

APPENDIX A – DEL 1 af 2

A1 Model area for the two study: Ringkøbing fjord catchment and Mid-Zealand catchment

Figur A1-1 ti A1-3 viser de to forskellige oplande i NIFA-projektet: (1) Oplandet til Ringkøbing fjord og (2) Oplandet til Suså-Tryggevælde å-Køge å-Langvand å i Midtsjælland. De to oplande er velegnede til opgaven, da de opfylder behov for problemstillinger med akvifer bæredygtighed (saltvandsind- og optrængning) samt påvirkning af recipientmæssig bæredygtighed (environmental/ecological flow) (Navarro and Schmidt, 2012; Arthington & Tharme, 2003; Henriksen and Refsgaard, 2013).

I figurerne ses afgrænsningen af det modellerede modelområdet for de to oplande. På kortene er desuden vist topografi, vandløbssetup (incl. tilføjede små vandløb vist med lyseblåt), placering af vandføringsmålestationer(Q-stationer) samt performance (NSE) for modelkørsler fra 1989-2018(de historiske modelkørsler).

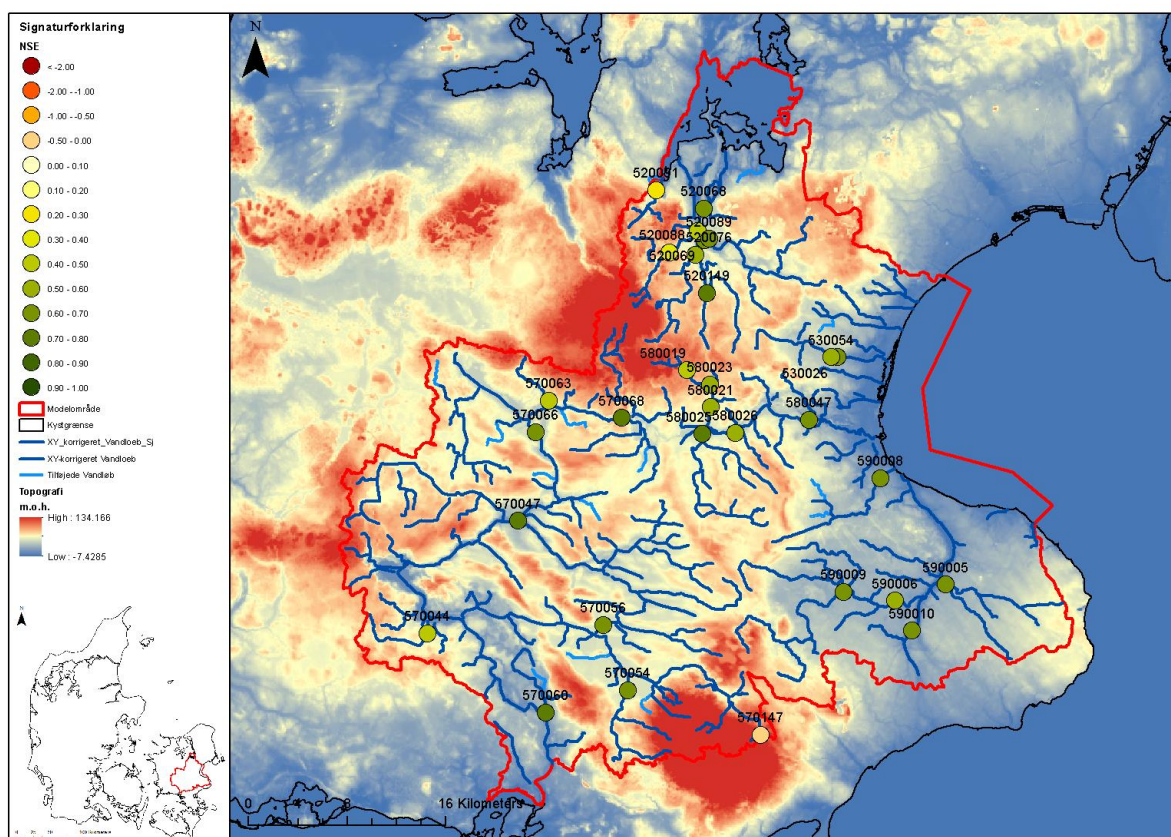
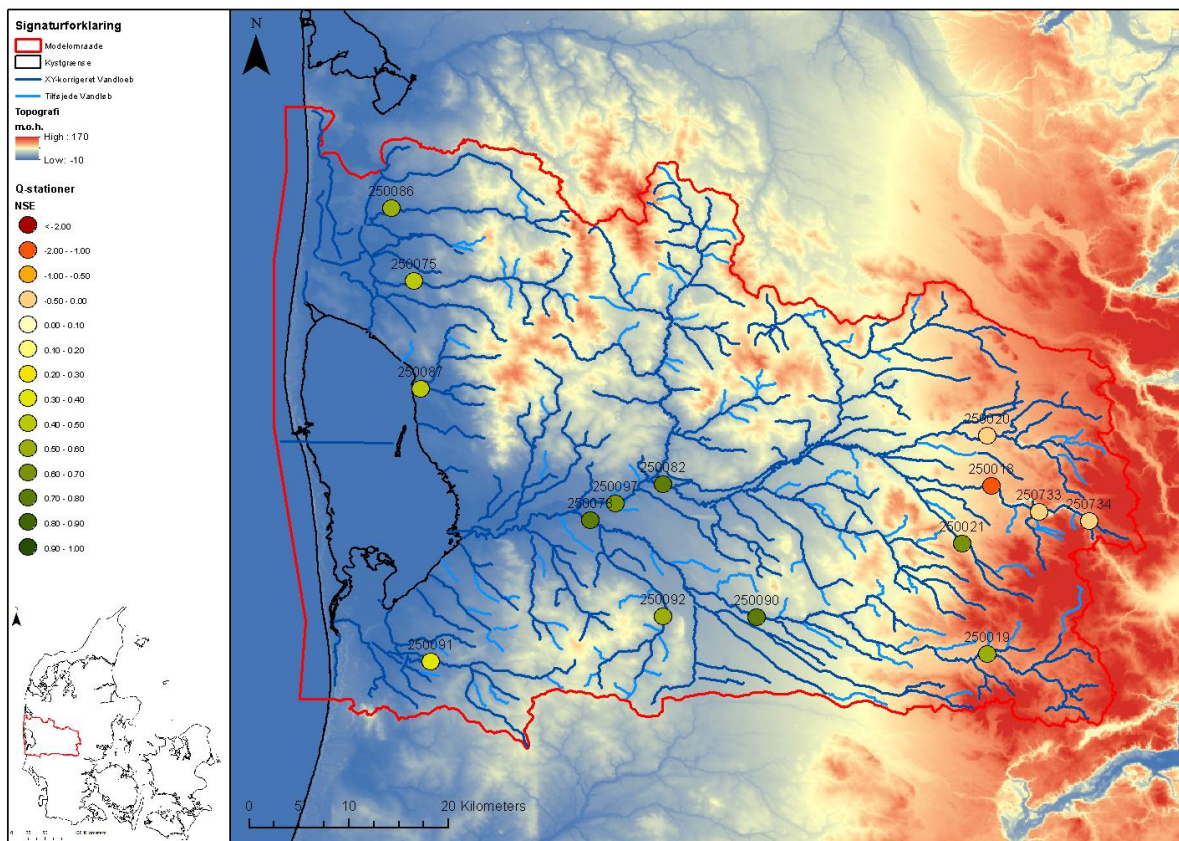


Figure A1-1: Location and the performance (NSE) for the discharge station in the Ringkøbing catchment(upper figure) and in Mid-Zealand catchment(lower figure).

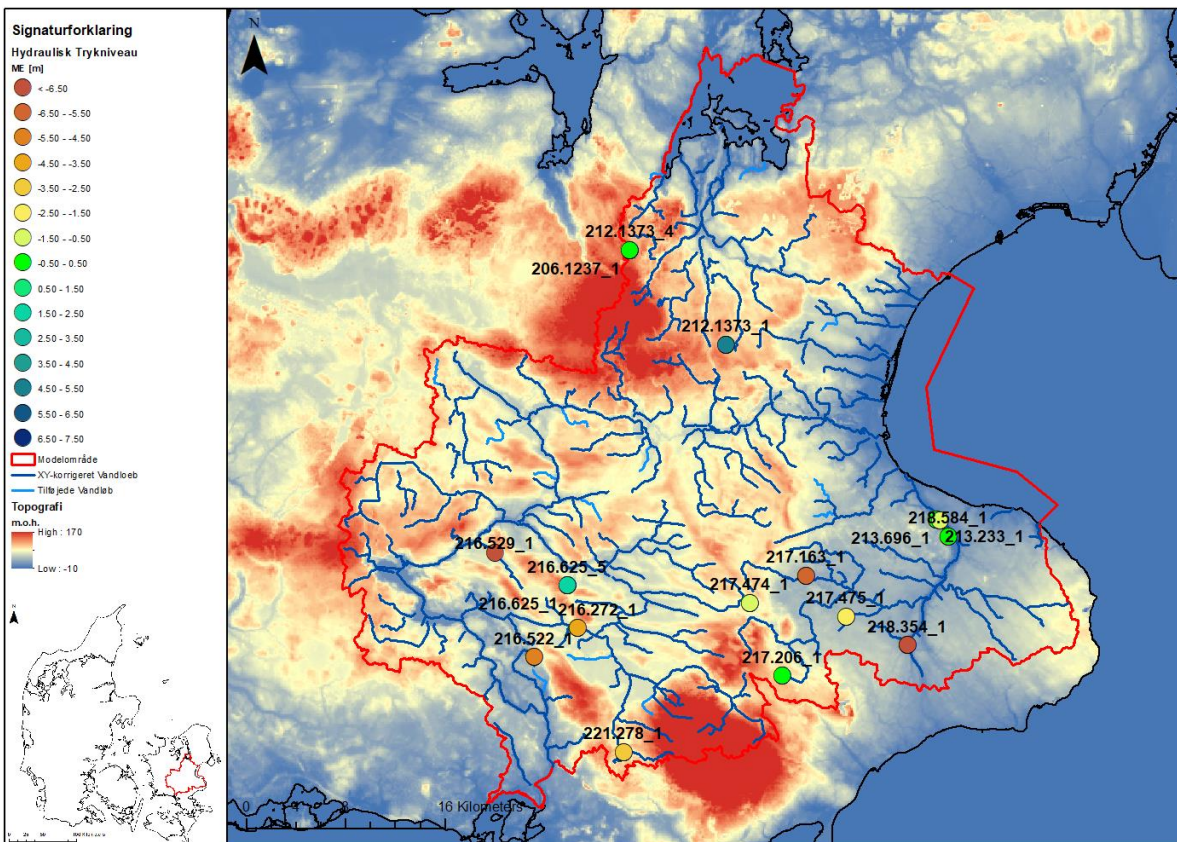
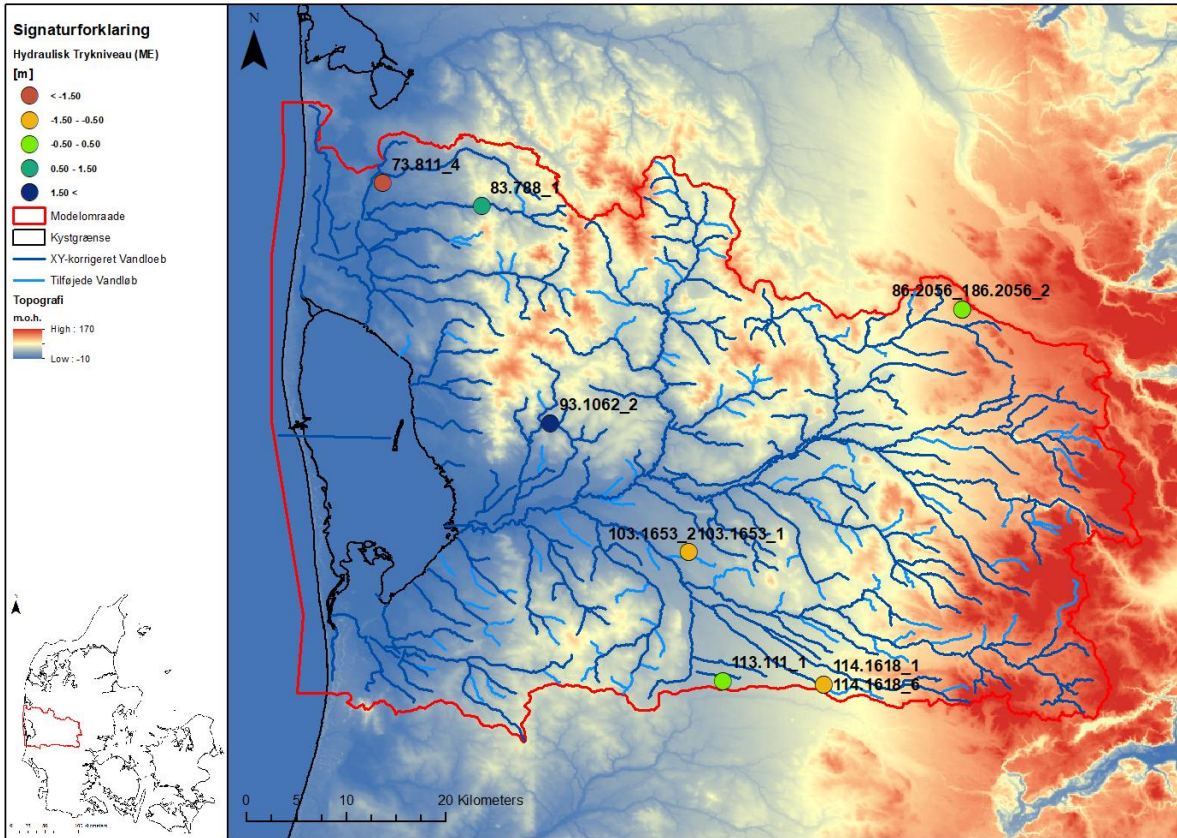


Figure A1-2: Figure shows the location and the performance (ME) for the wells in the Ringkøbing catchment(upper figure) and in Mid-Zealand catchment(lower figure).

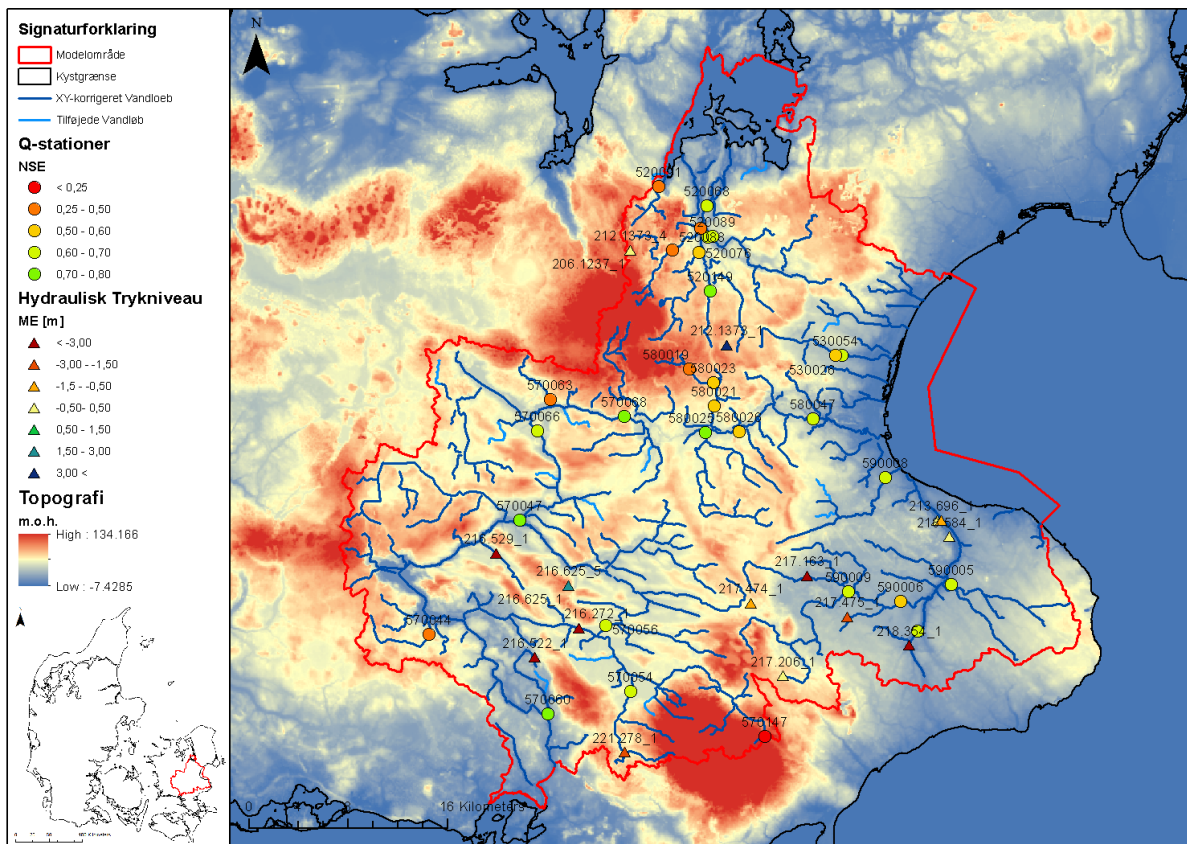
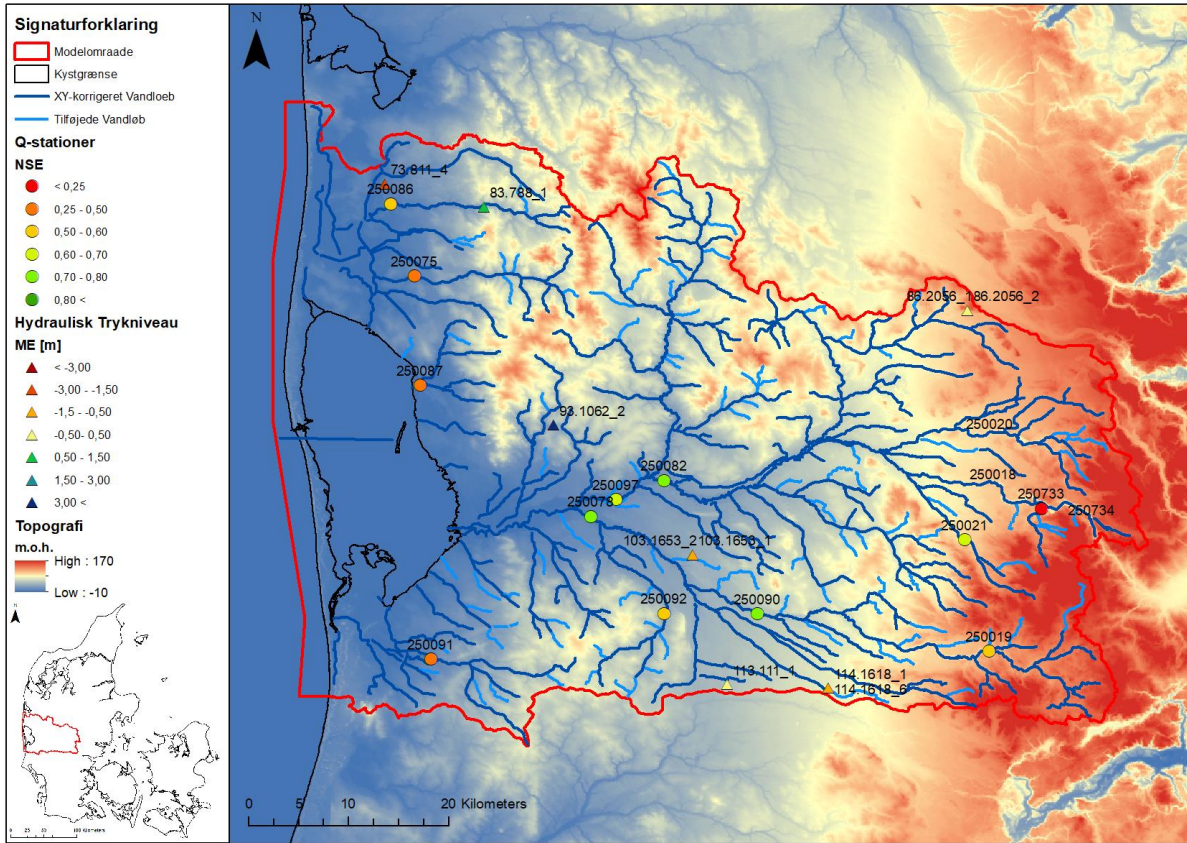


Figure A1-3: The two selected case studies with location of river discharge stations.

A2 Model performances – selected timeseries in supplementary material

For modellerne for oplandene til Ringkøbing fjord og Midtsjælland er modellernes prædiktionssevne og fejl vurderet (performance tests) for de opstillede 200 m modeller ved sammenligning med DK-model2019 samt på basis af observerede klimadata. Begge modeller er kørt for 1989-2018 hvorefter der er udtrukket middelfejl (ME), root mean square error (RMSE, som er et på bud på usikkerheden på den gennemsnitlige prædiktionsfejl) og NashSutcliffe efficiency coefficient (NSE-R2, som mål for modellernes prædiktionssevne).

Resultatet af performance testen har vist at der er opnået samme eller forbedret performance i forhold til monitoringsfiltre (nationale pejletidsserier) i de to oplande. Afstrømninger i 7 udvalgte vandløb i både Ringkøbing fjord og Midtsjælland opland, er modelleret på et performanceniveau der svarer til DK-model2019.

Model performance for Ringkøbing catchment

Table A2-1: Performance criteria for Ringkøbing catchment model runned with 500x500m grid and 200x200m grid, respectively .

Modeller (Head)	ME [m]	MAE [m]	RMSE [m]
Ringkøbing catchment - 500m	-0.65	1.24	1.34
Ringkøbing catchment - 200m	-0.02	1.03	1.10

Table A2-2: Model performance for selected discharge-stations for Ringkøbing catchment model runned with 500x500m grid and 200x200m grid, respectively

Udvalgte Q-stationer	Ringkøbing - 500m [NSE]	Ringkøbing - 200m [NSE]
Q250021 (BRANDE_AA, 4300.000)	0.79	0.67
Q250075 (HOVER_AA, 17291.61)	0.40	0.49
Q250078 (SDR_OMME_AA, 26500.54)	0.84	0.85
Q250082 (SKJERN_AA, 53702.46)	0.89	0.77
Q250086 (TIM_AA, 18537.43)	0.58	0.64
Q250087 (VENNER_AA, 4623.000)	0.43	0.50
Q250097 (SKJERN_AA, 60900.00)	0.86	0.73
Mean of 7 stations	0.68	0.66

Model performance for Mid-Zeland catchment

Table A2-3: Performance criteria for Mid-Zeland catchment model runned with 500x500m grid and 200x200m grid, respectively .

