



Meteorologisk
institutt

Når det unormale blir det normalt - Hva er normalt?

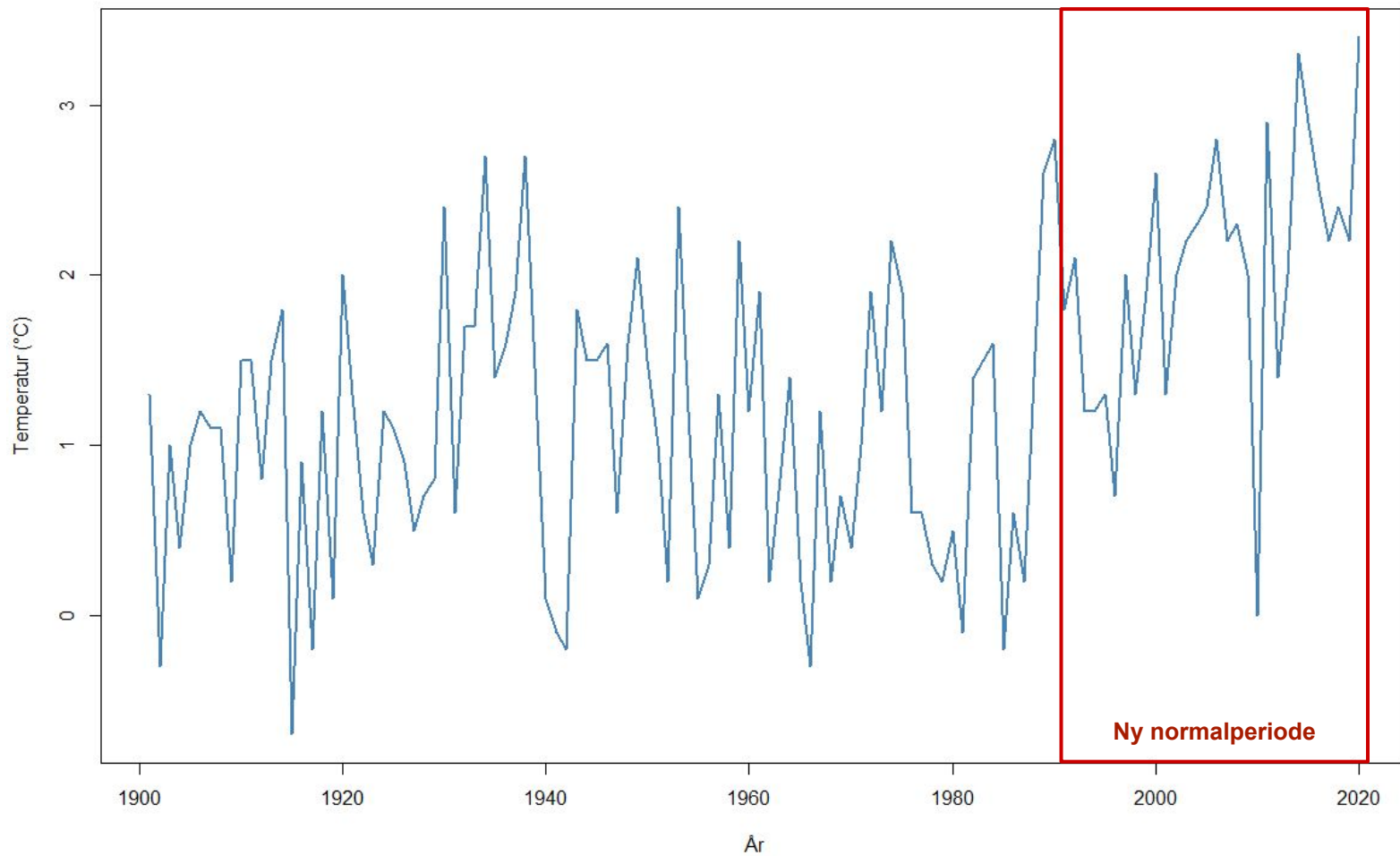
Ole Einar Tveito, Elinah Khasandi Kuya, Herdis Motrøen Gjelten

Nye klimanormaler - et utfordrende arbeid

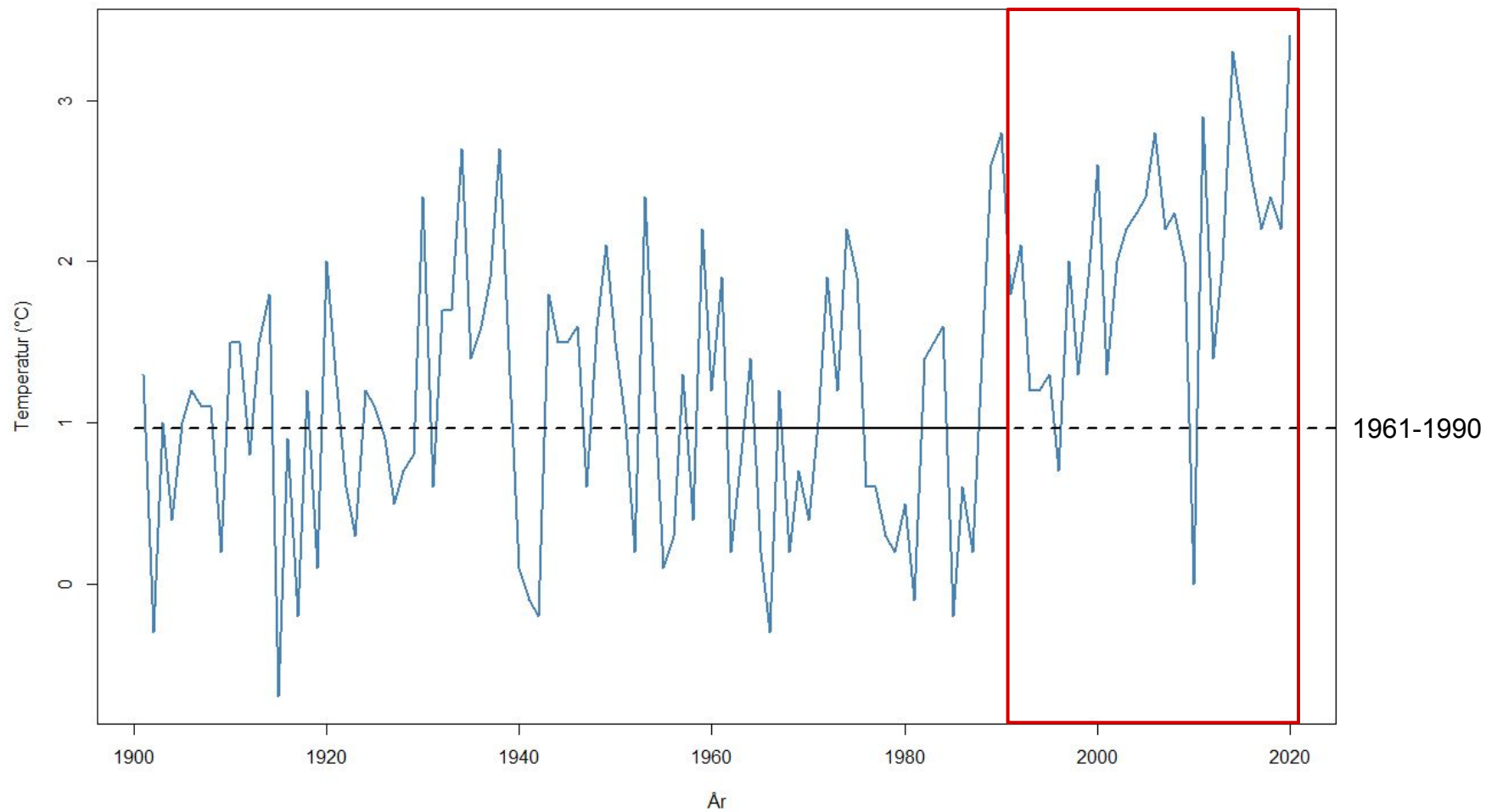
- Normalene er basert på observasjoner
- Store endringer i observasjonsnettet i løpet av de siste 20-25 årene
- Klima i endring
- ..og hva er egentlig normalt?



