

Appendix B

SEARs assessment requirements

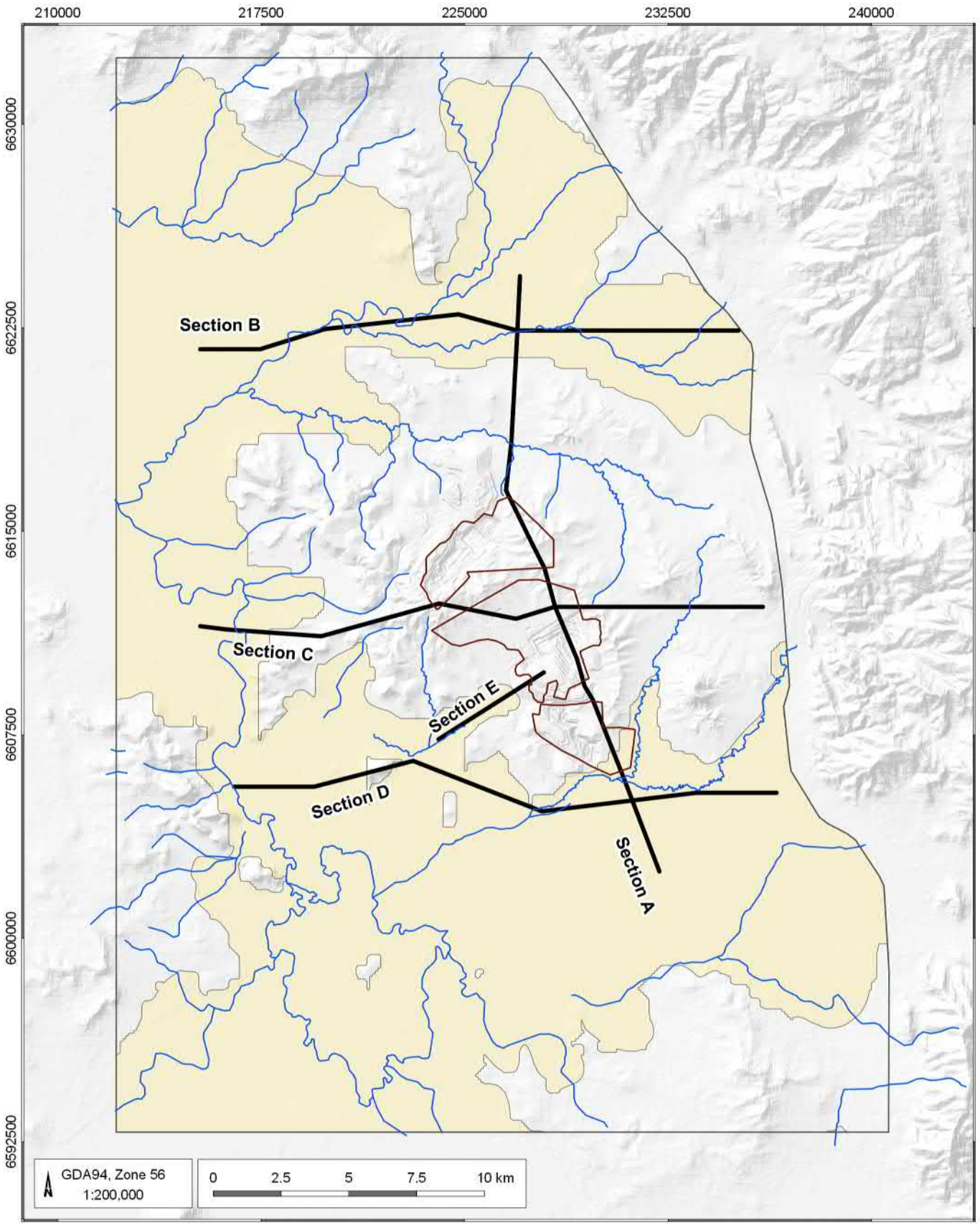
Table B 1 SEARs assessment requirements

Number	SEARs assessment requirement	Section of GIA assessment requirement is addressed
13	<p>The Modification Report must include a detailed water assessment undertaken in accordance with the IESC Information Guidelines (http://iesc.environment.gov.au/publications/information-guidelines-independent-expert-scientific-committee-advice-coal-seam-gas). The Modification Report should present sufficient evidence for independent verification of:</p> <ul style="list-style-type: none"> the processes of cause and effect between the project and water resource; and the magnitude of the impacts on water resources. 	<p>This GIA represents the detailed water assessment with respect to groundwater.</p>
14	<p>Sufficient information should be provided to consider the appropriateness of the underlying assumptions and conceptual models on which numerical models are based. An independent reader of the environmental assessment documents should be able to verify all significant conclusions made by the proponent.</p>	<p>Section 7/Appendix A (model assumptions) and Section 6 (conceptual model).</p>
15	<p>The Modification Report should provide the following information outlined in the IESC Information Guidelines:</p> <ul style="list-style-type: none"> A description of current regional and proposed impacts to water resources and water-dependent assets. 	<p>Section 6 (current impacts) and Section 8 (proposed impacts).</p>
16	<p>The water assessment should provide a regional overview of the project area including a description of the geological basin, coal resource, surface water catchments, groundwater systems, water-dependent assets, and current and reasonably foreseeable coal mining, CSG development and other water-intensive activities, including irrigation. This should include any relevant information generated by a bioregional assessment.</p>	<p>Section 3/Section 4/Section 5/Section 6.</p>
17	<p>Provide descriptions of existing conditions, values and sensitivity to potential impacts.</p>	<p>Section 6.</p>