Modeller (Head)	ME [m]	MAE [m]	RMSE [m]
Mid-Zeland catchment - 500m	-0.93	3.64	3.68
Mid-Zeland catchment - 200m	-1.69	2.83	2.87

Table A2-3: Model performance for selected discharge-stations for Mid-Zeland catchment model runned with 500x500m grid and 200x200m grid, respectively

Udvalgte Q- stationer	Sjællandsmodel - 500m[NSE]	Sjællandsmodel - 200m[NSE]
Q520068 (LANGVAD_AA_DK1, 10679.50)	0.56	0.70
Q520076 (TOKKERUP_AA_DK1, 10793.00)	0.77	0.50
Q570056 (SUSAA_DK1, 17845.27)	0.50	0.68
Q570066 (RINGSTED_AA_DK1, 9585.307)	0.28	0.65

Q580047 (KOEGE_AA_DK1, 12787.00)	0.67	0.69
Q590005 (KROGBAEK_DK1, 3507.444)	0.65	0.67
Q590009 (SAVL4_DK1, 7185.000)	0.72	0.63
Mean of 7 stations	0.59	0.64

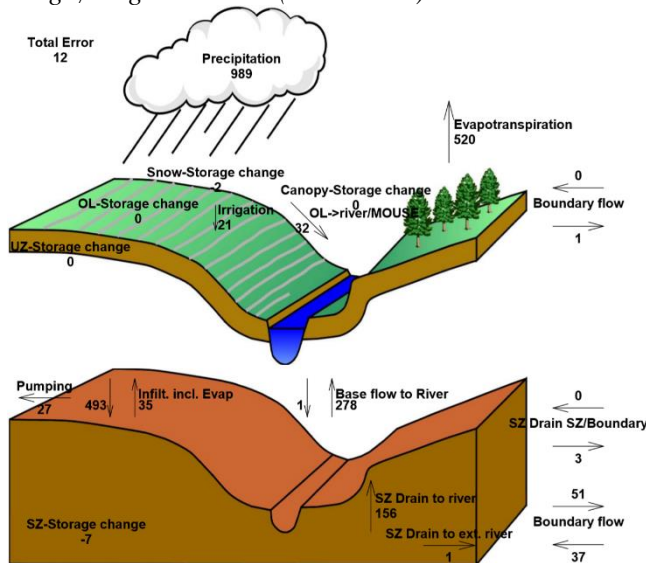
A3: Water balances (Ringkøbing fjord opland and Midtsjælland model area):

Historical observed climate 1989-2018

Nedenstående figur A3 viser en grafisk afbilledning af den totale vandbalance for den historiske kørsel (1989-2018) for oplandet til Ringkøbing fjord og oplandet til Suså-Tryggevælde å-Køge å-Langvand å i Midtsjælland. Den historiske kørsel er modelleret med observerede klimadata. Den totale vandbalance er udregnet i mm/år, og beregnet som et gennemsnit af den 30-årig historiske periode. Den totale vandbalance er beregnet indenfor landområderne i modelområderne for de to oplande, for dermed ikke at medregne hav-områder og fjorde i den totale vandbalance.

Oplandet til Ringkøbing Fjord er karakteriseret ved en stor udstrømning af grundvand til vandløbssystemet, hvorimod oplandet på Midtsjælland er karakteriseret ved begrænset grundvandsudveksling, mens drænvandskomponenten har relativt stor betydning. Desuden er der store klimatiske forskelle på de to oplande, hvor nedbøren i Vestjylland er signifikant større end nedbøren på Midtsjælland. Samtidig er grundvandsindvinding til husholdning betydeligt lavere i Vestjylland, som dog i tørre år kan have en betydelig indvinding til markvanding (se Figur A3).

Ringkøbing catchment (1989-2018)



Mid-Zealand catchment (1989-2018)

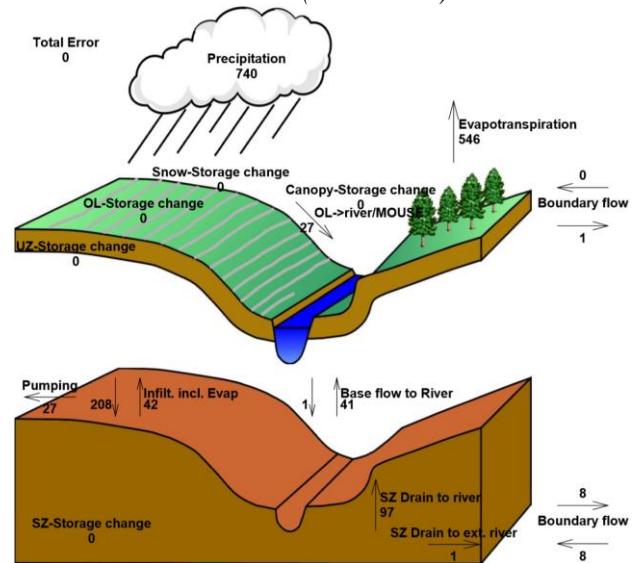


Figure A2: Water balance graphic, in mm per year simulated in 1990-2018, for Ringkøbing catchment and Mid-Zealand, respectively.

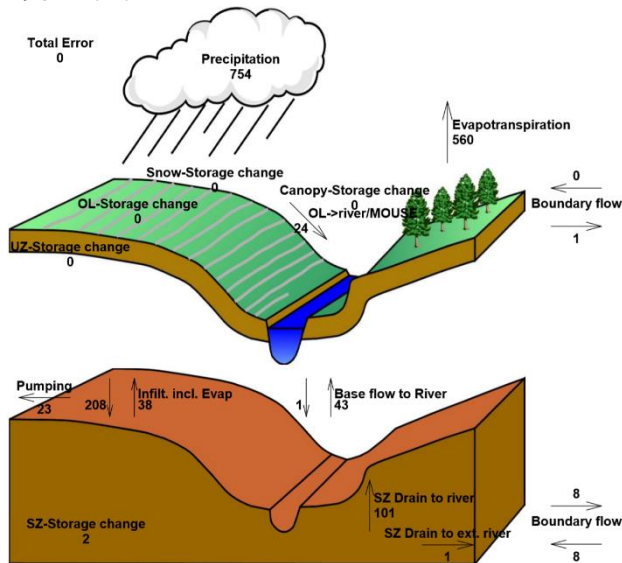
Reference and climate models

Nedenstående figurer viser grafiske afbilledninger af den totale vandbalance for reference kørsel (1981-2010) og for klimakørslen for hhv. oplandet til Ringkøbing fjord og oplandet i Midsjælland. Der er anvendt i alt fire forskellige scenarier i klimafremskrivningen: RCP8.5 wet climate model (IPSL-RCA), RCP8.5 median climate model (KNMI), RCP8.5 dry climate model (HIRHAM), samt RCP4.5 median climate model (HIRHAM). Både reference og klimakørslen er kørt med fire forskellige scenarier. Klimakørslerne med klimascenarierne RCP8.5 er kørt for perioden 2071-2100 og RCP4.5 er kørt for 2041-2070.

Water balances in Mid-Zealand catchment

RCP 8.5 wet climate model (IPSL-RCA)

1981-2010



2071-2100

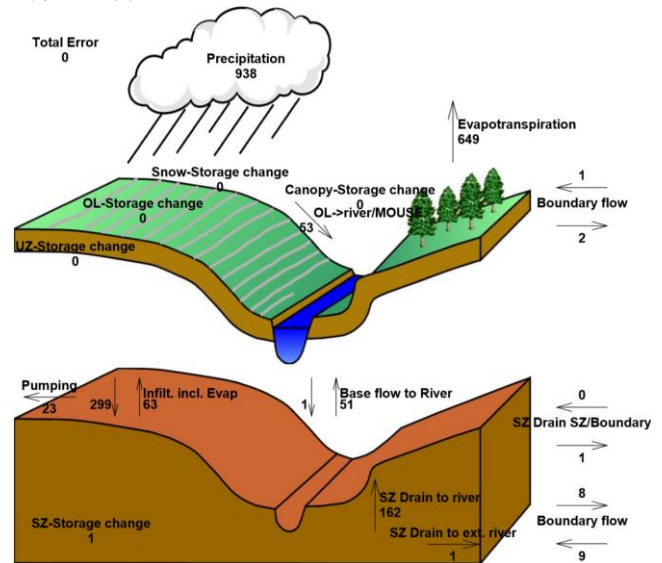
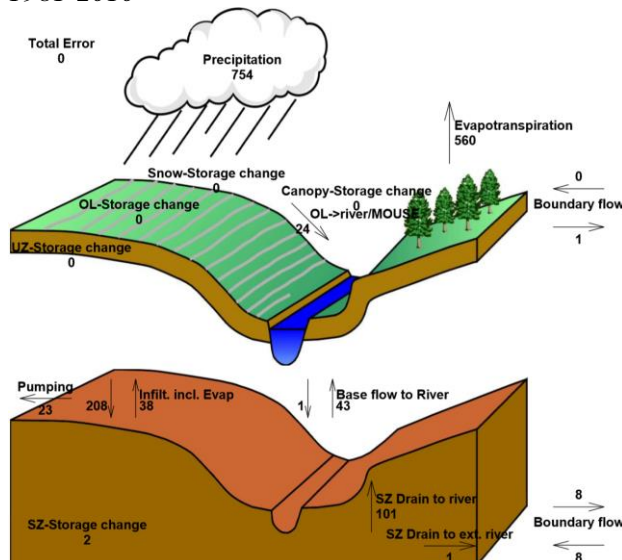


Figure A3-1 : Water balance graphic for the RCP 8.5 wet climate model (IPSL-RCA) , in mm per year, simulated for Mid-Zealand catchment for the periods 1981-2010(left) and 2071-2100(right) .

RCP 8.5 median climate model (KNMI)

1981-2010



2071-2100

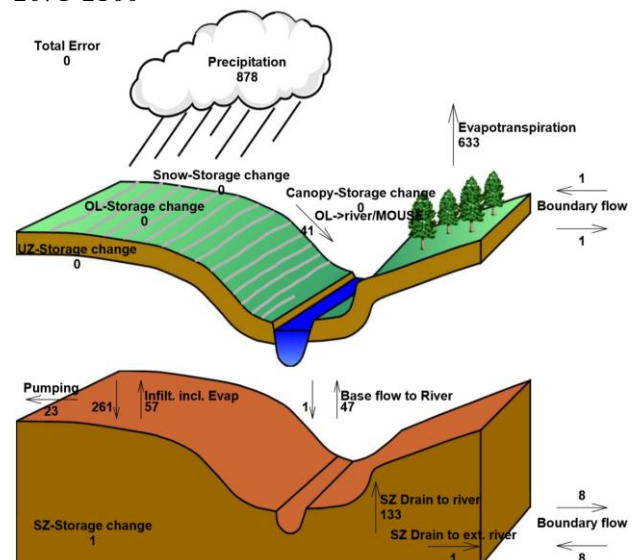
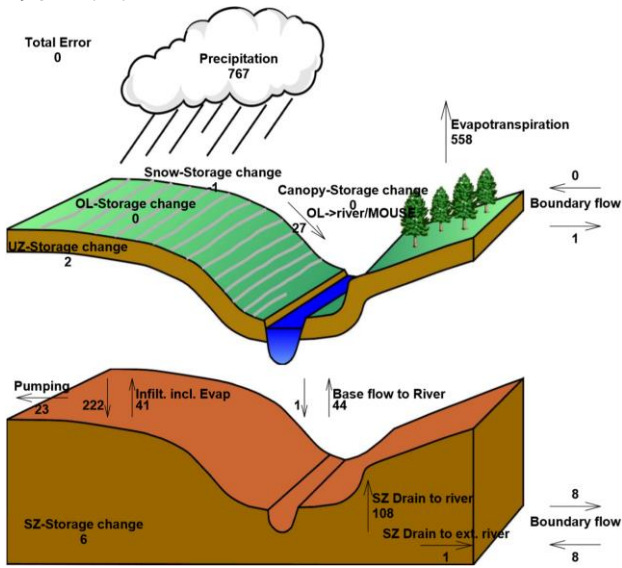


Figure A3-2: Water balance graphic for the RCP 8.5 median climate model (KNMI) , in mm per year, simulated for Mid-Zealand catchment for the periods 1981-2010(left) and 2071-2100(right) .

RCP 8.5 dry climate model (HIRHAM)
1981-2010



2071-2100

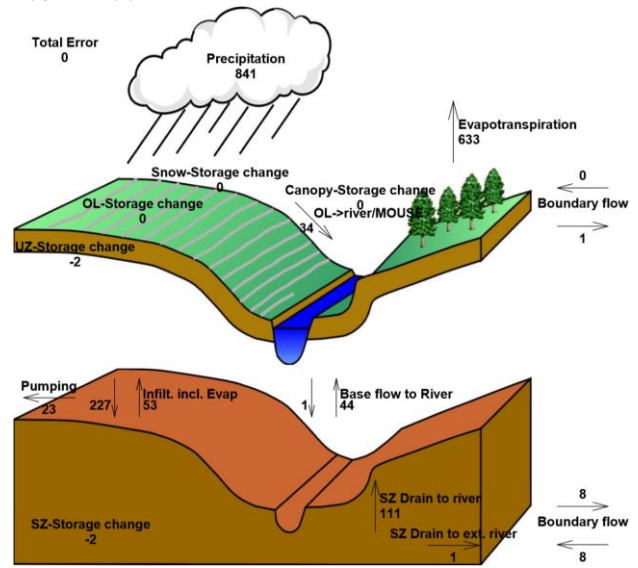
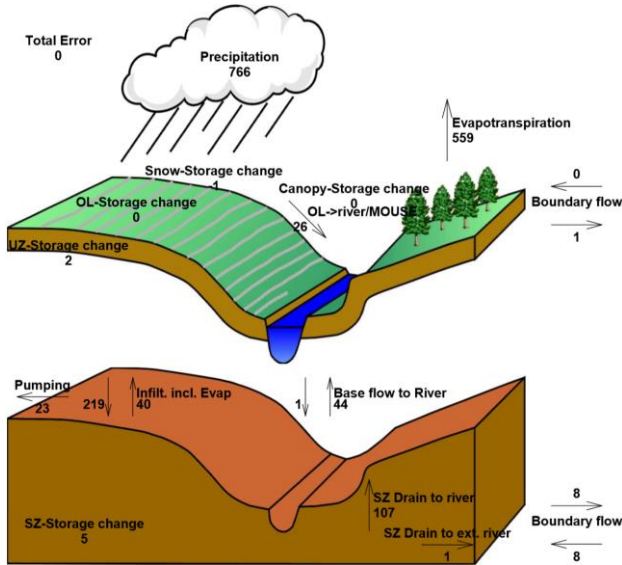


Figure A3-3 : Water balance graphic for the RCP 8.5 dry climate model (HIRHAM), in mm per year, simulated for Mid-Zealand catchment for the periods 1981-2010(left) and 2071-2100(right) .

RCP4.5 (HIRHAM)
1981-2010



2041-2070

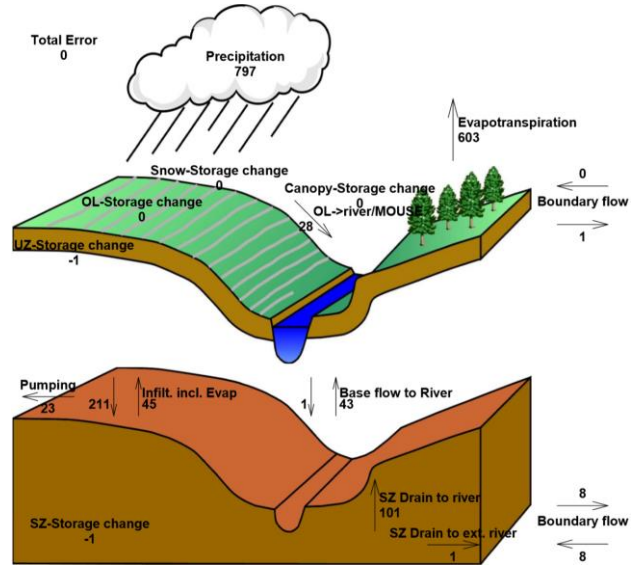
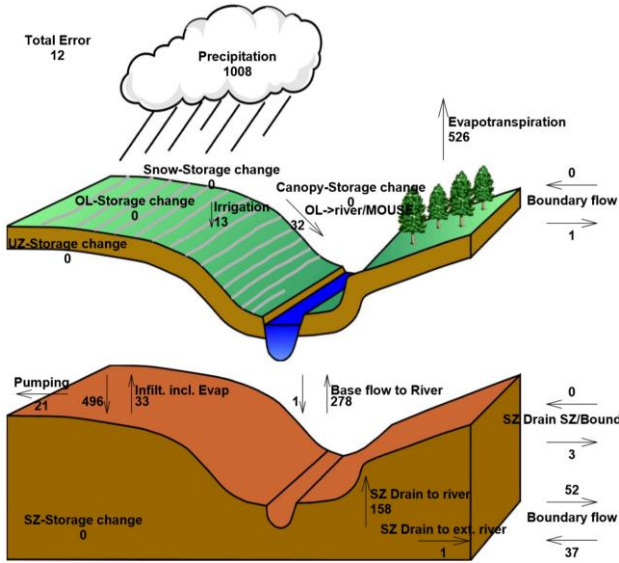


Figure A3-4 : Water balance graphic for the climate model RCP4.5 (HIRHAM), in mm per year, simulated for Mid-Zealand catchment for the periods 1981-2010(left) and 2041-2070(right) .

Water balances in Ringkøbing catchment

RCP 8.5 wet climate model (IPSL-RCA)

1981-2010



2071-2100

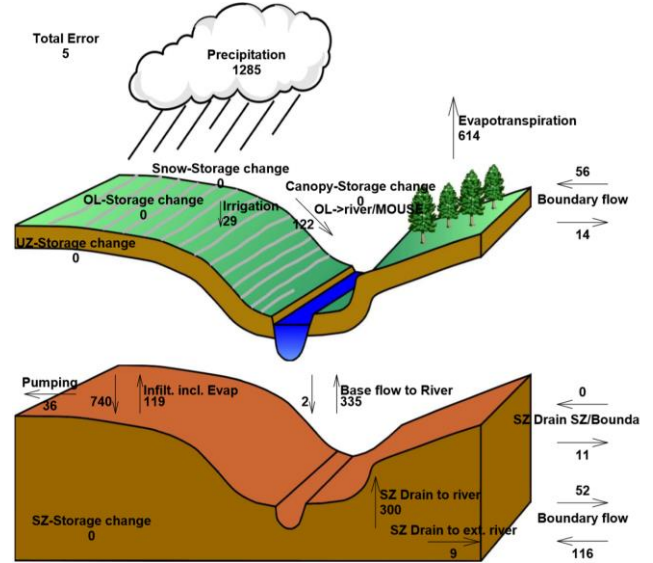
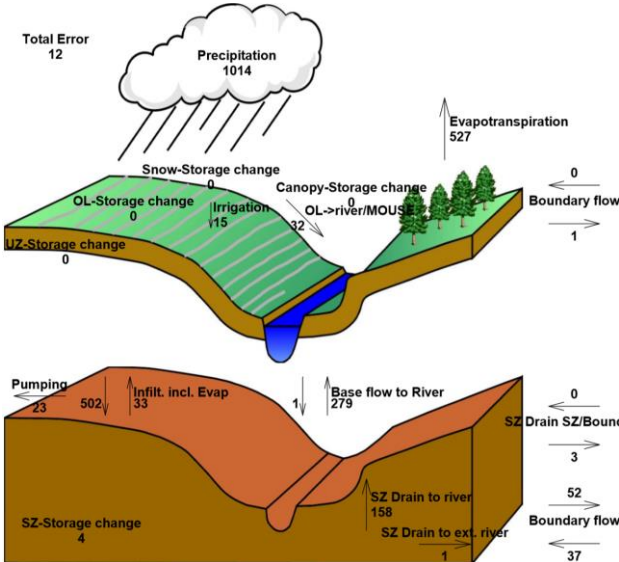


Figure A3-3: Water balance graphic for the RCP 8.5 wet climate model (IPSL-RCA), in mm per year, simulated for Ringkøbing catchment for the periods 1981-2010(left) and 2071-2100(right).

RCP 8.5 median climate model (KNMI)

1981-2010



2071-2100

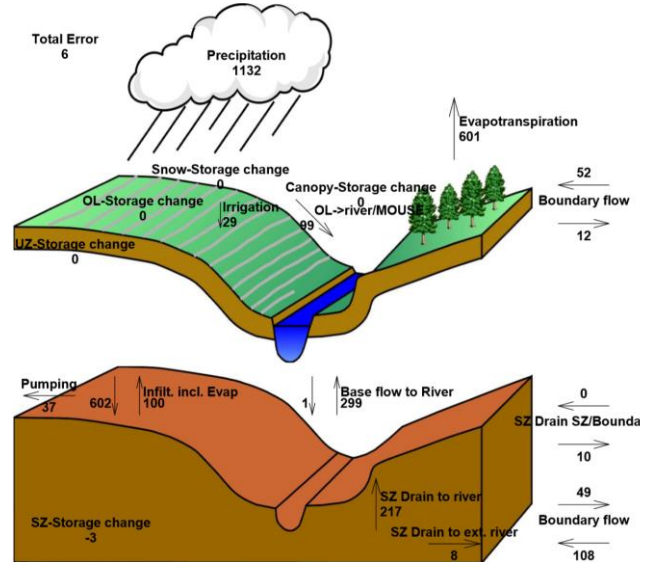
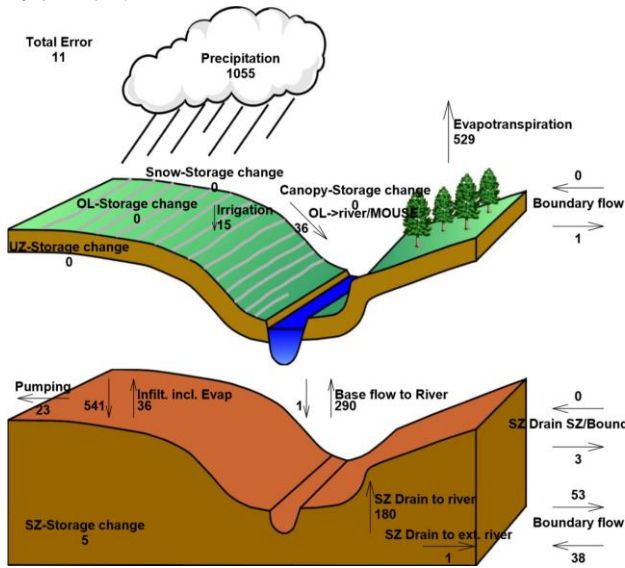


Figure A3-5: Water balance graphic for the RCP 8.5 median climate model (KNMI), in mm per year, simulated for Ringkøbing catchment for the periods 1981-2010(left) and 2071-2100(right).

RCP 8.5 dry climate model (HIRHAM)
1981-2010



2071-2100

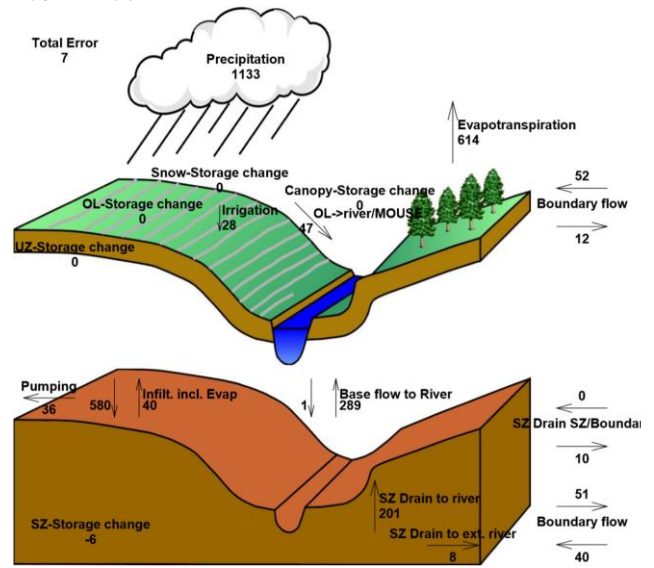
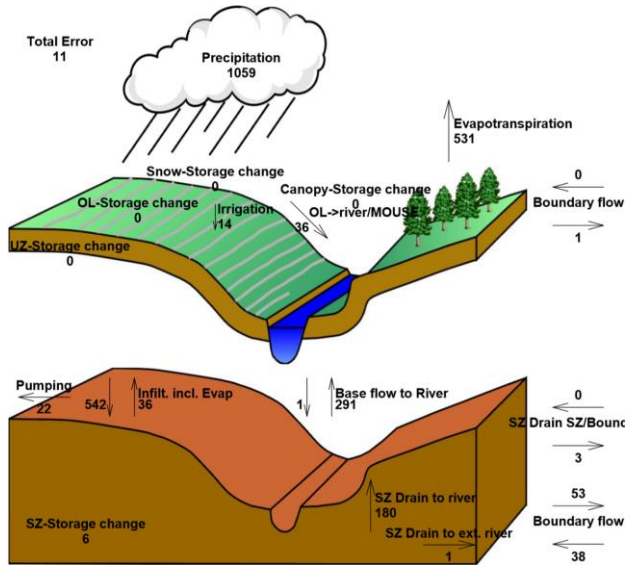


Figure A3-6 : Water balance graphic for the RCP 8.5 dry climate model (HIRHAM) , in mm per year, simulated for Ringkøbing catchment for the periods 1981-2010(left) and 2071-2100(right) .

