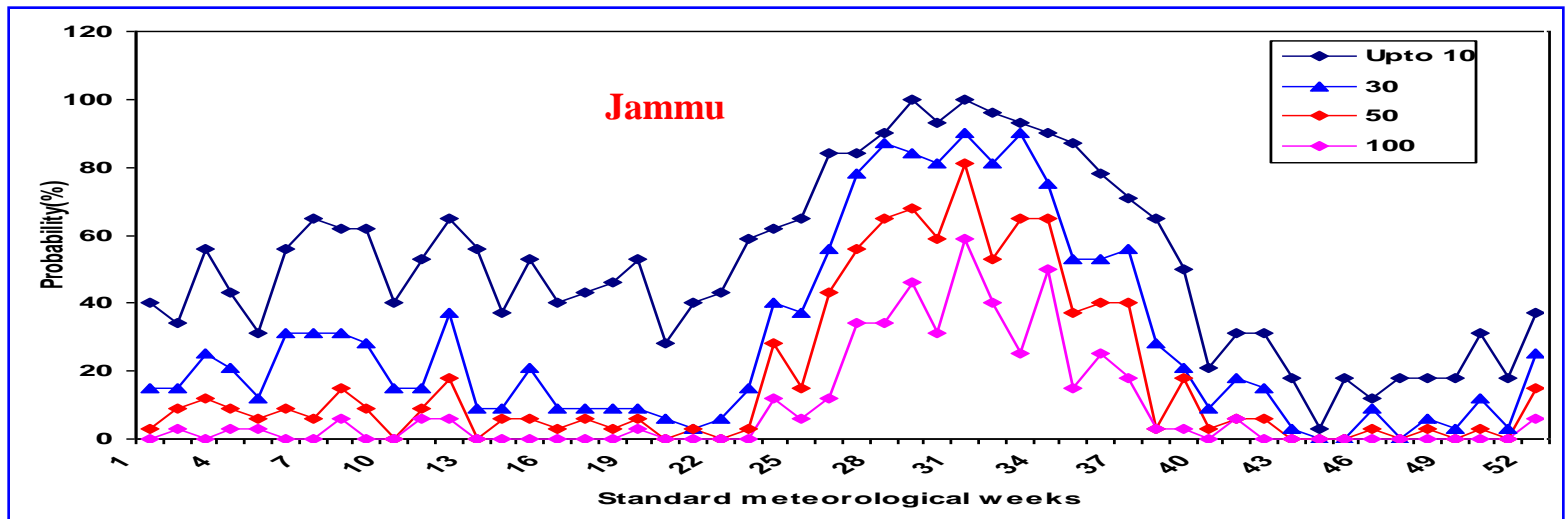


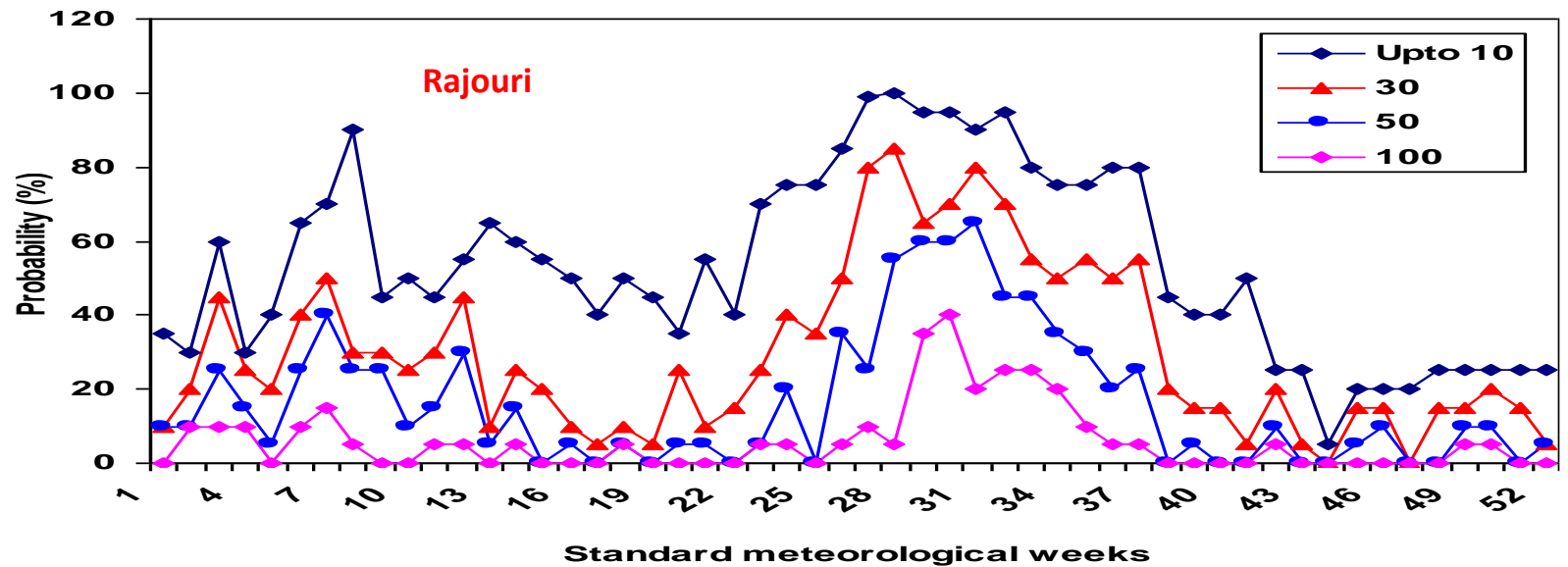
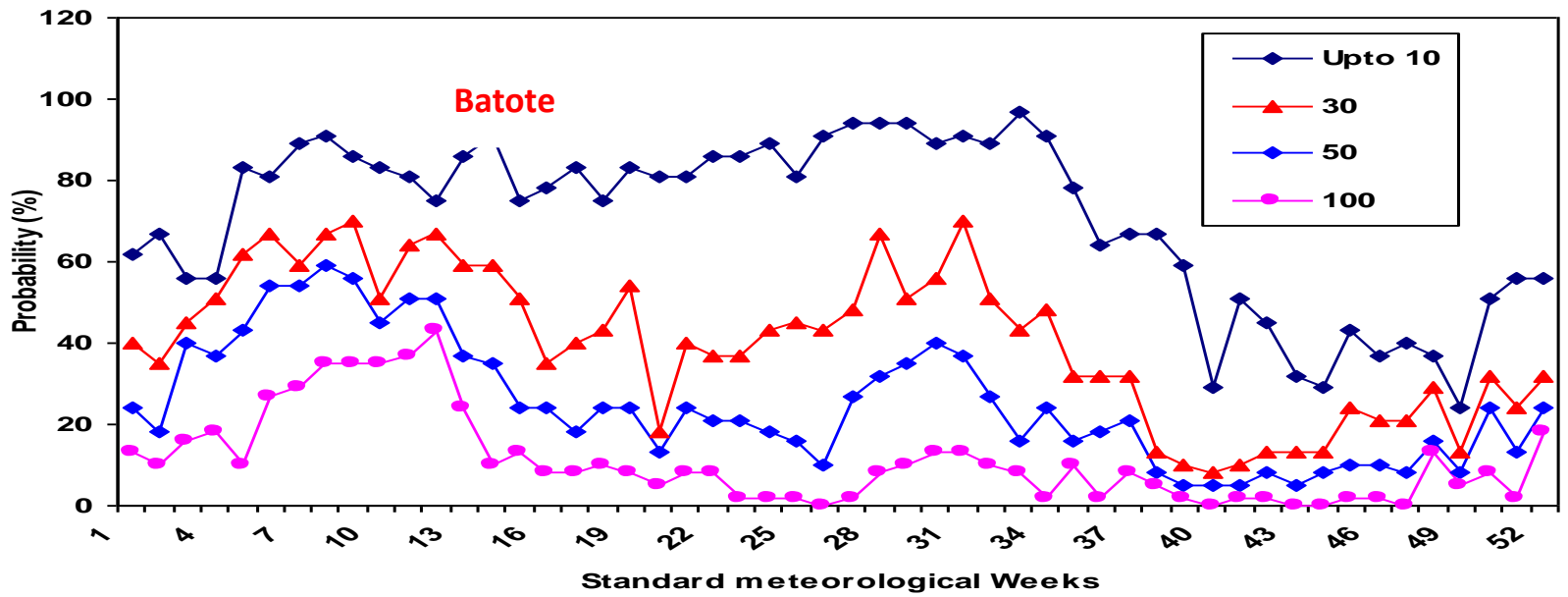
Annual Moisture Index across the Jammu region

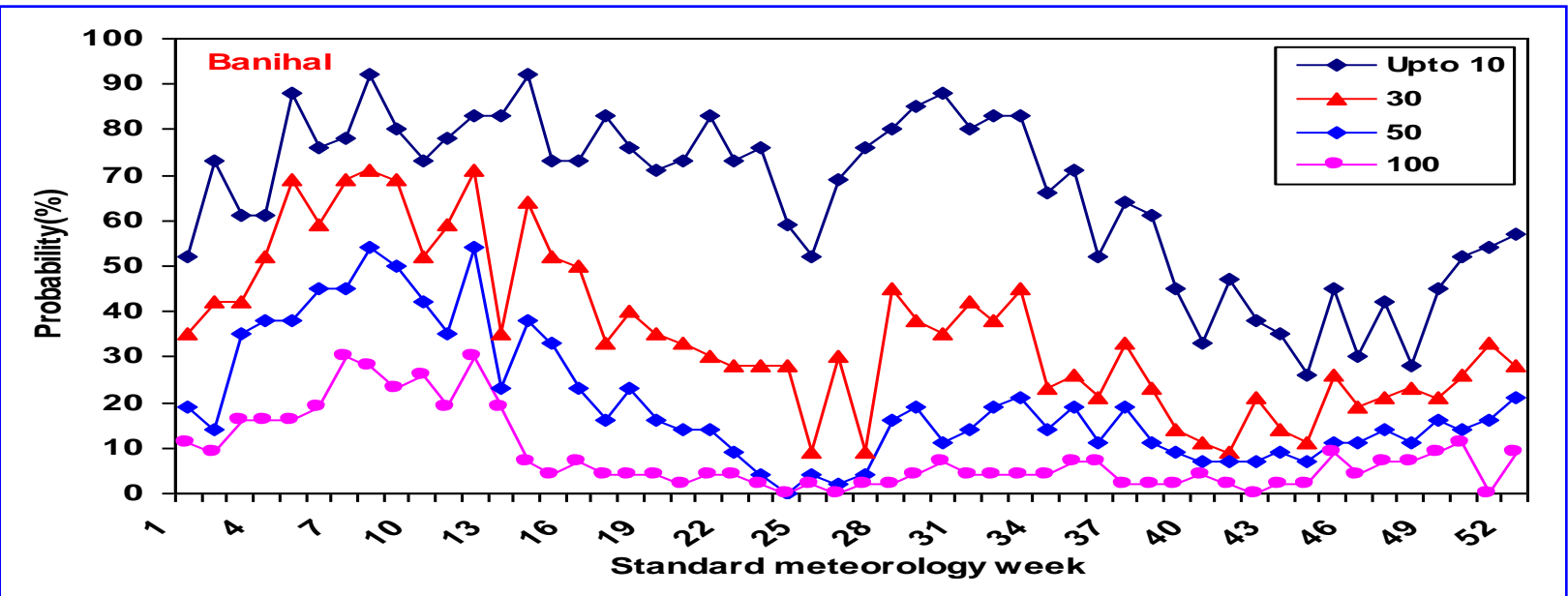
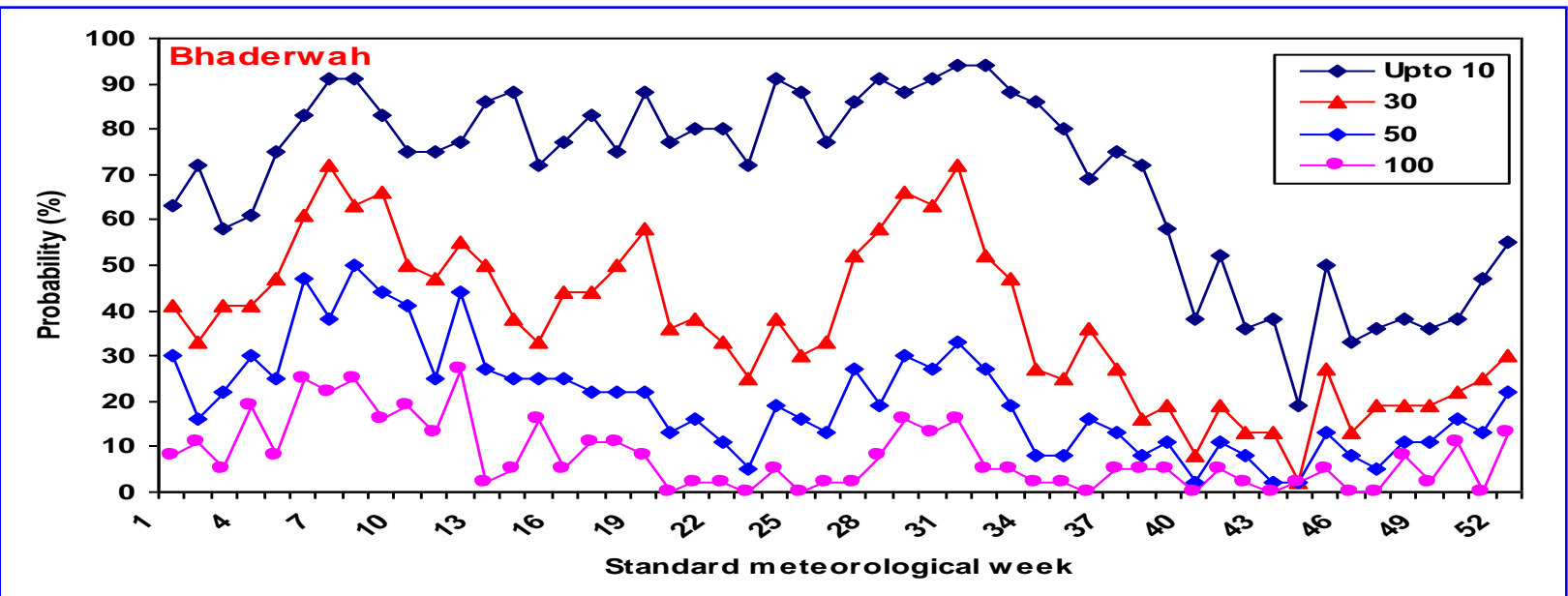


Rainfall Probability

Conditional rainfall probability gives an idea of rainfall occurrence of different quantity in the particular weeks, which is helpful for planning of various agronomical practices