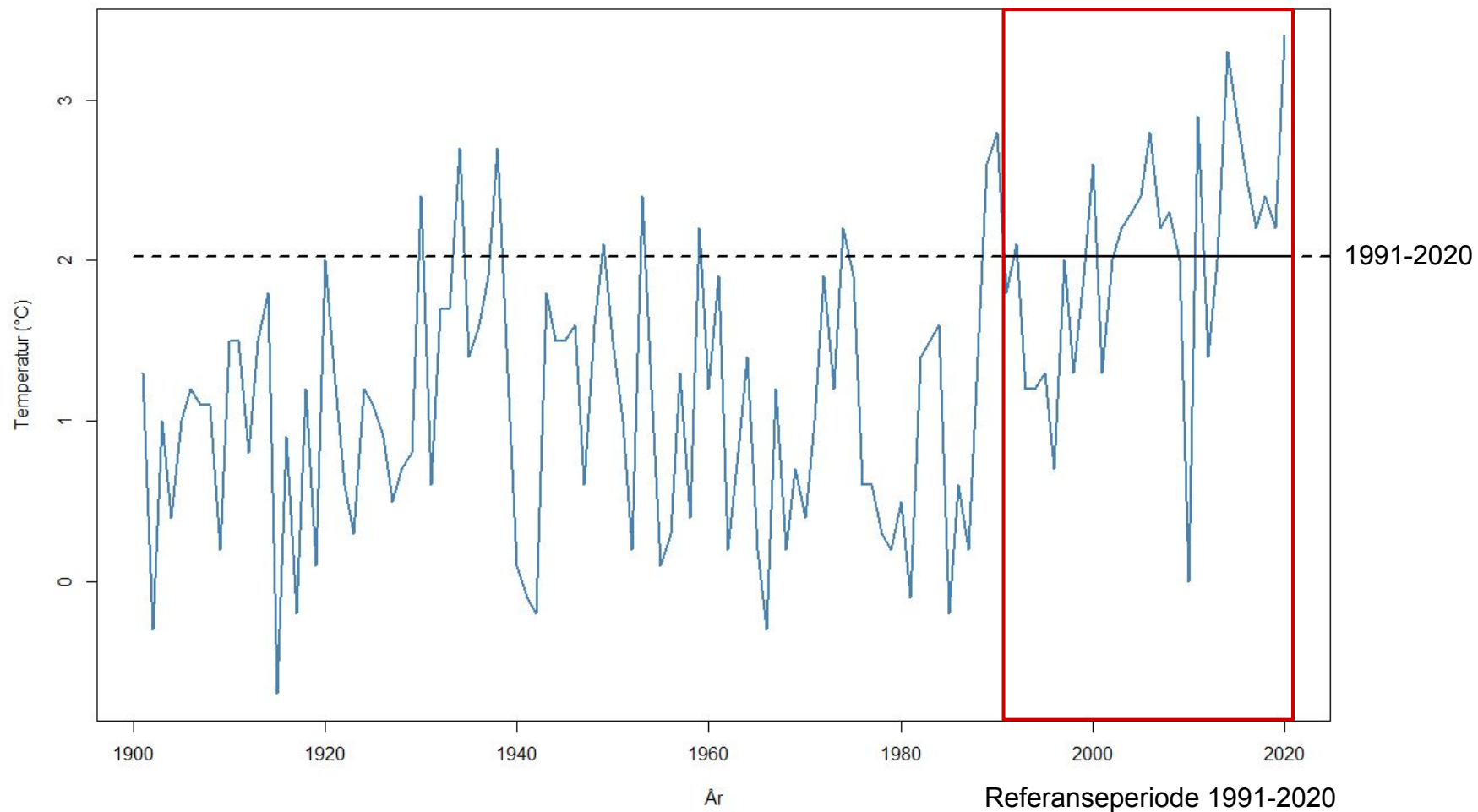
Gjennomsnittlig lufttemperatur Norge



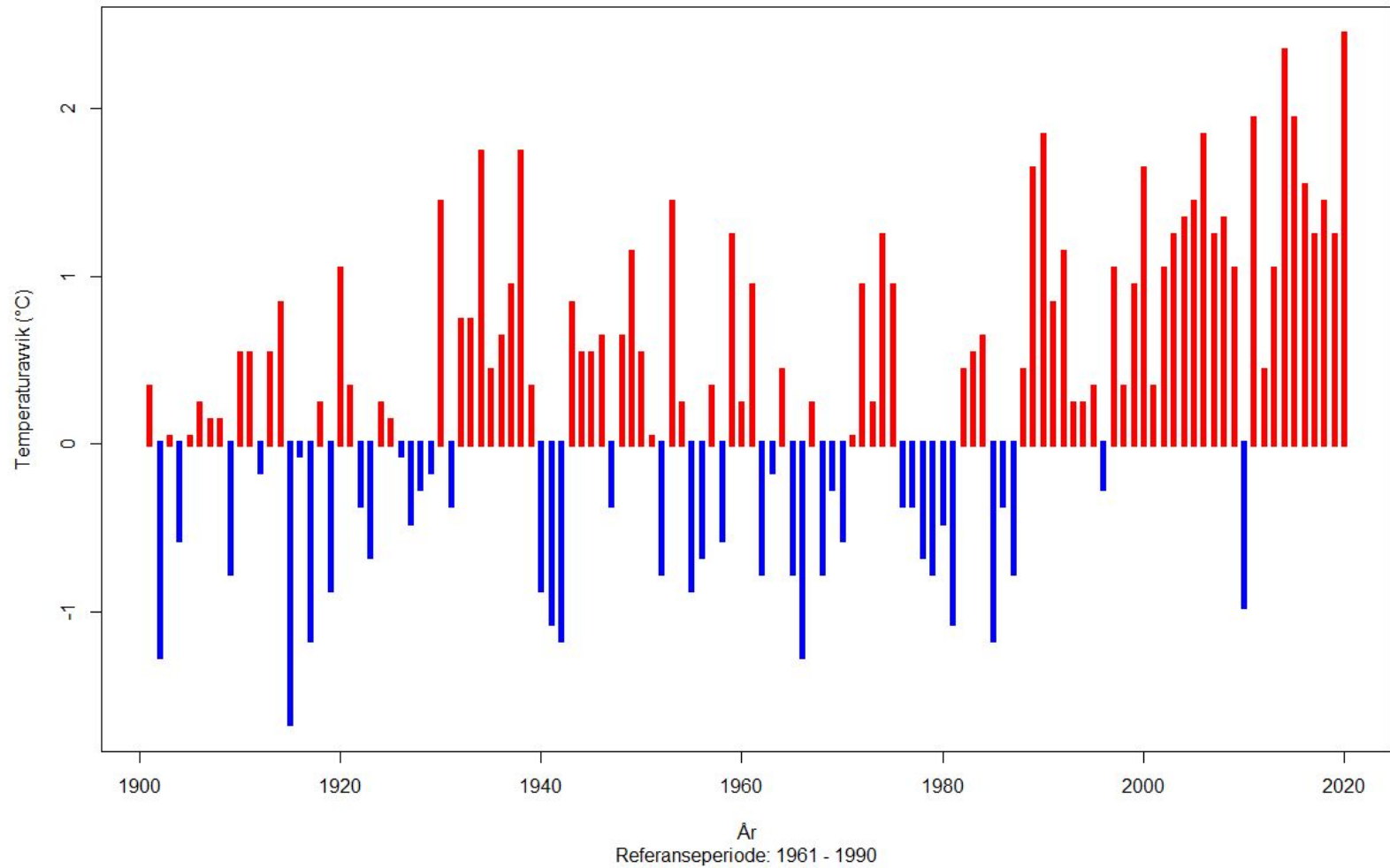
Gjennomsnittlig lufttemperatur Norge



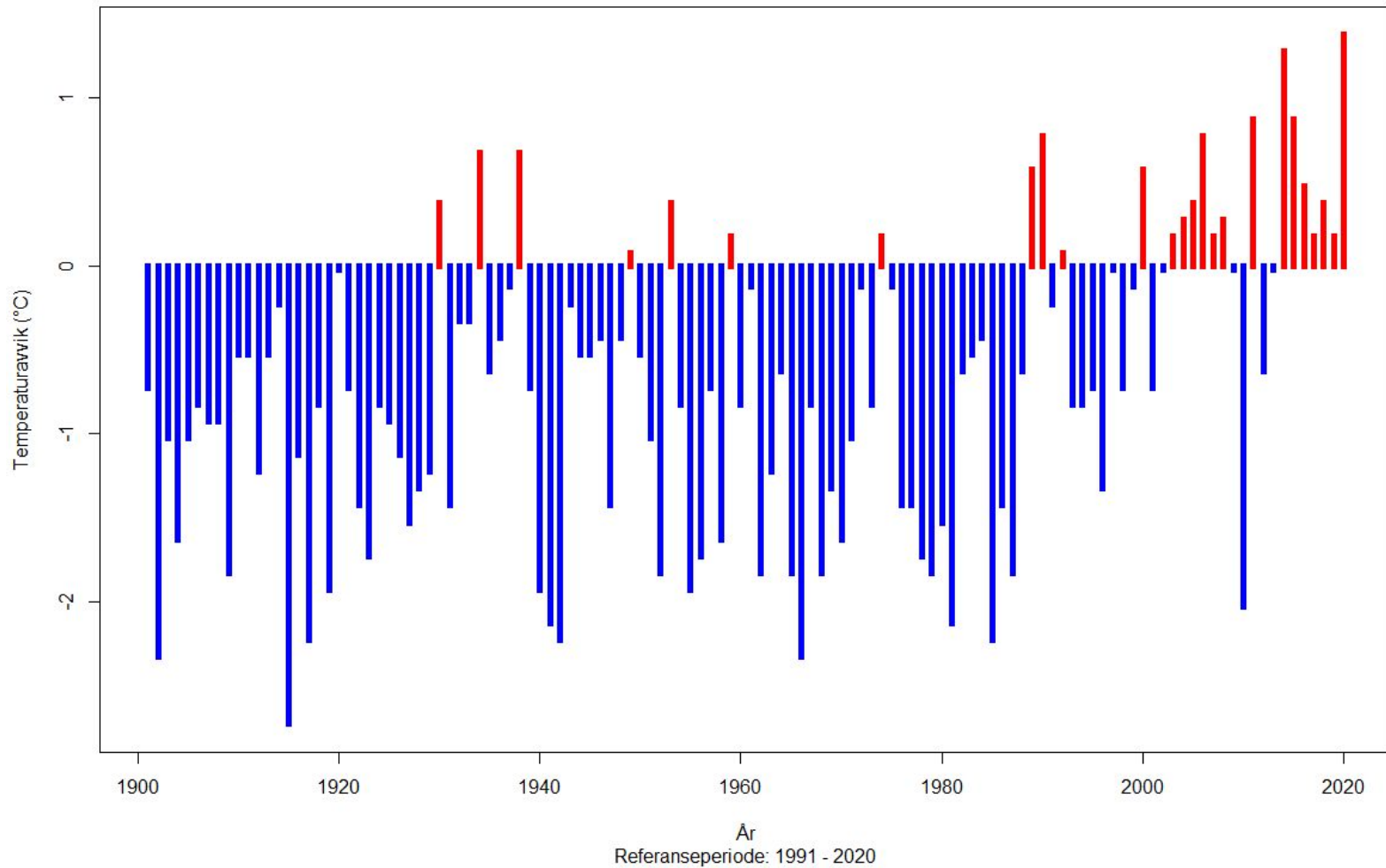
Gjennomsnittlig lufttemperatur Norge



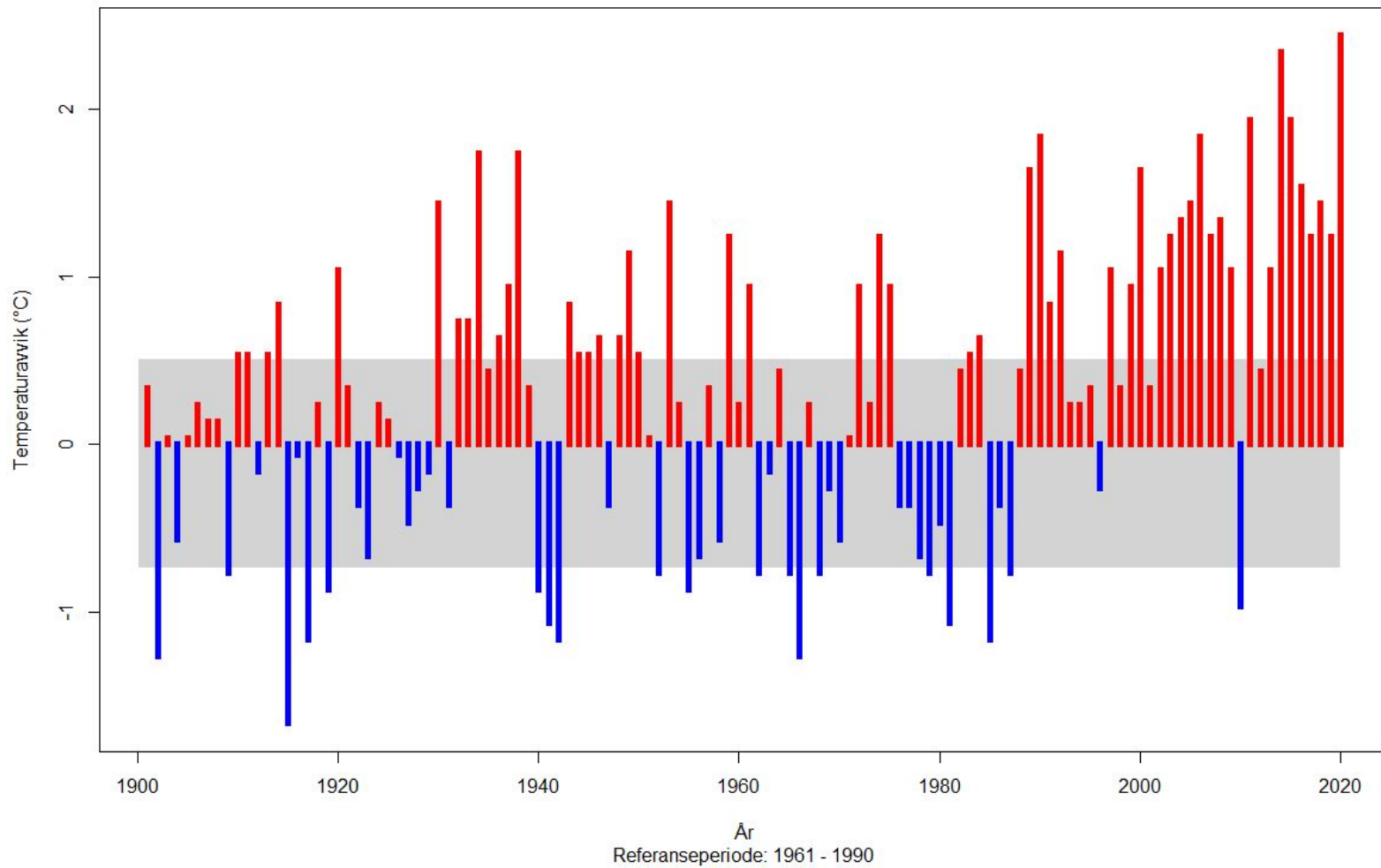