RCP4.5 (HIRHAM)
1981-2010



2041-2070

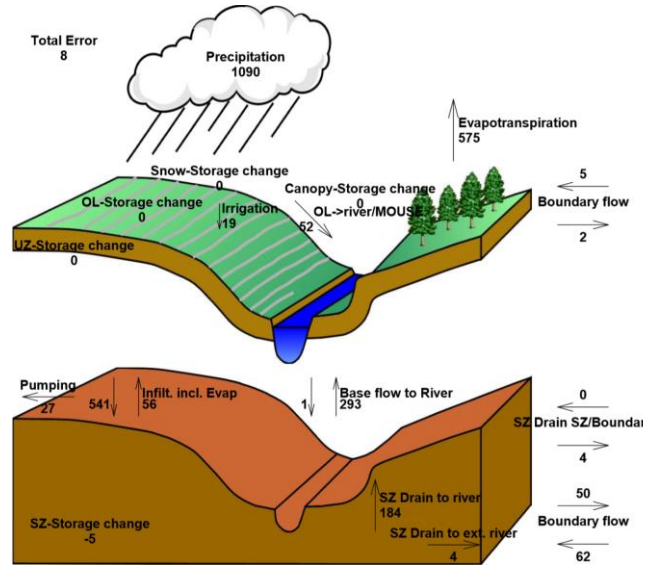


Figure A3-7: Water balance graphic for climate model the RCP4.5 (HIRHAM), in mm per year, simulated for Ringkøbing catchment for the periods 1981-2010(left) and 2041-2070(right) .

Vandbalance klimafaktor

I nedenstående table ses en oversigt over klimaforandringernes indflydelse på den totale vandbalance for de fire forskellige klimascenarier målt vha. klimafaktor($\text{climate factor}_{\text{precip}} = \text{precip future climate} / \text{precip present climate}$ etc.) for oplandet til Ringkøbing Fjord og oplandet i Midtsjælland. Desuden ses resultaterne for den historiske periode baseret på de observerede klimainput(mm/år).

Table A3-1: Overall results of climate change impacts on water balances for the two catchments by calculated climate factor ($\text{climate factor}_{\text{precip}} = \text{precip future climate} / \text{precip present climate}$ etc.). In italic is shown the results for the historical period based on observed climate inputs (mm/year).

Model simulated climate factors for water balance components							
Scenario \ Component	Precip.	Evapot.	Recharge	Abstrac.	Drain	Baseflow	Overland
<i>Ringkøbing</i>							
RCP8.5 Wet	1.27	1.17	1.49	1.71(2.23)	1.90	1.21	3.81
RCP8.5 Median	1.12	1.14	1.20	1.61(1.93)	1.37	1.07	3.09
RCP8.5 Dry	1.07	1.16	1.07	1.56(1.87)	1.12	1.00	1.31
RCP4.5 Median	1.03	1.08	1.00	1.23(1.36)	1.02	1.01	1.44
<i>Ringkøbing historical performance run 1989-2018 (mm/year)</i>	<i>989</i>	<i>520</i>	<i>493</i>	<i>27(21)</i>	<i>162</i>	<i>278</i>	<i>32</i>
<i>Sjælland</i>							
RCP8.5 Wet	1.24	1.68	1.44	1.00	1.60	1.19	2.21
RCP8.5 Median	1.16	1.13	1.25	1.00	1.32	1.09	1.71
RCP8.5 Dry	1.10	1.13	1.02	1.00	1.03	1.00	1.26
RCP4.5 Median	1.04	1.08	0.96	1.00	0.94	0.98	1.08
<i>Mid-Zealand historical performance run 1989-2018 (mm/year)</i>	<i>740</i>	<i>546</i>	<i>208</i>	<i>27</i>	<i>101</i>	<i>41</i>	<i>27</i>

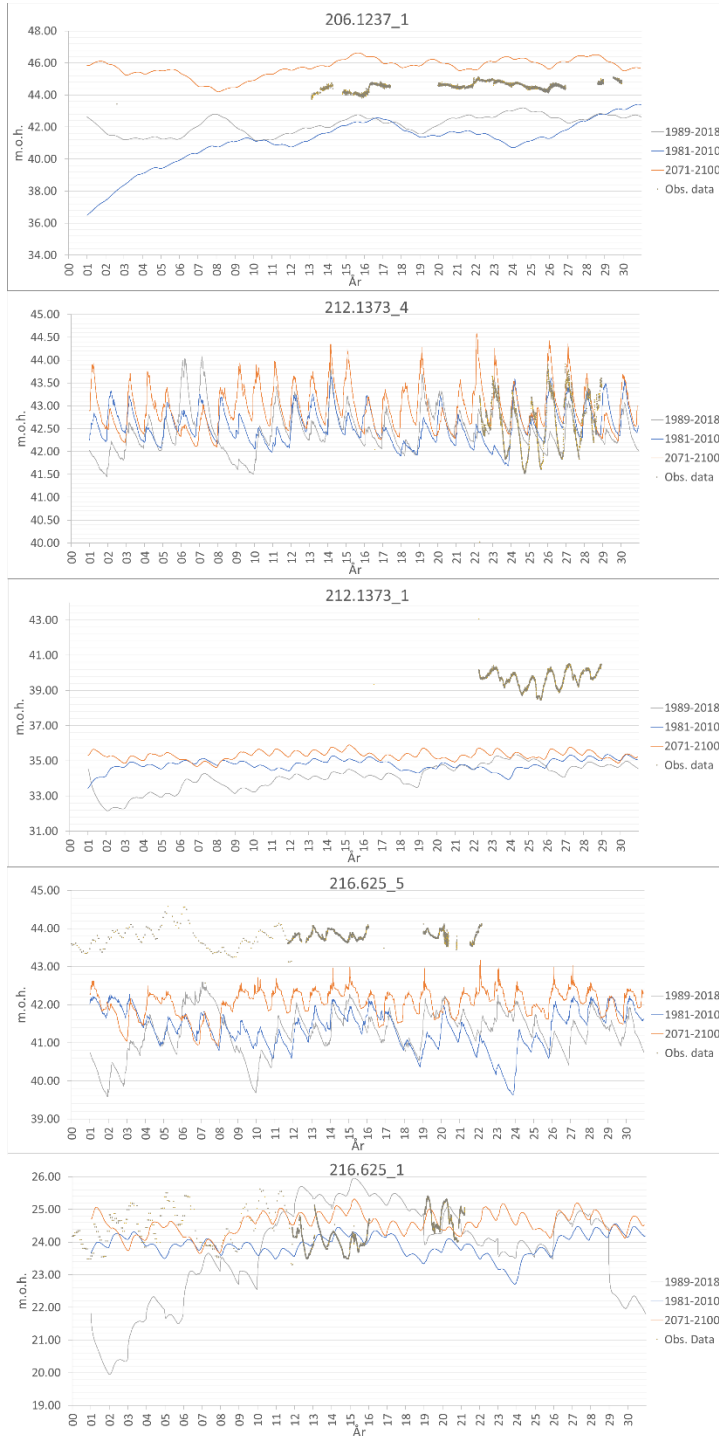
Climate factor ($= \text{flow}^{\text{future}} / \text{flow}^{\text{present}}$). In bracket under abstraction for Ringkøbing is shown climate factor for irrigation amount

A4 Plot of raw values for 30 years piezometric head

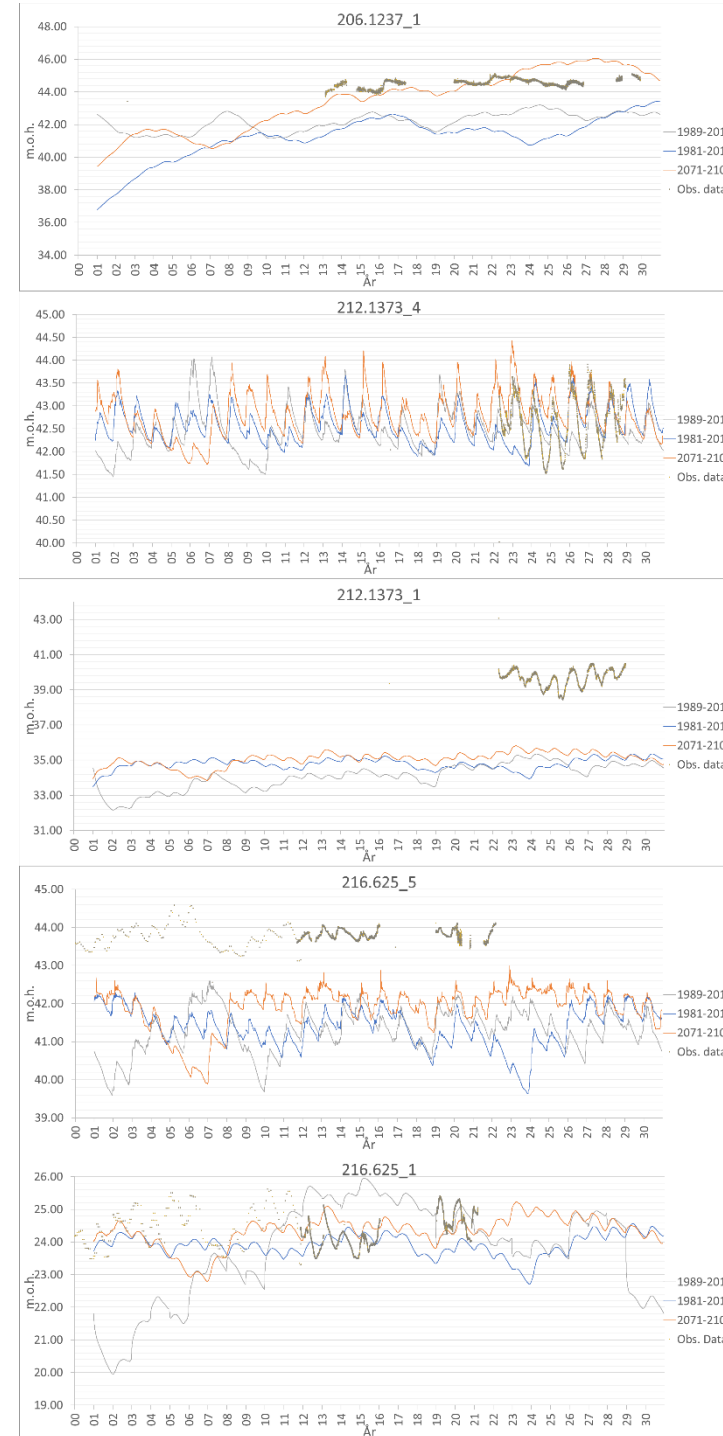
De nedenstående grafer viser de simulerede og observerede hydrauliske trykniveau i udvalgte borer for for både oplandet for Ringkøbing Fjord og oplandet i Midtsjælland for en 30-årig periode. De 30-årige perioder for både reference kørslen(1981-2010) og fremtidige kørsel(2071-2100/2041-2070) for de fire klimamodeller er plottet i graferne. Desuden ses det simulerede hydrauliske trykniveau for den historiske kørsel(1989-2018) i de udvalgte borer, samt det observerede trykniveau for selvsamme periode.

Mid-Zeland catchment

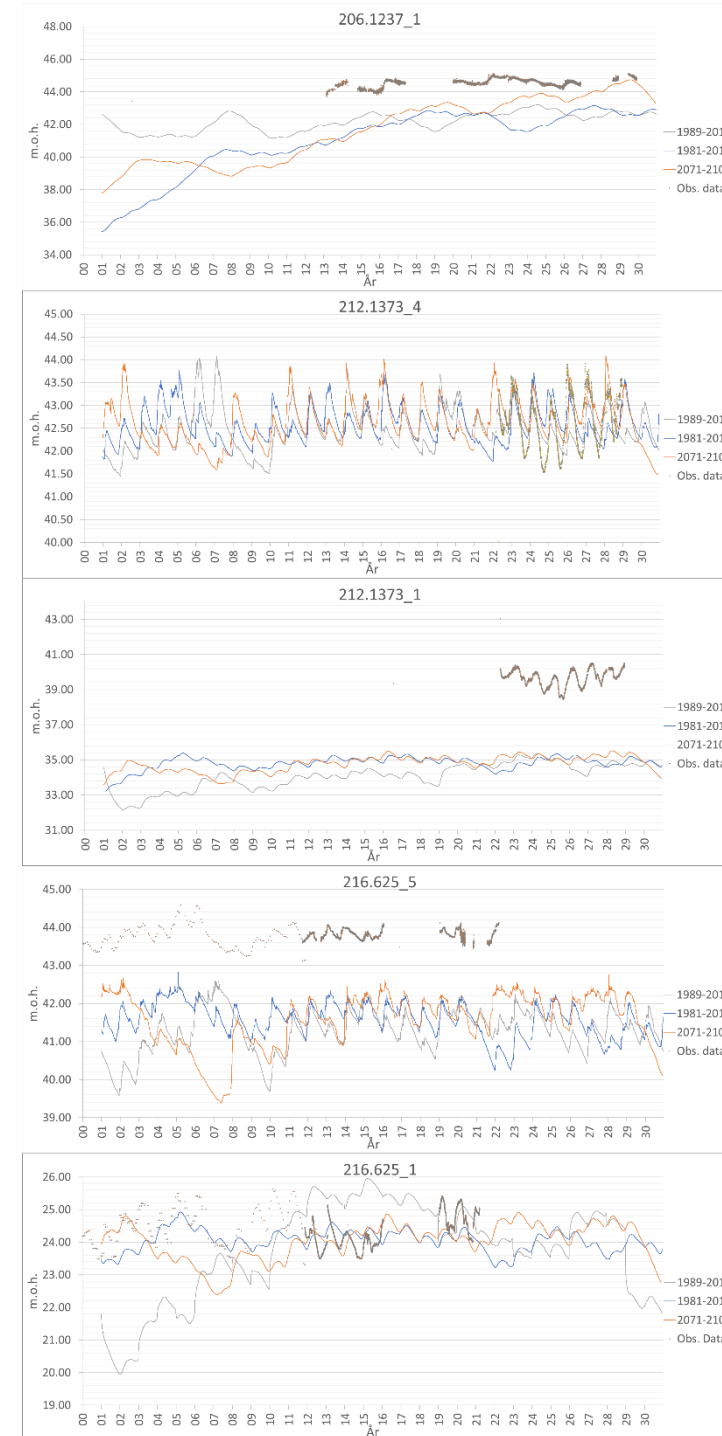
RCP 8.5 wet climate model



RCP 8.5 median climate model



RCP 8.5 dry climate model



RCP4.5 HIRHAM

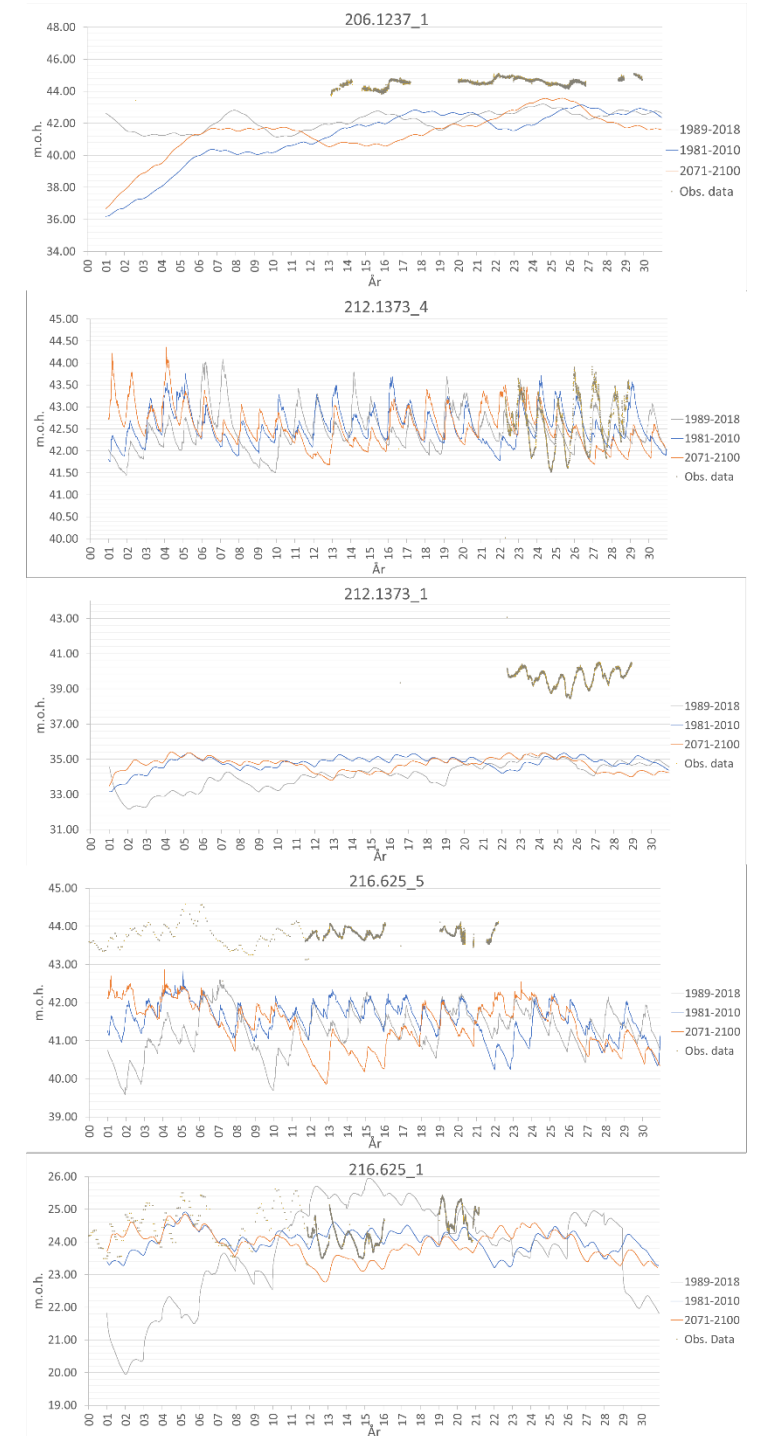
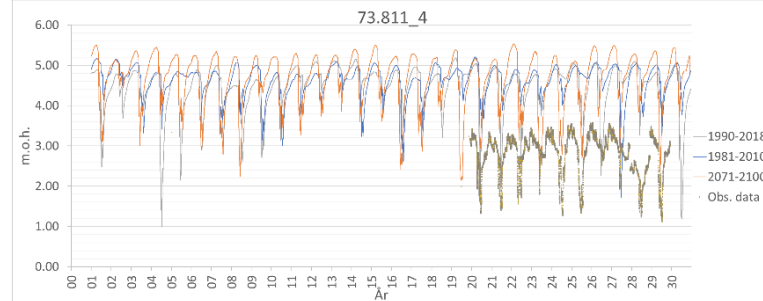


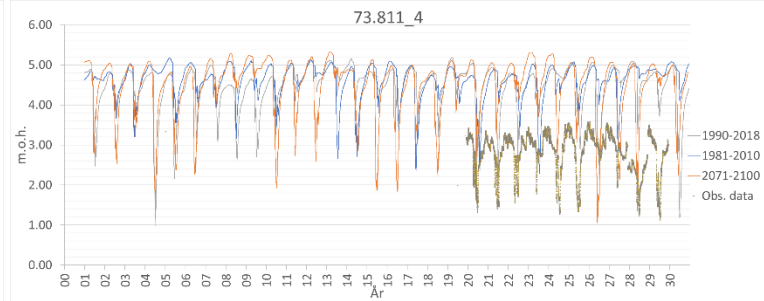
Figure A4-1: The graphs shows the simulated and observed hydraulic head in the wells 206.1237(filter 1), 212.1373_4(filter 4), 216.625(filter 5) and 216.625 (filter 1) for the Ringkøbing catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed hydraulic head in the same period. The blue line represent the simulated hydraulic head the four climate models in the period 1981-2010, whereas the orange line represent the simulated hydraulic head for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