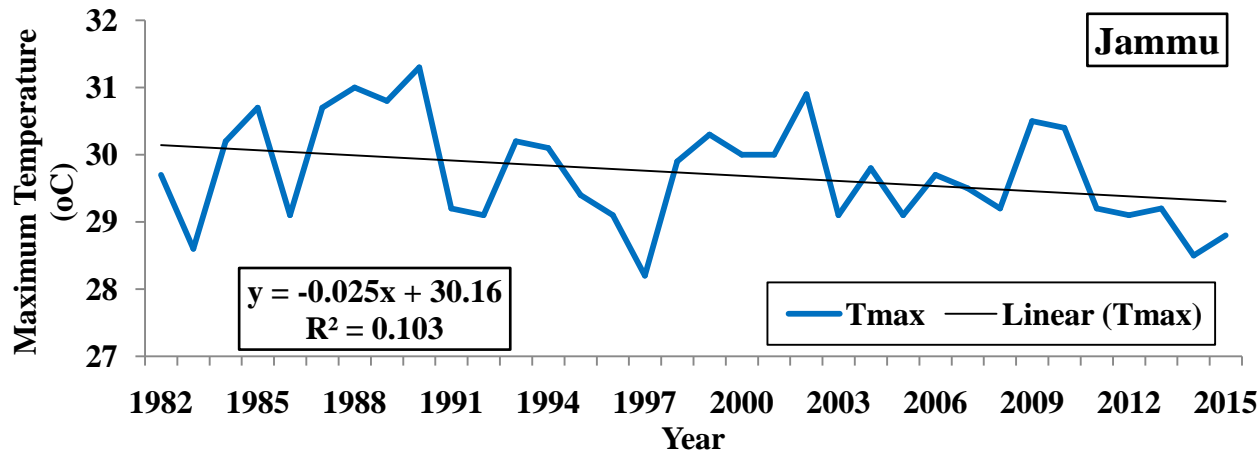






Analysis of Temperatures

Annual Maximum Temperature Trends



Jammu

Average maximum temperature=29.7°C

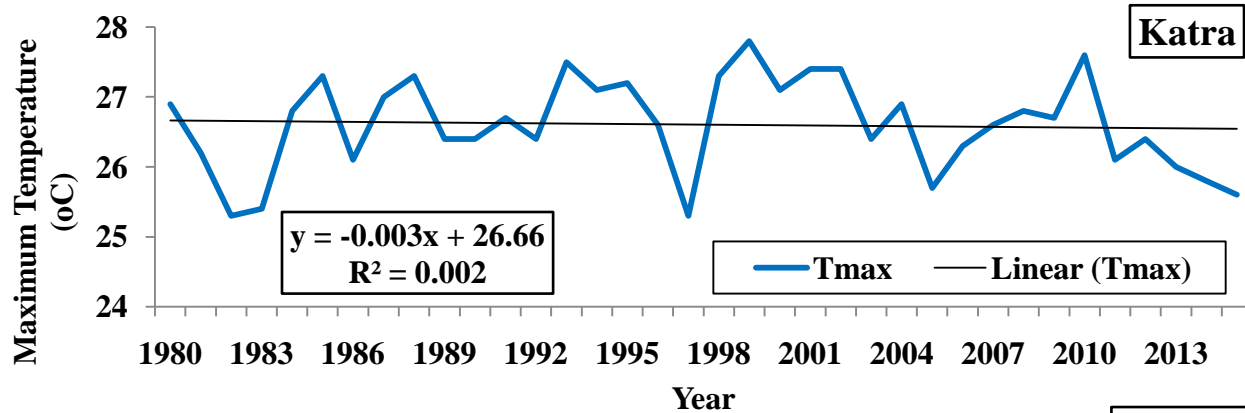
Decrease

@0.03°C/year

Projected

2020= 0.42%

2030= 1.26%



Katra

Average maximum temperature=26.6°C

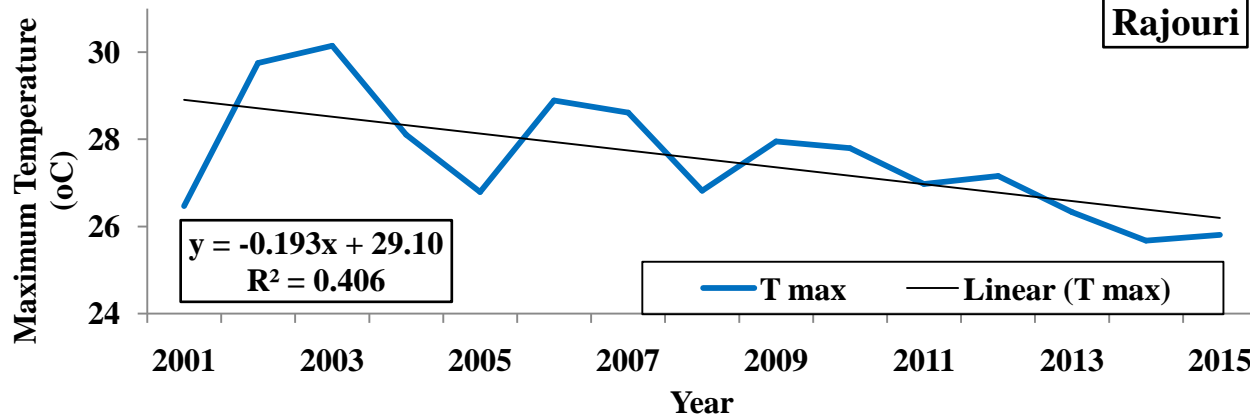
Decrease

@0.003°C/year

Projected

2020= 0.06%

2030= 0.17%



Rajouri

Average maximum temperature=27.6°C

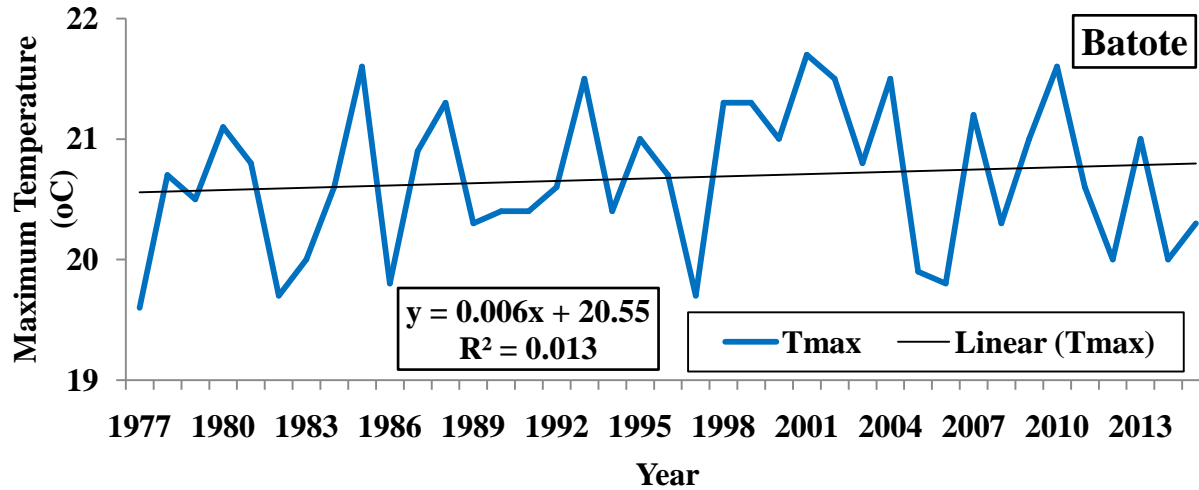
Decrease

@0.19°C/year

Projected

2020=3.5%

2030= 10.5%



Batote

Average maximum temperature=20.6°C

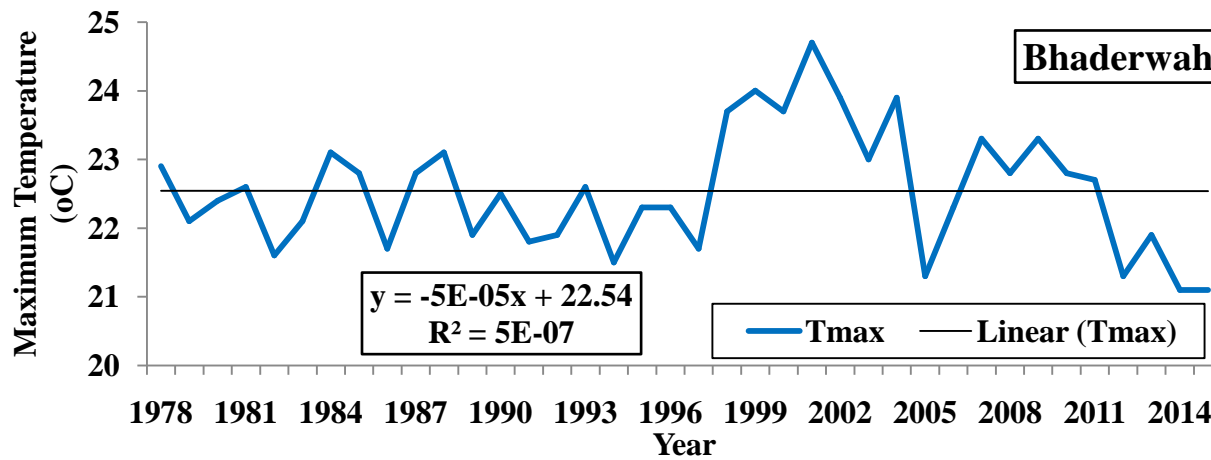
Increase

@0.006°C/year

Projected

2020= 0.15%

2030= 0.44%



Bhaderwah

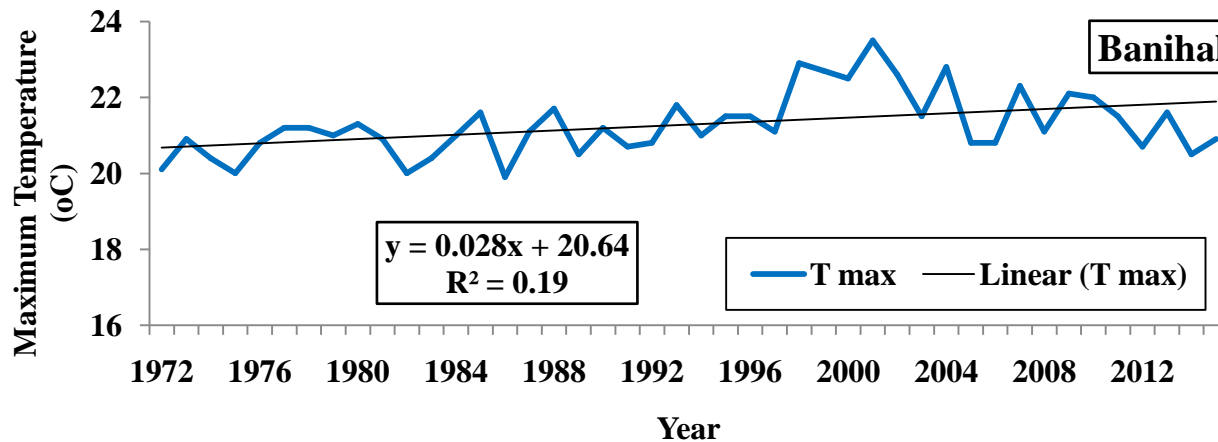
Average maximum temperature=22.5°C

No change

Projected

2020= 0.00

2030= 0.00



Banihal

Average maximum temperature=21.2°C

Increase

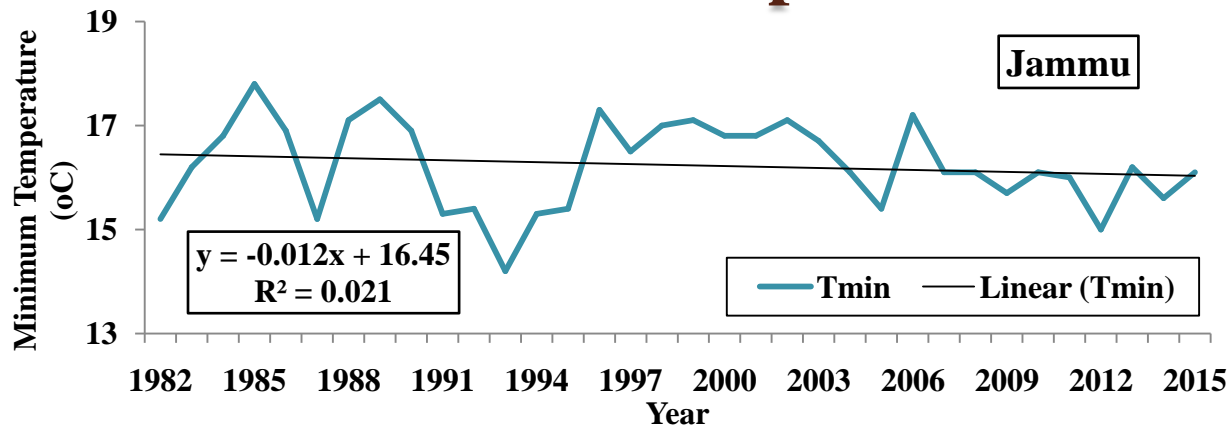
@0.03°C/year

Projected

2020= 0.66%

2030=1.98%

Annual Minimum Temperature trends



Jammu

Average minimum temperature=16.2°C

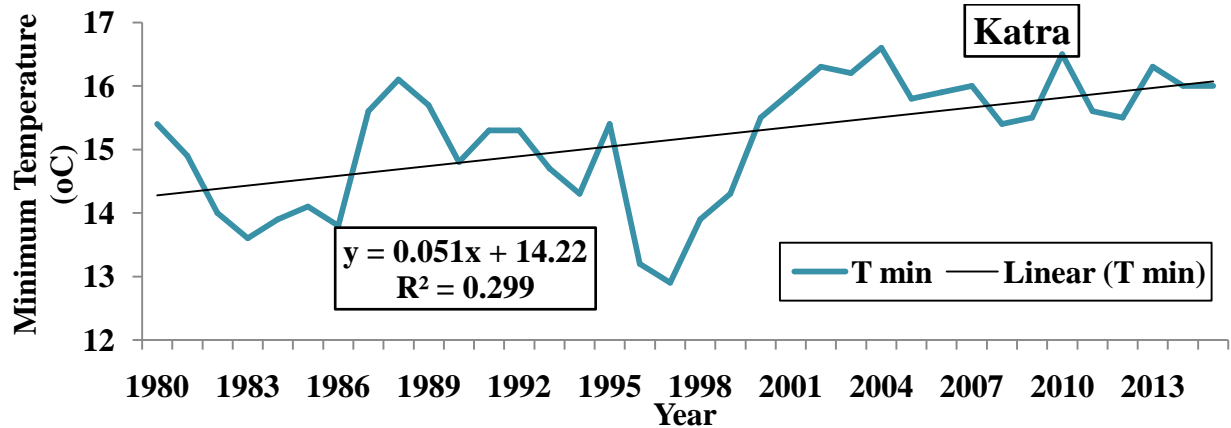
Decrease

@0.01°C/year

Projected

2020=0.37%

2030=1.11%



Katra

Average minimum temperature=15.2°C