Årstemperatur Norge



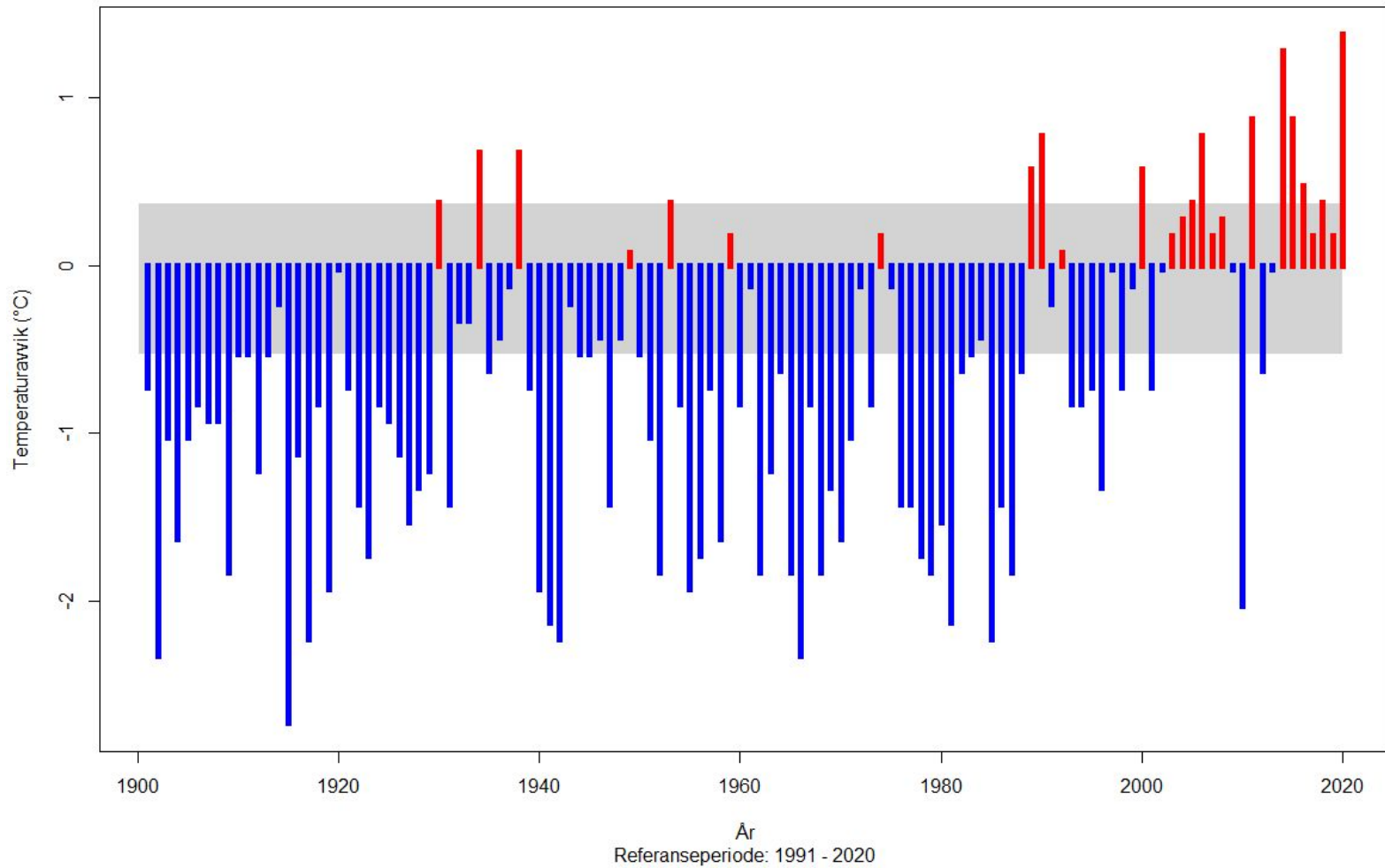
Årstemperatur Norge



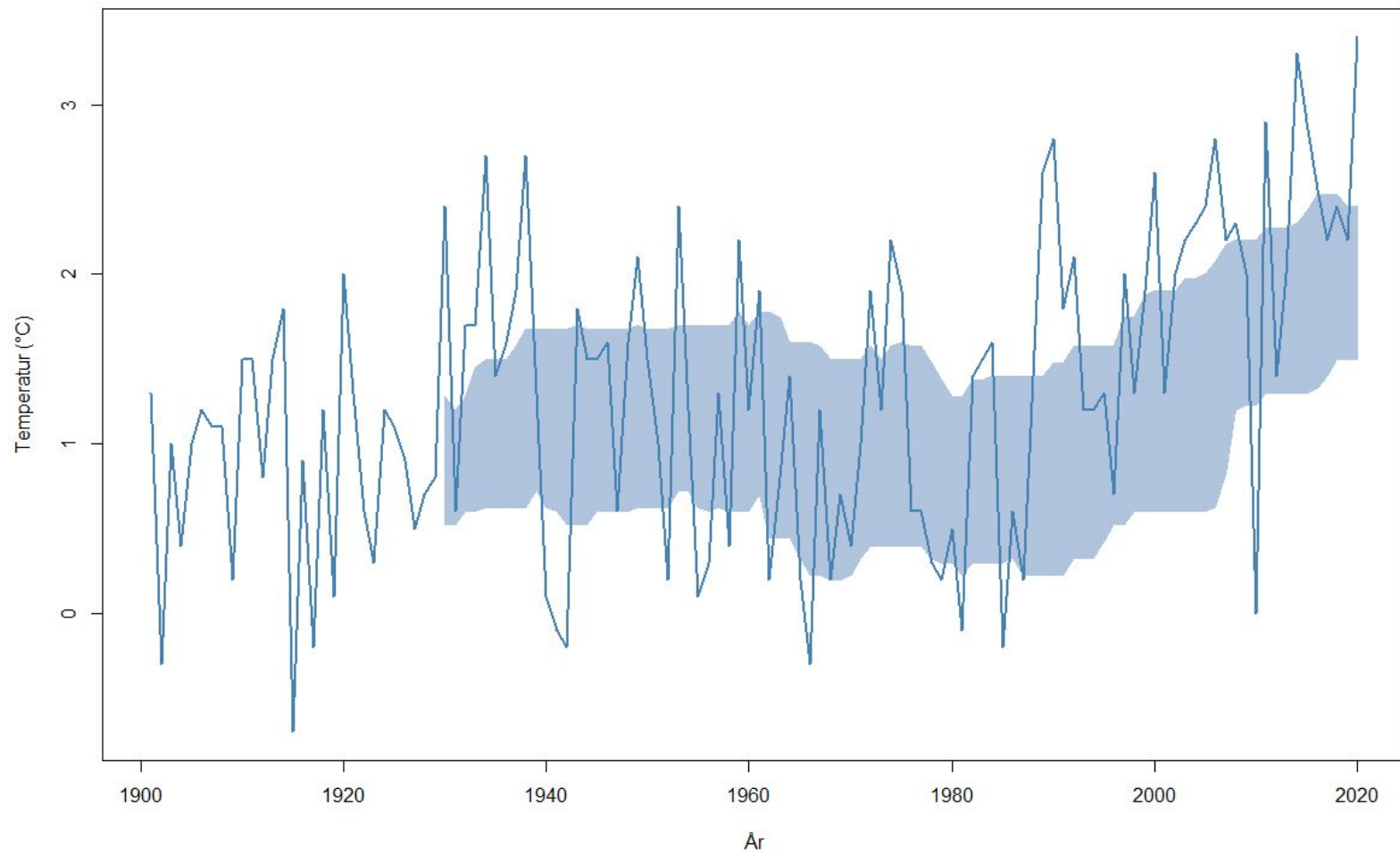
Årstemperatur Norge



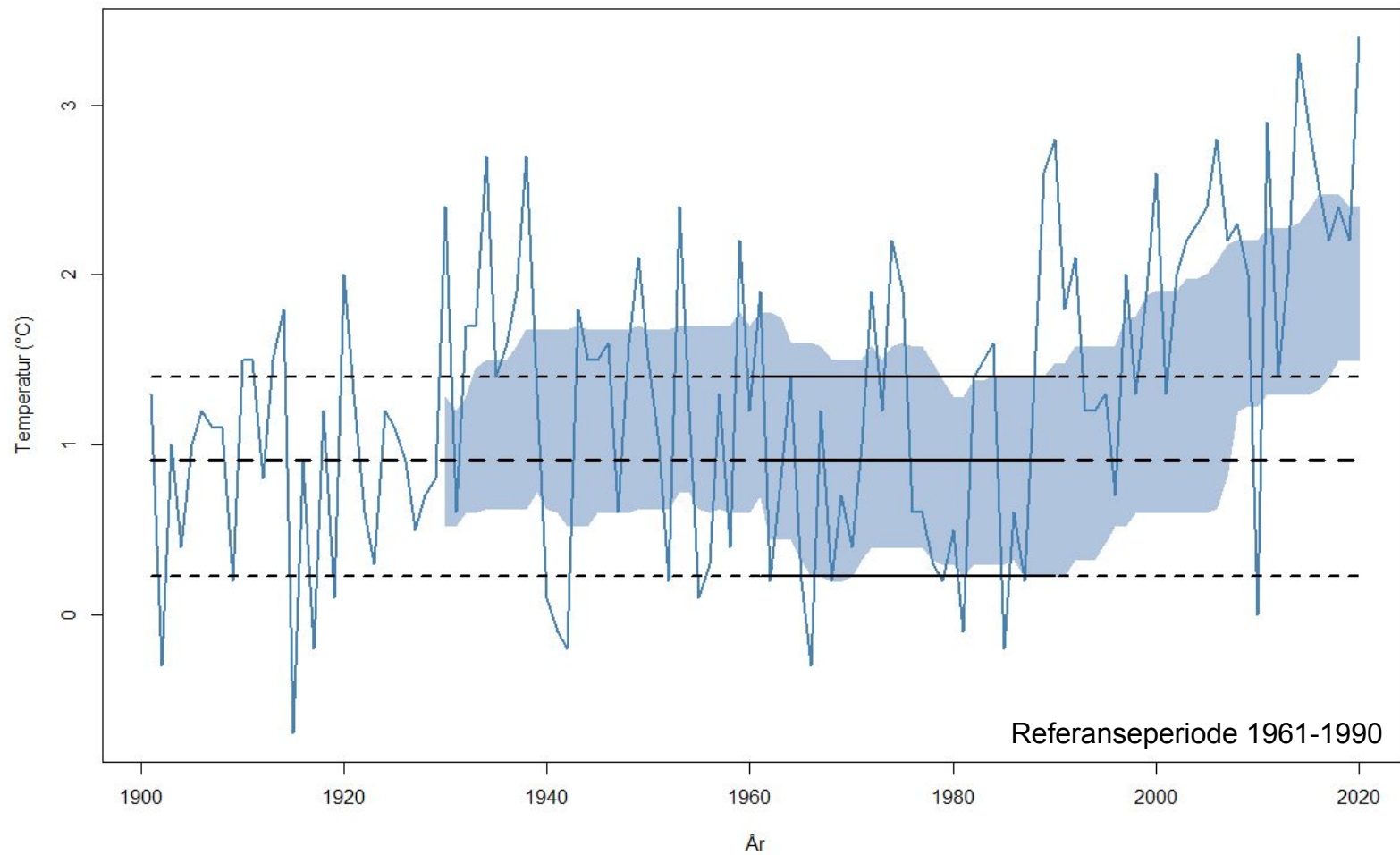
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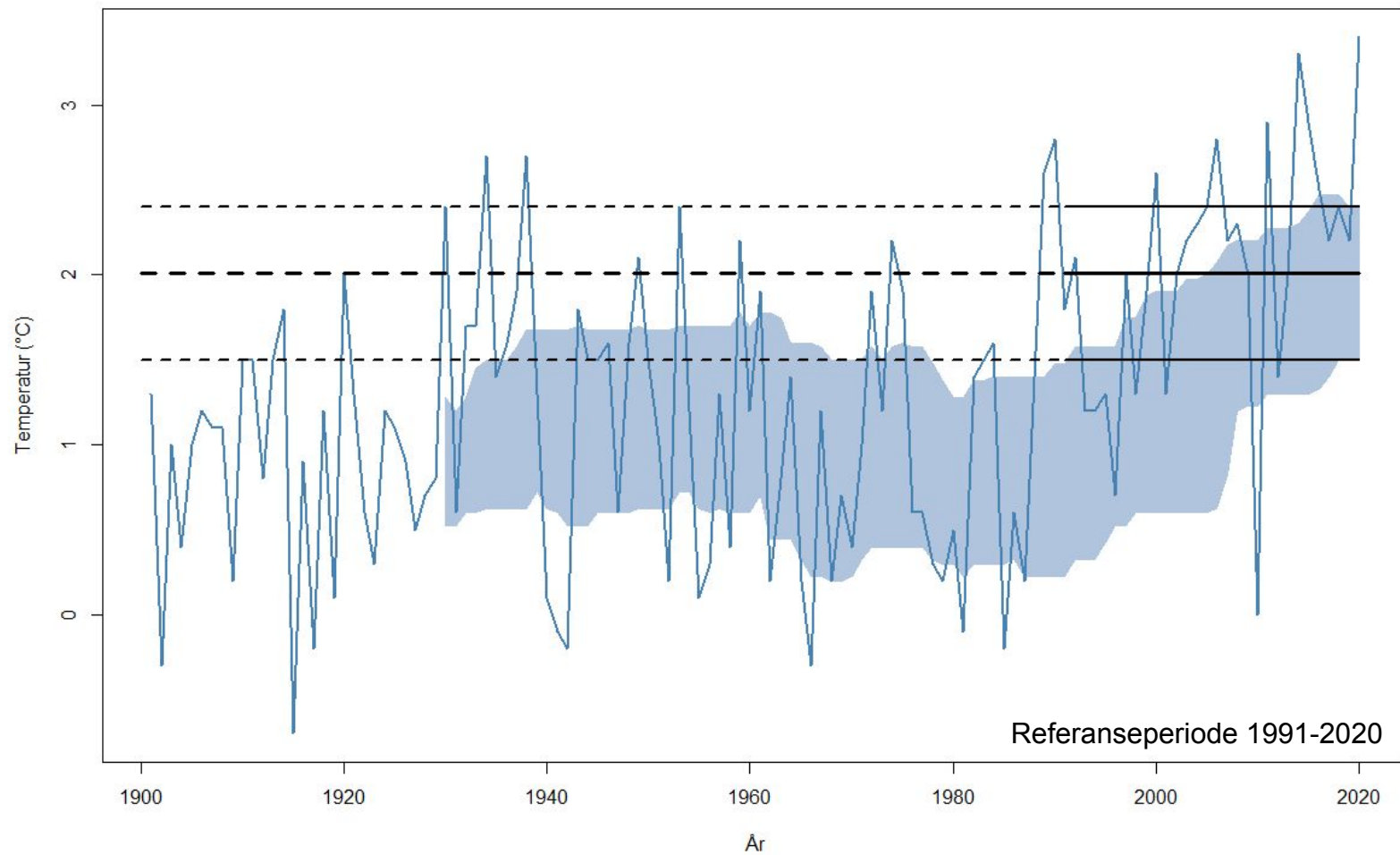
År - Norge