Ringkøbing fjord catchment

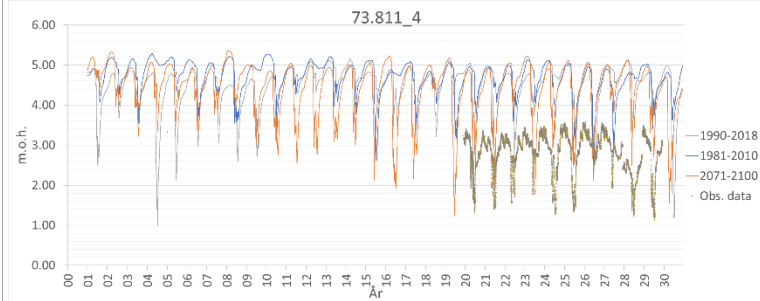
RCP 8.5 wet climate model



RCP 8.5 median climate model



RCP 8.5 dry climate model



RCP4.5 HIRHAM

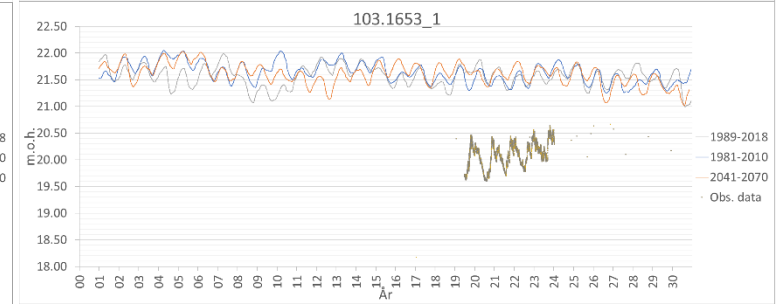
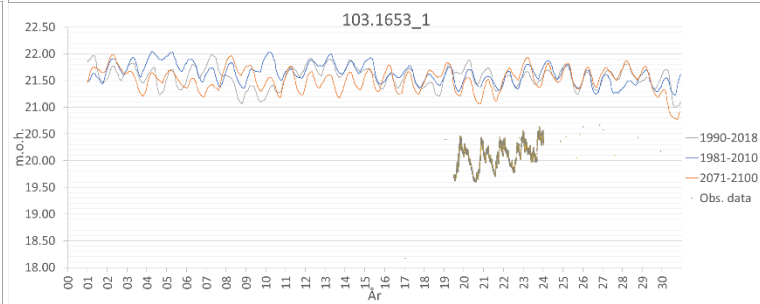
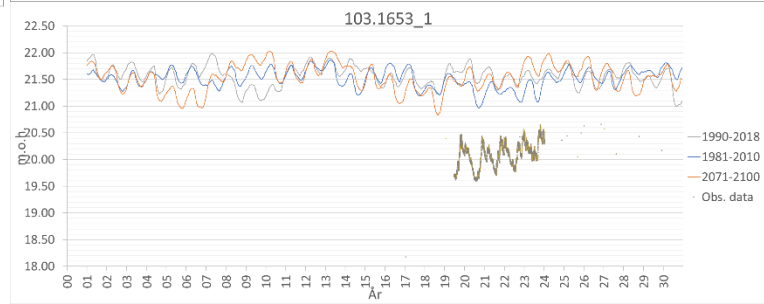
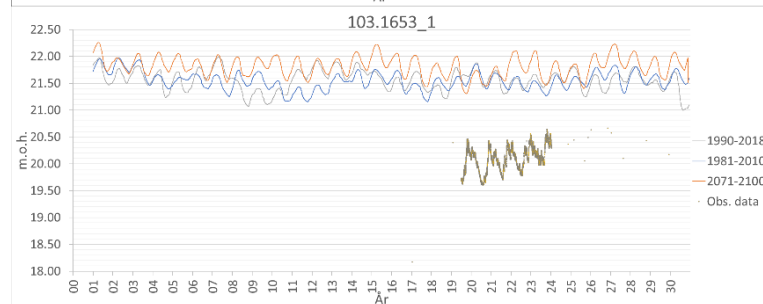
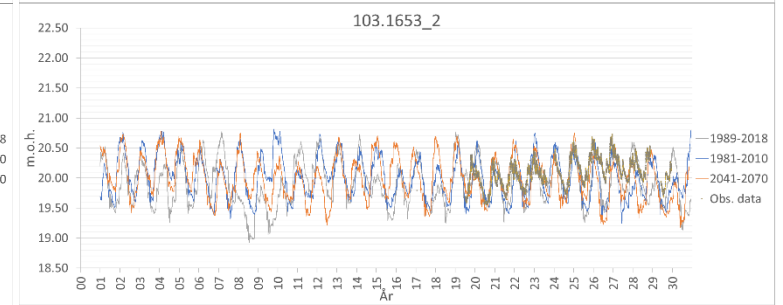
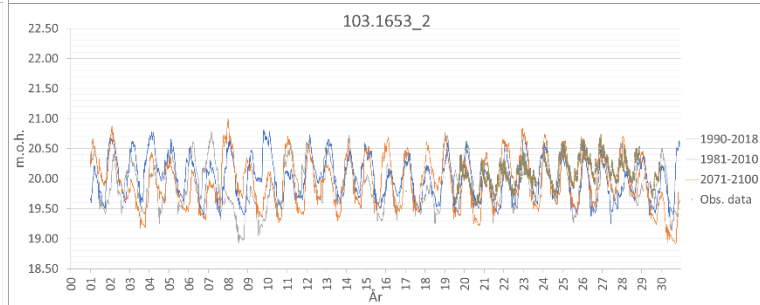
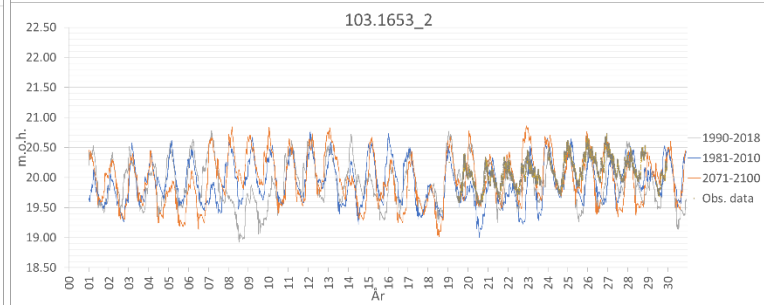
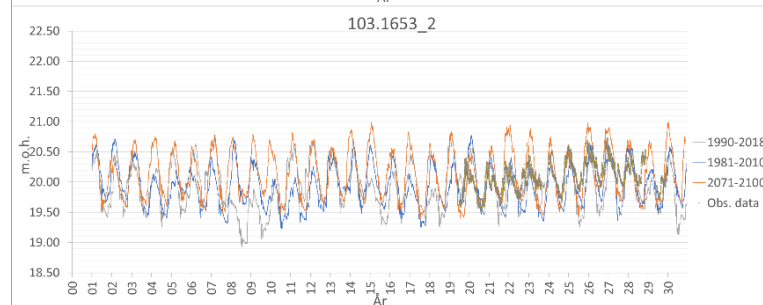
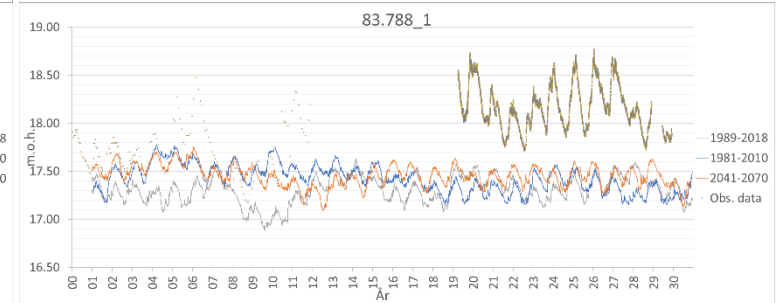
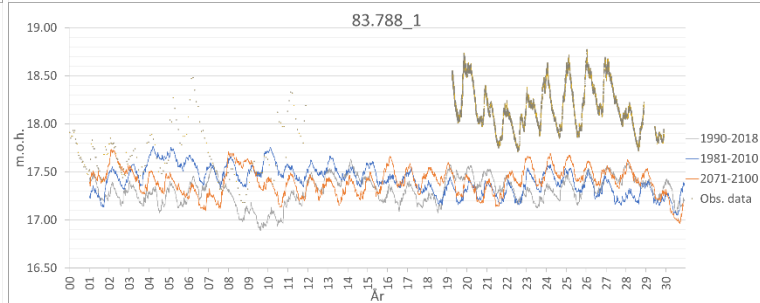
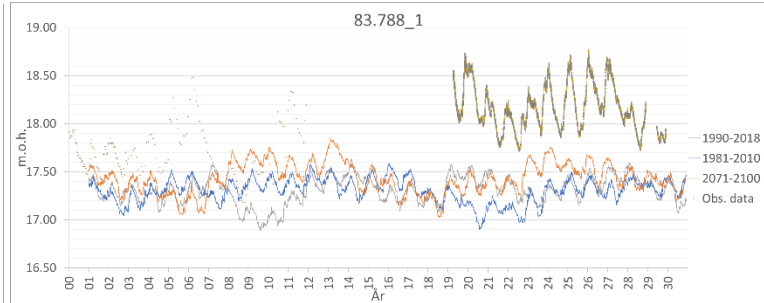
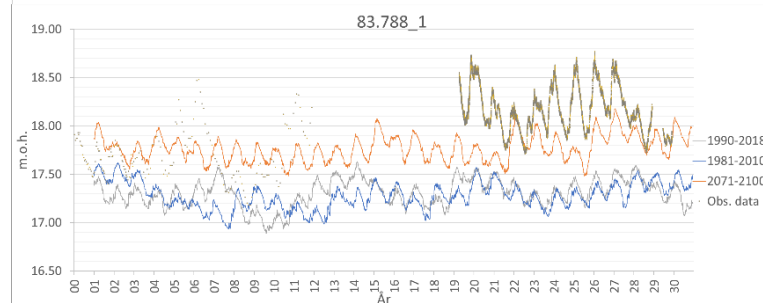
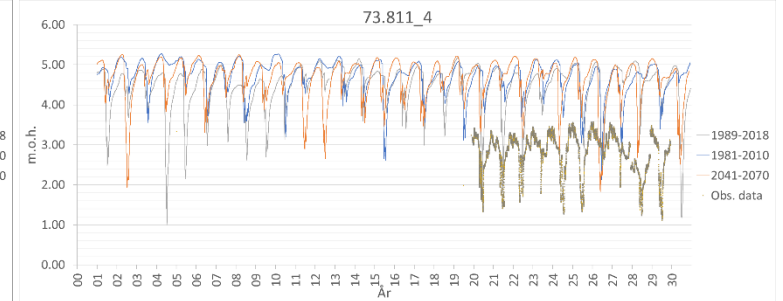


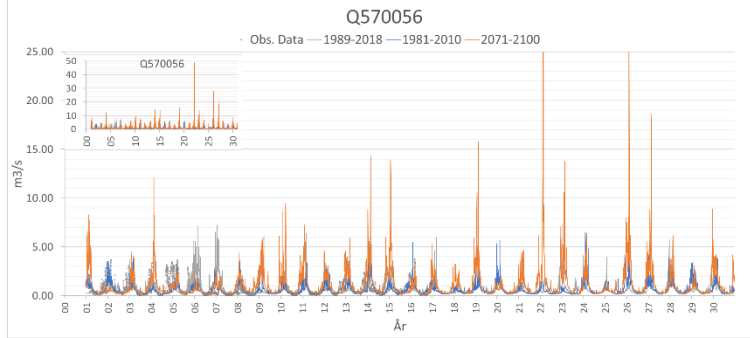
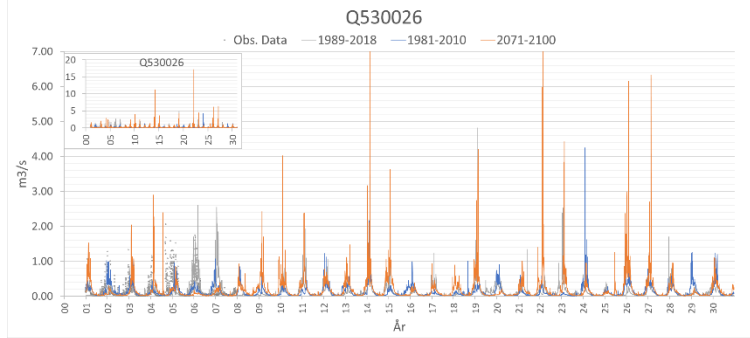
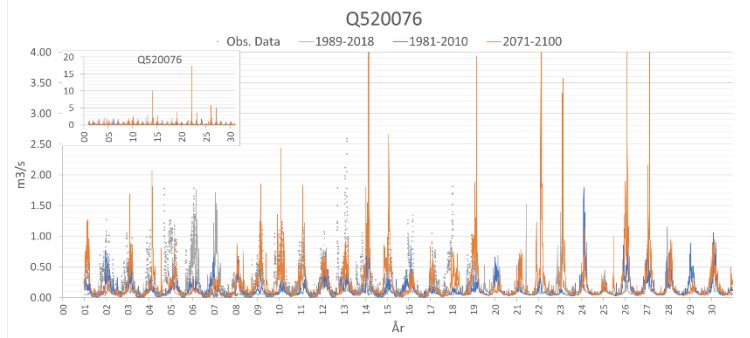
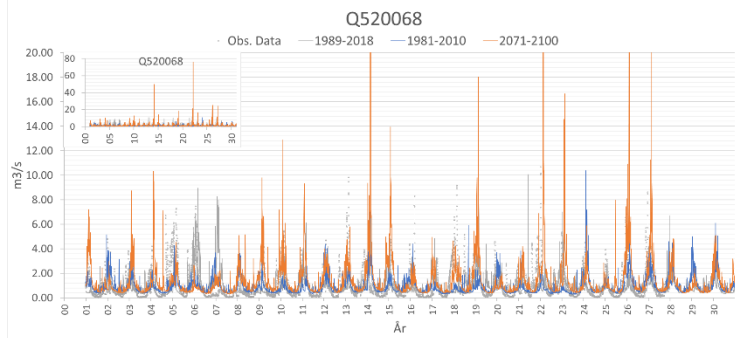
Figure A4-2 : The graphs shows the simulated and observed hydraulic head in the wells 73.811 (filter 4), 83.788(filter 1), 103.1653(filter 2) and 103.1653 (filter 1) for the Ringkøbing catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed hydraulic head in the same period. The blue line represent the simulated hydraulic head the four climate models in the period 1981-2010, whereas the orange line represent the simulated hydraulic head for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

A5. Plot of 30 years daily discharge values for selected monitoring discharge stations

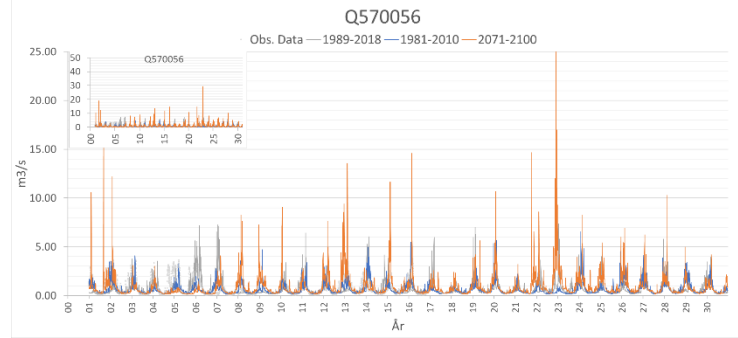
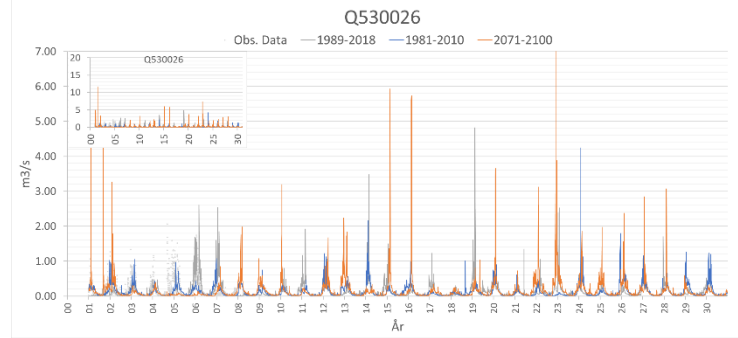
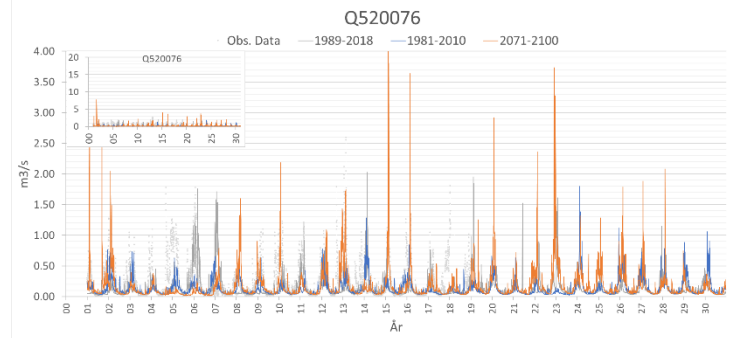
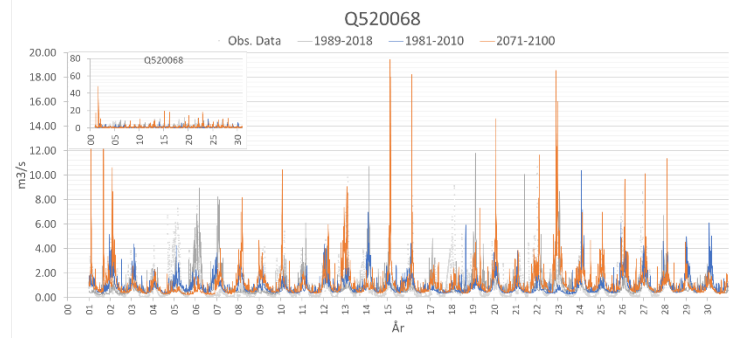
De nedenstående grafer viser de simulerede og observerede afstrømning i udvalgte afstræmningsstationer for både oplandet for Ringkøbing Fjord og oplandet i Midtsjælland for en 30-årig periode. De 30-årige perioder for både reference kørslen(1981-2010) og fremtidige kørsel(2071-2100/2041-2070) for de fire klimamodeller er plottet i graferne. Desuden ses afstrømningen for den historiske kørsel(1989-2018) i de udvalgte afstrømningsstationer, samt det observerede afstrømning for selvsamme periode.

Mid-Zeland catchment

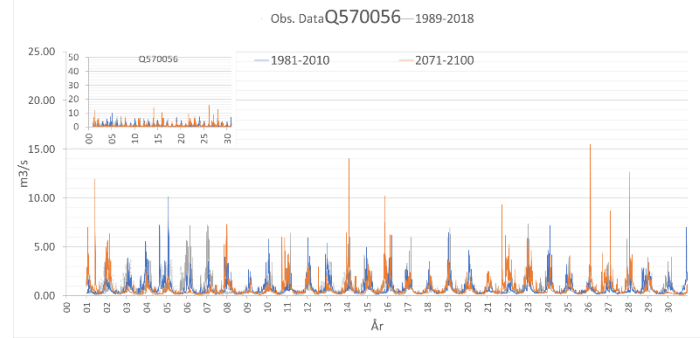
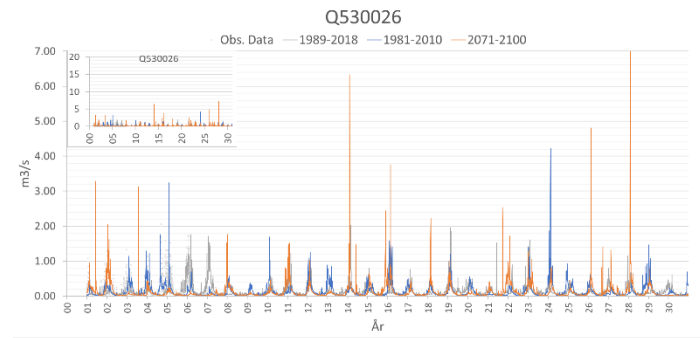
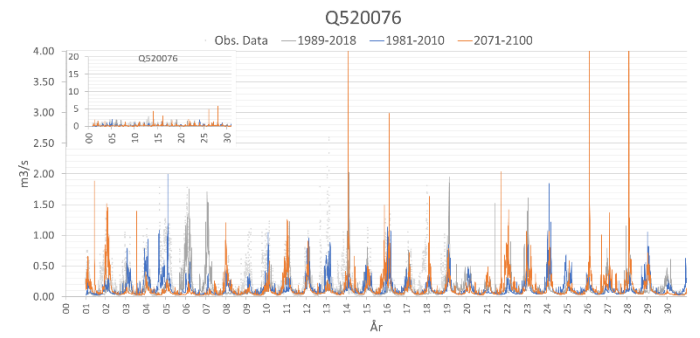
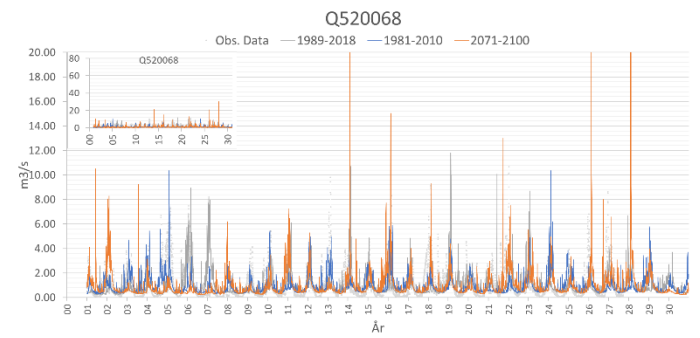
RCP 8.5 wet climate model



RCP 8.5 median climate model



RCP 8.5 dry climate model



RCP4.5 HIRHAM

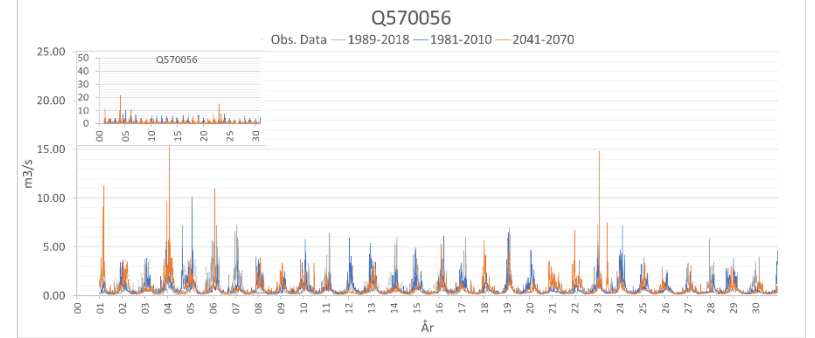
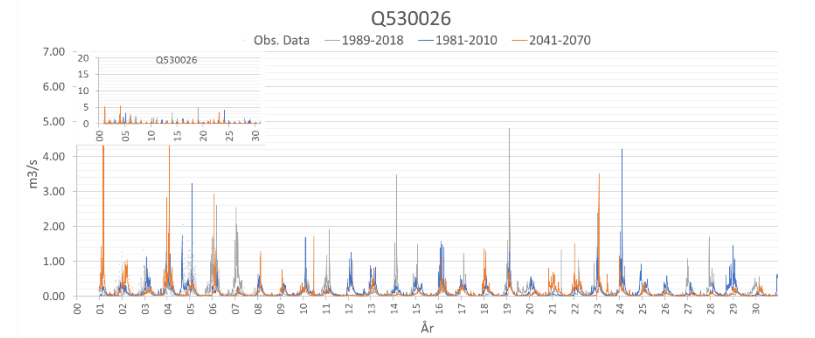
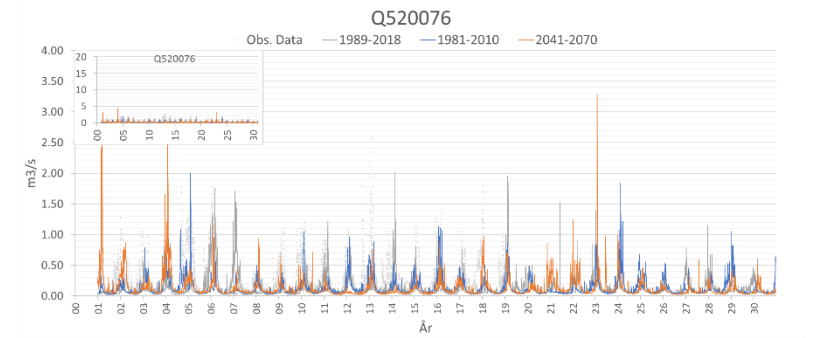
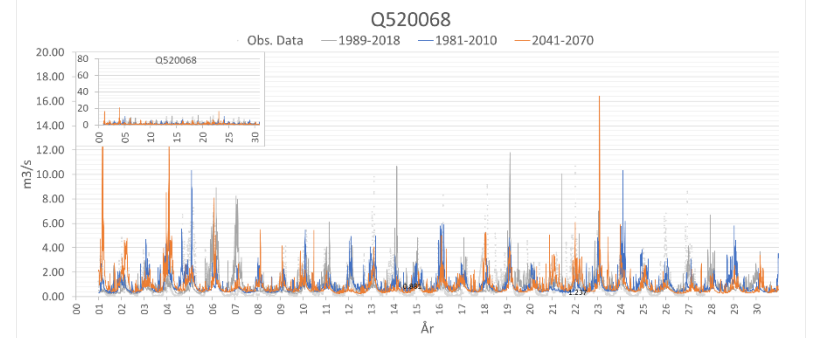
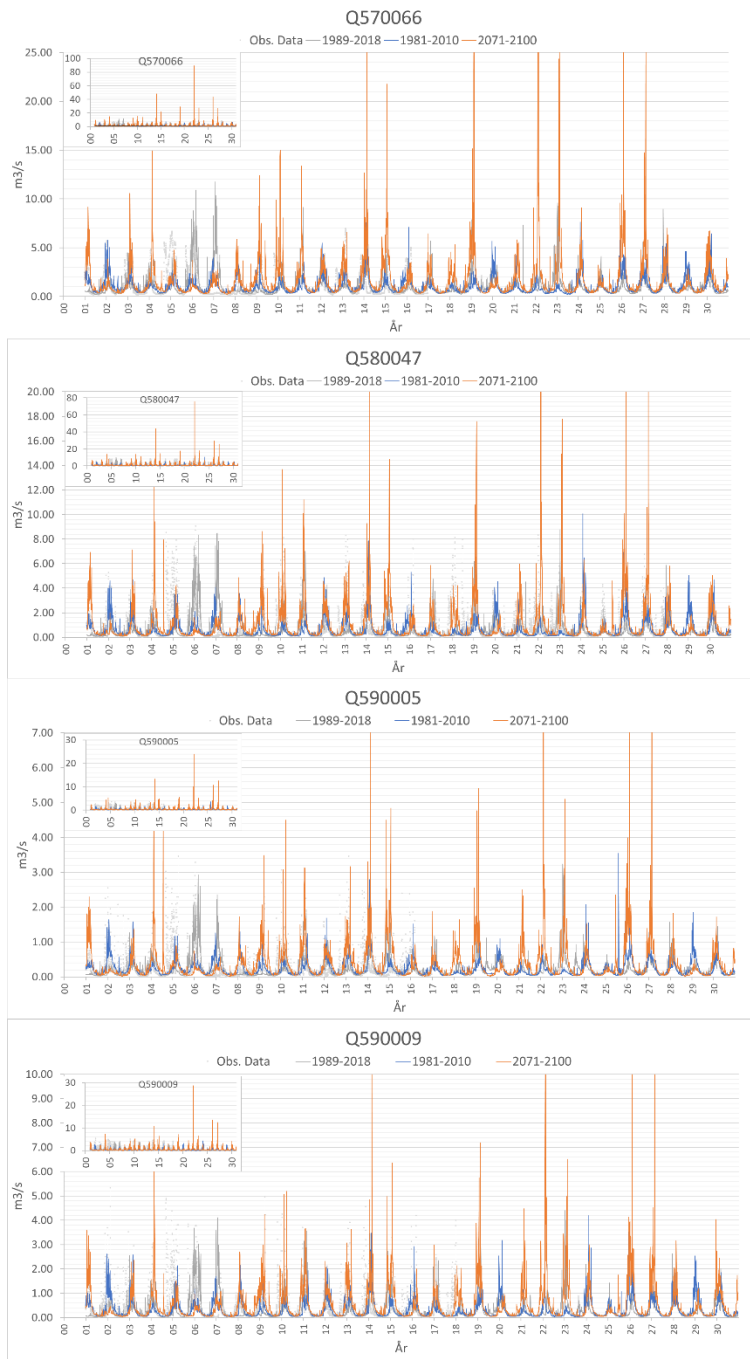
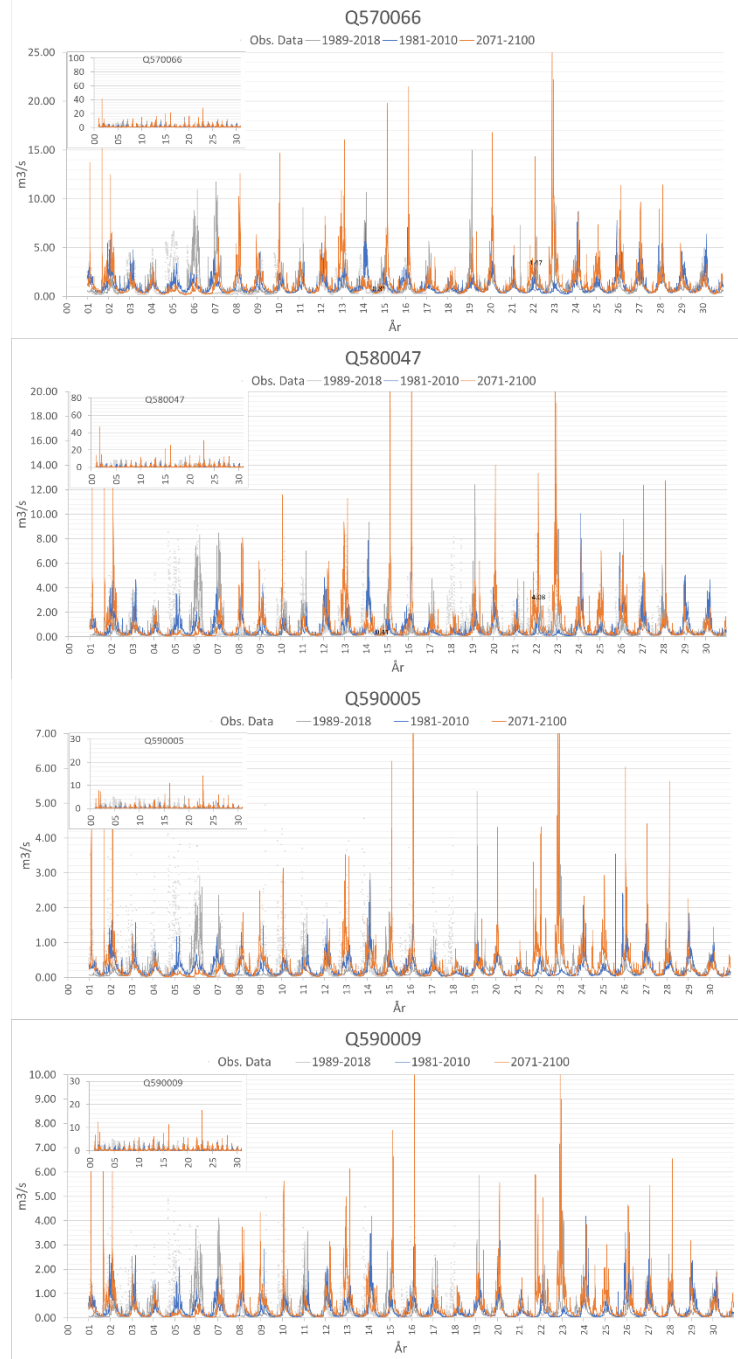