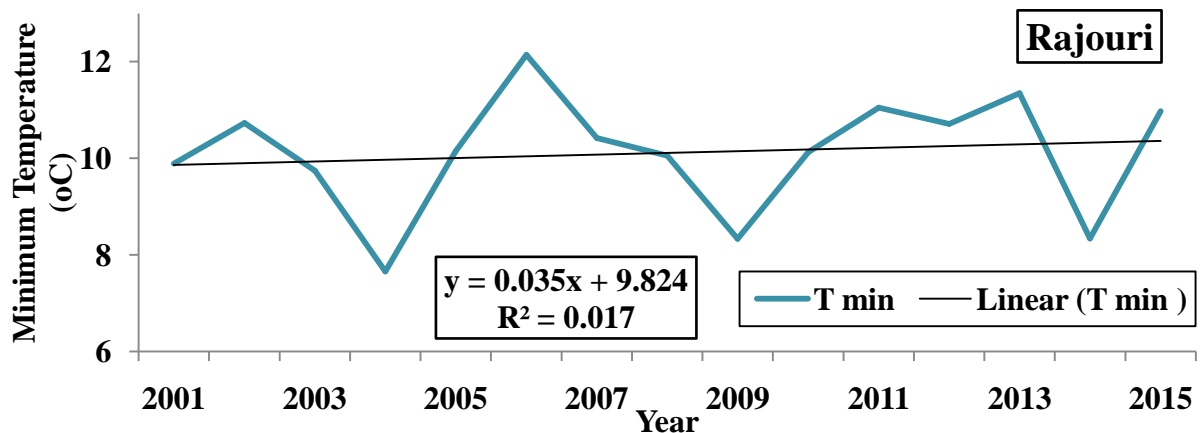
Increase

@0.05°C/year

Projected

2020= 1.68%

2030=5.03%



Rajouri

Average minimum temperature=10.1°C

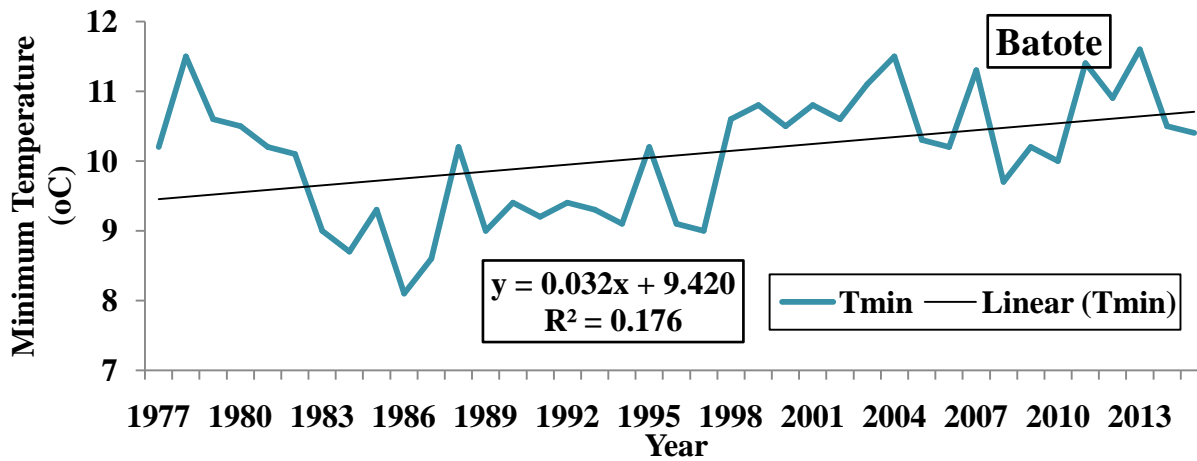
Increase

@0.04°C/year

Projected

2020=1.73%

2030=5.20%



Batote

Average minimum temperature=10.1°C

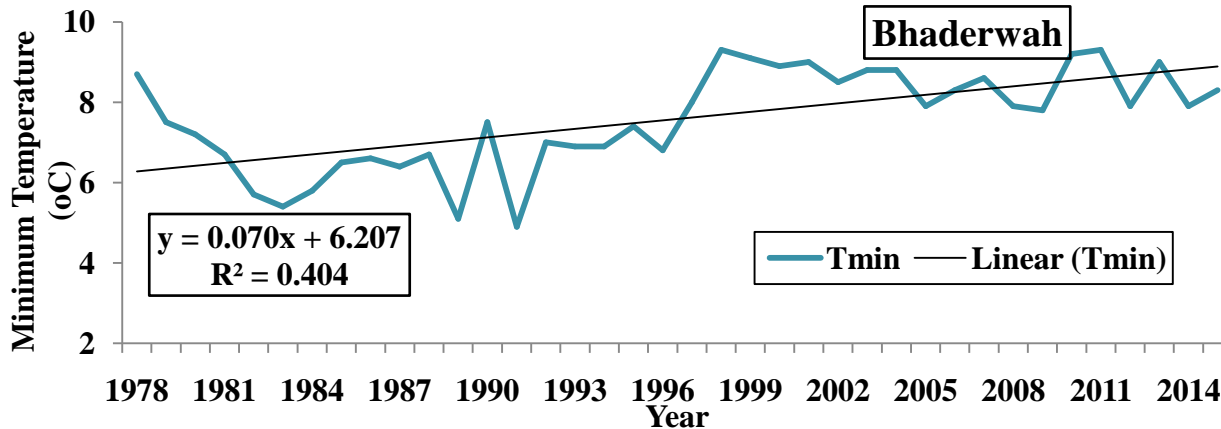
Increase

@0.03°C/year

Projected

2020=1.58%

2030= 4.75%



Bhaderwah

Average minimum temperature=7.5°C

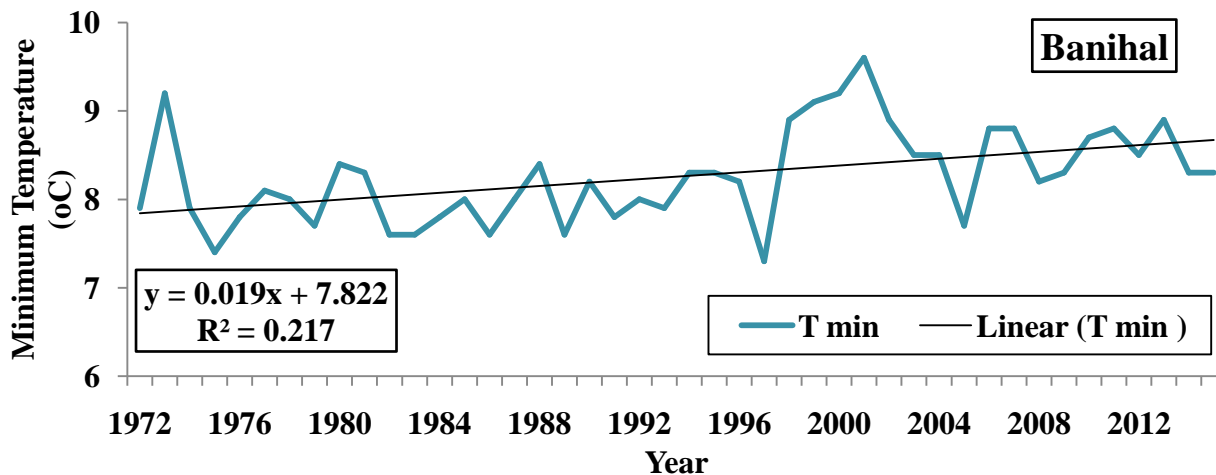
Increase

@0.07°C/year

Projected

2020= 4.67%

2030=14.0%



Banihal

Average minimum temperature=8.2°C

Increase

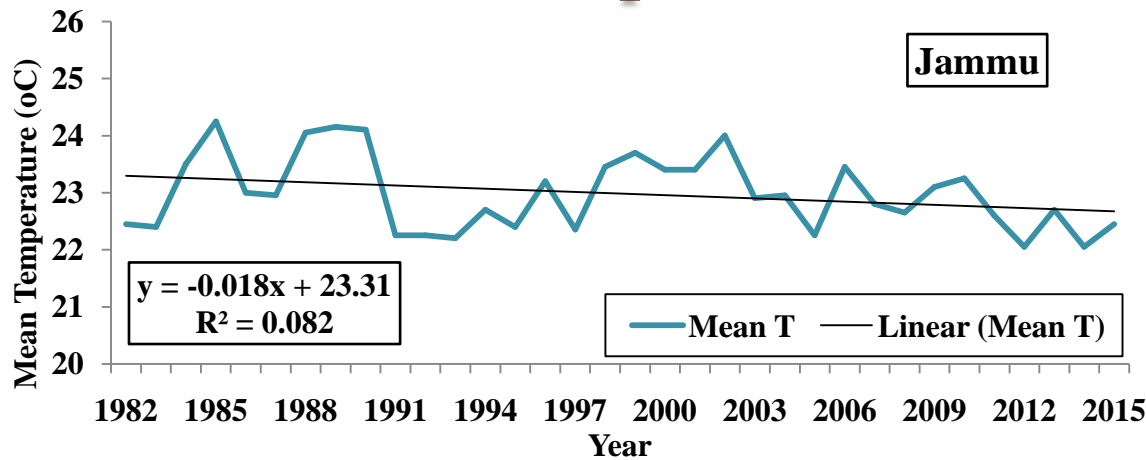
@0.02°C/year

Projected

2020=1.16%

2030= 3.48%

Annual mean temperature trends



Jammu

Mean Annual temperature=23.0°C

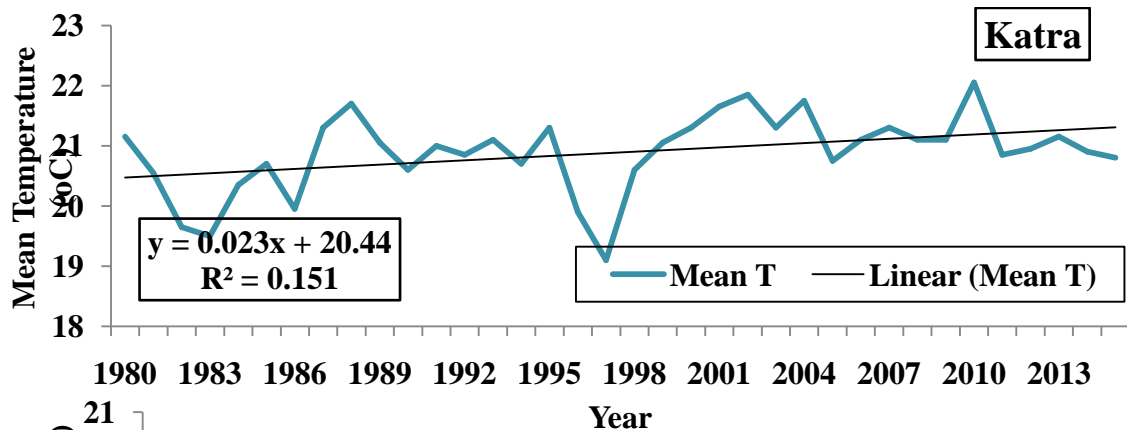
Decrease

@0.02°C/year

Projected

2020= 0.39%

2030= 1.17%



Katra

Mean Annual temperature=20.9°C

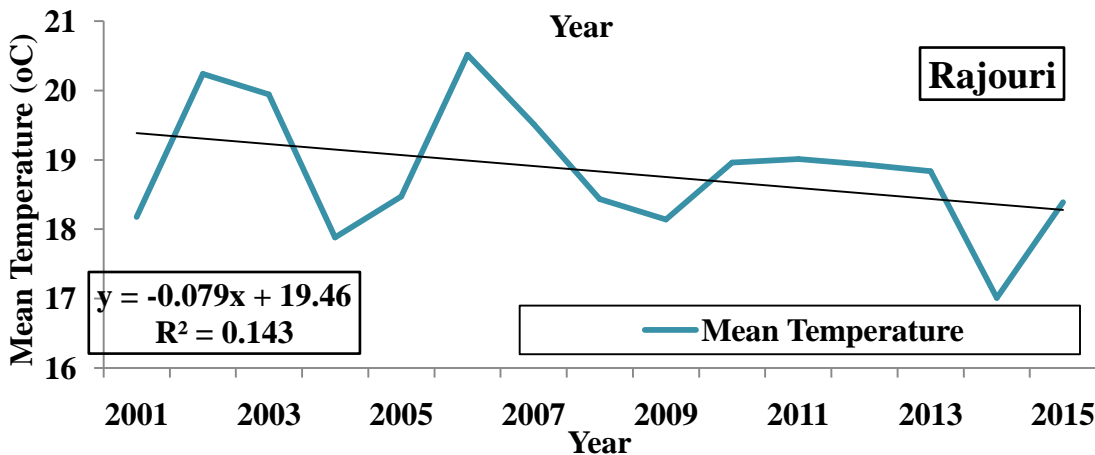
Increase

@0.02°C/year

Projected

2020= 0.55%

2030= 1.65%



Rajouri

Mean Annual temperature=18.9°C

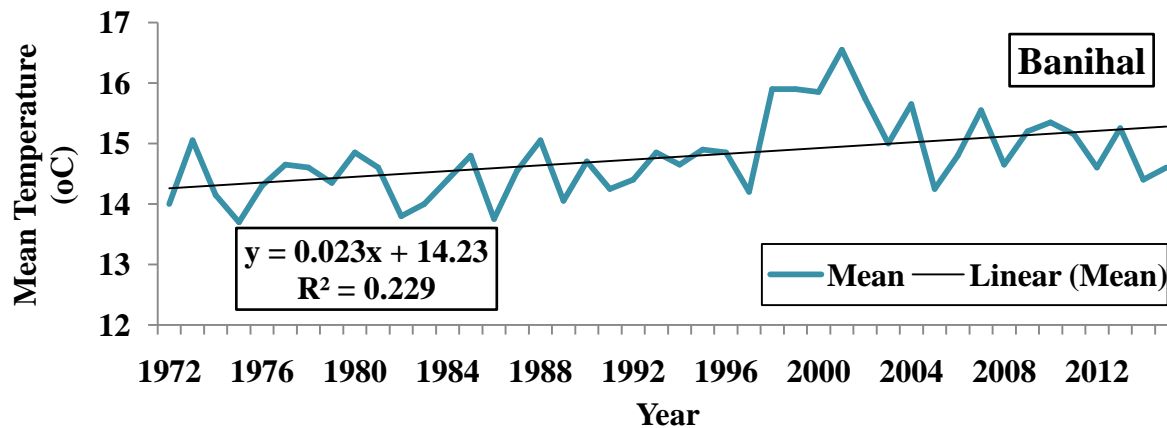
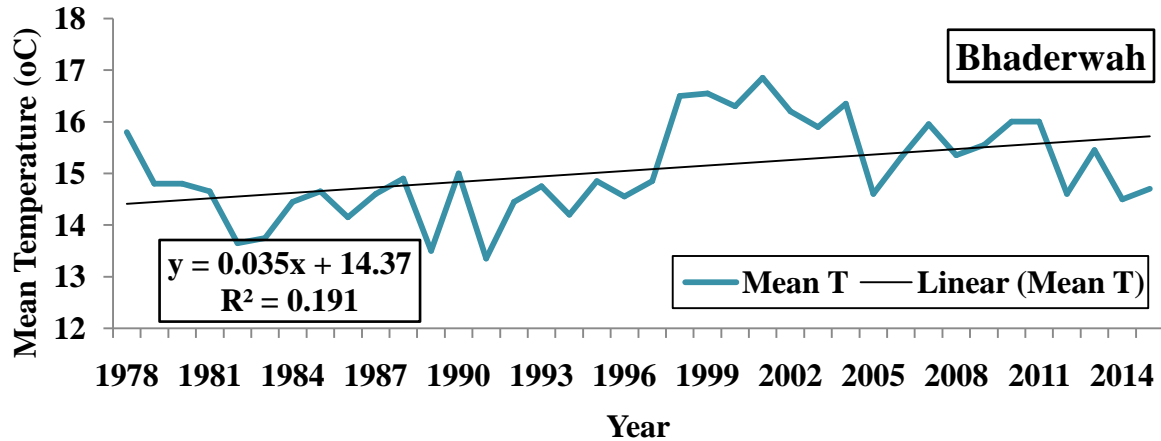
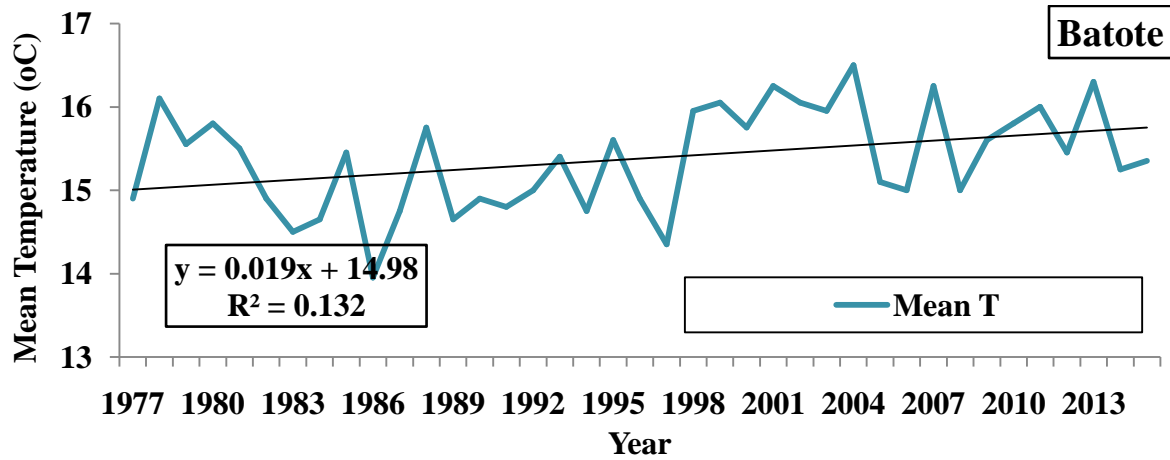
Decrease