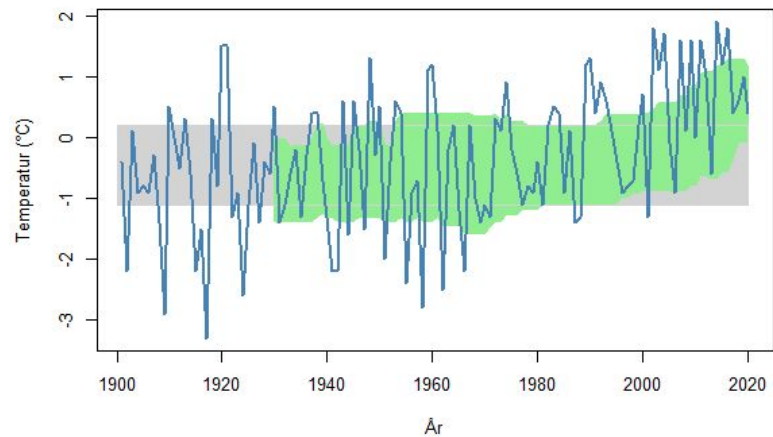
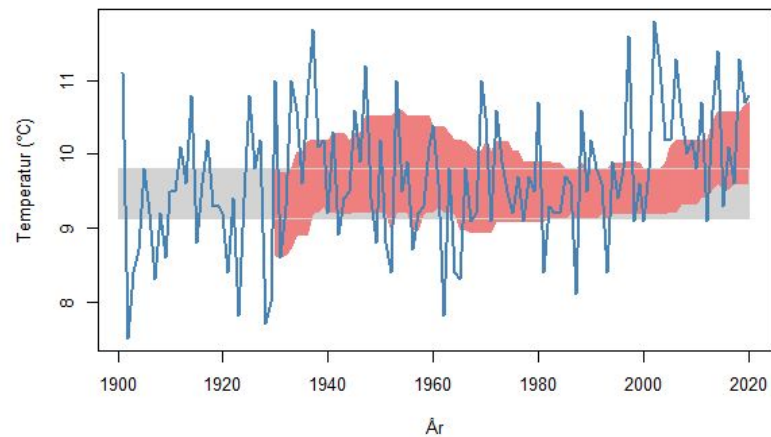
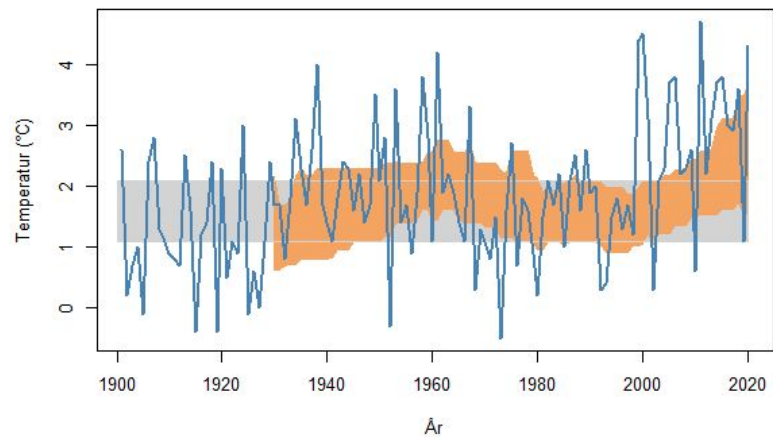
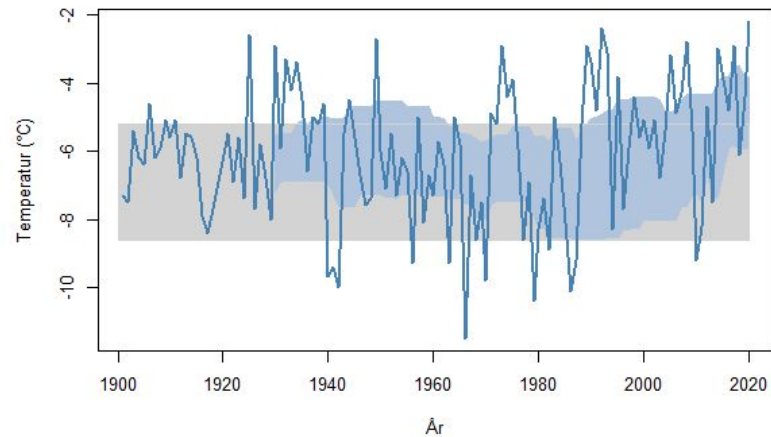


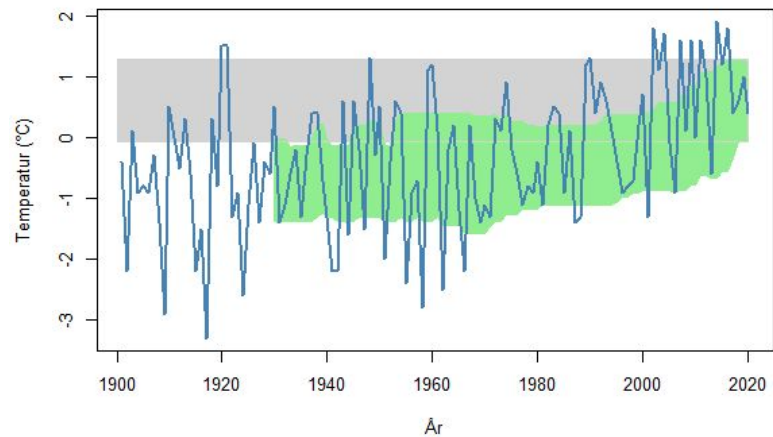
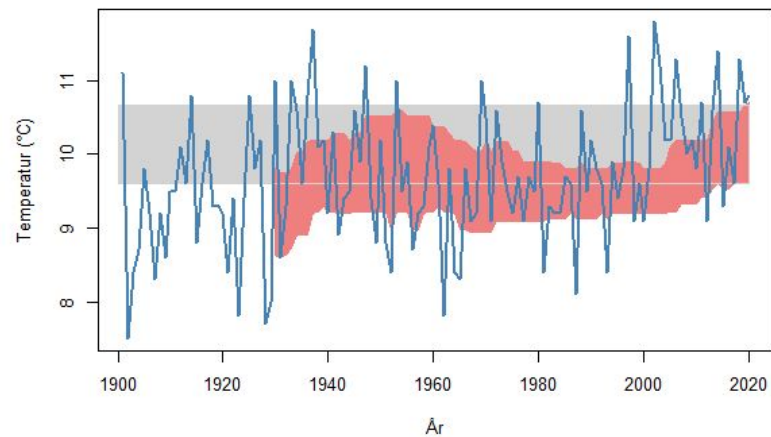
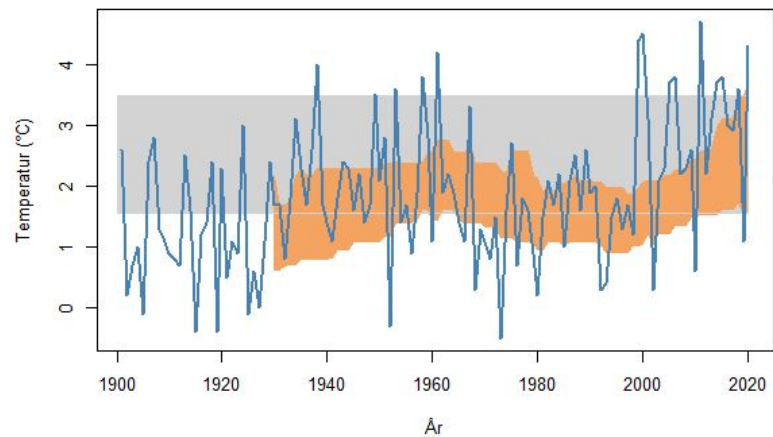
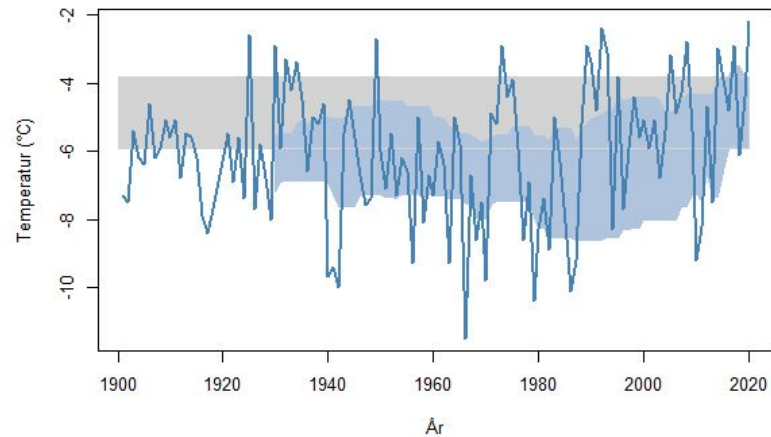
År - Norge



År - Norge

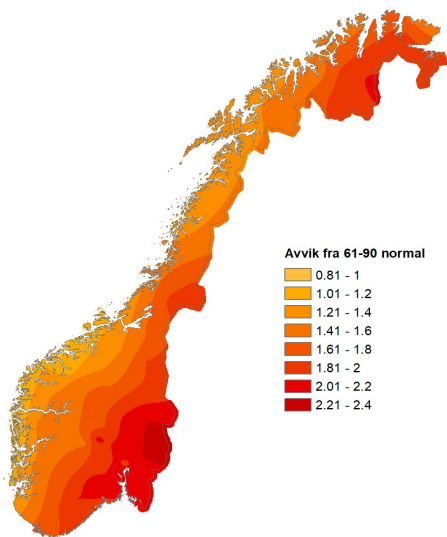


Vår**Sommer****Høst****Vinter**

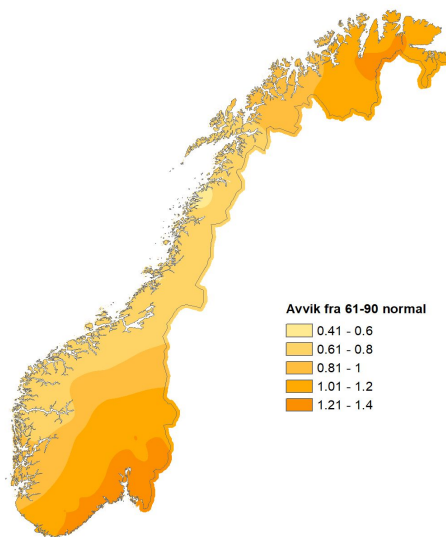
Vår**Sommer****Høst****Vinter**

Sesongendringer - temperatur

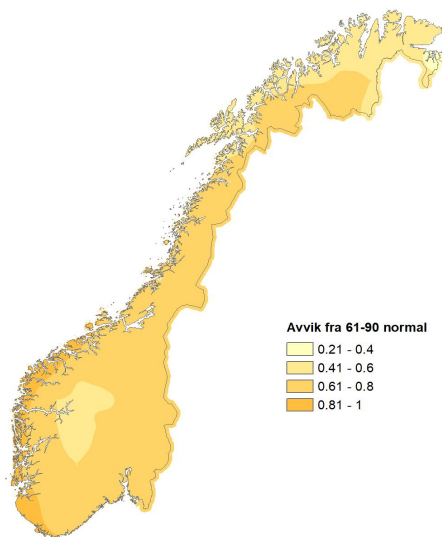
Vinter



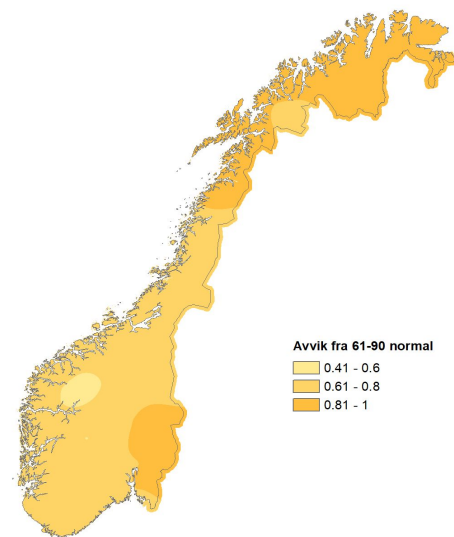
Vår



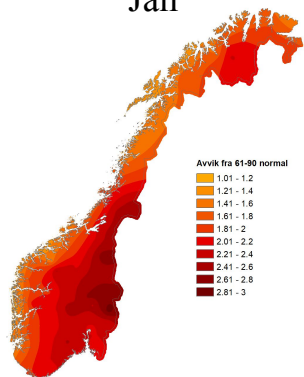
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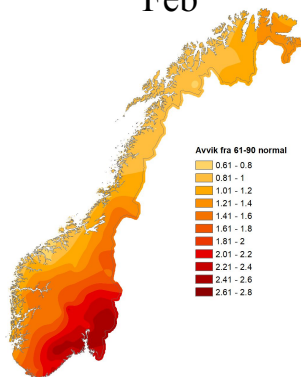
Høst