18	<p>Provide conceptual and/or numerical modelling of potential impacts.</p>	<p>Section 6.10 (conceptual impacts) and Section 8 (modelled impacts).</p>
19	<p>Propose mitigation and management measures.</p>	<p>Section 10.</p>
20	<p>Include a groundwater model that uses a wider variety of parameters and predictions to enable clarification of potential drawdown impacts and include, accordingly, the assessment of impacts on the creeks and tributaries traversing the mining area and downstream. The modelling should show the range of likelihood of possible outcomes, based on sensitivity and uncertainty analysis.</p>	<p>Section 7/Appendix A (model parameters), Section 8 (predictions), Section 8.3/Appendix A (uncertainty analysis).</p>
21	<p>Predictions of groundwater changes over the life of the proposed projects (for example, using numerical groundwater models).</p>	<p>Section 8.</p>

Number	SEARs assessment requirement	Section of GIA assessment requirement is addressed
22	Predictions of groundwater recovery beyond the life of the proposed projects (for example, using numerical groundwater models).	Section 8.2.
23	Confirm the distribution of GDEs in the region and the depth to groundwater in areas of potential GDEs.	Section 6.8.2.
24	Include an assessment of GDEs	Section 8.1.7.
27	The Modification Report should include a cumulative impact assessment and consider all relevant past, present and reasonably foreseeable actions, including impacts from water-intensive activities other than mining and CSG, and programs and policies that are likely to impact water resources. Where impacts from a new project are considered small, these need to be considered with the impacts from existing development and the cumulative impact must be assessed to determine if a threshold of acceptable total impact may be crossed.	Section 8.
28	The Modification Report should derive site-specific water quality guidelines and provide more information on how they plan to monitor impacts. For example, the parameters and frequency of monitoring should be detailed.	Section 10.
29	Predictions of final void water quality and quantity.	Section 8.2.
30	Discussion on re-equilibration of groundwater and eventual discharges to the environment.	Section 8.2.