Figure A5-1: The graphs shows the simulated and observed discharge at the monitoring discharge stations Q520068(Langevad å), Q520076(Tokkerup å), Q530026(Skensved å) and Q570056(Suså) in Mid-Zeland catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed discharge in the same period. The blue line represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange line represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

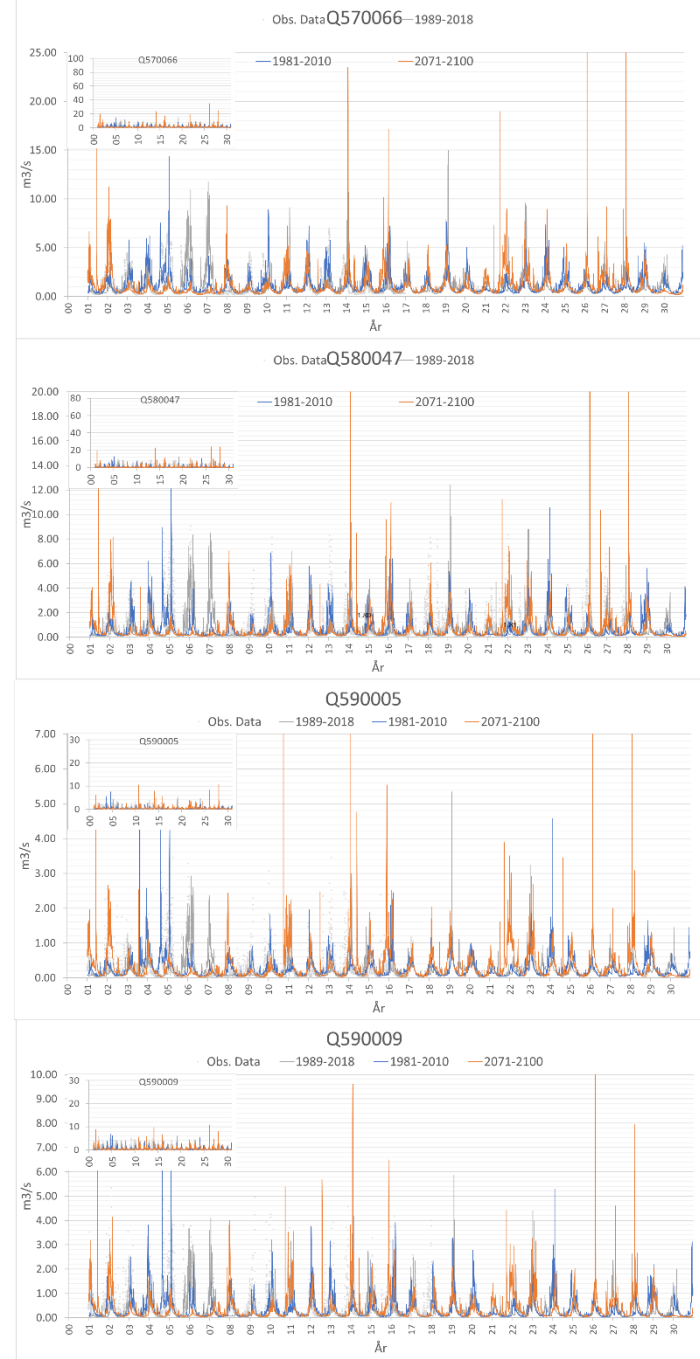
RCP 8.5 wet climate model



RCP 8.5 median climate model



RCP 8.5 dry climate model



RCP4.5 HIRHAM

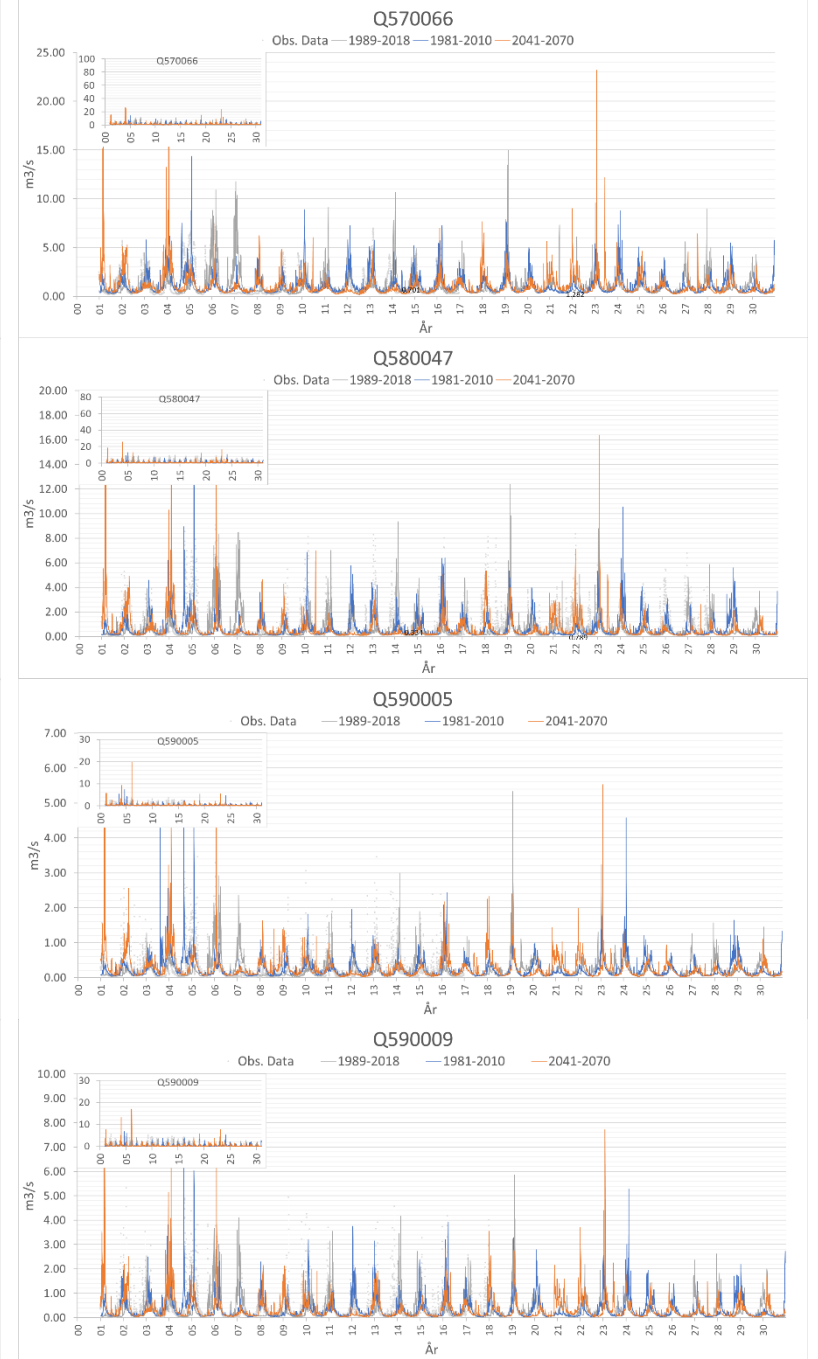
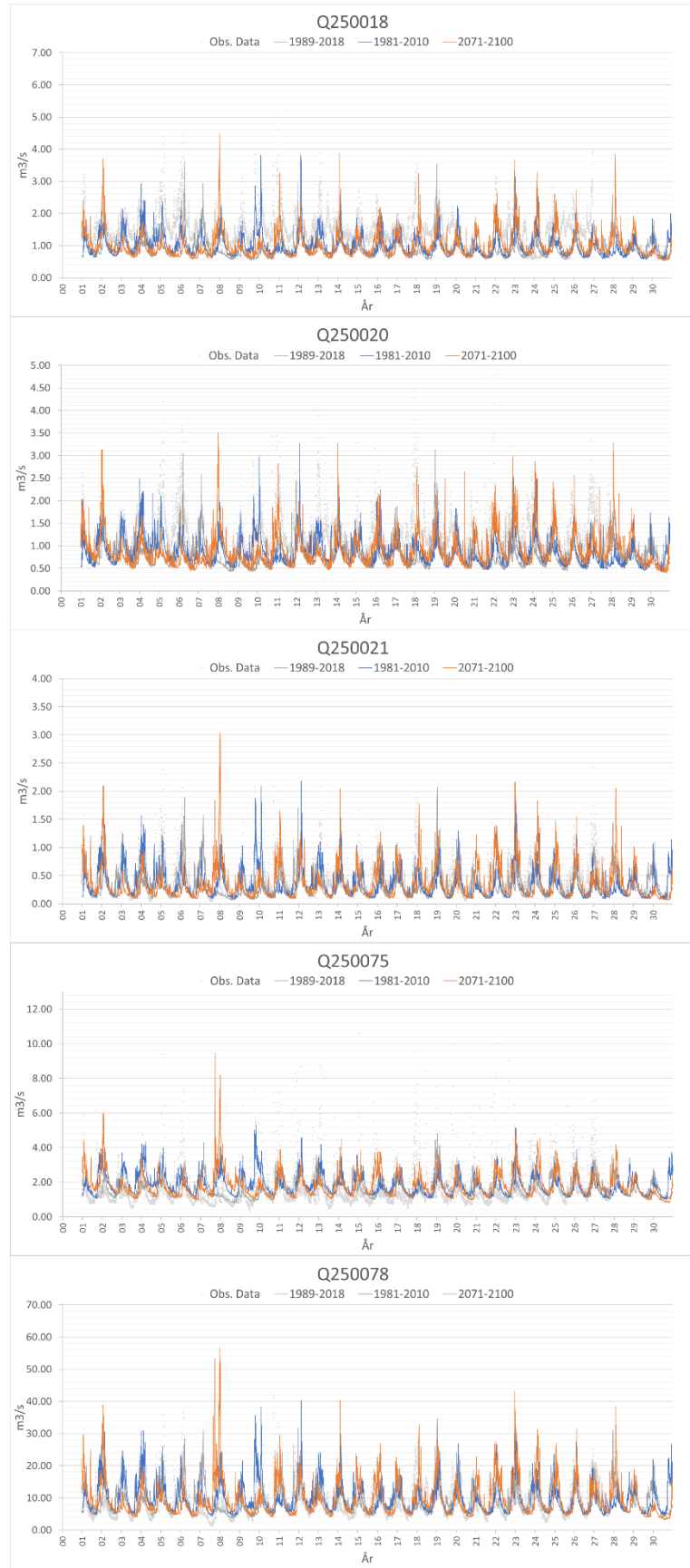


Figure A5-2: The graphs shows the simulated and observed discharge at the monitoring discharge stations Q570066(Ringsted å), Q580047(Køge å), Q590005(Krogbæk å) and Q90009(SAVL4) in Mid-Zeland catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed discharge in the same period. The blue line represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange line represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-

Ringkøbing fjord catchment

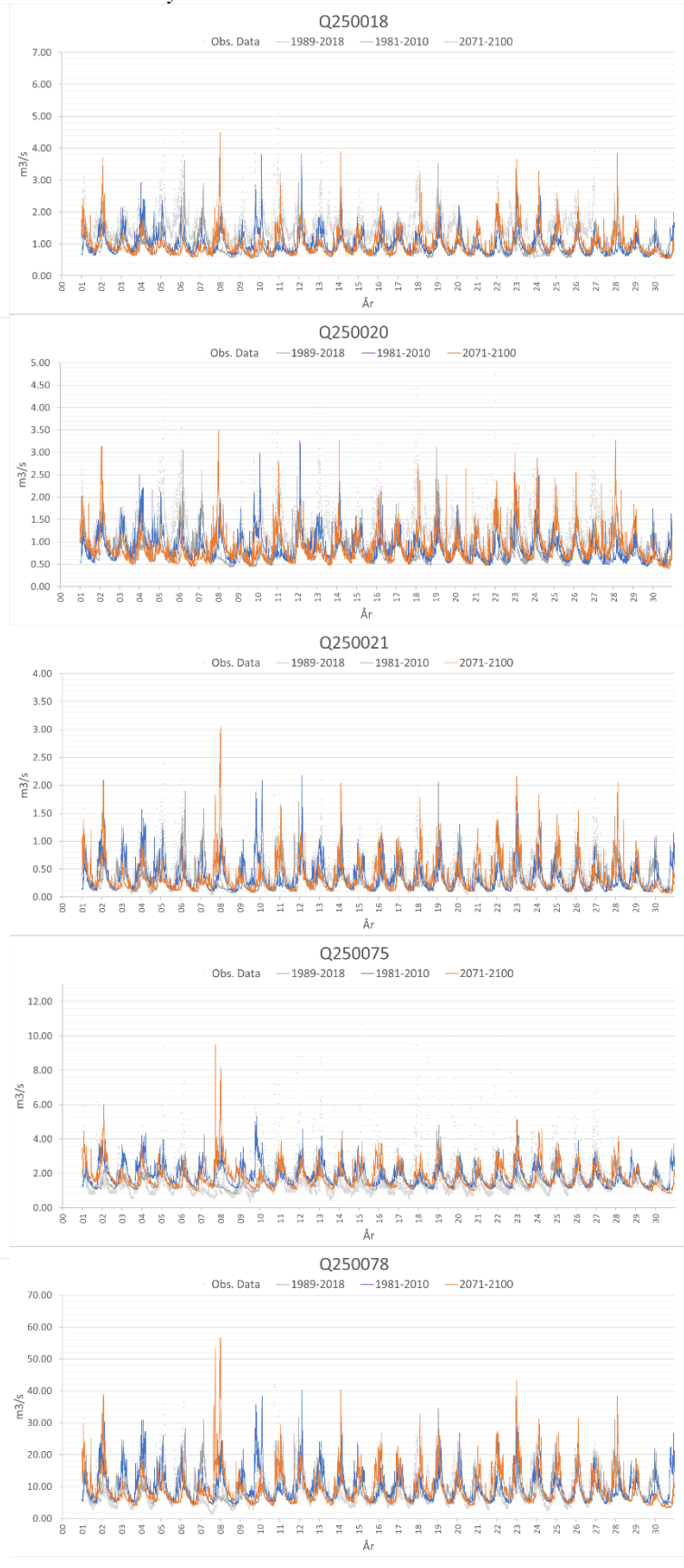
RCP 8.5 wet climate model



RCP 8.5 median climate model



RCP 8.5 dry climate model



RCP4.5 HIRHAM

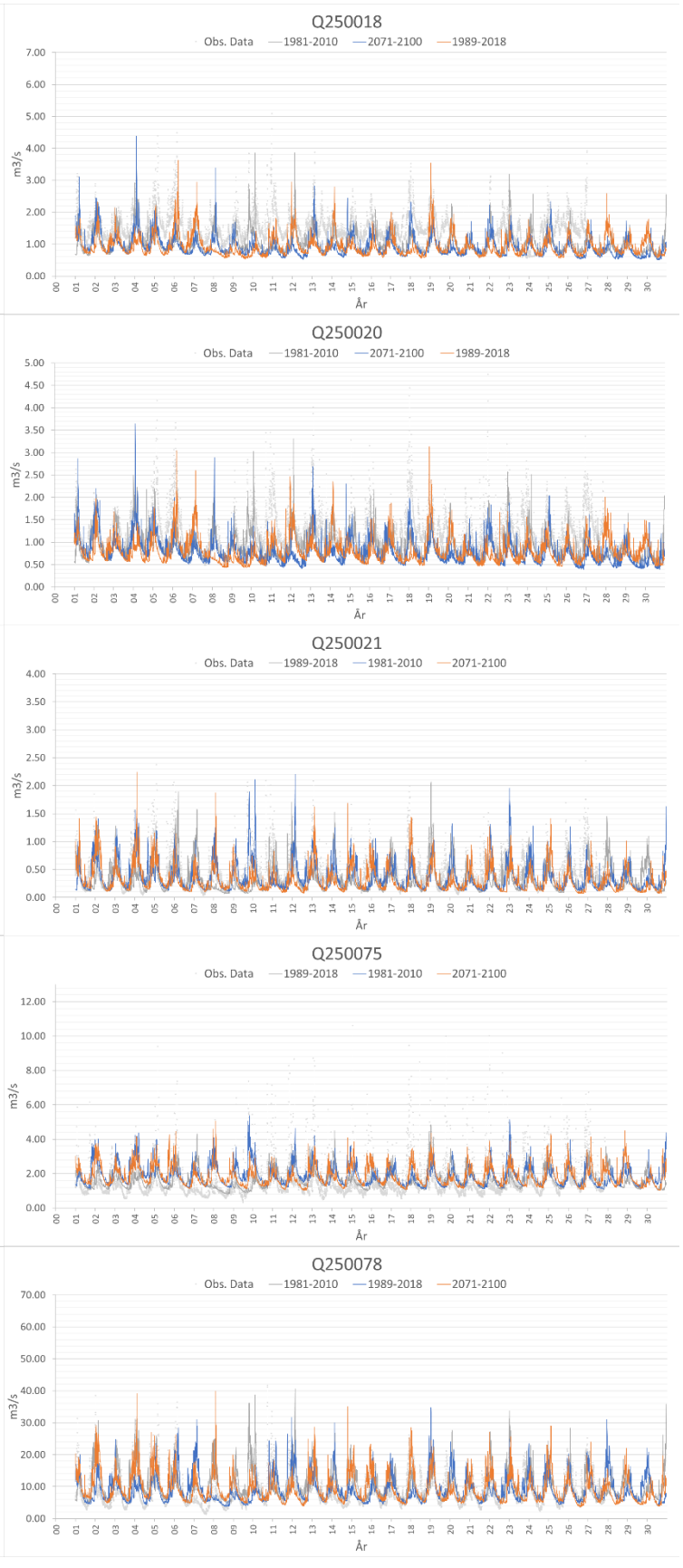


Figure A6-1 The graphs shows the simulated and observed discharge at the monitoring discharge stations Q250018(Skjern å, Tykskov), Q250020(Holtum å), Q250021(Brande å), Q250075(Hover å) and Q250078(Sdr. Omme å) in Ringkøbing catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed discharge in the same period. The blue line represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange line represent the simulated discharge for the four climate models in the

RCP 8.5 wet climate model

RCP 8.5 median climate model

RCP 8.5 dry climate model

RCP4.5 HIRHAM



Figure A6-2 : The graphs shows the simulated and observed discharge at the monitoring discharge Q250082(Skjern å), Q250086(Tim å), Q250087(Venner å) and Q250097(Skjern å) in Ringkøbing catchment in a 30-year period. The grey line represent the historical model run in the period 1989-2018, whereas the grey points represent the observed discharge in the same period. The blue line represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange line represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP

A6: Plot of mean monthly discharge for selected monitoring stations

De nedenstående grafer viser den gennemsnitlige månedlige afstrømning, målt i m³/dag, i udvalgte afstrømningsstationer. Graferne afbilder både den historiske kørsel (1989-2018), reference kørslen (1981-2010) og den fremtidige kørsel (2071-2100/2041-2070) for alle fire klimascenarier i både oplandet for Ringkøbing Fjord og oplandet i Midtsjælland.