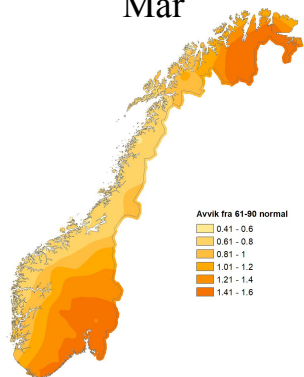
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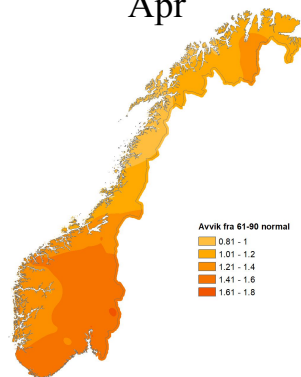
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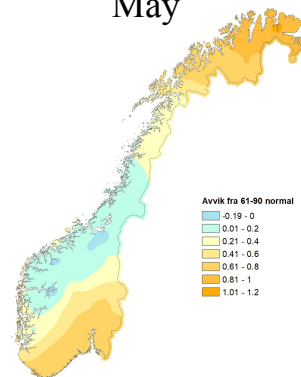
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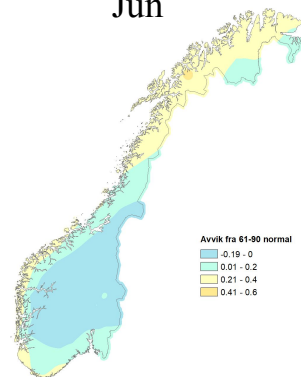
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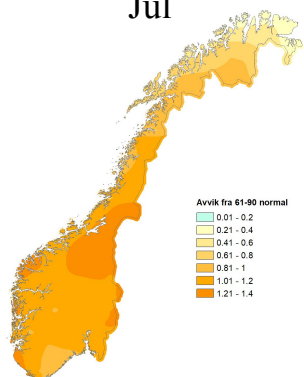
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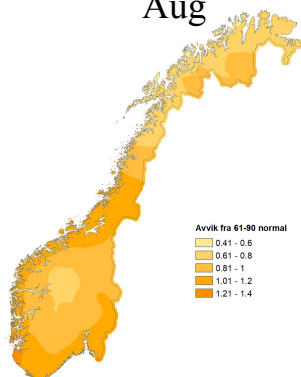
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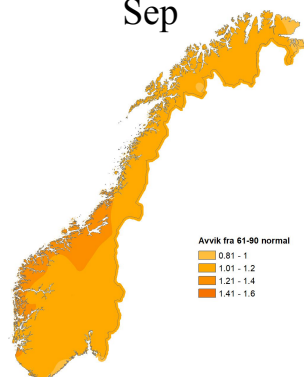
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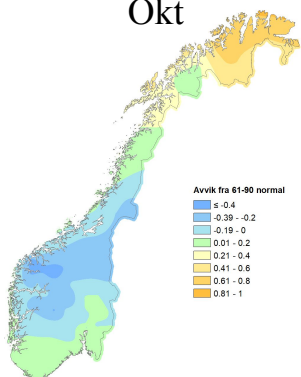
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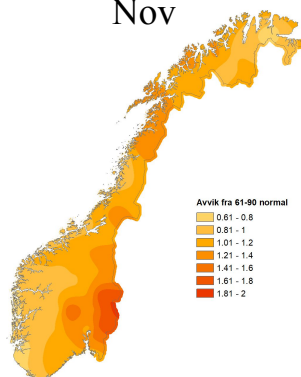
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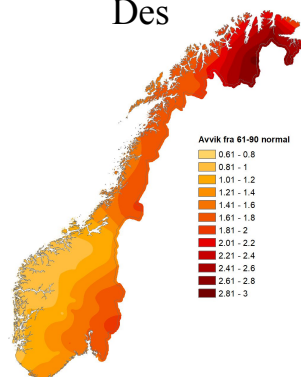
Okt