@0.08°C/year

Projected

2020= 2.09%

2030= 6.27%



Batote

Mean Annual temperature=15.4°C

Increase

@0.02°C/year

Projected

2020= 0.62%

2030= 1.85%

Bhaderwah

Mean Annual temperature=15.0°C

Increase

@0.04°C/year

Projected

2020= 1.17%

2030= 3.50%

Banihal

Mean Annual temperature=14.7°C

Increase

@0.02°C/year

Projected

2020= 0.78%

2030= 2.35%

Monthly temperature Trends

<i>Stations/ Month</i>	Jammu	Katra	Banihal	Batote	Baderwah	Rajouri
January	-0.084	+0.005	+0.059	+0.029	+0.027	-0.232
February	-0.032	-0.004	+0.052	-0.002	+0.014	-0.358
March	-0.017	+0.051	+0.065	+0.093	+0.116	-0.132
April	+0.034	+0.037	+0.018	-0.015	+0.002	-0.165
May	+0.033	+0.036	+0.020	-0.003	+0.007	+0.040
June	-0.058	-0.038	-0.001	-0.038	-0.045	-0.028
July	-0.026	-0.015	+0.015	+0.009	+0.016	-0.183
August	-0.019	-0.023	+0.010	-0.009	-0.038	-0.154
September	-0.039	-0.021	+0.013	+0.000	-0.048	-0.122
October	-0.027	-0.027	+0.012	-0.014	-0.033	-0.179
November	-0.037	-0.018	+0.024	+0.004	-0.021	-0.359
December	-0.032	-0.008	+0.057	+0.029	0.002	-0.450

Projected monthly Max. temperature (°C) in 2020 & 2030

Station/ Months	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
January	-0.42	-1.26	0.03	0.08	-1.16	-3.48
February	-0.16	-0.48	-0.02	-0.06	-1.79	-5.37
March	-0.09	-0.26	0.26	0.77	-0.66	-1.98
April	0.17	0.51	0.19	0.56	-0.83	-2.48
May	0.17	0.50	0.18	0.54	0.20	0.60
June	-0.29	-0.87	-0.19	-0.57	-0.14	-0.42
July	-0.13	-0.39	-0.08	-0.23	-0.92	-2.75
August	-0.10	-0.29	-0.12	-0.35	-0.77	-2.31
September	-0.20	-0.59	-0.11	-0.32	-0.61	-1.83
October	-0.14	-0.41	-0.14	-0.41	-0.90	-2.69
November	-0.19	-0.56	-0.09	-0.27	-1.80	-5.39
December	-0.16	-0.48	-0.04	-0.12	-2.25	-6.75

Projected monthly Max. temperature (°C) in 2020 & 2030

Station/ Months	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
January	0.30	0.89	0.15	0.44	0.14	0.41
February	0.26	0.78	-0.01	-0.03	0.07	0.21
March	0.33	0.98	0.47	1.40	0.58	1.74
April	0.09	0.27	-0.08	-0.23	0.01	0.03
May	0.10	0.30	-0.02	-0.05	0.04	0.11
June	-0.01	-0.02	-0.19	-0.57	-0.23	-0.68
July	0.08	0.23	0.05	0.14	0.08	0.24
August	0.05	0.15	0.05	0.14	-0.19	-0.57
September	0.07	0.20	0.00	0.00	-0.24	-0.72
October	0.06	0.18	-0.07	-0.21	-0.17	-0.50
November	0.12	0.36	0.02	0.06	-0.11	-0.32
December	0.29	0.86	0.15	0.44	0.01	0.03

Monthly Trends of Minimum Temperature (°C/year)

Stations/ Months	Jammu	Katra	Banihal	Batote	Baderwah	Rajou ri
January	-0.058	+0.025	+0.011	+0.026	+0.080	-0.105
February	-0.020	+0.053	+0.046	+0.037	+0.071	-0.058
March	-0.043	+0.059	+0.042	+0.081	+0.104	+0.030
April	-0.031	+0.059	+0.002	+0.016	+0.056	+0.045
May	+0.004	+0.073	+0.001	+0.023	+0.060	-0.066
June	-0.026	+0.041	+0.005	+0.016	+0.047	+0.215
July	+0.065	+0.046	+0.011	+0.032	+0.083	+0.140
August	+0.060	+0.072	+0.031	+0.031	+0.068	+0.163
September	+0.040	+0.056	+0.016	+0.038	+0.088	+0.006
October	+0.003	+0.087	+0.029	+0.041	+0.070	+0.085
November	-0.044	+0.045	+0.019	+0.042	+0.060	+0.005
December	-0.091	+0.034	+0.026	+0.040	+0.051	-0.030

Projected monthly Min. temperature (°C) in 2020 & 2030

Station/ Month	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
January	-0.29	-0.87	0.13	0.38	6.18	-0.53
February	-0.10	-0.30	0.27	0.80	10.15	-0.29
March	-0.22	-0.65	0.30	0.89	7.34	0.15
April	-0.16	-0.47	0.30	0.89	5.34	0.23
May	0.02	0.06	0.37	1.10	5.32	-0.33
June	-0.13	-0.39	0.21	0.62	2.76	1.08
July	0.33	0.98	0.23	0.69	3.17	0.70
August	0.30	0.90	0.36	1.08	5.00	0.82
September	0.20	0.60	0.28	0.84	4.31	0.03
October	0.02	0.05	0.44	1.31	8.64	0.43
November	-0.22	-0.66	0.23	0.68	6.14	0.03
December	-0.46	-1.37	0.17	0.51	6.63	-0.15

Projected monthly Min. temperature (°C) in 2020 & 2030

Station/ Month	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Min T	2020	2030	2020	2030	2020	2030
January	0.06	0.17	0.13	0.39	0.40	1.20
February	0.23	0.69	0.19	0.56	0.36	1.07
March	0.21	0.63	0.41	1.22	0.52	1.56
April	0.01	0.03	0.08	0.24	0.28	0.84
May	0.01	0.02	0.12	0.35	0.30	0.90
June	0.03	0.08	0.08	0.24	0.24	0.71
July	0.06	0.17	0.16	0.48	0.42	1.25
August	0.16	0.47	0.16	0.47	0.34	1.02
September	0.08	0.24	0.19	0.57	0.44	1.32
October	0.15	0.44	0.21	0.62	0.35	1.05
November	0.10	0.29	0.20	0.60	0.30	0.90
December	0.13	0.39	0.20	0.60	0.26	0.77

Seasonal temperature trends

Met. Seasonal Trends of Maximum Temperature (°C/year)

Stations/ Seasons	Jammu	Katra	Banihal	Batote	Baderwah	Rajouri
Winter season (Jan.-Feb.)	-0.058	+0.000	+0.055	+0.013	+0.020	-0.295
Pre-monsoon season(March-May)	+0.017	+0.042	+0.034	+0.025	+0.042	-0.085
Monsoon season (June-Sept.)	-0.035	-0.024	+0.009	-0.009	-0.029	-0.122
Post Monsoon Season (Oct.-Dec.)	-0.032	-0.018	+0.031	+0.006	-0.017	-0.329

Crop Seasonal Trends of Maximum Temperature (°C/year)

Stations/ Season	Jammu	Katra	Banihal	Batote	Baderwah	Rajouri
Kharif (Jun-Sept)	-0.035	-0.024	+0.011	-0.008	-0.021	-0.122
Rabi (Oct-Mar)	-0.039	0.001	+0.044	+0.019	+0.017	-0.359

Projected Seasonal Max. temperature (°C) in 2020 & 2030

Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Max T	2020	2030	2020	2030	2020	2030
Winter	-0.29	-0.87	0.00	0.00	-1.48	-4.43
Pre monsoon	0.09	0.26	0.21	0.63	-0.43	-1.28
Monsoon	-0.18	-0.53	-0.12	-0.36	-0.61	-1.83
Post monsoon	-0.16	-0.48	-0.09	-0.27	-1.65	-4.94
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Winter	0.28	0.83	0.07	0.20	0.10	0.30
Pre monsoon	0.17	0.51	0.13	0.38	0.21	0.63
Monsoon	0.05	0.14	-0.05	-0.14	-0.15	-0.44
Post monsoon	0.16	0.47	0.03	0.09	-0.09	-0.26

Projected Crop Seasonal Max. temperature (°C) in 2020 & 2030

Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Kharif	-0.18	-0.53	-0.12	-0.36	-0.61	-1.83
Rabi	-0.20	-0.59	0.01	0.02	-1.80	-5.39
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Kharif	0.06	0.17	-0.04	-0.12	-0.11	-0.32
Rabi	0.22	0.66	0.10	0.29	0.08	0.24

Seasonal Trends of Minimum Temperature (°C/year)

Stations/ Season	Jammu	Katra	Banihal	Batote	Baderwah	Rajouri
Winter season (Jan.-Feb.)	-0.039	+0.039	+0.028	+0.031	+0.076	-0.082
Pre-monsoon season(March- May)	-0.023	+0.064	+0.015	+0.041	+0.074	+0.003
Monsoon season (June-Sept.)	+0.035	+0.054	+0.016	+0.029	+0.071	+0.131
Post Monsoon Season (Oct.-Dec.)	-0.043	+0.056	+0.025	+0.041	+0.060	+0.020

Seasonal Trends of Minimum Temperature (°C/year)

Stations/ Season	Jammu	Katra	Banihal	Batote	Baderwah	Rajouri
Kharif (Jun-Sept)	+0.035	+0.054	+0.013	+0.029	+0.069	0.131
Rabi (Oct-mar)	-0.043	+0.053	+0.026	+0.046	+0.075	-0.022

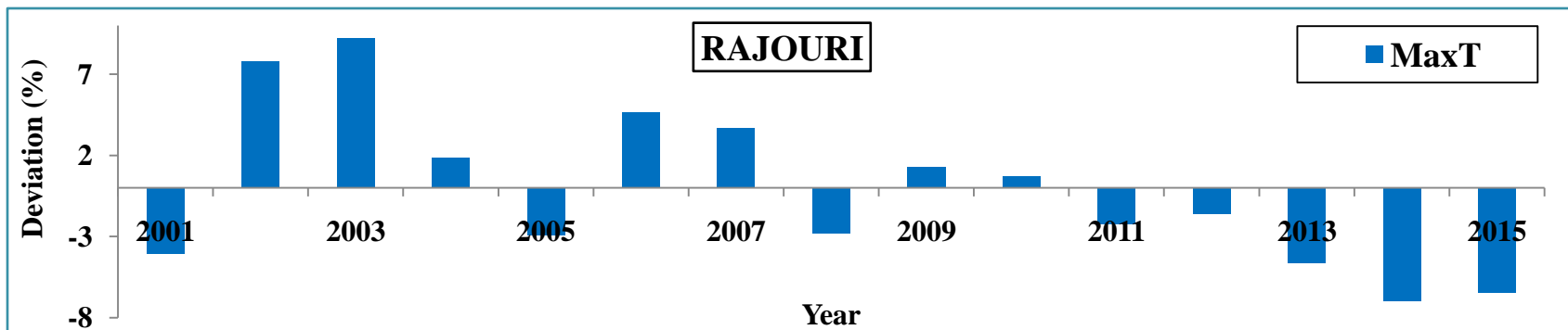
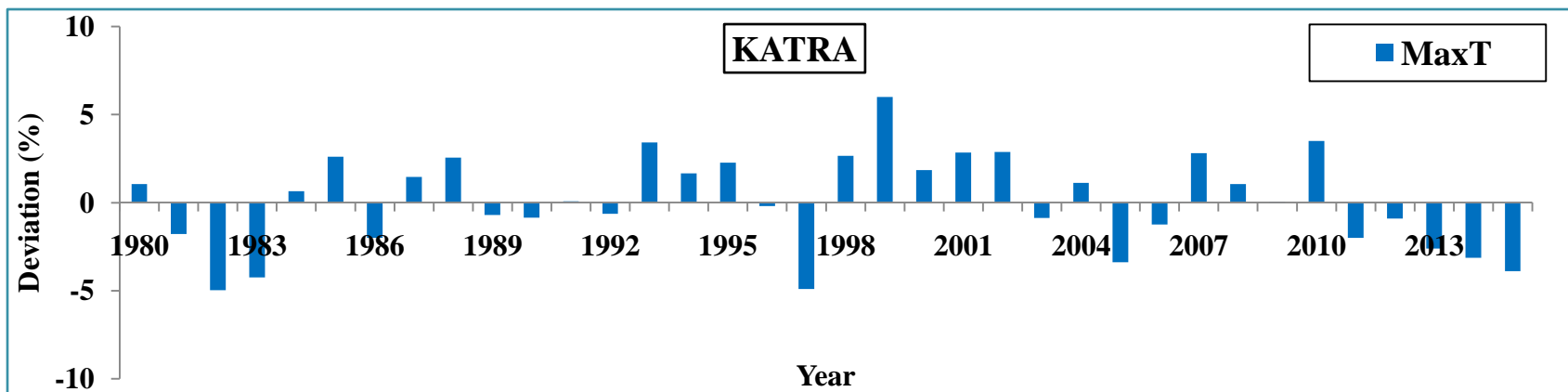
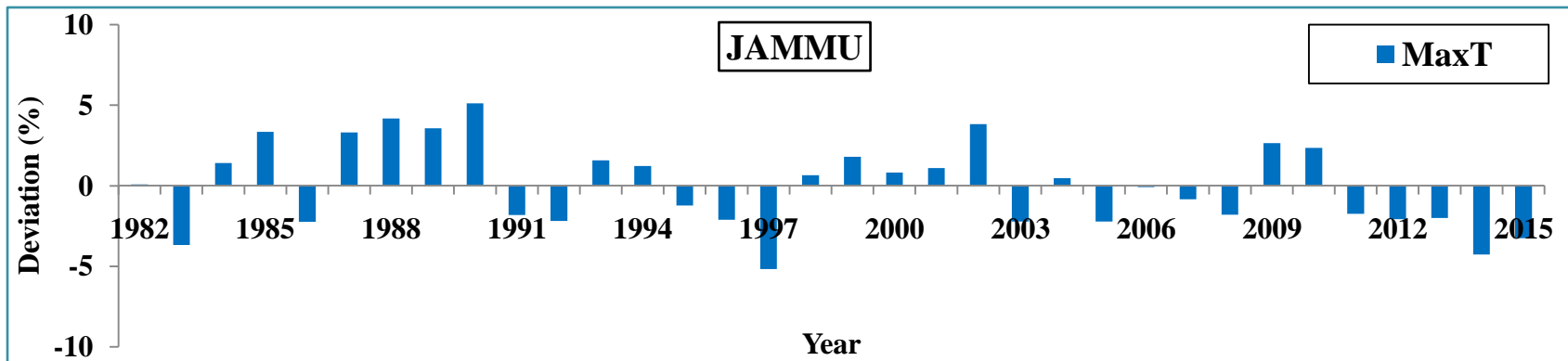
Projected Seasonal Min. temperature (°C) in 2020 & 2030