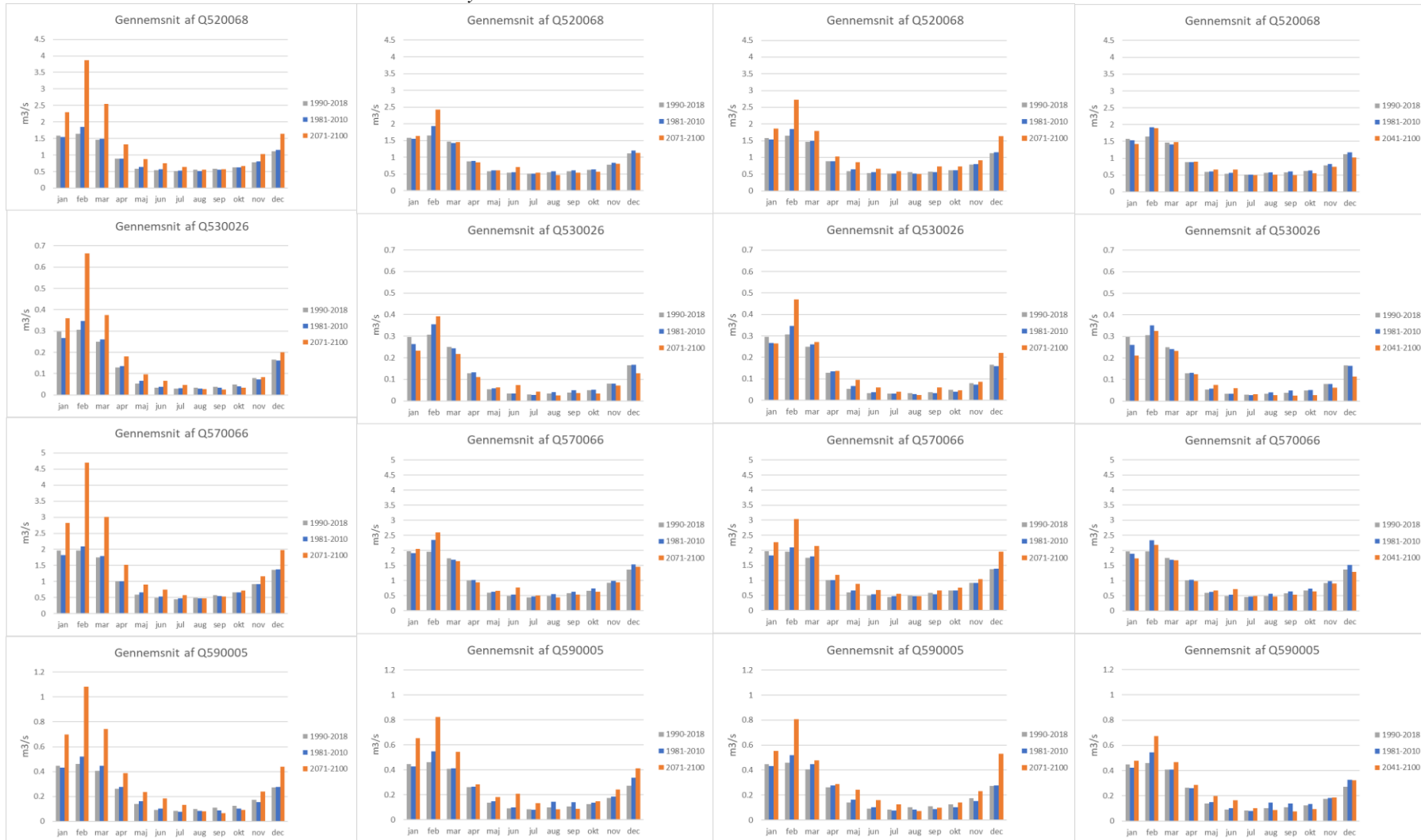
Mid-Zealand catchment

RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM



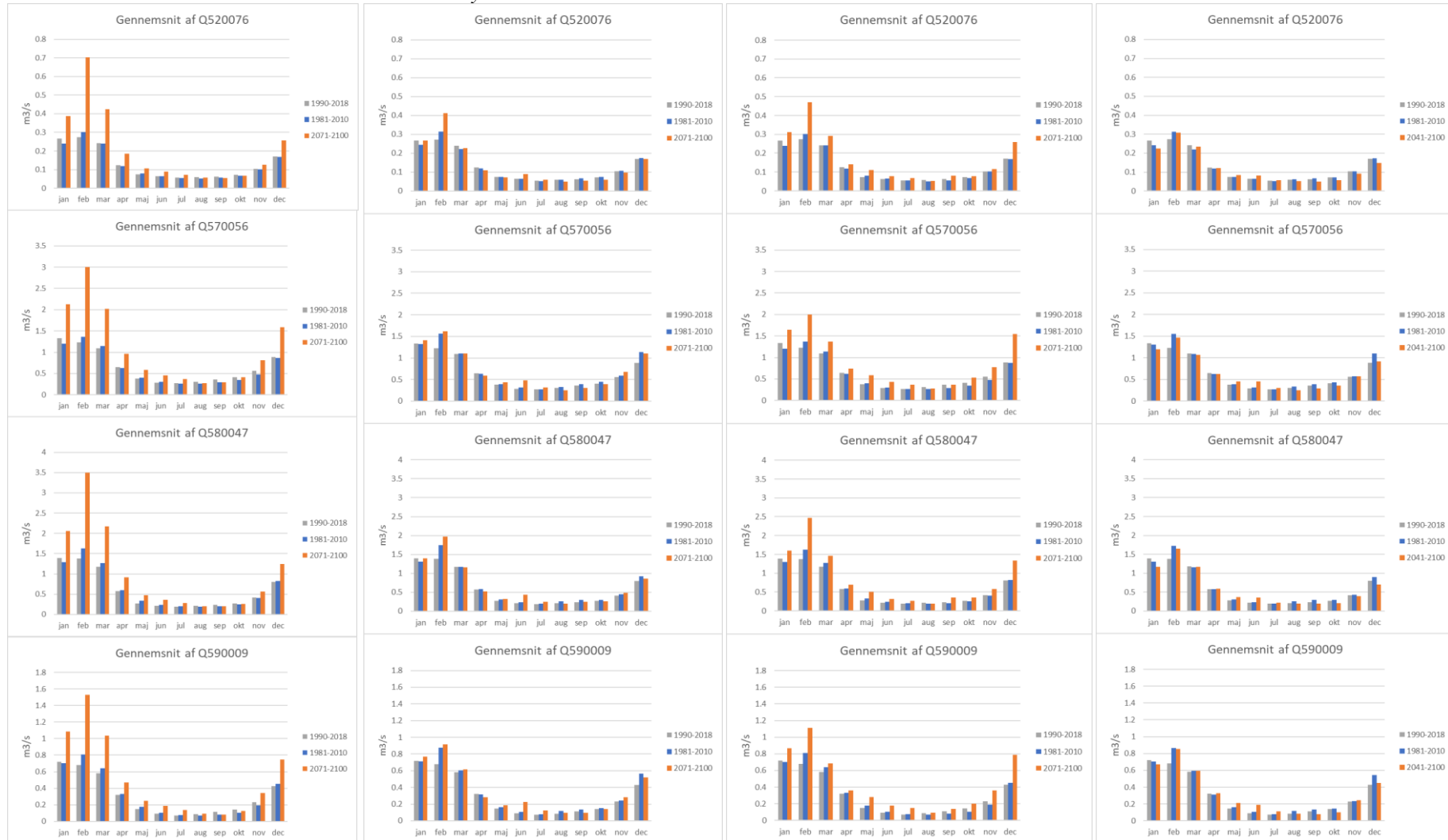
Figur A6-1: The figure shows graphs of the simulated mean mounthly discharge, at Q520068(Langevad å), Q530026(Skensved å), Q570066(Ringsted å) and Q590005(Krogbæk å), in a 30-year period for the four climate models in Mid-Zealand catchment . The grey colums represent the historical model run in the period 1989-2018, where the blue colums represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange colums represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

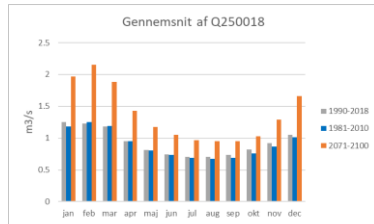
RCP 4.5 HIRHAM



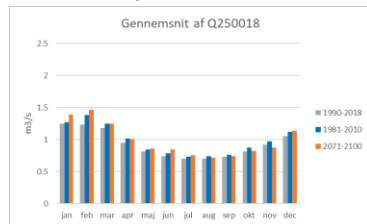
Figur A6-1: The figure shows graphs of the simulated mean mounthly discharge, at Q520076(Tokkerup å), Q570056(Suså), Q580047(Køge å) and Q90009(SAVL4), in a 30-year period for the four climate models in Mid-Zealand catchment . The grey colums represent the historical model run in the period 1989-2018, where the blue colums represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange colums represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

Ringkøbing Fjord catcment

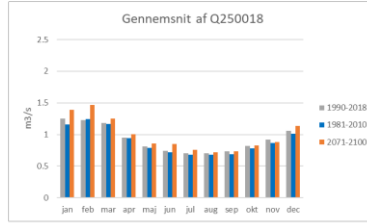
RCP 8.5 Wet model



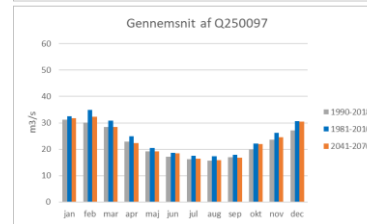
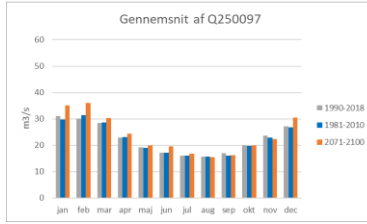
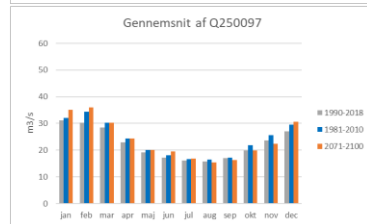
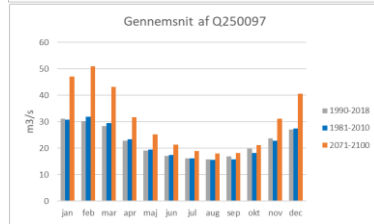
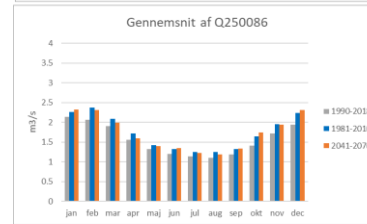
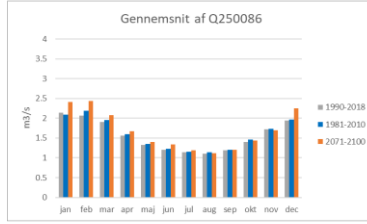
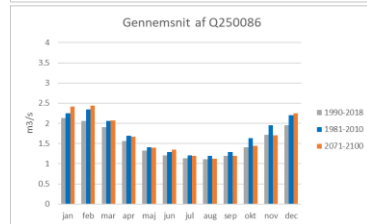
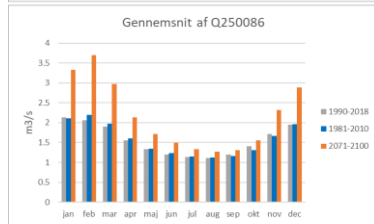
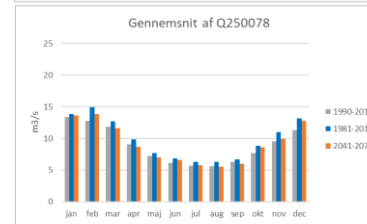
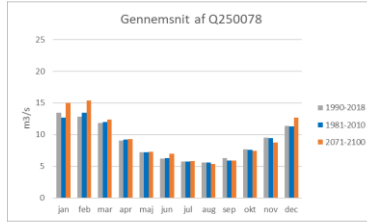
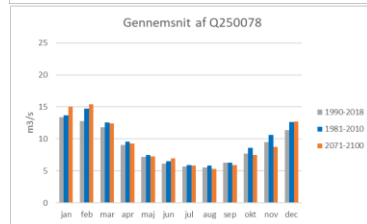
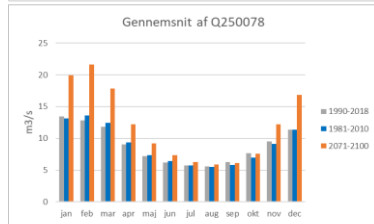
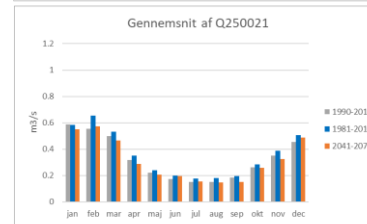
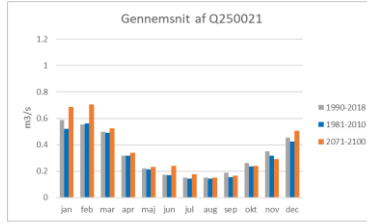
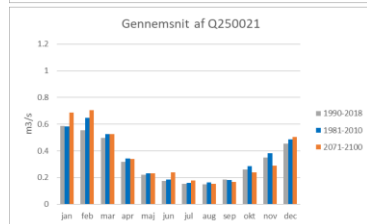
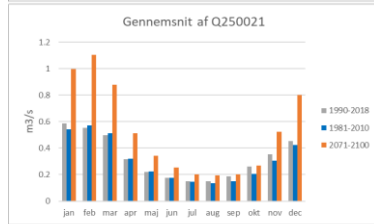
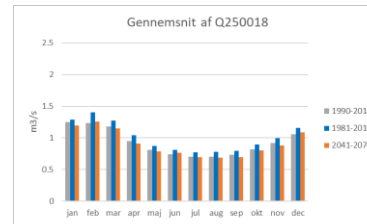
RCP 8.5 Dry climate model



RCP 8.5 Median climate model

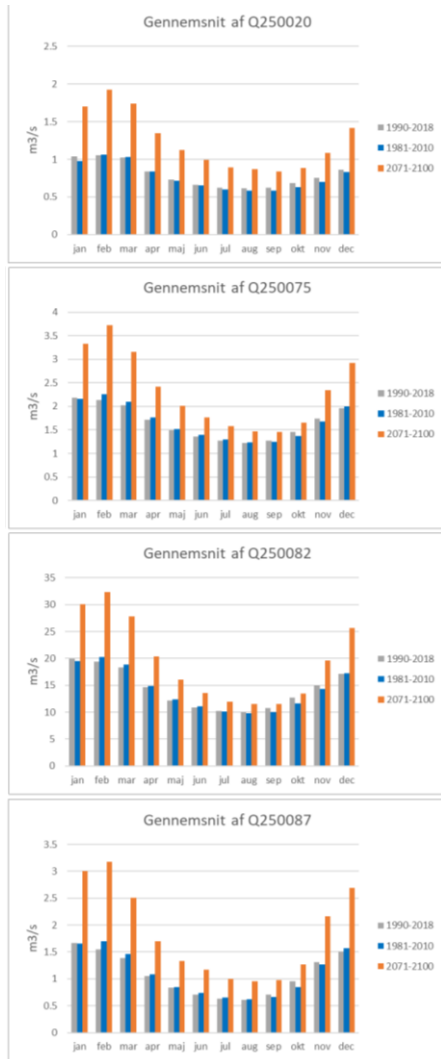


RCP 4.5 HIRHAM

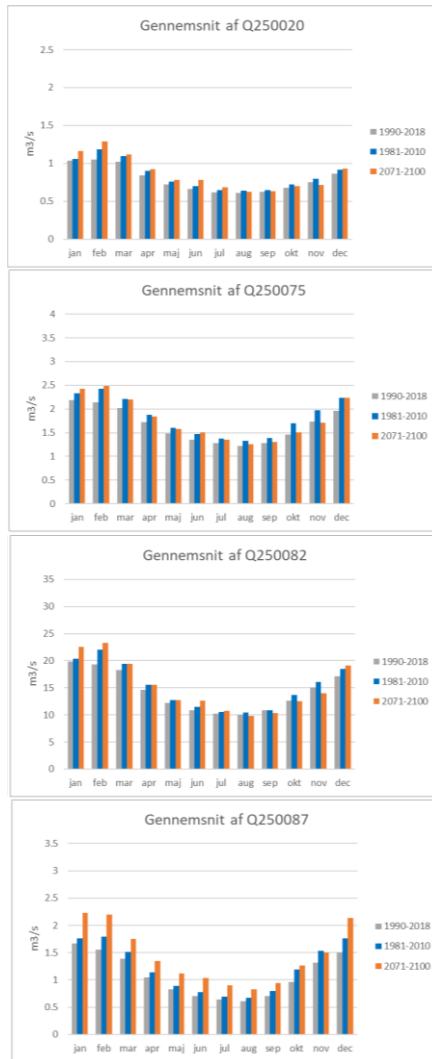


Figur A6-2: The figure shows graphs of the simulated mean mounthly discharge, at Q250018(Skjern å, Tykskov), Q250021(Brande å), Q250078(Sdr. Omme å), Q250086(Tim å) and Q250097(Skjern å), in a 30-year period for the four climate models in Ringkøbing catchment . The grey colums represent the historical model run in the period 1989-2018, where the blue colums represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange colums represent the simulated discharge for the four climate models in the period 2071-2100(RCP

RCP 8.5 Wet model



RCP 8.5 Dry climate model



RCP 8.5 Median climate model



RCP 4.5 HIRHAM



Figur A6-3: The figure shows graphs of the simulated mean mounthly discharge, at Q250020(Holtum å), Q250075(Hover å), Q250082(Skjern å) and Q250087(Venner å), in a 30-year period for the four climate models in Ringkøbing catchment . The grey colums represent the historical model run in the period 1989-2018, where the blue colums represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange colums represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

A7:Plot of monthly groundwater level for selected monitoring stations

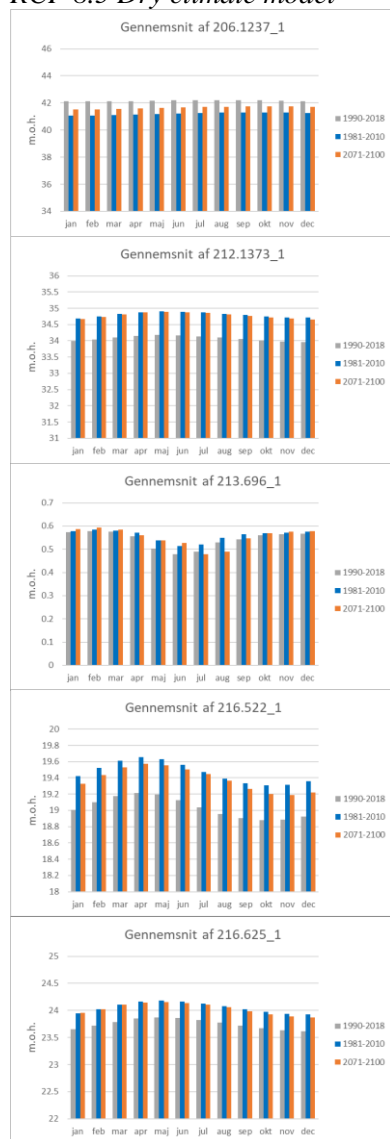
De nedenstående grafer viser den gennemsnitslige månedlige hydrauliske trykniveau, målt i m.o.h, i udvalgte boringer. Graferne afbilder både den historiske kørsel(1989-2018), reference kørslen(1981-2010) og den fremtidige kørsel(2071-2100/2041-2070) for alle fire klimascenarier i både oplandet for Ringkøbing Fjord og oplandet i Midtsjælland.

Mid-zealand catchment

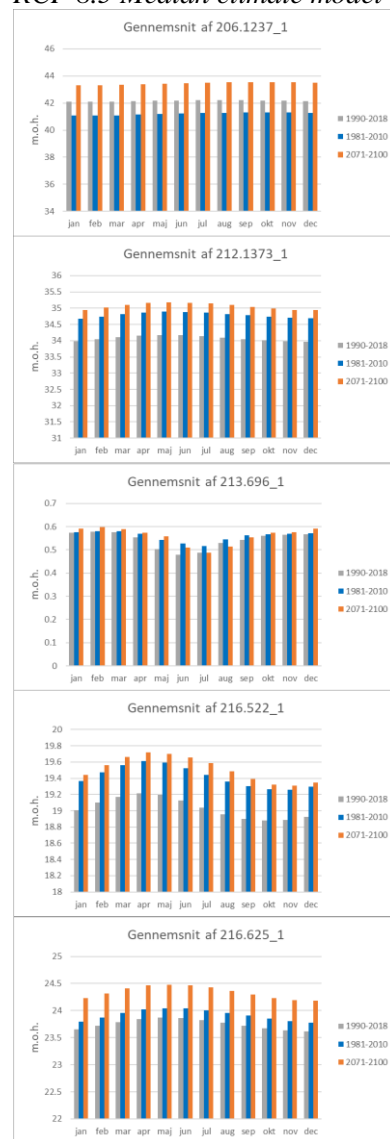
RCP 8.5 Wet model



RCP 8.5 Dry climate model



RCP 8.5 Median climate model

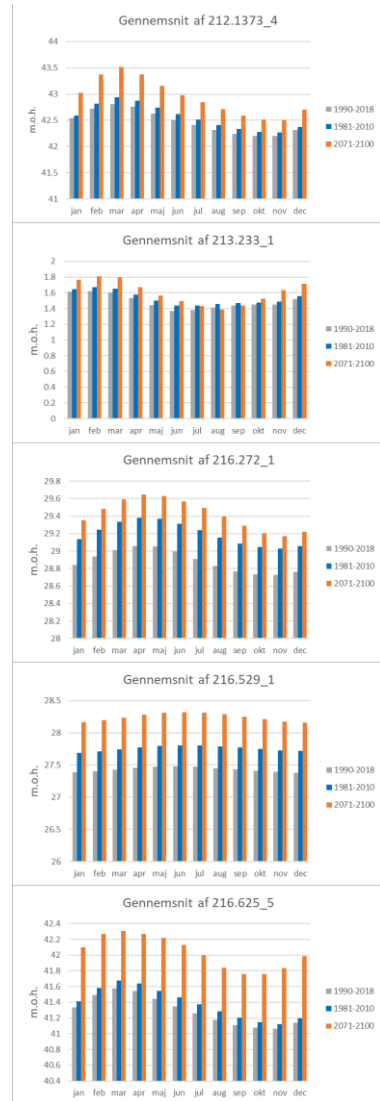


RCP 4.5 HIRHAM

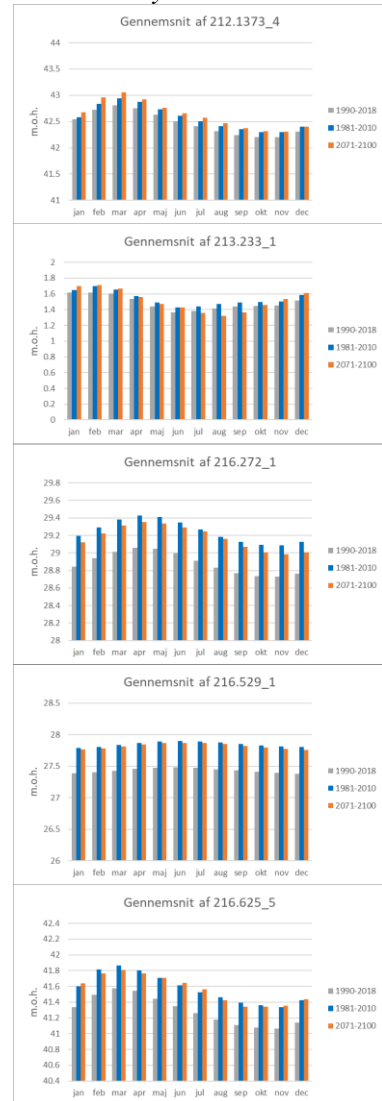


Figure A7-1: The figure shows graphs of the simulated mean monthly groundwater level, at 206.1237(filter 1), 212.1373(filter 1), 213.696_1(filter 1), 216.522(filter 1) and 216.625 (filter 1), in a 30-year period for the four climate models in Mid-Zealand catchment . The grey columns represent the historical model run in the period 1989-2018, where the blue columns represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange columns represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