Nov

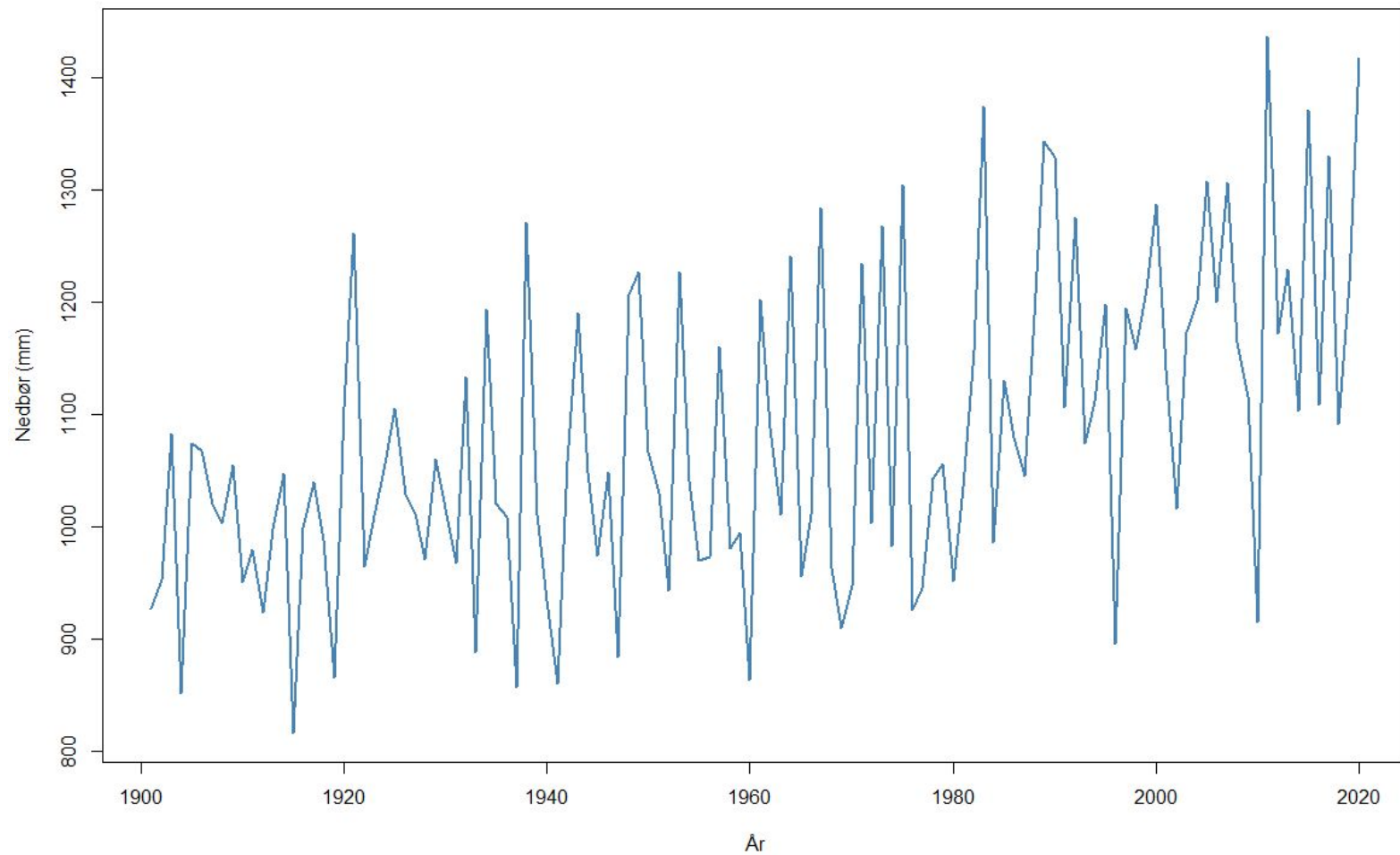


Des



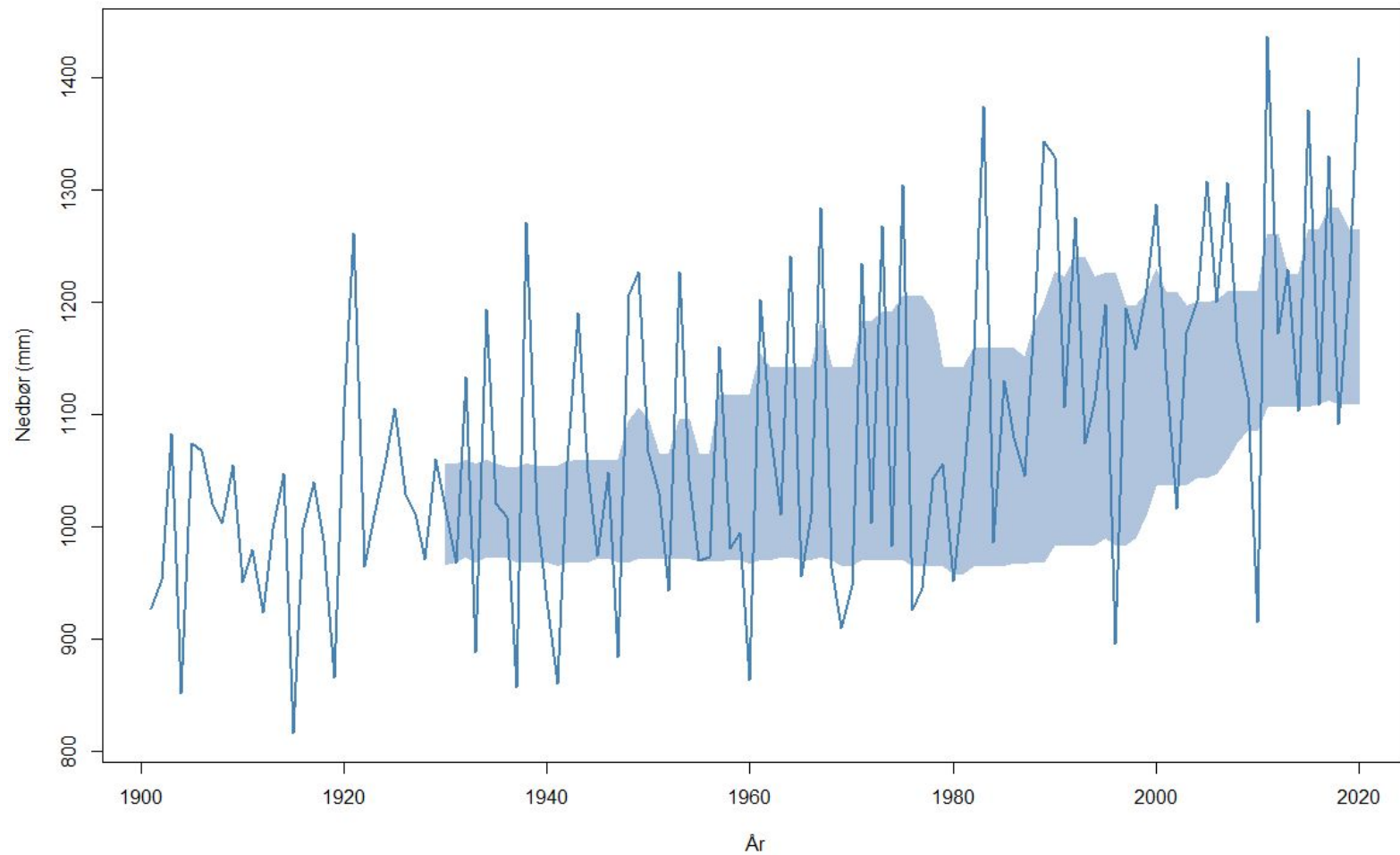
Nedbør

År - Norge



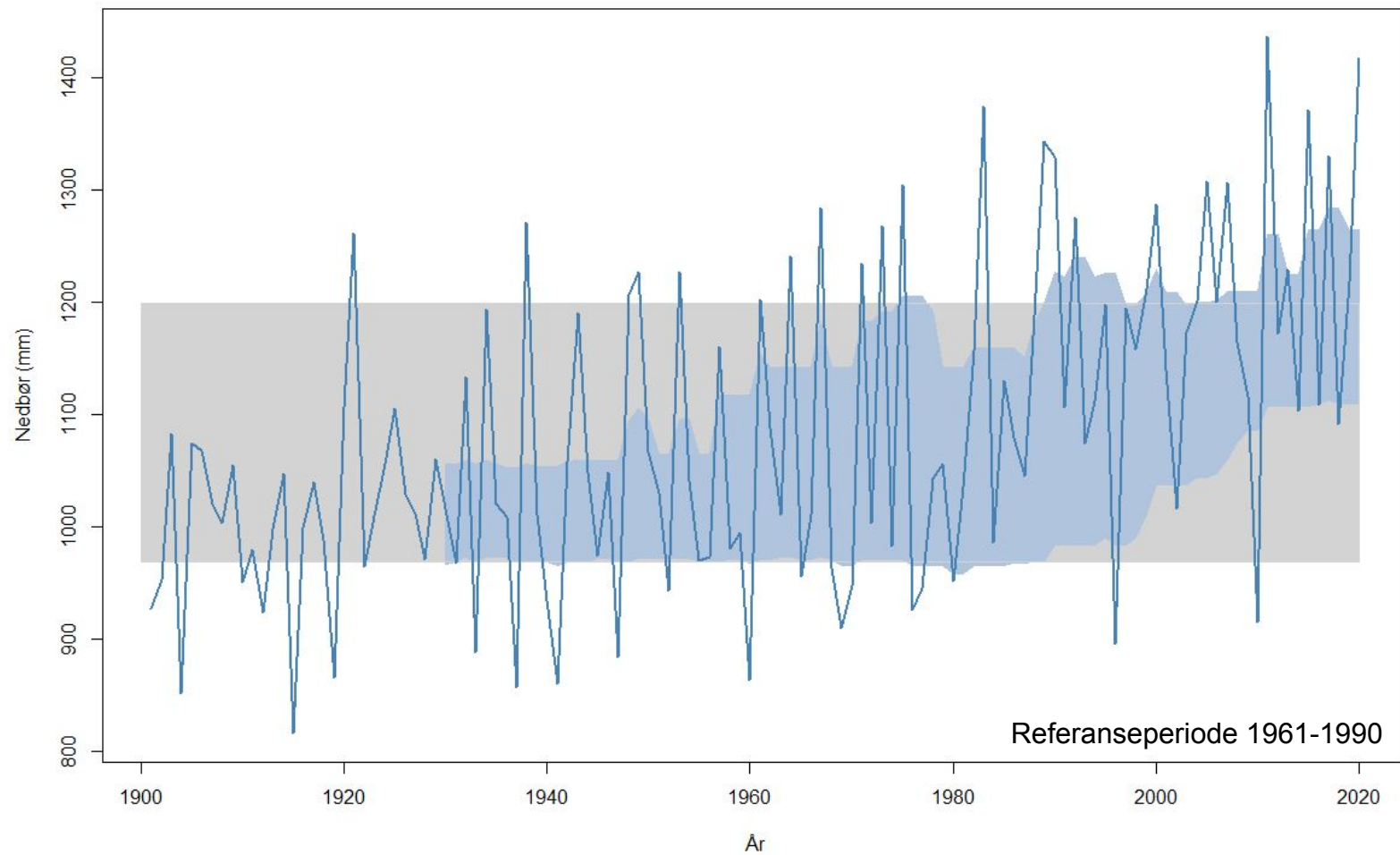
Nedbør

År - Norge



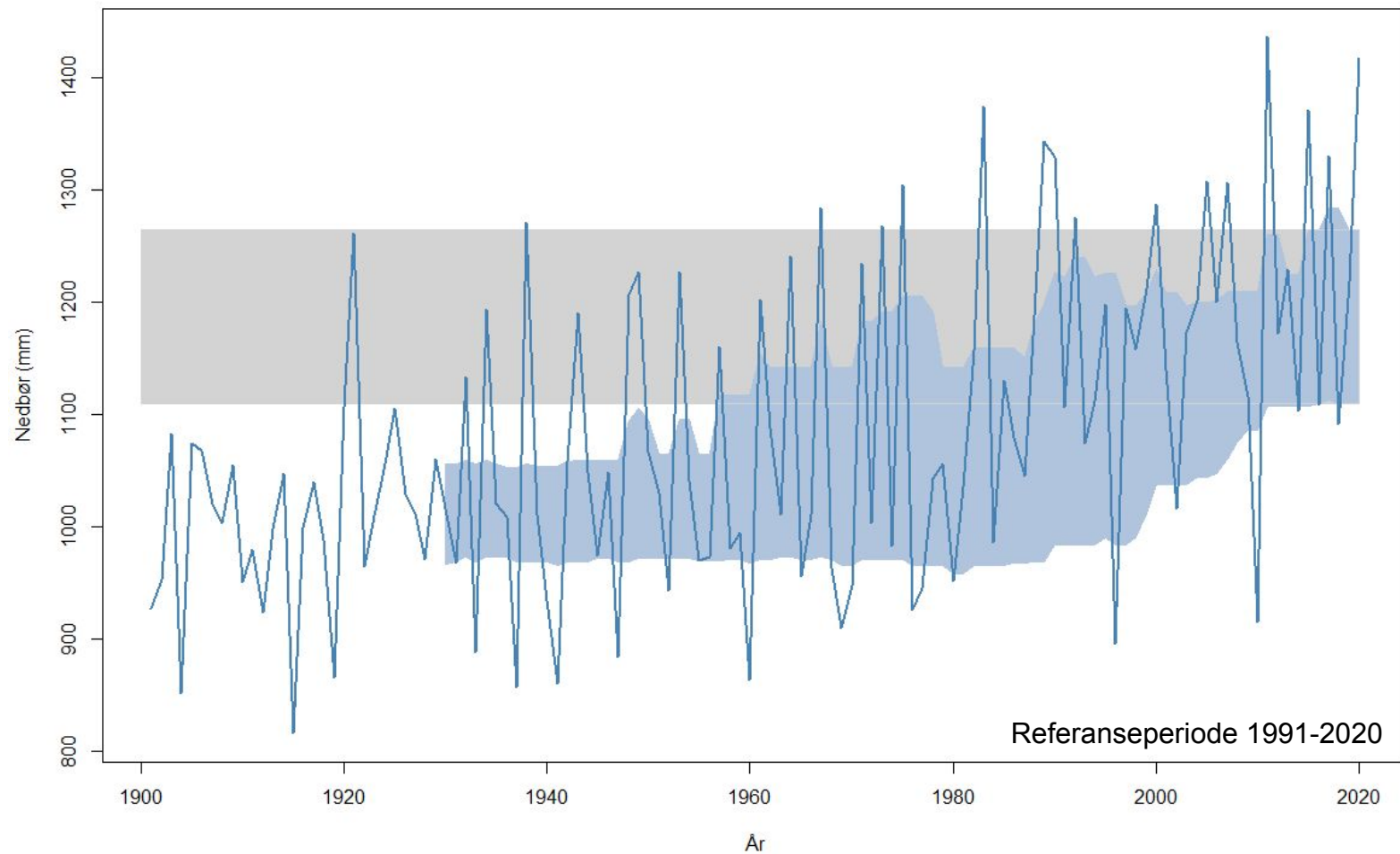
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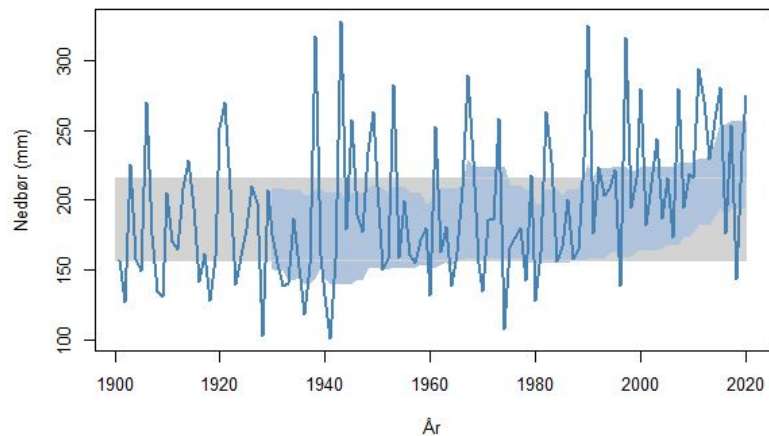
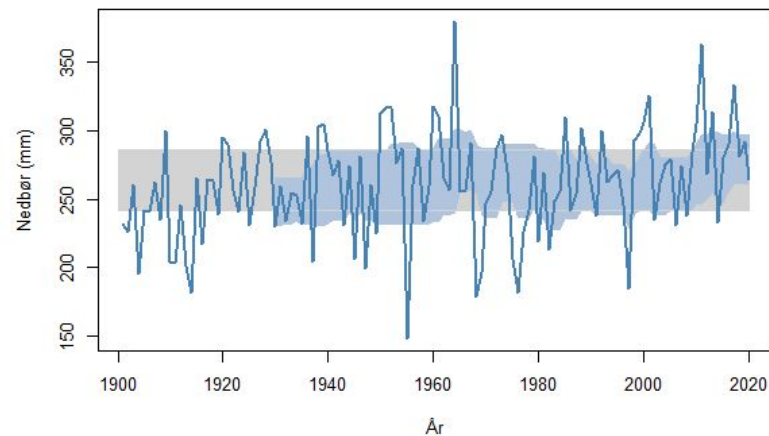
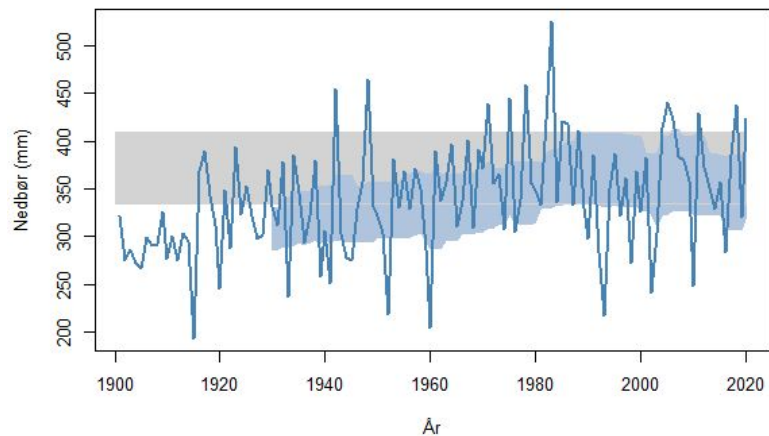
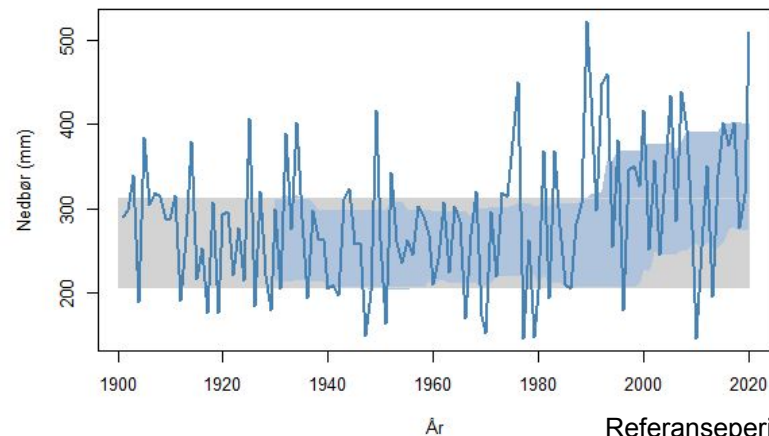
År - Norge