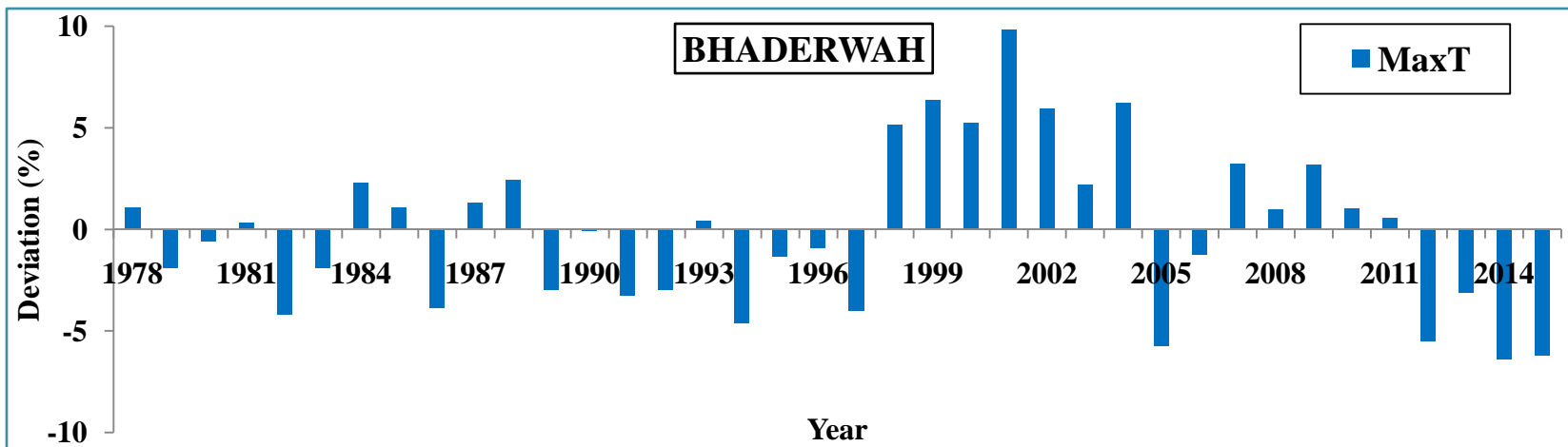
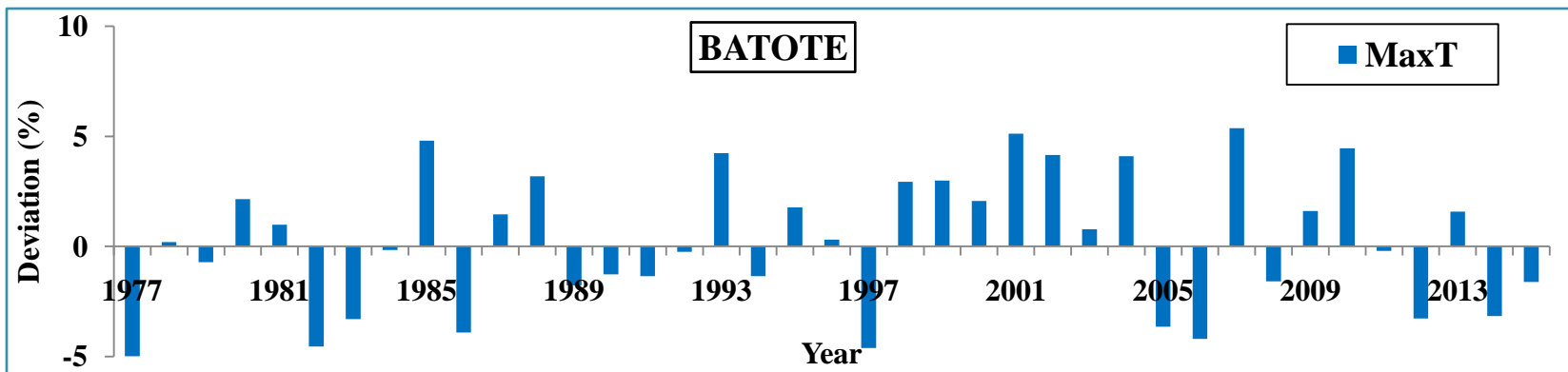
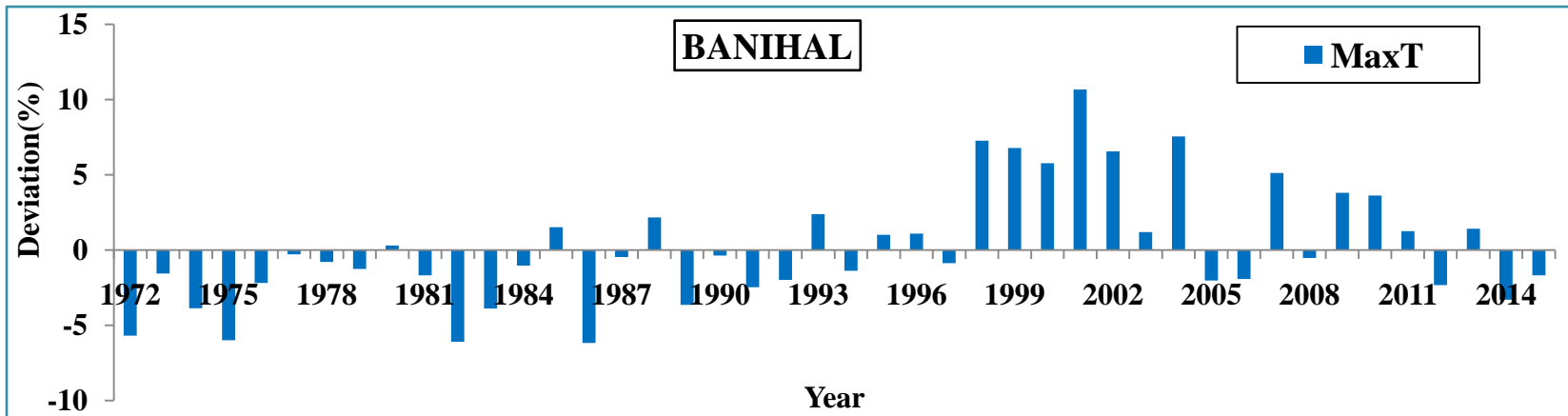
Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Winter	-0.20	-0.59	0.20	0.59	-0.41	-1.23
Pre monsoon	-0.12	-0.35	0.32	0.96	0.02	0.05
Monsoon	0.18	0.53	0.27	0.81	0.66	1.97
Post monsoon	-0.22	-0.65	0.28	0.84	0.10	0.30
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Winter	0.14	0.42	0.16	0.47	0.38	1.14
Pre monsoon	0.08	0.23	0.21	0.62	0.37	1.11
Monsoon	0.08	0.24	0.15	0.44	0.36	1.07
Post monsoon	0.13	0.38	0.21	0.62	0.30	0.90

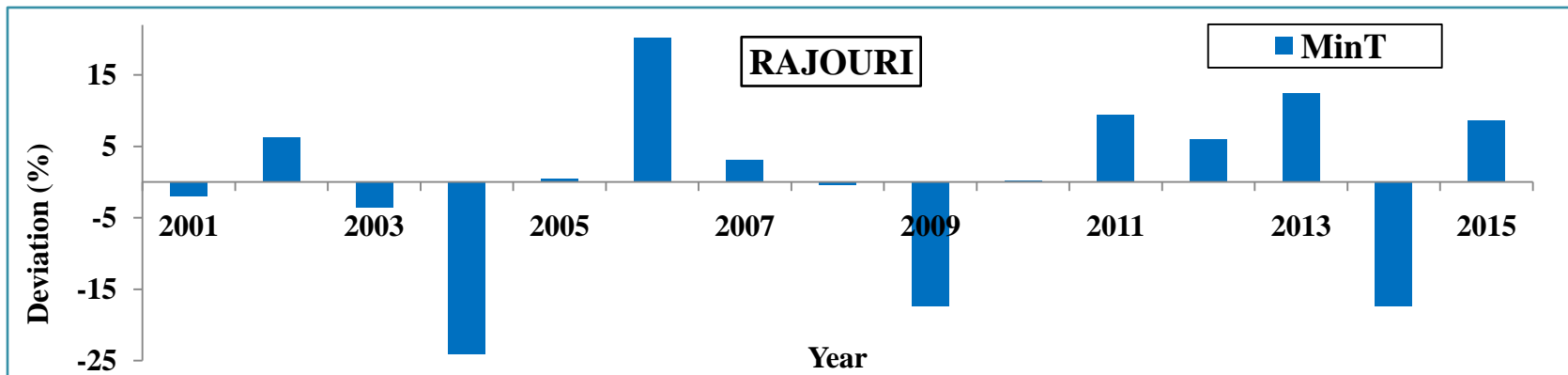
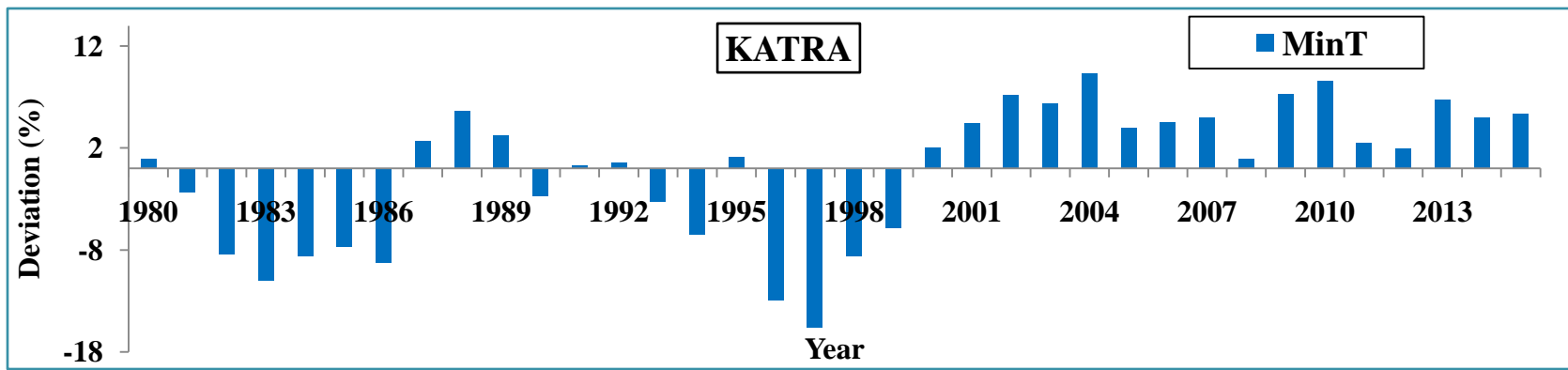
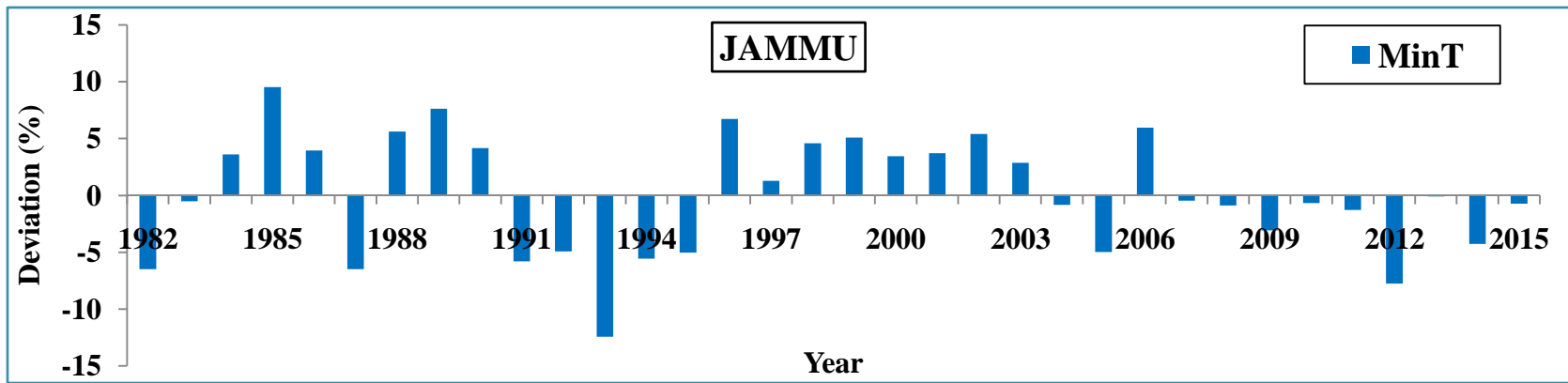
Projected Crop Seasonal Min. Temperature (°C) in 2020 & 2030

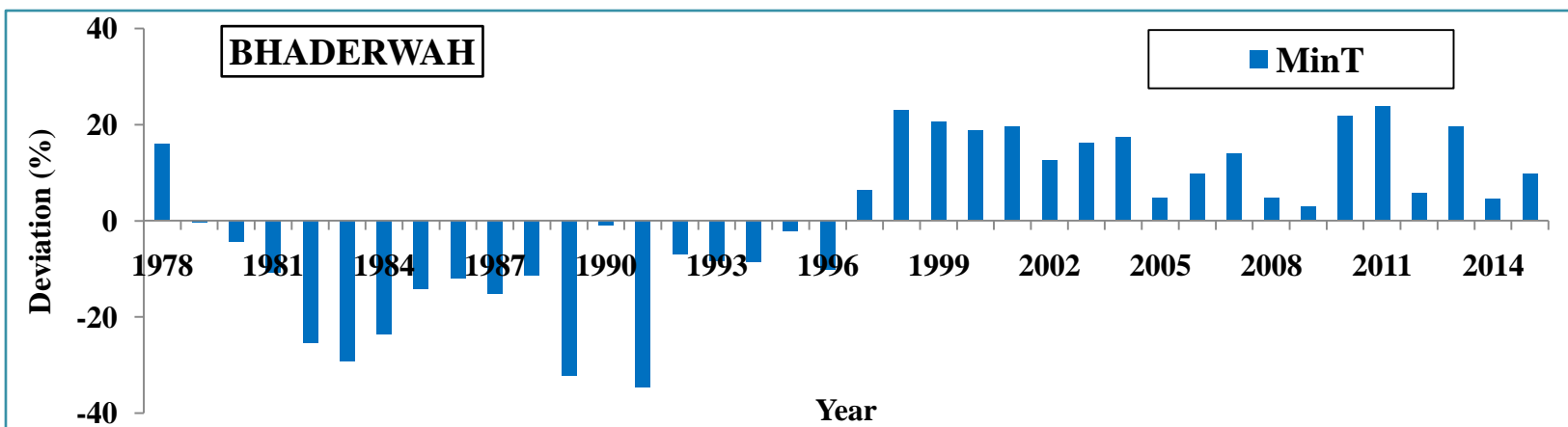
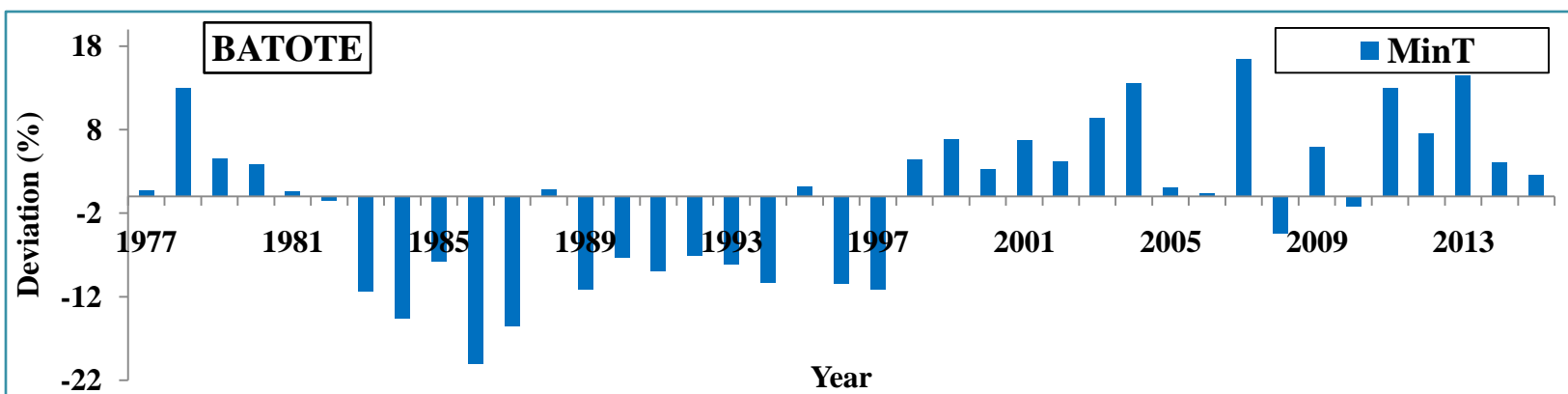
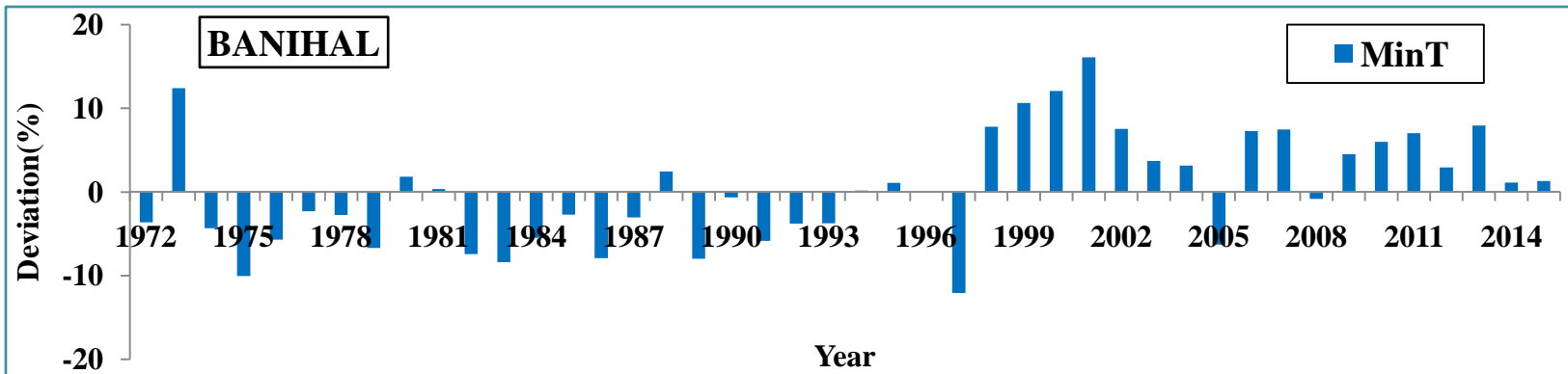
Station/ Season	Jammu		Katra		Rajouri	
	2020	2030	2020	2030	2020	2030
Kharif	0.18	0.53	0.27	0.81	0.65	1.97
Rabi	-0.22	-0.65	0.27	0.80	-0.11	-0.33
Station/ Season	Banihal		Batote		Bhaderwah	
	2020	2030	2020	2030	2020	2030
Kharif	0.07	0.20	0.14	0.42	0.35	1.04
Rabi	0.13	0.39	0.23	0.69	0.35	1.04