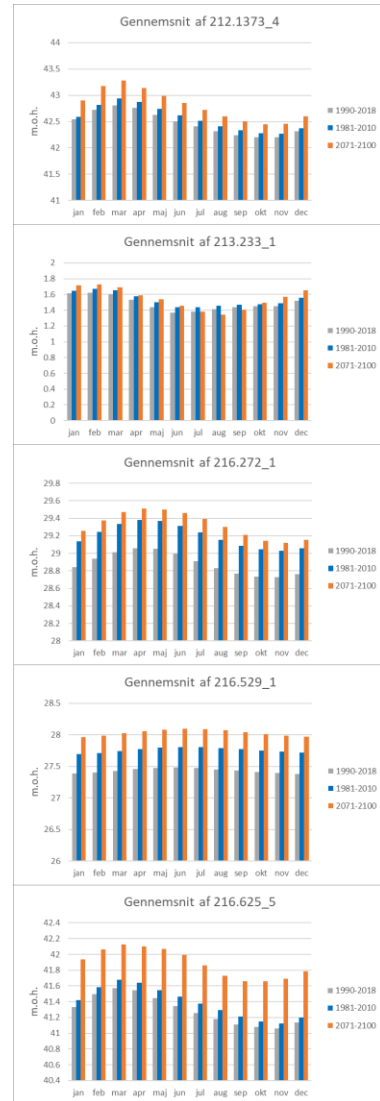
RCP 8.5 Wet model



RCP 8.5 Dry climate model



RCP 8.5 Median climate model



RCP 4.5 HIRHAM

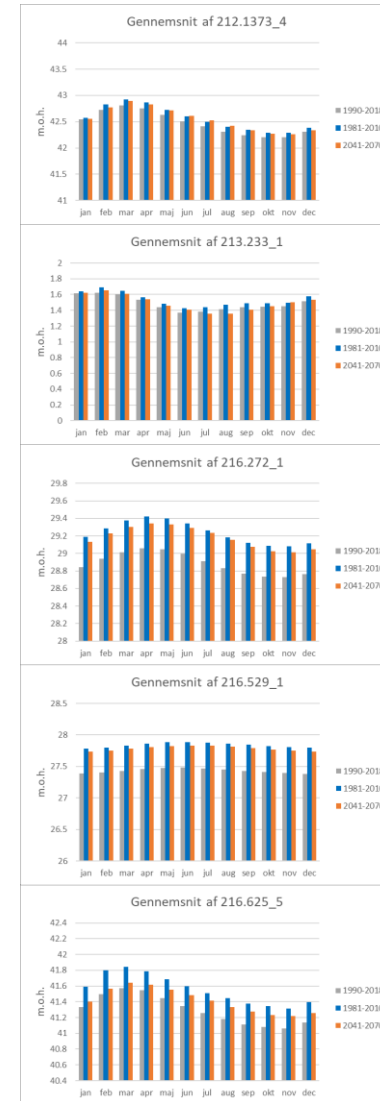
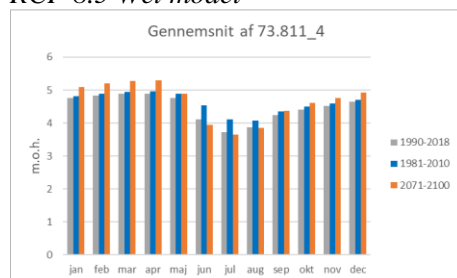


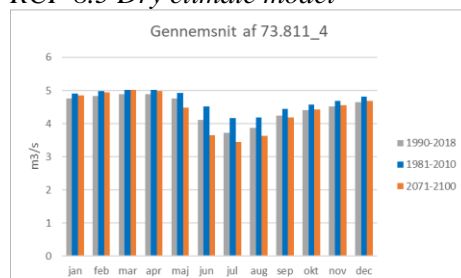
Figure A7-2: The figure shows graphs of the simulated mean monthly groundwater level, at 212.1373(filter 4), 213.233(filter 1), 216.272(filter 1), 216.529(filter 1) and 216.625 (filter 5), in a 30-year period for the four climate models in Mid-Zealand catchment . The grey columns represent the historical model run in the period 1989-2018, where the blue columns represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange columns represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

Rinkøbing fjord catchment

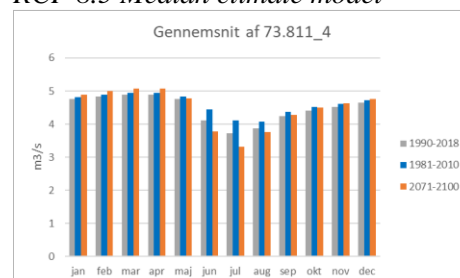
RCP 8.5 Wet model



RCP 8.5 Dry climate model



RCP 8.5 Median climate model



RCP 4.5 HIRHAM

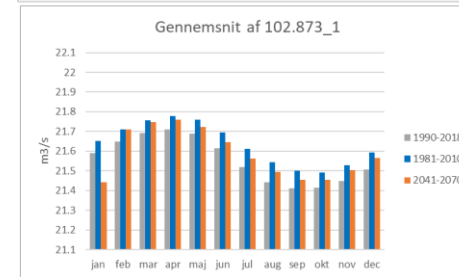
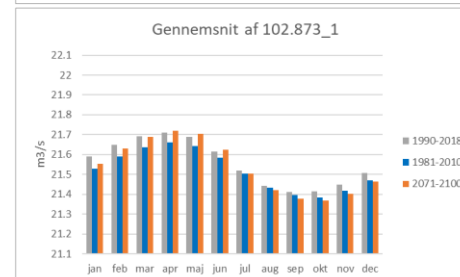
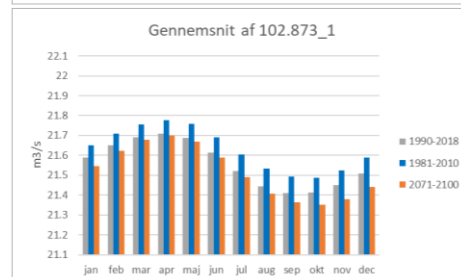
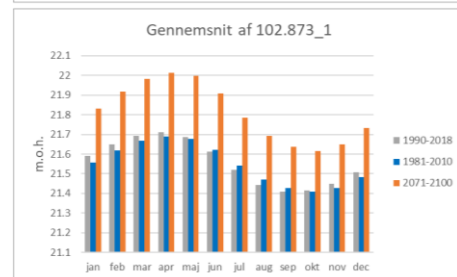
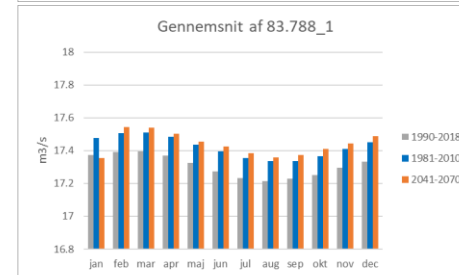
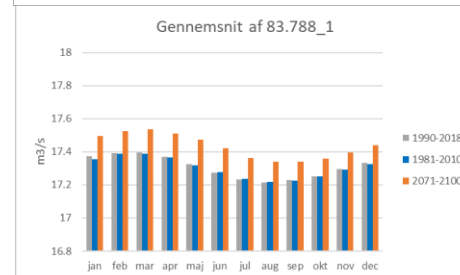
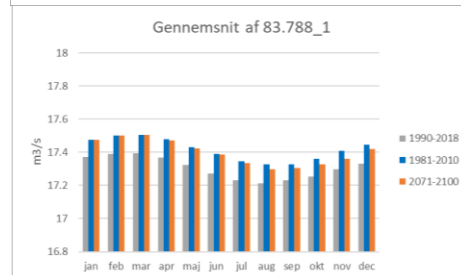
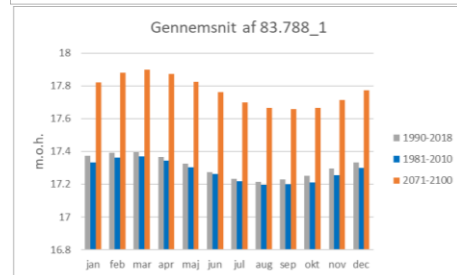
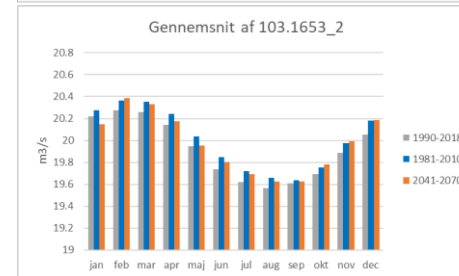
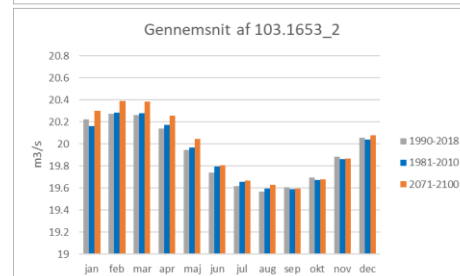
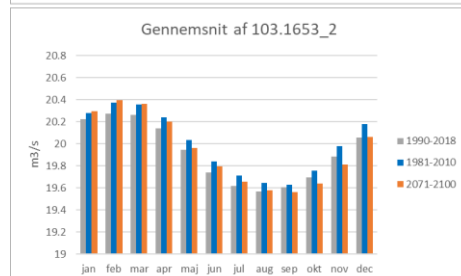
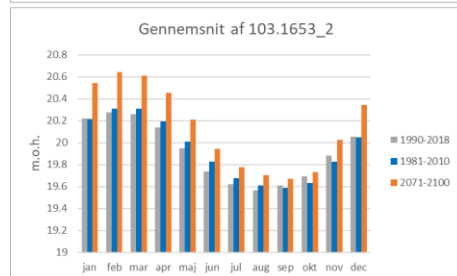
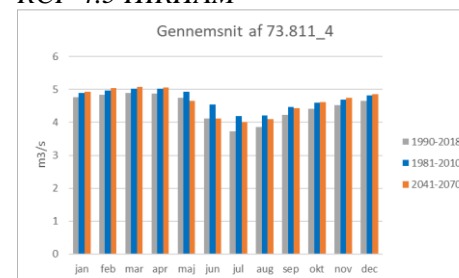


Figure A7-3: The figure shows graphs of the simulated mean monthly groundwater level, at 73.811(filter 4), 103.1653(filter 2), 83.788_1(filter 1) and 102.873(filter 1), in a 30-year period for the four climate models in Rinkøbing fjord catchment. The grey columns represent the historical model run in the period 1989-2018, where the blue columns represent the simulated discharge for the four climate models in the period 1981-2010, whereas the orange columns represent the simulated discharge for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

A8. Annual maximum flow for selected stations

Mid-Zealand catcment

RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM.

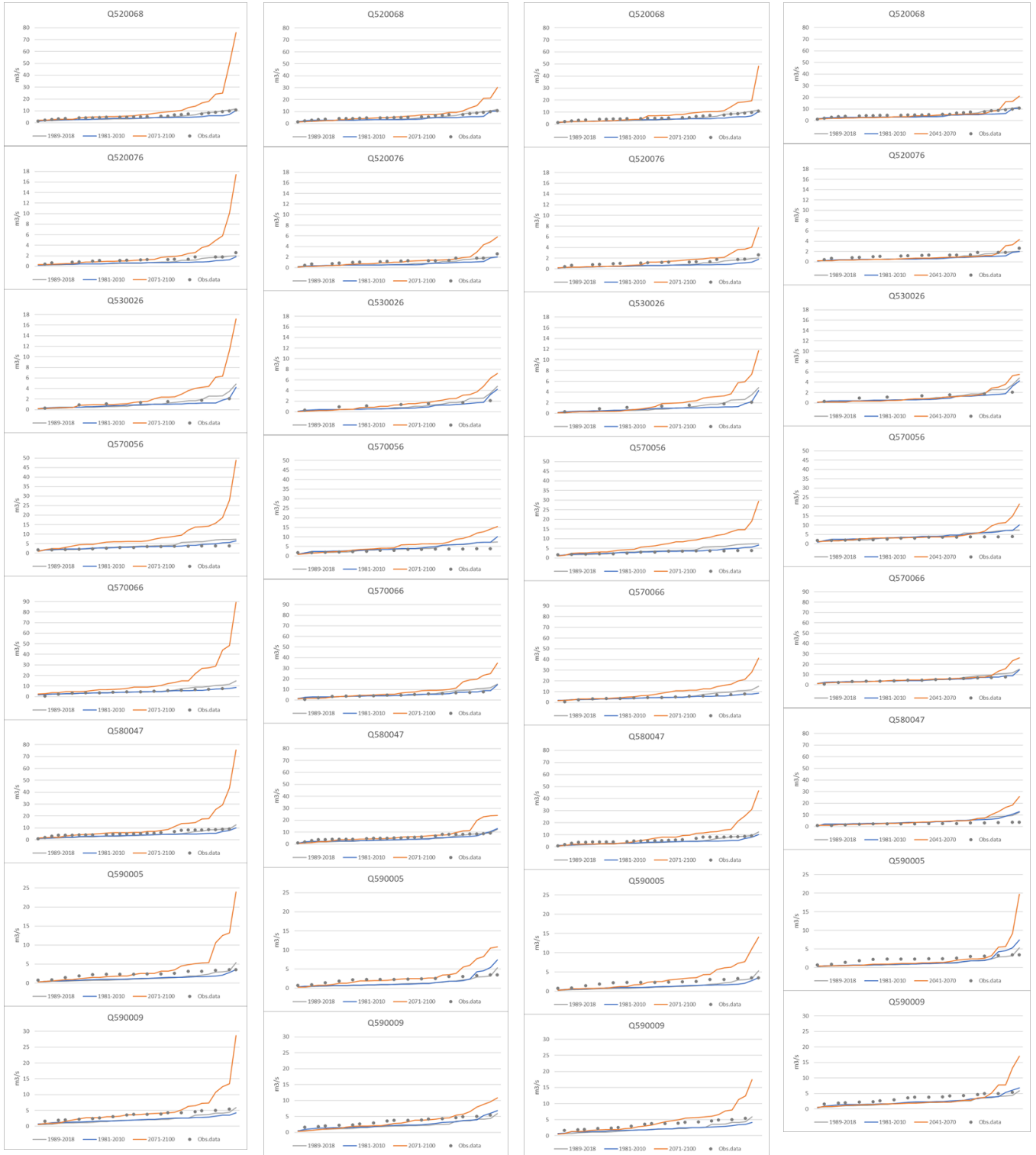


Figure A8.1 Annual max Mid-Zealand: Orange future, Blue: Reference, Grey: Obs Climate and Dots: Observed annual daily max discharge

Ringkøbing fjord catcment

RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM.

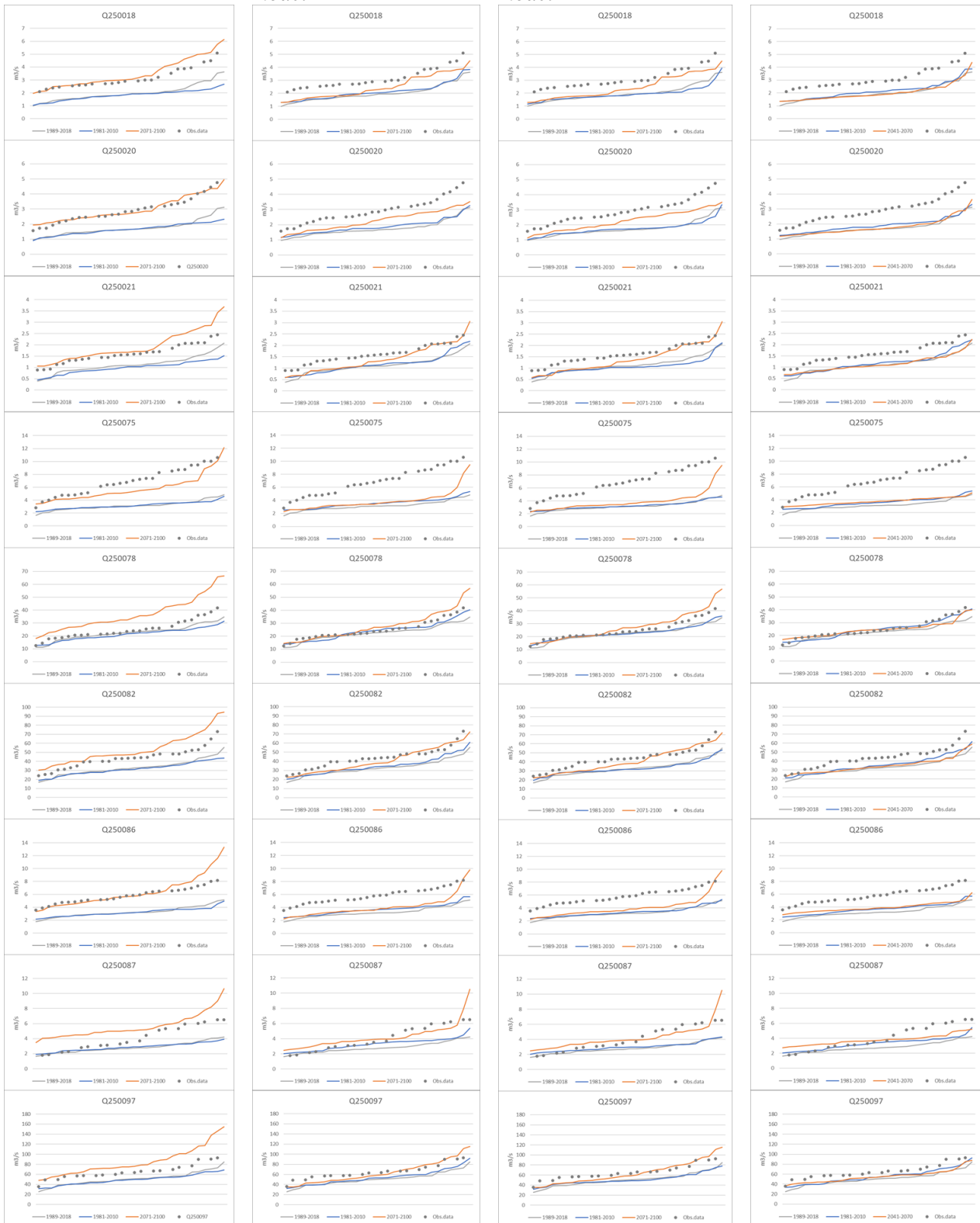


Figure A8.2 Annual max Ringkøbing fjord: Orange future, Blue: Reference, Grey: Obs Climate and Dots: Observed annual daily max discharge

A9 Annual minimum flow for selected stations

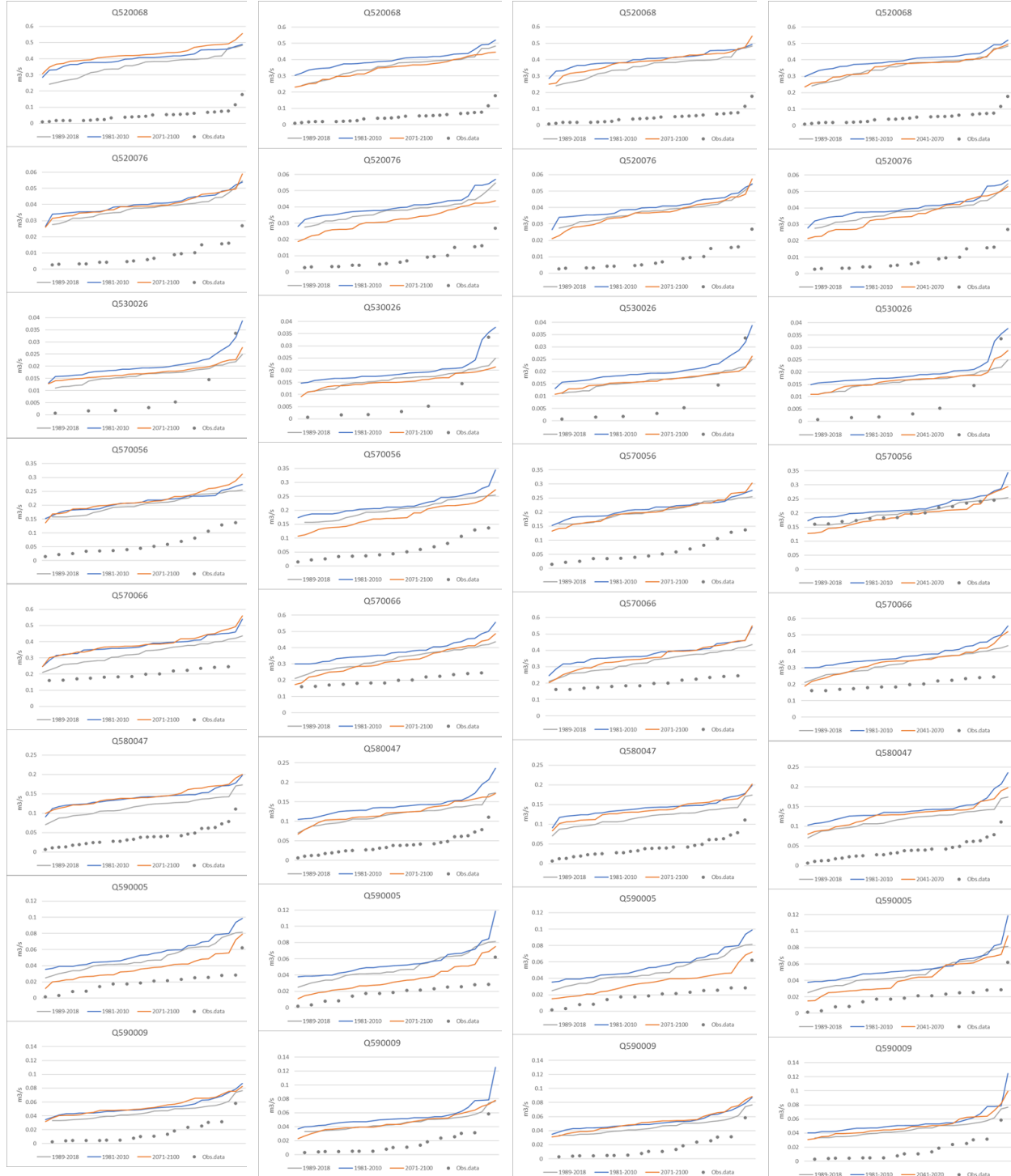
Mid-Zealand catment

RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM.