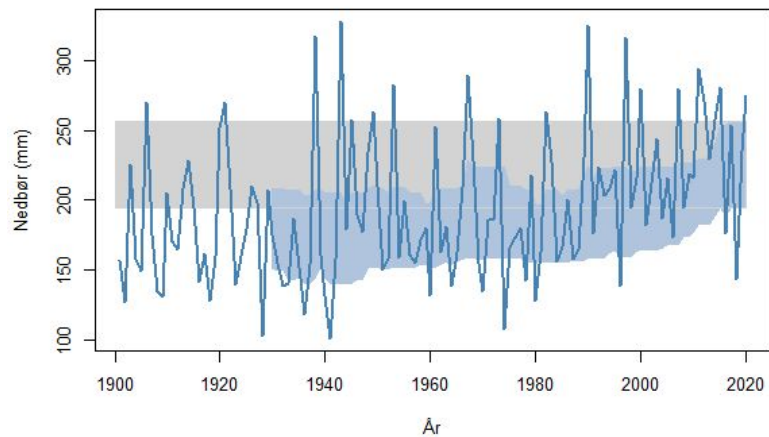
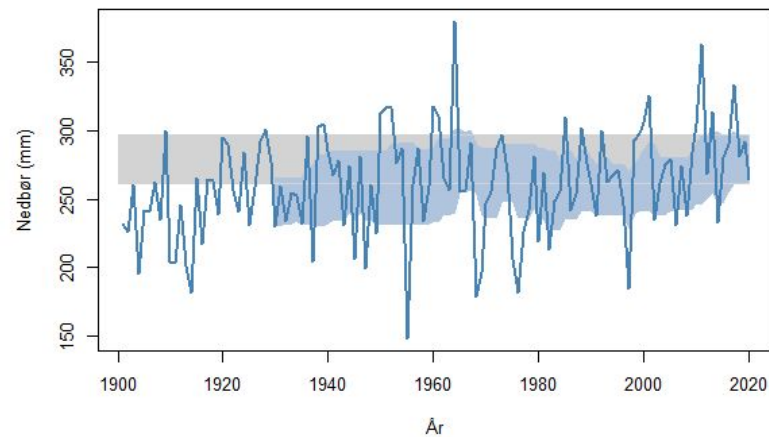
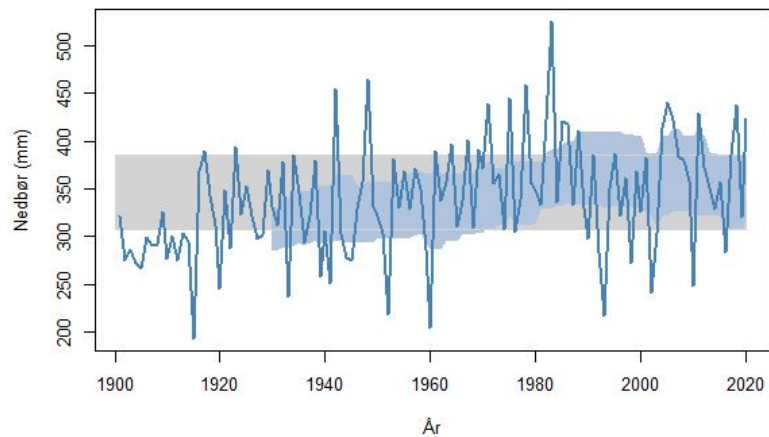
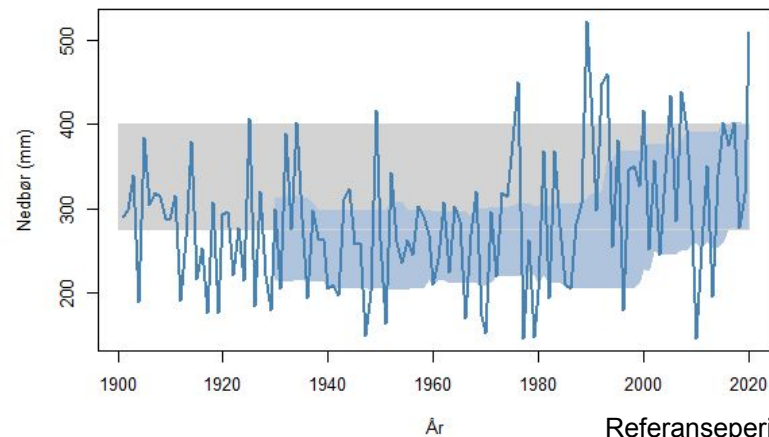
Nedbør

År - Norge



Vår**Sommer****Høst****Vinter**

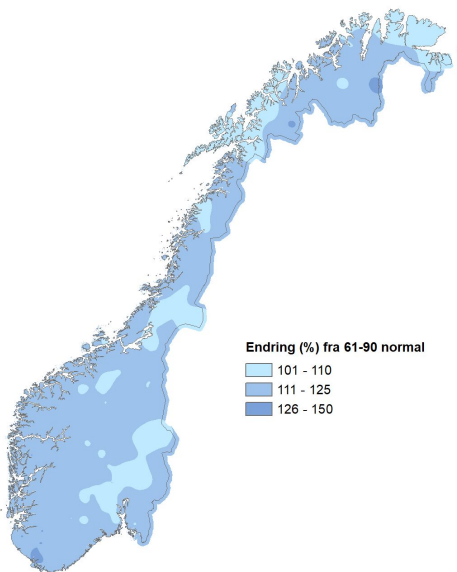
Referanseperiode 1961-1990

Vår**Sommer****Høst****Vinter**

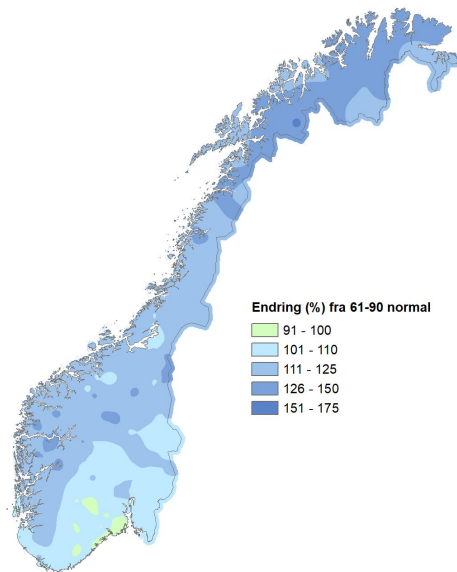
Referanseperiode 1991-2020

Sesongendringer - nedbør

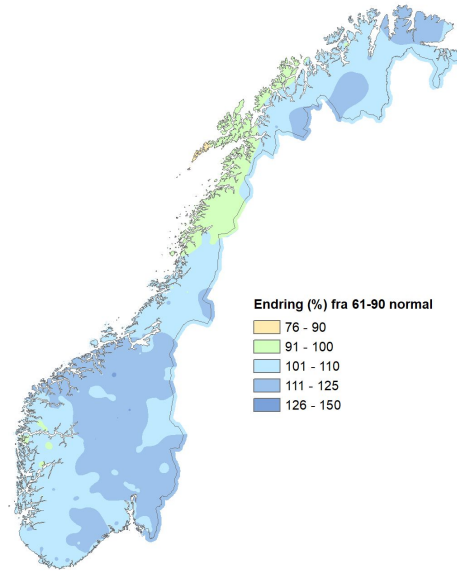
Vinter



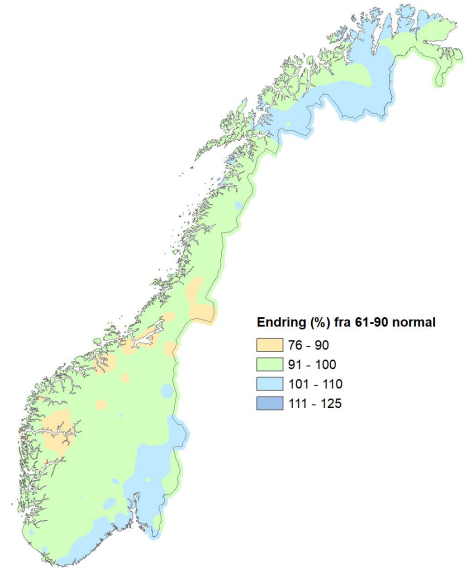
Vår



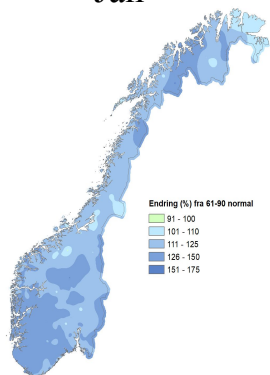
Sommer



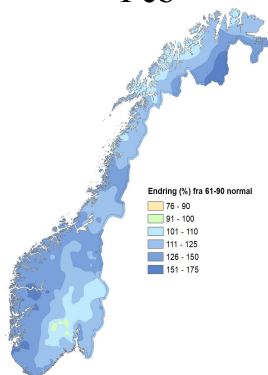
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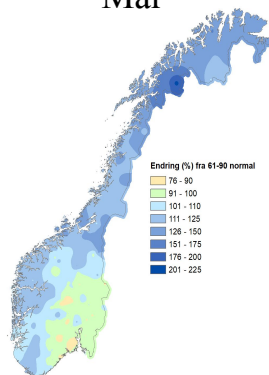
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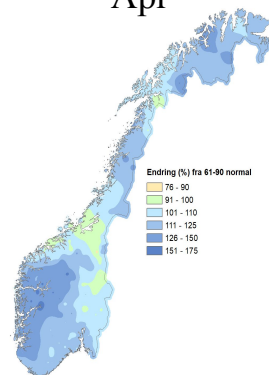
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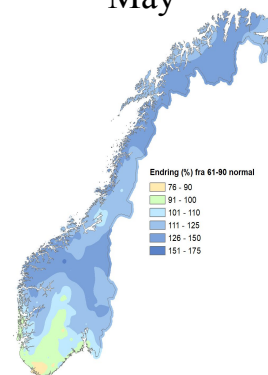
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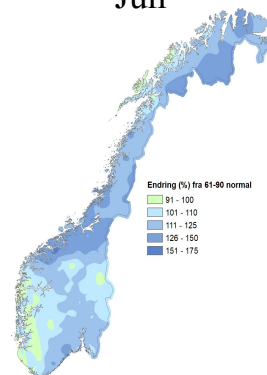
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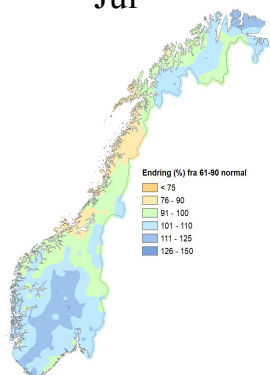
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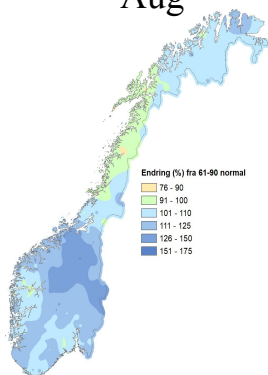
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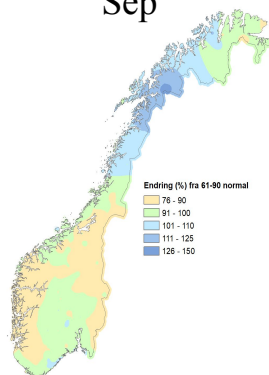
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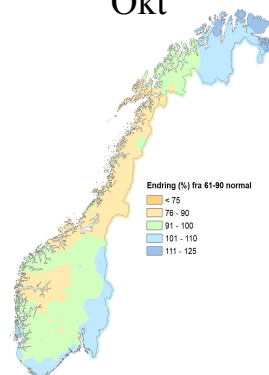
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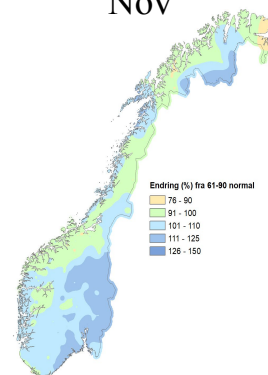
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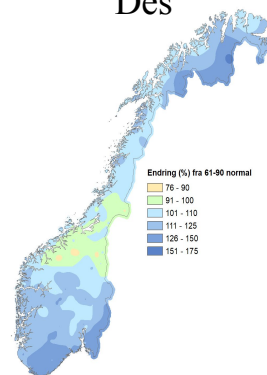
Okt



Nov



Des



Normaler skal kun representere variasjoner i været!

Værobservasjoner kan over tid påvirkes av andre **ytre forhold** enn bare været:

Endringer i miljøet rundt værstasjonene

- Bygningsmasse
- Arealbruk og vegetasjon

Endringer på stasjonen

- Endring i utstyr
- Skifte av observatør

Observasjonsnettet til MET har gjennomgått betydelige endringer i løpet av de siste 30 årene:

- Automatisering
- Ny sensorteknologi
- Har ofte medført til flytting av stasjonene

⇒ Alt dette er forhold som kan påvirke observasjonene slik at de kan inneholde trender som ikke bare er forårsaket været, og som dermed gjør at serien ikke er **homogen**

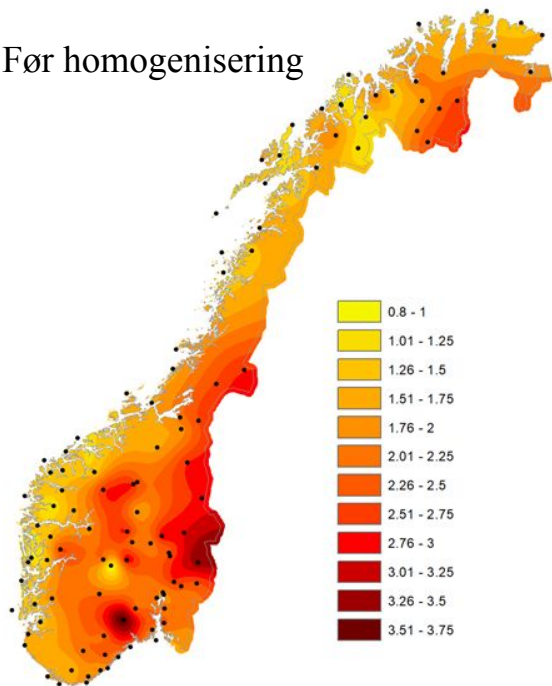
Homogenisering

Vi har lagt ned en stor jobb i å justere for slike effekter i observasjonsseriene våre slik at de mest mulig viser riktig variasjon i været:

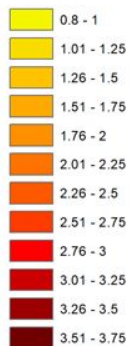
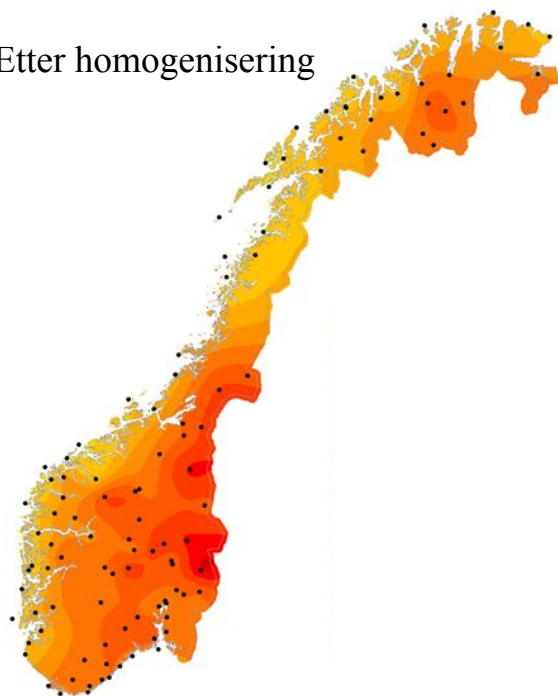
- Skjøting av serier etter flytting
- Korreksjon av homogenitetsbrudd forårsaket av dokumenterte hendelser på målestedet eller i måleserien

Effekten av homogenisering

Før homogenisering



Etter homogenisering



Homogenisering & komplettmentering

Vi har lagt ned en stor jobb i å justere for slike effekter i observasjonsseriene våre slik at de mest mulig viser riktig variasjon i været:

- Skjøting av serier etter flytting
- Korreksjon av homogenitetsbrudd forårsaket av dokumenterte hendelser på målestedet eller i måleserien

WMO (Verdens meteorologiorganisasjon) har strenge krav til beregning av normaler, bl.a. et krav til minst 80% datadekning i perioden.