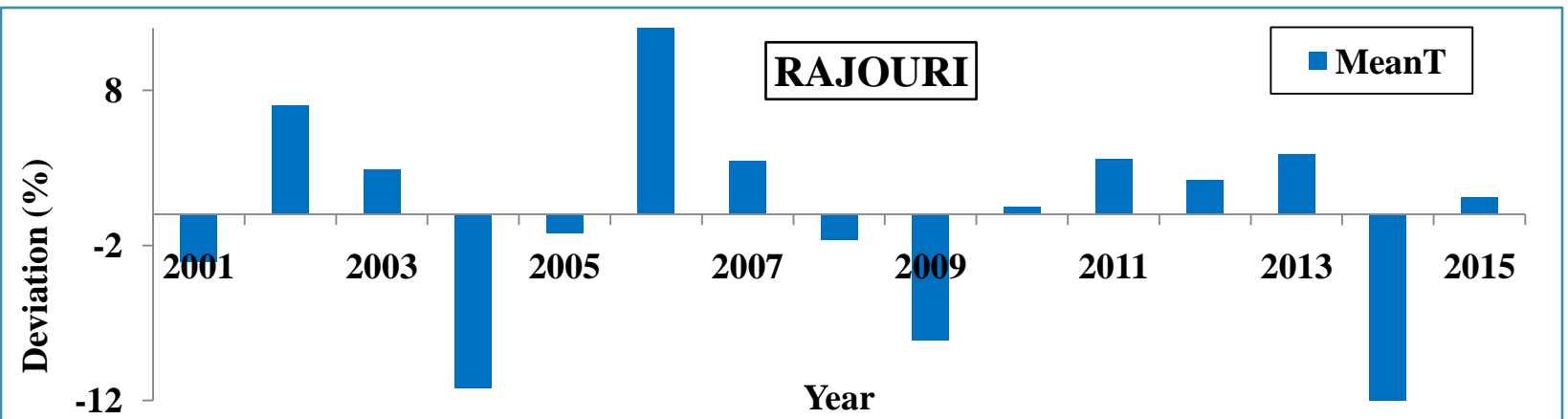
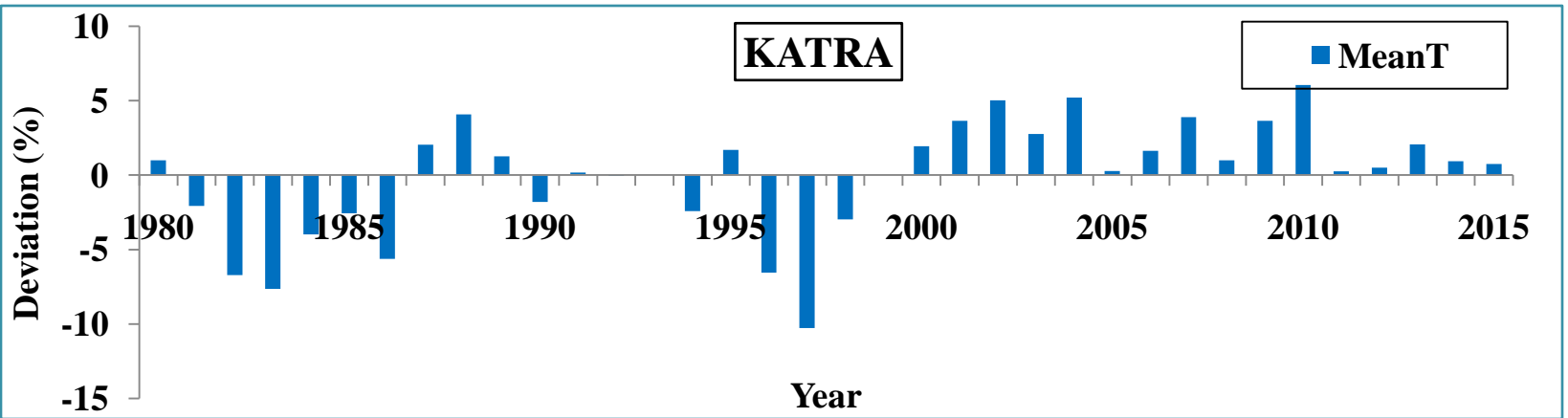
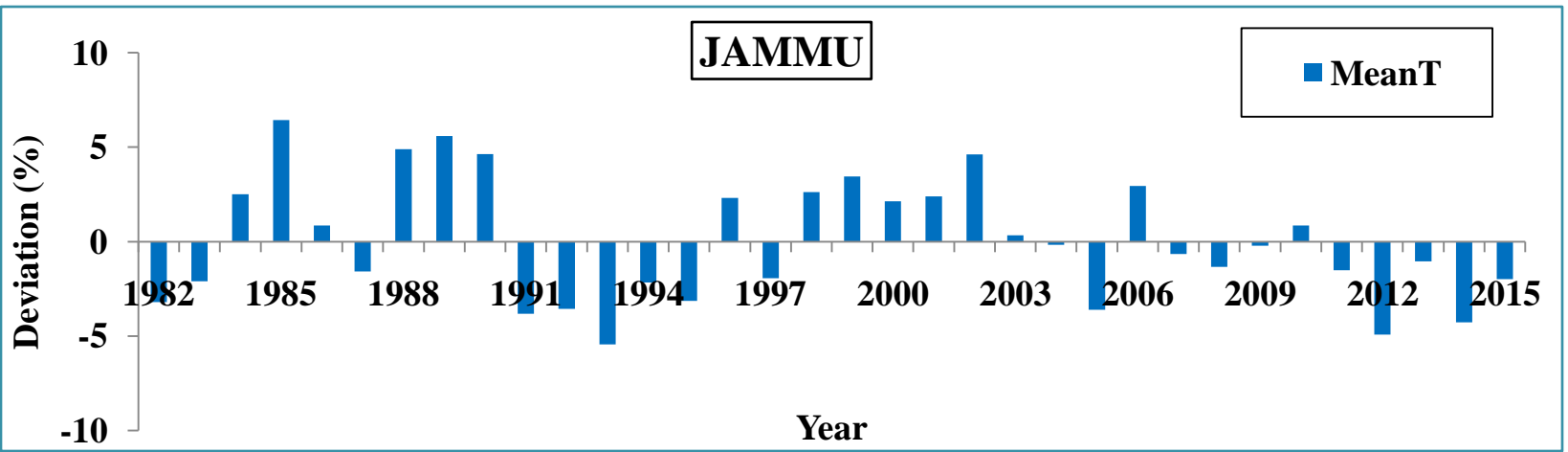
Temperature deviations from normal

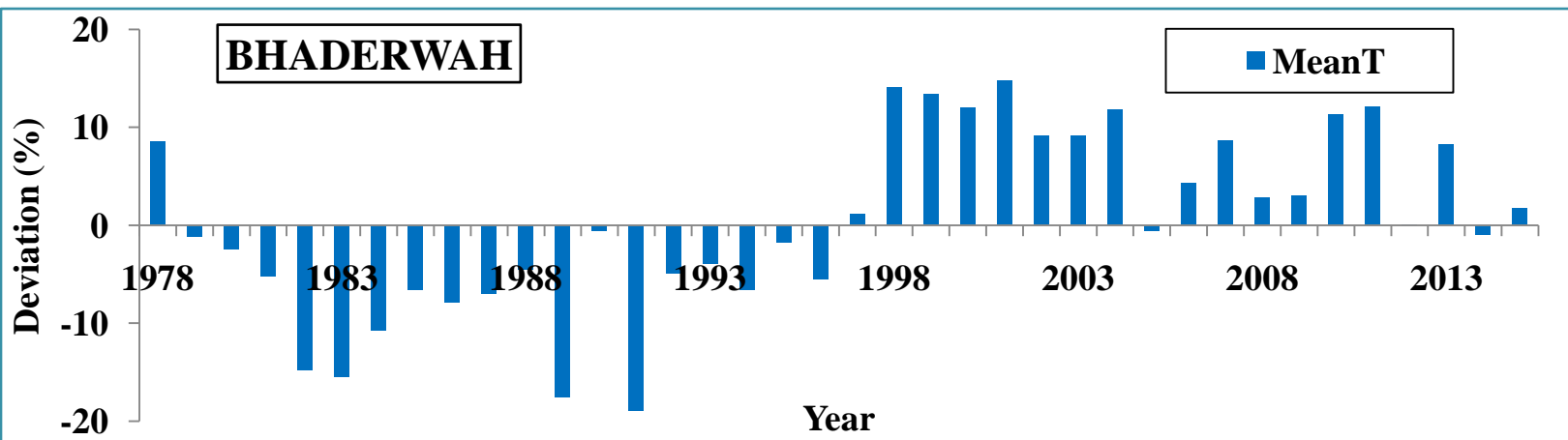
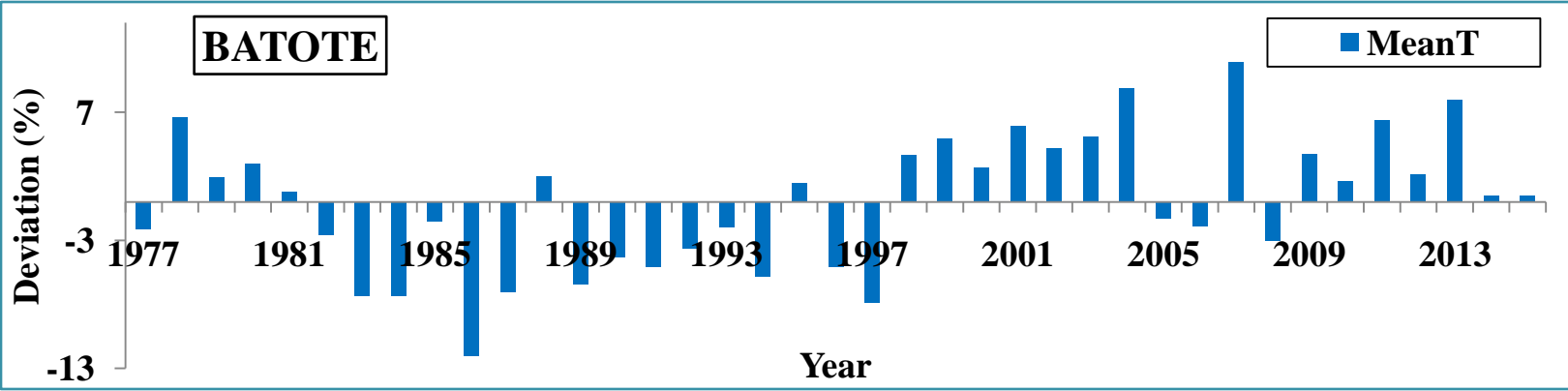
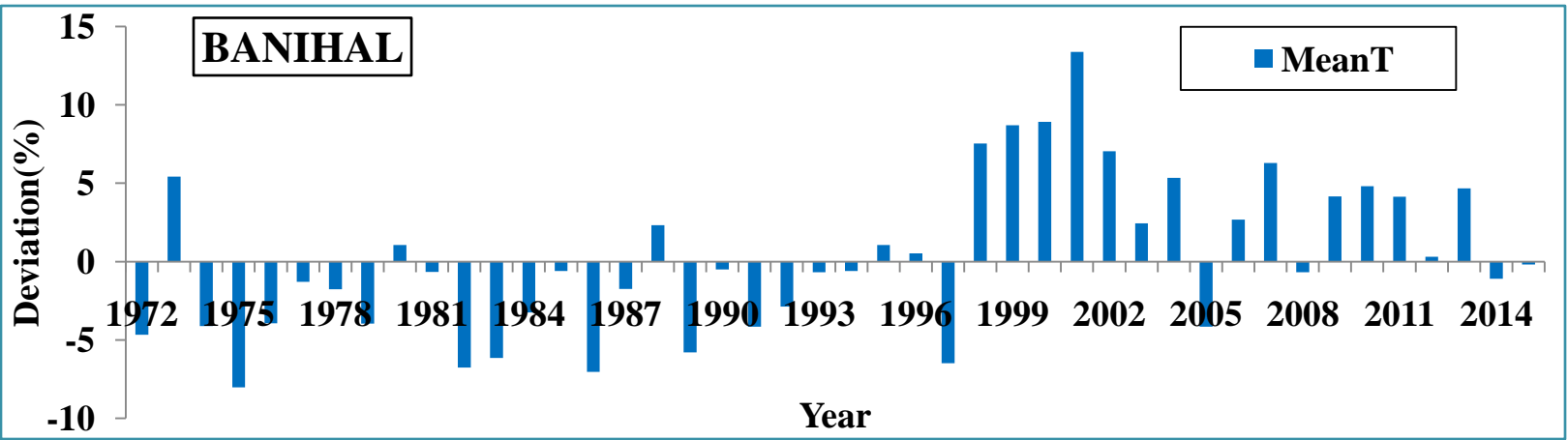