Figur A9-1: The figure shows graphs of the discharge divided into ascending annual minimum flow levels for Mid-Zealand, at Q520068(Langevad å), Q520076(Tokkerup å), Q530026(?), Q570056(Suså), Q570066(Ringsted å), Q580047(Køge å), Q590005(Krogbæk å)and Q90009(SAVL4) in a 30-year period, for the four climate models in Mid-Zealand catchment. The grey line represents the annual minimum flow levels in the historical model run in the period 1989-2018, whereas the grey points represent the observed minimum flow levels in the same period (these observations are sorted by quantity distributed over a year). The blue line represent the annual minimum flow levels for the four climate models in the period 1981-2010, whereas the orange line represent the annual minimum flow levels for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

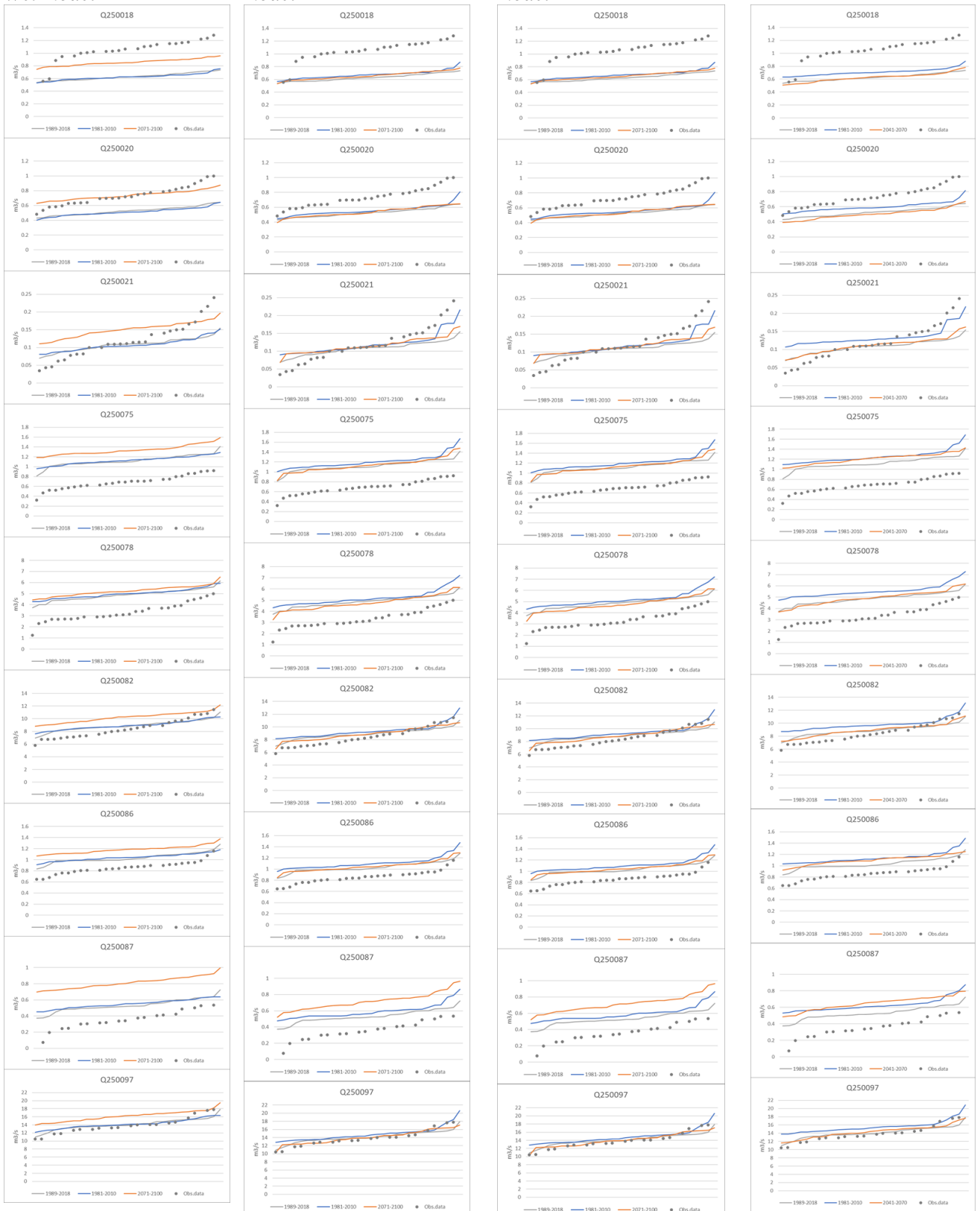
Ringkøbing fjord catcment

RCP 8.5
Wet model

RCP 8.5 Dry climate
model

RCP 8.5 Median climate
model

RCP 4.5 HIRHAM.

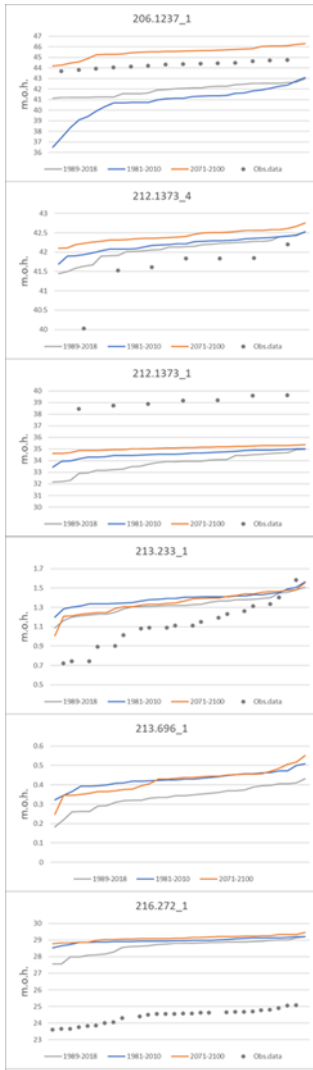


Figur A9-2: Annual minimum flow Ringkøbing fjord: Orange: future, blue: reference, grey: observed climate and Dots: observed

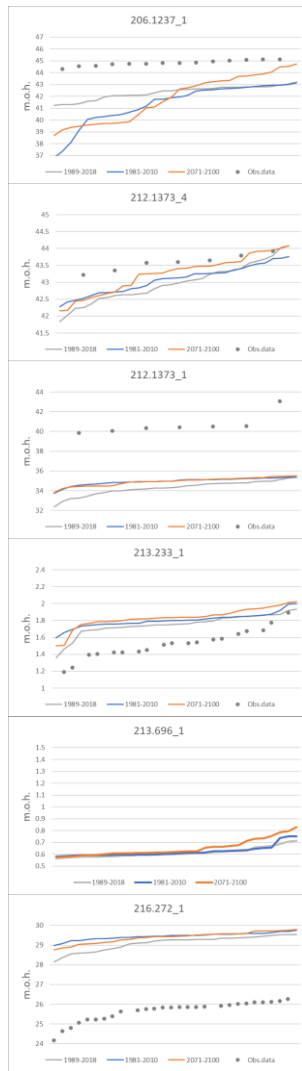
A10. Annual maximum groundwater level selected stations

Mid-Zealand catchment

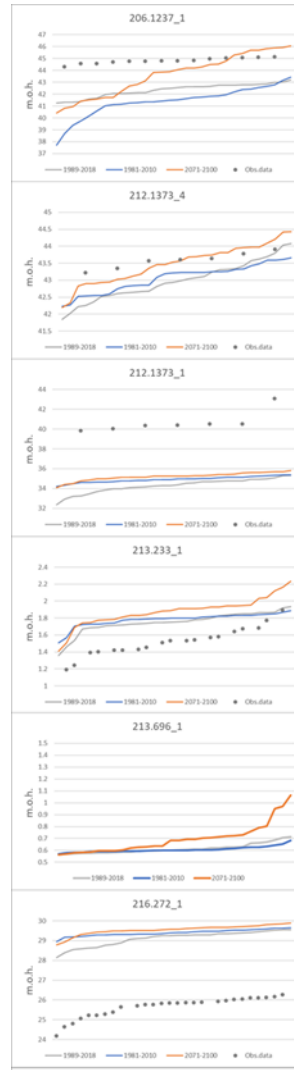
RCP 8.5 Wet model



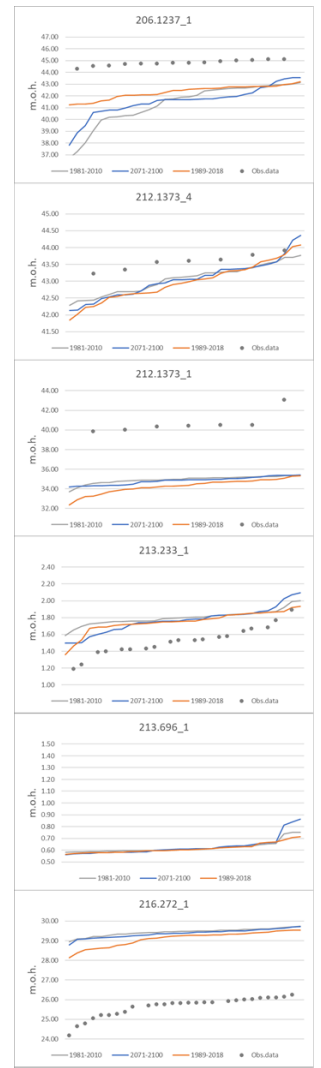
RCP 8.5 Dry climate model

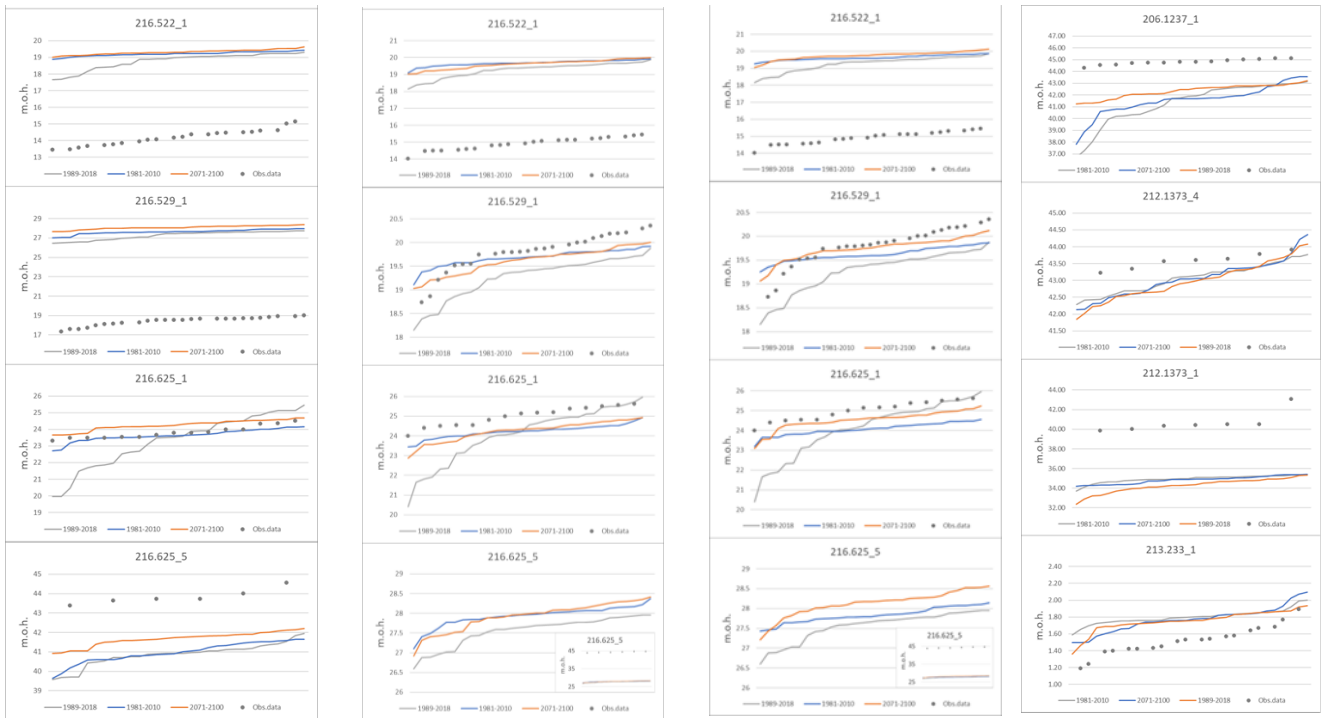


RCP 8.5 Median climate model



RCP 4.5 HIRHAM.

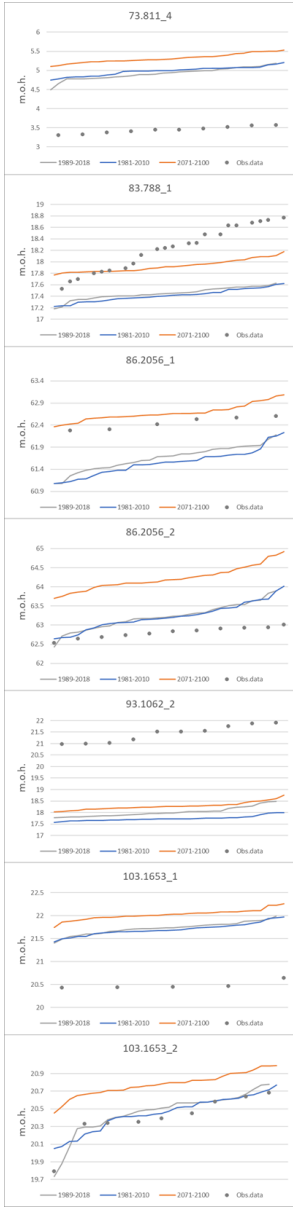




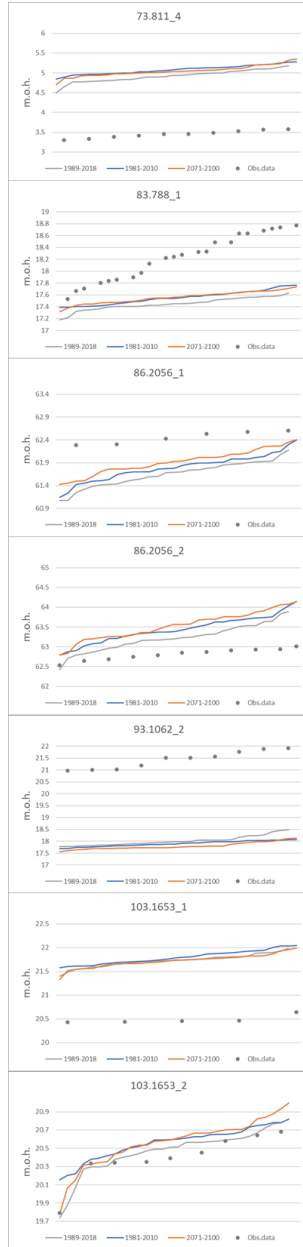
Figur A10-1: The figure shows graphs of the ascending annual maximum groundwater levels , at 206.1237(filter), 2112.1373(filter 4), 212.1373(filter 1), 213.233(filter 1), 213.696 (filter 1), 216.272 (filter 1), 216.522(filter 1), 216.529(filter 1), 216.625(filter 1) and 216.625(filter 5) in a 30-year period, for the four climate models in Mid-Zealand catchment. The grey line represents the annual maximum groundwater levels in the historical model run in the period 1989-2018, whereas the grey points represent the observed maximum groundwater levels in the same period (these observations are sorted by quantity distributed over a year). The blue line represent the annual maximum groundwater levels for the four climate models in the period 1981-2010, whereas the orange line represent the annual maximum groundwater levels for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).

Ringkøbing fjord catchment

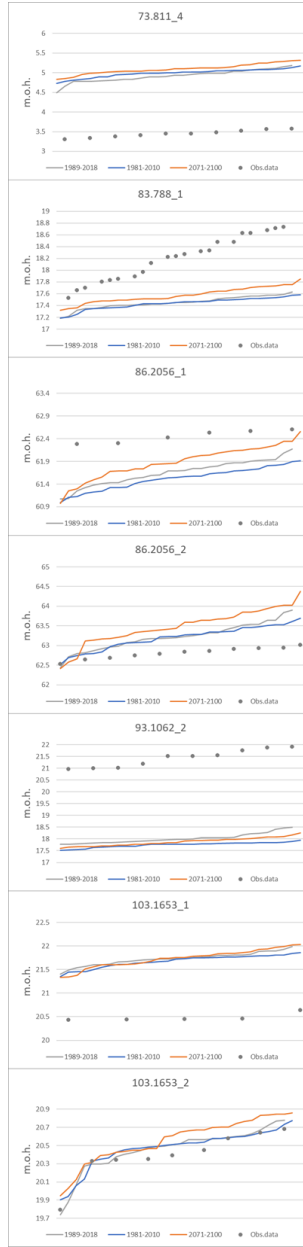
RCP 8.5 Wet model



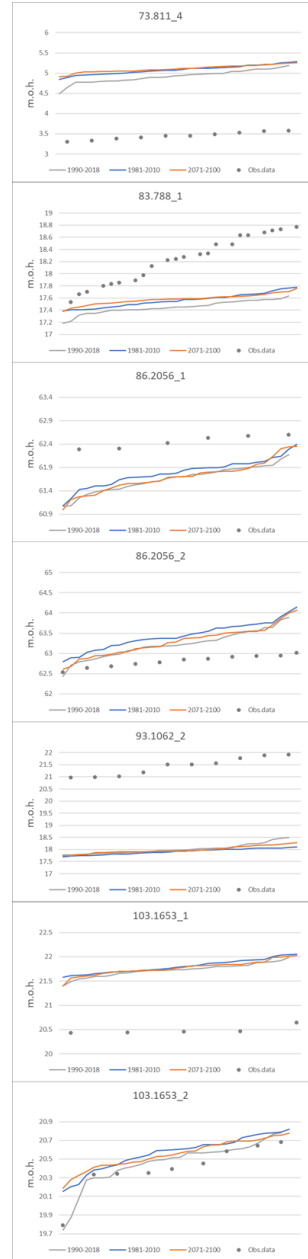
RCP 8.5 Dry climate model



RCP 8.5 Median climate model



RCP 4.5 HIRHAM.



A11. Annual minimum groundwater level selected stations

Mid-Zealand catchment

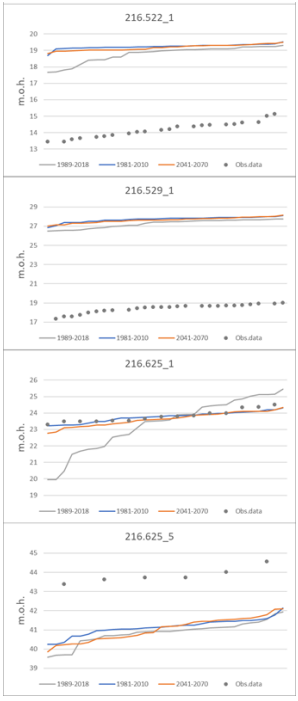
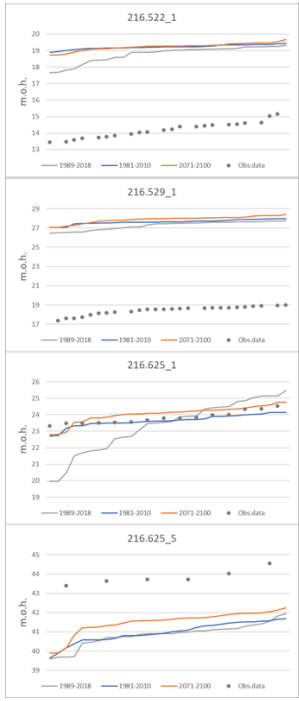
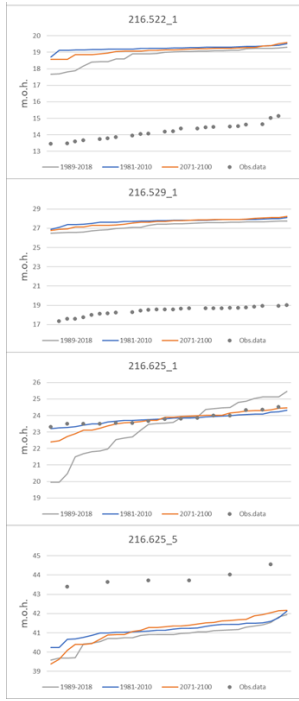
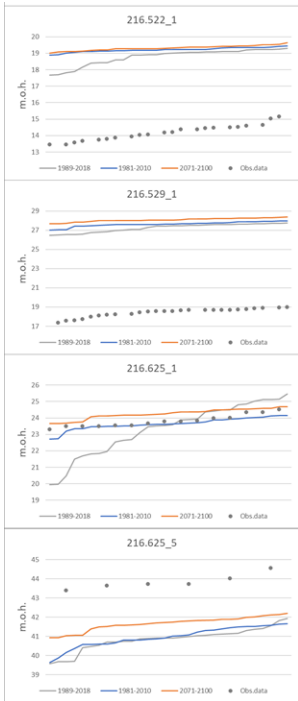
RCP 8.5 Wet model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM.





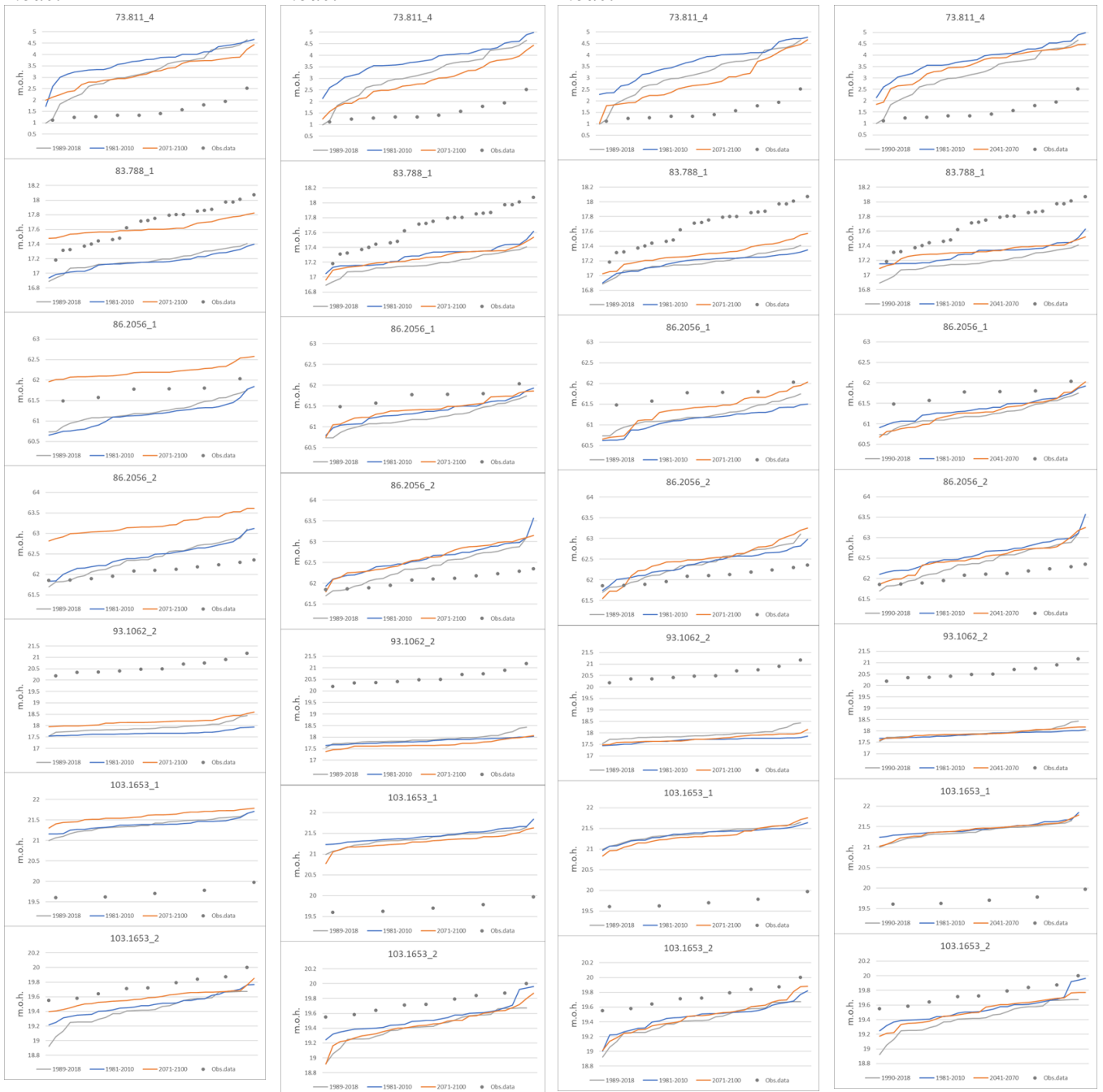
Ringkøbing fjord catchment

RCP 8.5 Wet climate model

RCP 8.5 Dry climate model

RCP 8.5 Median climate model

RCP 4.5 HIRHAM.



Figur A11-1: The figure shows graphs of the ascending annual minimum groundwater levels, at 73.811(filter 4), 83.788(filter 1), 86.2056(filter 1), 86.2056(filter 2), 93.1062(filter 2), 103.1653(filter 1) and 103.1653(filter 2) in a 30-year period, for the four climate models in Ringkøbing fjord catchment. The grey line represents the annual minimum groundwater levels in the historical model run in the period 1989-2018, whereas the grey points represent the observed minimum groundwater levels in the same period (these observations are sorted by quantity distributed over a year). The blue line represent the annual minimum groundwater levels for the four climate models in the period 1981-2010, whereas the orange line represent the annual minimum groundwater levels for the four climate models in the period 2071-2100(RCP 8.5)/2041-2070(RCP 4.5).