- Interpolasjon (beregning) av manglende måleverdier

Så langt....

- 108 temperaturserier
- 324 nedbørserier

Alle justeringer og korreksjoner dokumenteres, og skal kunne reproduseres og etterprøves!

Hva nå?

- Første foreløpige stasjonsnormaler for nedbør og middeltemperatur basert på det homogeniserte datagrunnlaget publiseres nå.
- Homogenisert datagrunnlag for perioden 1961-1990 publiseres i løpet av kort tid.
 - På sikt utvide de homogeniserte dataene til å dekke hele perioden 1901-d.d.
- Normaler for ytterligere lokaliteter og klimavariabler vil bli publisert på våre nettbaserte tjenester fortløpende utover året.

Normalverdier nedbør, 1991-2020

Stnr	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Ok	Nov	Dec	År
60	31.4	38.4	40.7	69.9	85.3	85.1	108.9	85.5	78.1	60.2	82.1	60.2	82.1
100	57.0	38.9	34.7	41.5	68.4	79.4	91.6	105.8	80.6	79.8	75.0	59.6	812.2
420	36.3	26.0	24.0	30.6	63.4	70.1	87.2	97.0	69.6	64.5	58.9	41.4	669.9
630	31.8	23.0	21.9	28.1	53.8	68.4	85.6	84.3	85.5	68.4	64.0	51.2	589.8
700	34.0	26.2	25.2	26.7	50.7	71.8	85.0	87.6	57.8	51.3	42.1	31.8	506.5
730	57.8	44.3	41.8	39.4	61.0	80.1	97.7	101.3	68.0	69.0	66.7	52.0	779.2
770	40.3	30.5	21.9	27.4	54.0	74.0	80.6	92.9	58.0	54.3	50.0	35.6	635.9
810	41.5	34.3	29.8	27.3	53.6	71.4	85.0	92.0	61.1	55.2	53.0	40.1	644.4
1080	66.4	50.8	46.3	48.6	53.4	75.0	67.2	91.0	85.5	102.0	91.3	79.4	859.3
1230	70.5	53.4	45.7	47.8	55.5	69.3	73.3	95.2	84.0	104.1	95.7	86.3	881.4
1400	76.7	56.8	49.1	51.2	61.5	81.5	82.0	98.6	88.4	107.9	98.8	91.9	944.2
1650	72.0	52.9	46.0	45.3	60.5	79.3	82.1	96.8	82.4	102.3	92.3	84.6	896.5

Normalverdier, temperatur, 1991-2020

4740	Stnr	Jan	Feb	Mar	Apr	Mai	Jun	Jul	Aug	Sep	Ok	Nov	Dec	År
5350	7590	-8.7	-5.7	-5.6	0.2	5.6	10.0	12.7	11.2	6.9	3.8	7.8	1.2	
6020	4810	-4.1	-4.1	-0.5	4.6	10.1	14.3	16.5	15.1	10.7	5.0	0.5	-1.4	5.4
6440	4850	-4.5	-3.9	-0.1	4.8	10.2	12.9	16.2	14.8	10.5	5.1	0.6	-0.5	5.1
6620	5920	-5.0	-4.3	-0.3	4.7	10.2	14.3	16.7	15.2	10.7	5.2	0.6	-3.8	5.4
7900	6020	-5.1	-4.9	-0.4	4.8	10.2	14.4	16.7	15.0	10.5	4.9	-0.1	-4.7	5.1
7950	7900	-4.4	-2.5	-2.5	2.4	8.2	12.9	15.2	13.1	8.8	2.7	-2.4	-2.7	2.8
8720	10380	-8.5	-8.1	-4.7	0.2	5.4	9.6	12.4	11.0	6.9	1.2	-4.1	-8.2	1.3
9120	8720	-4.7	-4.8	-0.8	4.3	9.8	13.8	16.1	14.7	10.5	4.8	0.1	-3.8	5.0
9160	12550	-4.9	-5.0	-1.0	4.0	9.4	13.8	16.3	15.2	11.0	5.4	0.6	-3.6	5.1
9870	12680	-6.1	-5.4	-1.2	4.0	9.4	13.7	16.1	14.5	10.1	4.1	-1.2	-5.5	4.4
10320	13855	-7.6	-7.3	-4.6	-0.1	4.8	9.1	11.6	10.2	6.5	0.5	-4.4	-7.0	-8.9
10380	13730	-6.0	-5.9	-3.9	1.6	6.3	10.3	13.0	11.7	7.5	1.7	-2.9	-5.7	2.4
10660	14560	-6.2	-5.9	-2.7	1.9	6.5	10.7	13.2	11.9	8.8	2.1	-2.9	-4.2	2.5
10660	14610	-6.5	-4.8	-4.8	-0.6	4.1	8.3	11.1	9.9	6.0	0.6	-3.8	-4.0	1.0
10800	17150	-1.7	-1.5	1.3	5.9	11.0	14.8	17.2	16.3	12.2	7.2	2.9	-0.6	7.1
10820	17850	-2.6	-2.6	-2.6	0.6	5.5	10.7	14.5	16.4	13.5	8.4	1.8	-1.9	4.5
11120	18700	-2.8	-2.9	1.4	6.2	11.4	15.3	17.7	16.5	12.2	6.5	2.2	-1.4	7.0
11710	18990	-3.5	-3.7	-1.1	3.3	8.4	12.1	14.5	13.4	9.3	4.1	-0.1	-2.6	4.5
12200	18910	-2.6	-2.3	0.7	5.3	10.6	14.4	16.7	15.6	11.3	6.0	1.7	-1.7	6.3
12520	22480	-6.7	-6.1	-2.7	2.2	7.2	11.5	13.9	12.4	8.0	2.3	-2.5	-4.2	2.8
12600	23160	-6.8	-6.2	-3.1	1.7	6.6	11.0	13.4	11.8	7.6	1.9	-3.0	-6.3	2.4
12820	23500	-7.2	-6.9	-2.4	2.5	7.4	11.8	14.4	12.8	8.5	2.5	-2.7	-4.9	2.9
13400	24810	-7.5	-6.8	-0.4	4.4	9.4	13.8	16.1	14.2	9.7	3.1	-2.6	-7.2	3.9
13410	24630	-6.2	-4.0	-3.6	0.5	5.5	9.9	12.4	11.1	7.4	1.9	-2.8	-5.6	2.0
13310	21930	-1.7	-1.4	1.4	3.8	11.2	14.9	17.1	16.1	12.1	7.0	2.8	-0.9	7.1
13640	27900	1.0	0.3	2.2	5.9	11.0	15.0	17.4	17.5	14.0	9.4	5.5	2.6	8.5
13700	28180	-4.3	-3.2	0.4	5.2	10.5	14.5	16.7	15.2	10.8	5.0	0.2	-3.7	5.8
14050	31720	-6.2	-7.8	-4.0	-0.1	5.1	9.4	12.0	10.4	6.5	1.1	-4.0	-7.8	1.8
14550	31650	-6.4	-6.7	4.5	-0.4	4.3	8.9	11.2	10.2	6.5	1.7	-2.6	-5.4	1.4
14711	32080	-2.8	-2.2	1.3	5.9	11.0	14.7	16.9	15.6	11.5	6.0	1.4	-2.2	8.4
15430	34330	0.6	0.2	2.3	6.1	10.9	14.4	17.2	16.9	13.5	8.4	4.8	1.7	8.1
15480	34240	1.2	0.7	2.6	6.1	10.9	14.7	17.0	16.8	13.5	8.9	5.1	2.2	8.3
15660	39360	1.6	1.1	2.7	5.8	10.4	14.2	16.4	16.4	13.5	9.2	5.4	2.6	8.3
15660	36360	-1.6	-1.5	1.3	5.5	10.6	14.5	16.7	15.7	11.6	6.7	2.6	-0.9	6.8
16010	37230	-2.0	-2.1	0.5	4.7	9.5	13.6	15.9	14.7	11.0	5.9	1.9	-1.1	6.0
17150	38140	0.1	0.1	2.4	6.4	11.2	14.6	16.9	16.1	13.6	8.0	4.2	1.1	7.8
17251	39040	0.2	0.2	2.3	6.0	10.7	14.4	16.6	16.0	12.4	7.9	4.0	0.9	7.6
17520	40300	2.2	1.5	1.6	5.9	10.1	13.6	16.0	16.2	13.4	9.4	5.0	2.4	8.0
17742	39750	1.0	1.4	0.9	5.0	9.7	13.0	16.1	15.2	11.8	6.9	3.1	0.1	6.7
17850	41775	-1.1	-1.3	0.9	5.0	10.0	13.6	15.4	14.0	10.4	6.1	2.4	-0.4	6.2
18110	42160	2.9	2.1	3.2	6.1	9.9	13.0	15.6	14.2	9.8	6.3	4.0	4.0	8.4
18450	44680	2.7	1.9	3.2	6.2	9.8	12.7	15.4	15.9	13.5	9.4	6.0	3.7	8.3
18500	44660	2.6	2.1	3.7	6.0	10.2	13.0	15.3	15.7	13.2	9.2	5.7	3.4	8.4
18970	46970	2.8	2.0	3.7	7.0	10.3	13.4	15.6	15.7	13.0	9.0	5.7	3.3	8.5
19100	46610	-0.2	-0.2	2.3	6.3	10.1	13.5	15.6	15.1	12.0	7.2	3.2	0.5	7.1
19610	46930	1.4	1.0	2.9	6.4	10.0	13.0	15.1	14.8	11.9	7.9	4.5	2.1	7.6
19710	47030	1.6	1.8	3.5	5.9	9.0	11.9	14.3	14.3	12.0	8.5	5.0	4.4	8.3
19830	48330	3.7	3.0	3.9	6.4	9.3	12.1	14.5	15.3	13.2	9.8	6.7	4.7	8.5
20250	50310	-1.8	-2.2	-0.3	3.1	7.2	10.7	12.8	12.3	9.3	5.0	1.3	-1.3	4.7
20500	50500	2.1	1.7	3.0	6.3	9.5	12.3	14.5	14.5	12.0	8.1	4.8	2.7	7.6
20640	50640	2.6	2.3	3.8	7.2	10.7	13.6	15.6	15.4	12.6	8.6	5.3	3.1	8.4
21330	51330	-2.0	-2.1	1.6	5.3	9.8	13.5	15.8	14.8	11.9	5.8	1.6	-1.4	6.1
21940	52310	-0.8	-1.1	0.9	4.5	8.4	11.9	14.2	13.7	10.4	6.1	2.9	0.8	6.5
22990	52990	3.4	2.8	3.4	5.9	8.7	11.4	13.7	14.1	12.2	8.6	5.9	4.0	7.8
23140	53140	3.9	3.2	3.8	5.8	8.1	10.7	13.2	14.2	12.5	9.2	6.5	4.5	7.9
23210	53210	3.0	2.5	3.3	5.4	8.6	10.7	13.0	13.7	11.8	8.2	5.5	3.8	7.4
26720	56720	-4.7	-4.5	-1.9	2.2	6.6	10.4	13.1	12.8	8.2	2.6	-1.9	-4.7	3.1
26930	56930	-2.7	-2.8	-0.5	3.6	7.9	11.7	14.7	13.9	10.2	4.8	0.5	-2.1	4.9

Side 1 av 2

Takk for oppmerksomheten