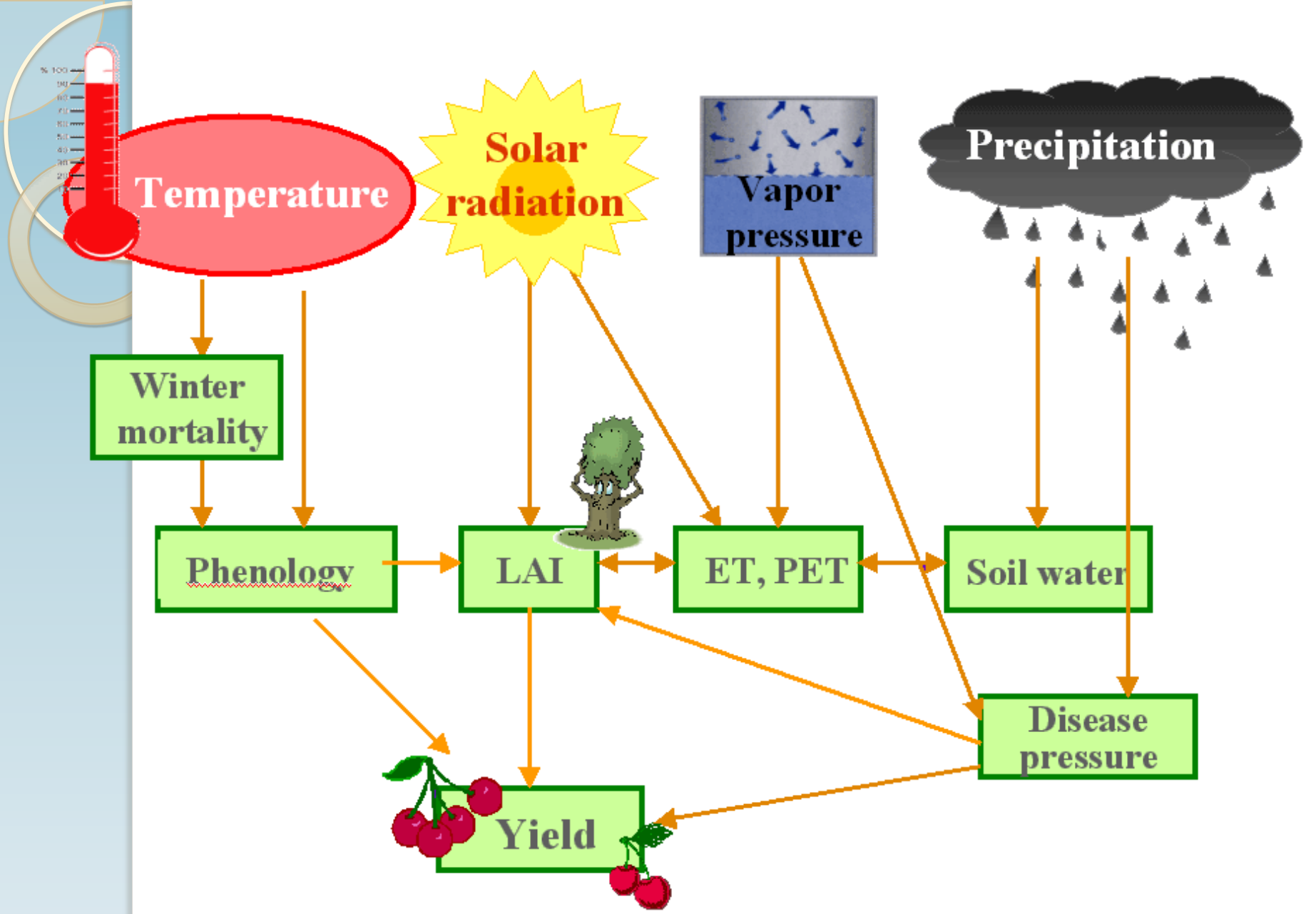












Extreme weather events

Trends of heavy rainfall events at different location in Jammu region

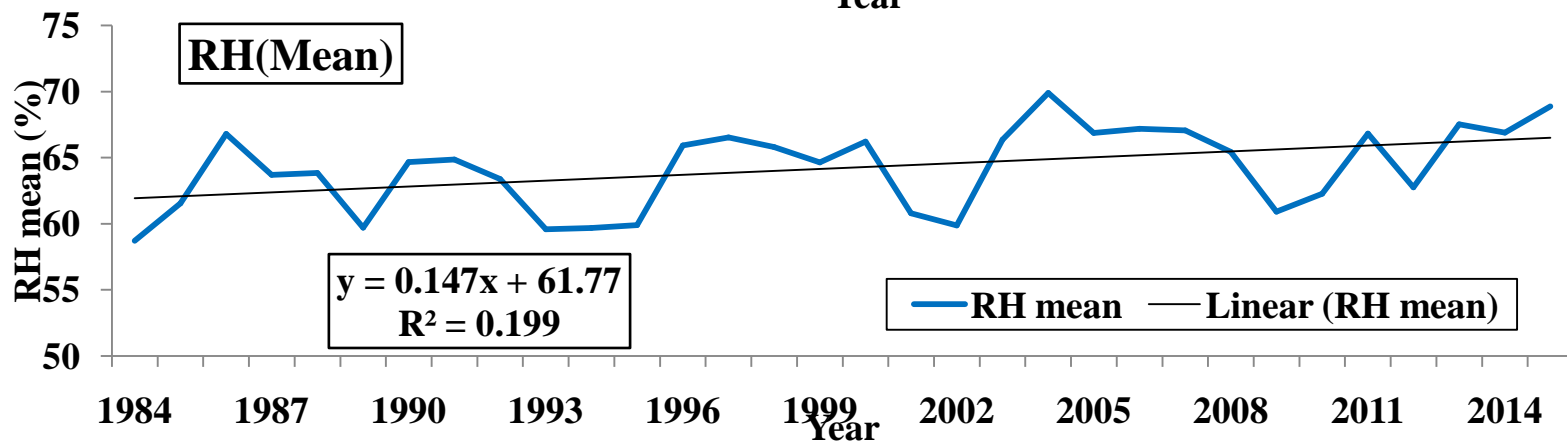
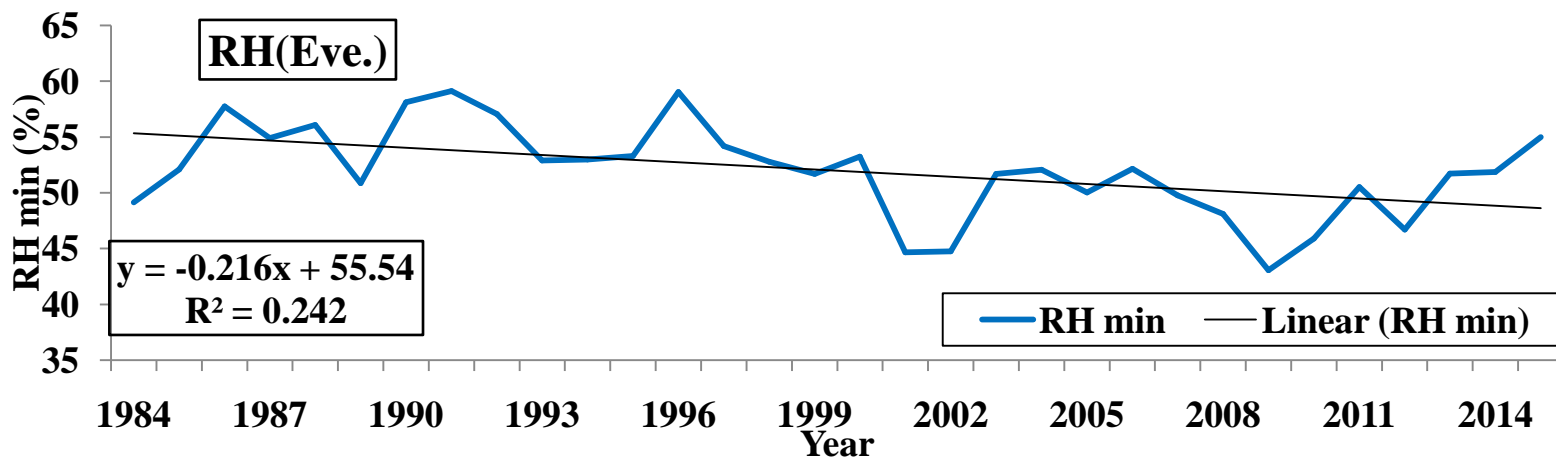
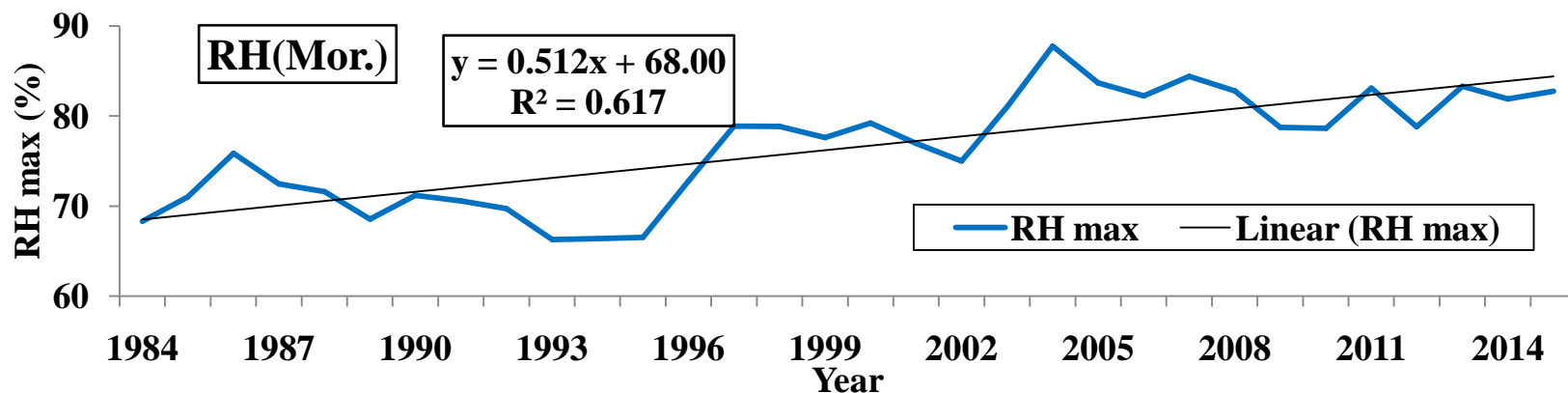
Stations	Kharif Season			Rabi Season		
	50-75	75-100	>100	50-75	75-100	>100
Jammu	0.005	0.013	-0.019	-0.013	-0.004	-0.005
Katra	0.012	-0.019	-0.001	-0.005	No change	-0.011
Banihal	0.011	0.004	0.002	0.016	0.003	0.008
Batote	-0.010	0.006	0.011	0.003	0.022	0.013
Bhaderwah	-0.005	0.007	0.011	-0.010	-0.017	-0.004
Rajouri	-0.048	-0.004	0.016	0.004	-0.009	No change

Trends of extreme temperature events at different location in Jammu region

Stations	Maximum Temperature		
	>40	>42	>44
Jammu	-0.329	-0.221	-0.0064
Katra	0.018	-0.009	-0.005
Rajouri	-0.110	-0.121	0.007





Stations	Minimum Temperature			
	≤ 7	≤ 5	≤ 2	≤ 0
Jammu	0.962	0.834	0.270	-0.003
Katra	-0.712	-0.590	-0.071	-0.016
Banihal	-0.307	-0.407	-0.528	-0.038
Batote	-0.944	-0.863	-0.617	-0.332
Bhaderwah	-1.083	-1.319	-1.454	-1.339
Rajouri	-0.153	0.064	0.928	0.307

Trends in Relative Humidity over Jammu district

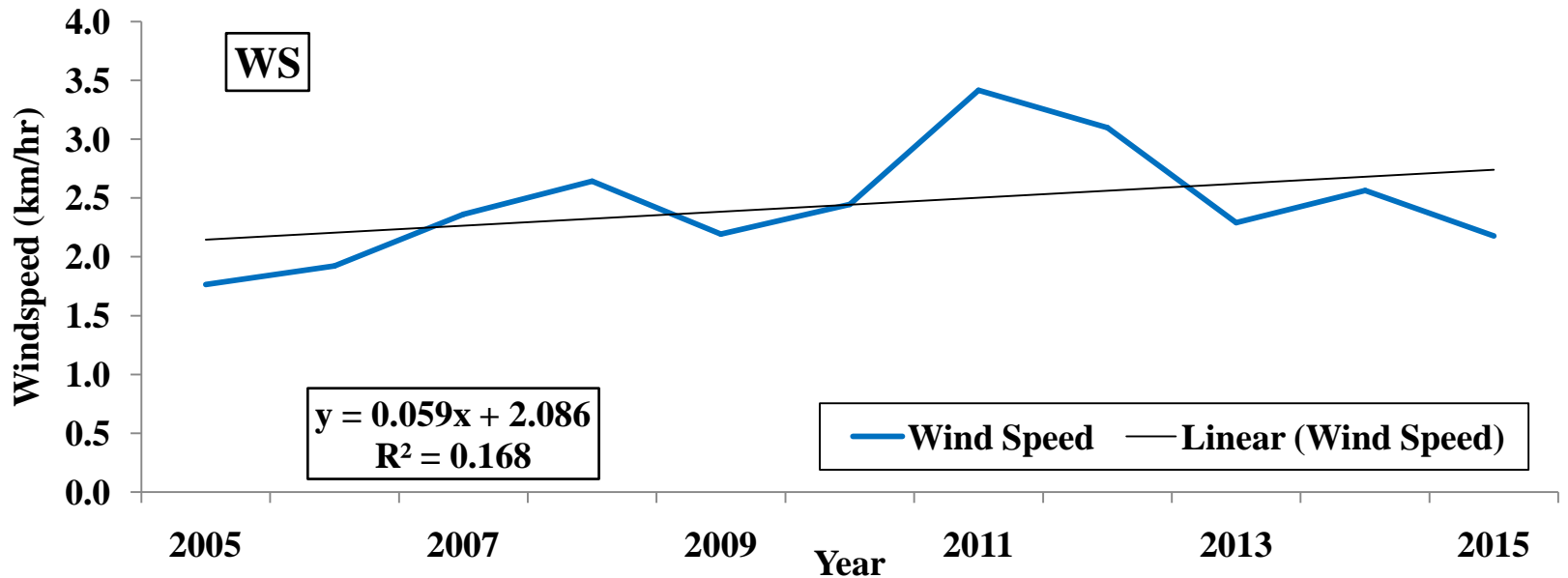
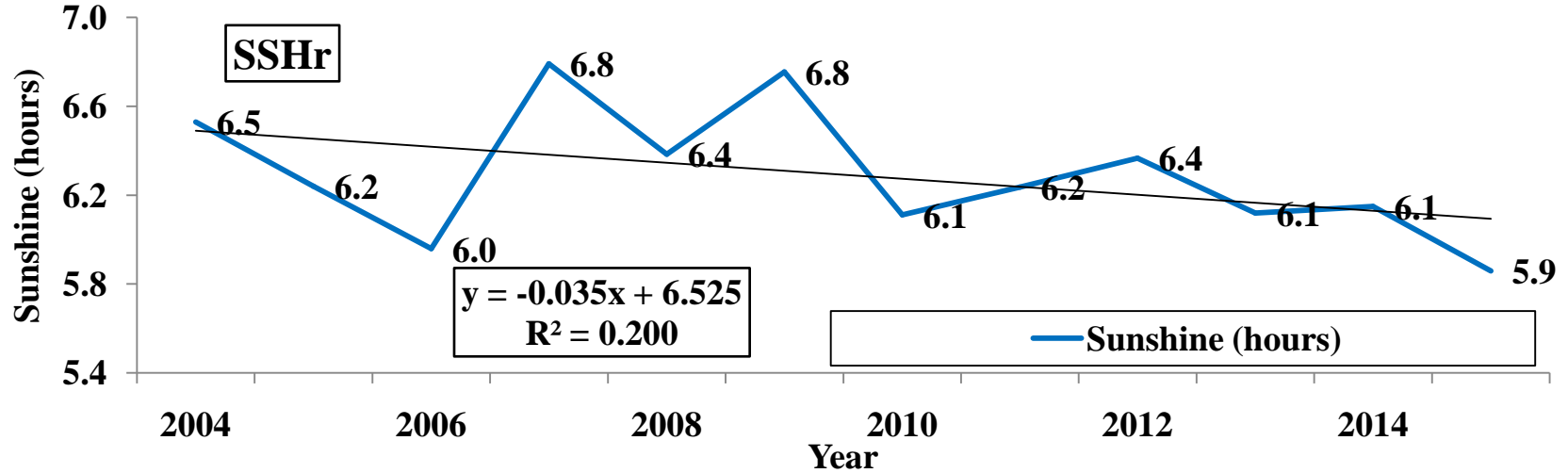


Thermal Humidity Index (Heat Index)

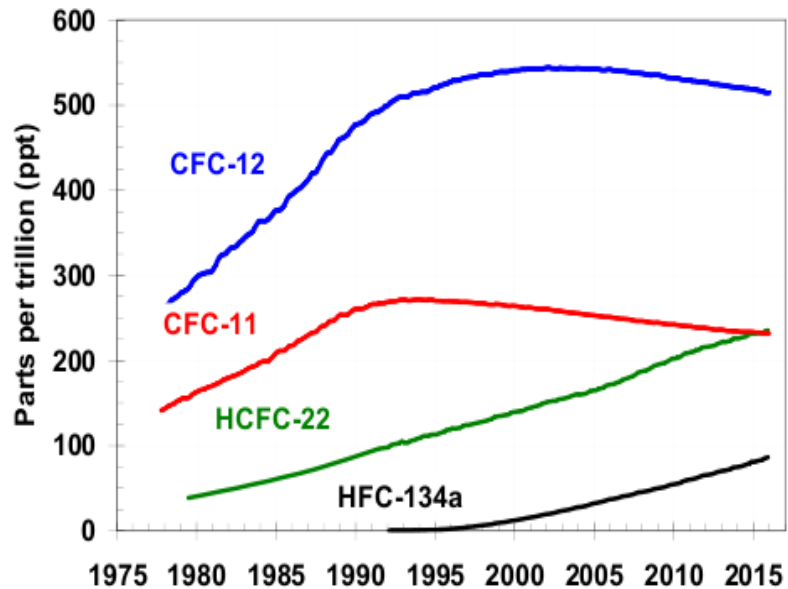
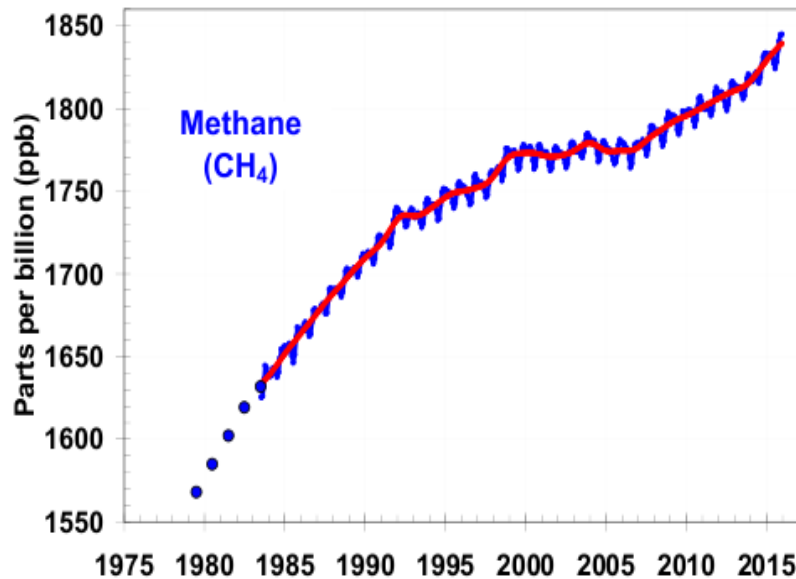
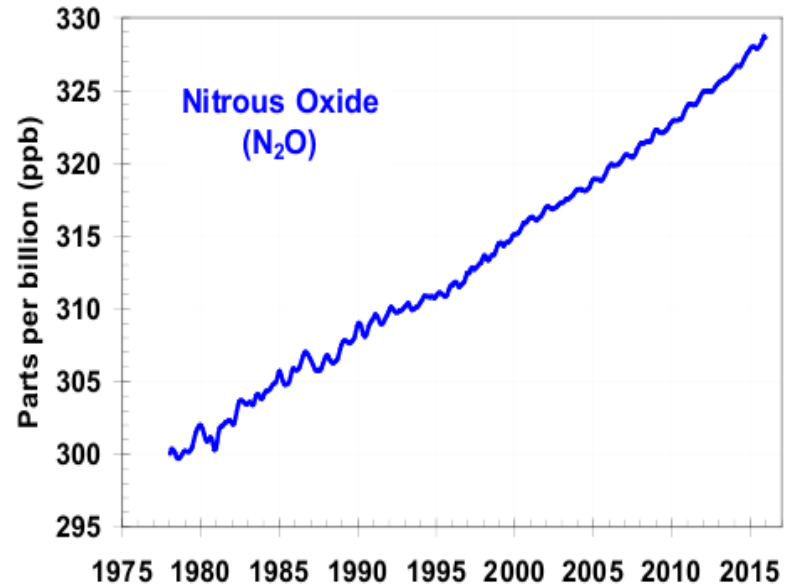
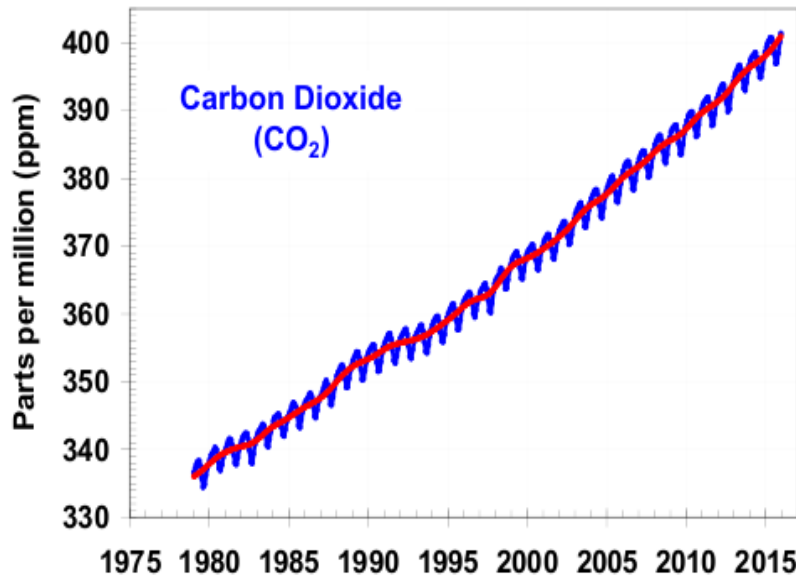
		temperature (°F)															
		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	81	84	86	89	93	97	101	106	112	117	124	130	137			
	60	82	84	88	91	95	100	105	110	116	123	129	137				
	65	82	85	89	93	98	103	108	114	121	128	136					
	70	83	86	90	95	100	105	112	119	126	134						
	75	84	88	92	97	103	109	116	124	132							
	80	84	89	94	100	106	113	121	129								
	85	85	90	96	102	110	117	126	135								
	90	86	91	98	105	113	122	131									
	95	86	93	100	108	117	127										
	100	87	95	103	112	121	132										

-  Caution
-  Extreme Caution
-  Danger
-  Extreme Danger

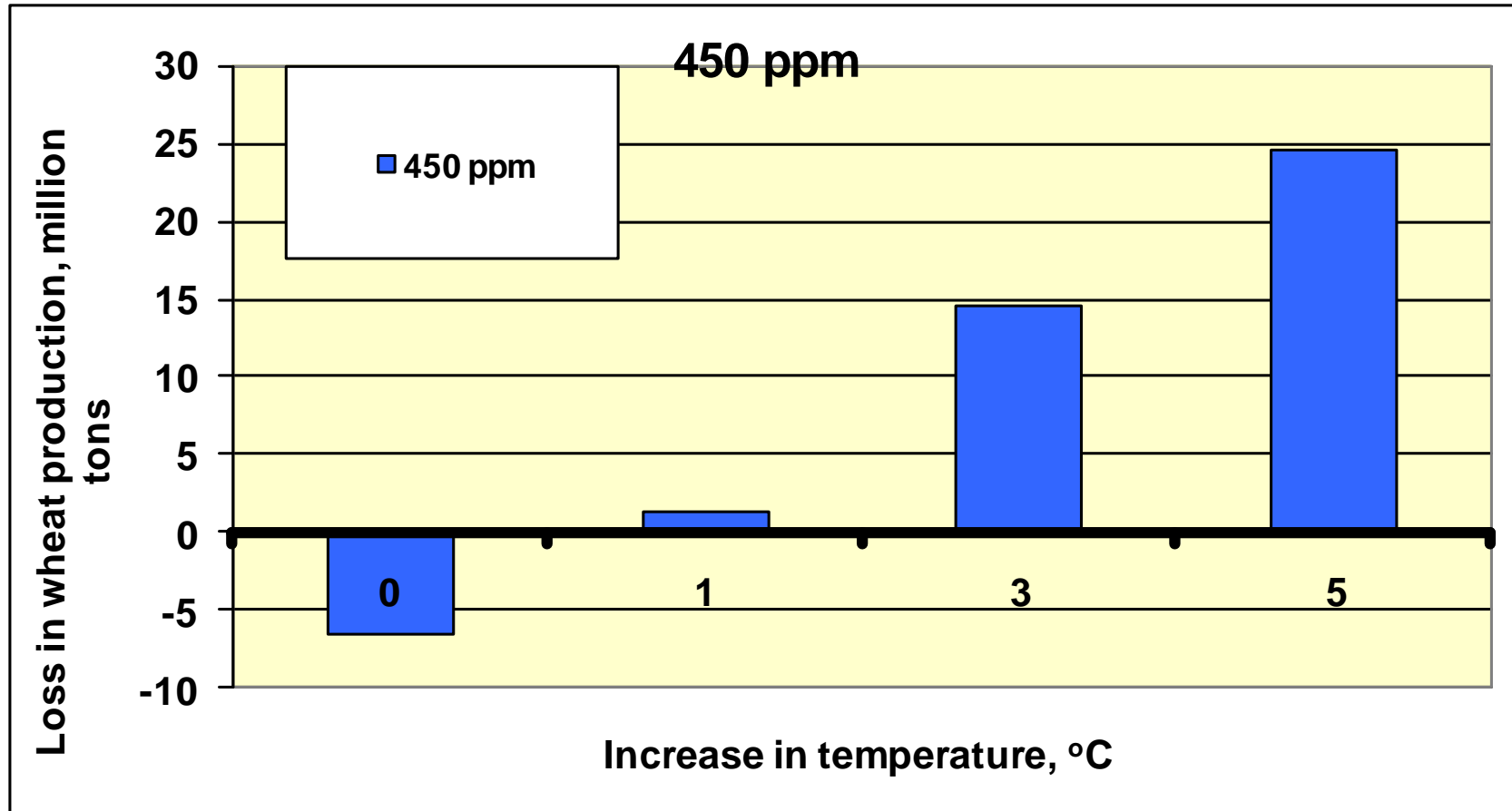
Trends of Sunshine hours and wind speed over Jammu district



Present Composition of GHGs in Atmosphere



Loss in wheat production due to climate variability/change*

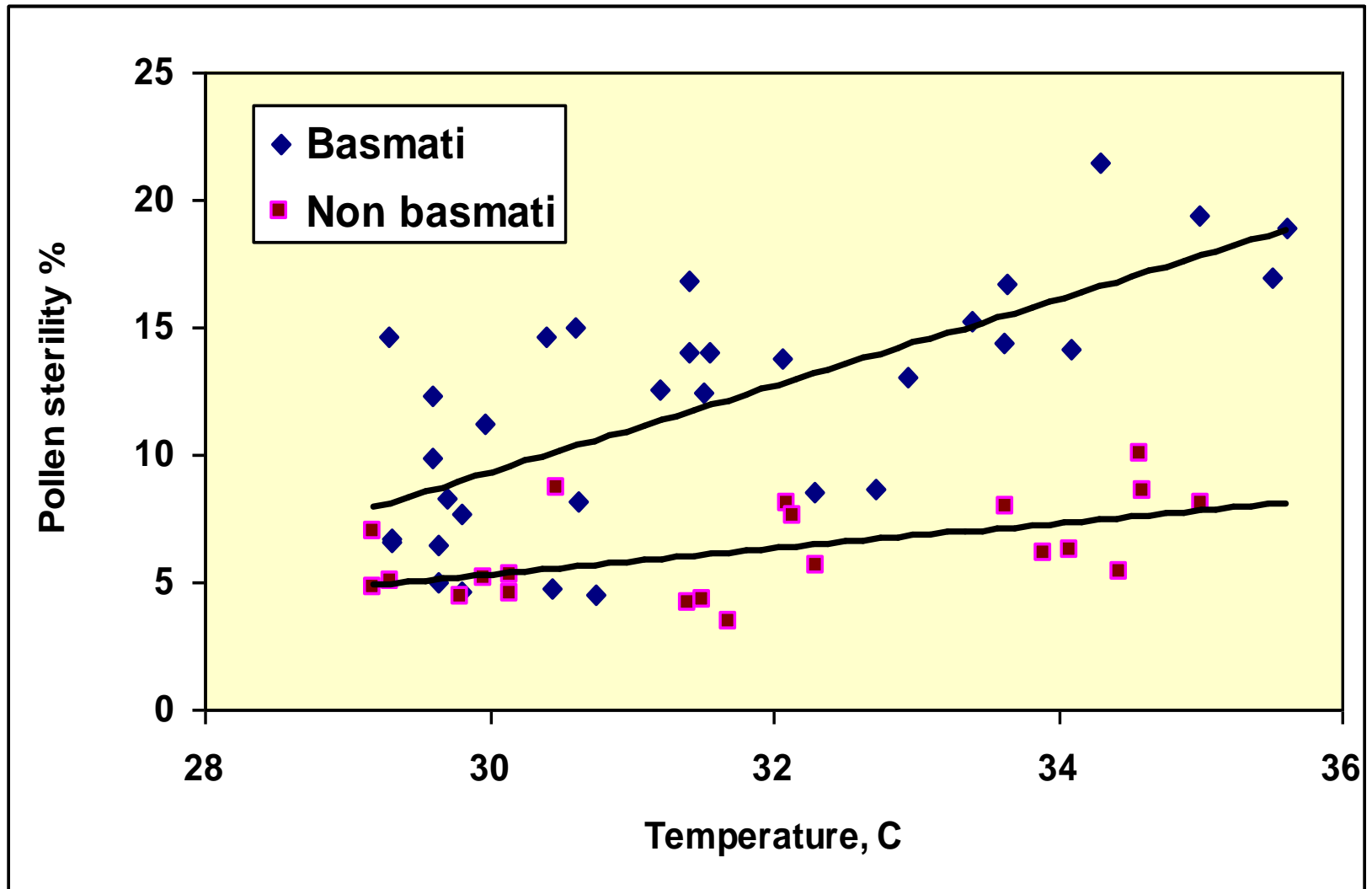


*assuming no change in area planted and irrigation availability

Projected yield of maize under different climatic scenarios

Parameters	% Change			
	Crop yield	LAI	Biomass	Grain no.
Temperature (°C)				
<i>Irrigated</i>				
1	-9.18	-1.06	-4.93	-5.06
3	-34.16	-28.99	-33.31	-27.92
5	-60.50	-59.57	-62.76	-52.16
<i>Rainfed</i>				
1	-9.64	-1.04	-5.48	-5.50
3	-35.89	-30.21	-34.47	-29.80
5	-61.48	-60.42	-63.33	-53.33

Climatic extremes: Effect of temperature stress on pollen sterility in Rice



Projected impacts of climate change on Agriculture

- ❖ **Increased droughts, floods, heat periods, and associated effects on pests are likely to increase production variability. This could be the most important issue.**
- ❖ **Reduced frequency of frost damage in plains of sub tropical region of Jammu**
- ❖ **Increasing temperature would increase fertilizer requirement for the same production targets; and result in higher emissions**
- ❖ **Increase in water, shelter, and energy requirement for livestock**
- ❖ **Declining apple yields in temperate areas due to inadequate chilling**
- ❖ **Physiological effects on crops, pastures, forests and livestock (quantity and quality)**
- ❖ **Changes in land and water resources (quantity and quality) in the region**
- ❖ **Altered hydrological cycle and precipitation variance**
- ❖ **Changes in length of growing period (LGP)**
- ❖ **Land degradation and desertification-increase in soil salinity**
- ❖ **Increased weed and pest challenges**
- ❖ **Reduced crop yields**



THANK
YOU