Appendix C

Cross sections



LEGEND

- Drainage
- Extent of mining
- Model extent
- Alluvium extent

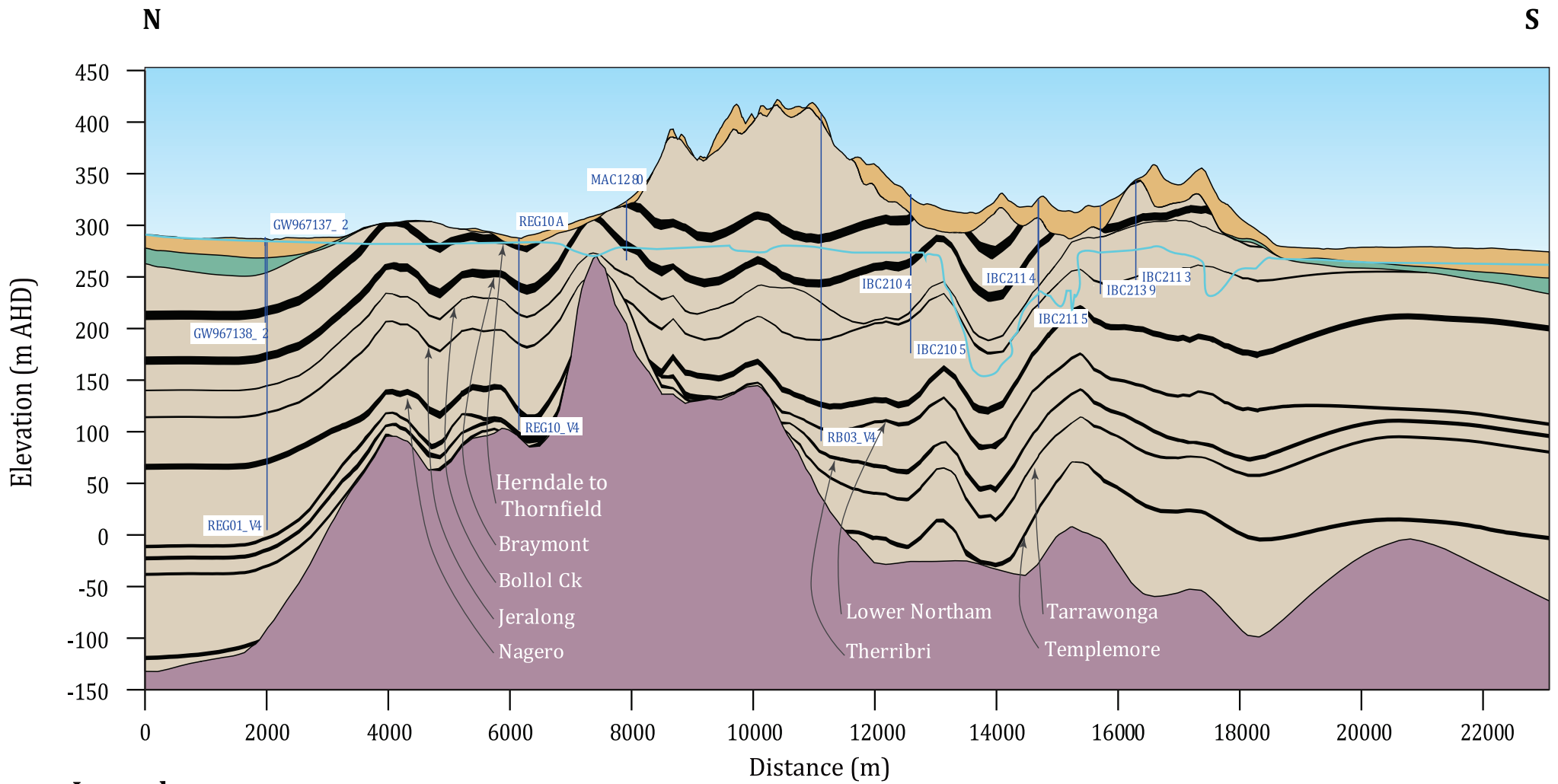
Boggabri MOD8 (G1850W)

Location of cross-sections



DATE
14/07/2021

FIGURE No:
C 1



Legend

- L01 Alluvium (Narrabri) / regolith
- L02 Alluvium (Gunnedah)
- Interburden
- Coal seam
- Basement
- 2019 groundwater table

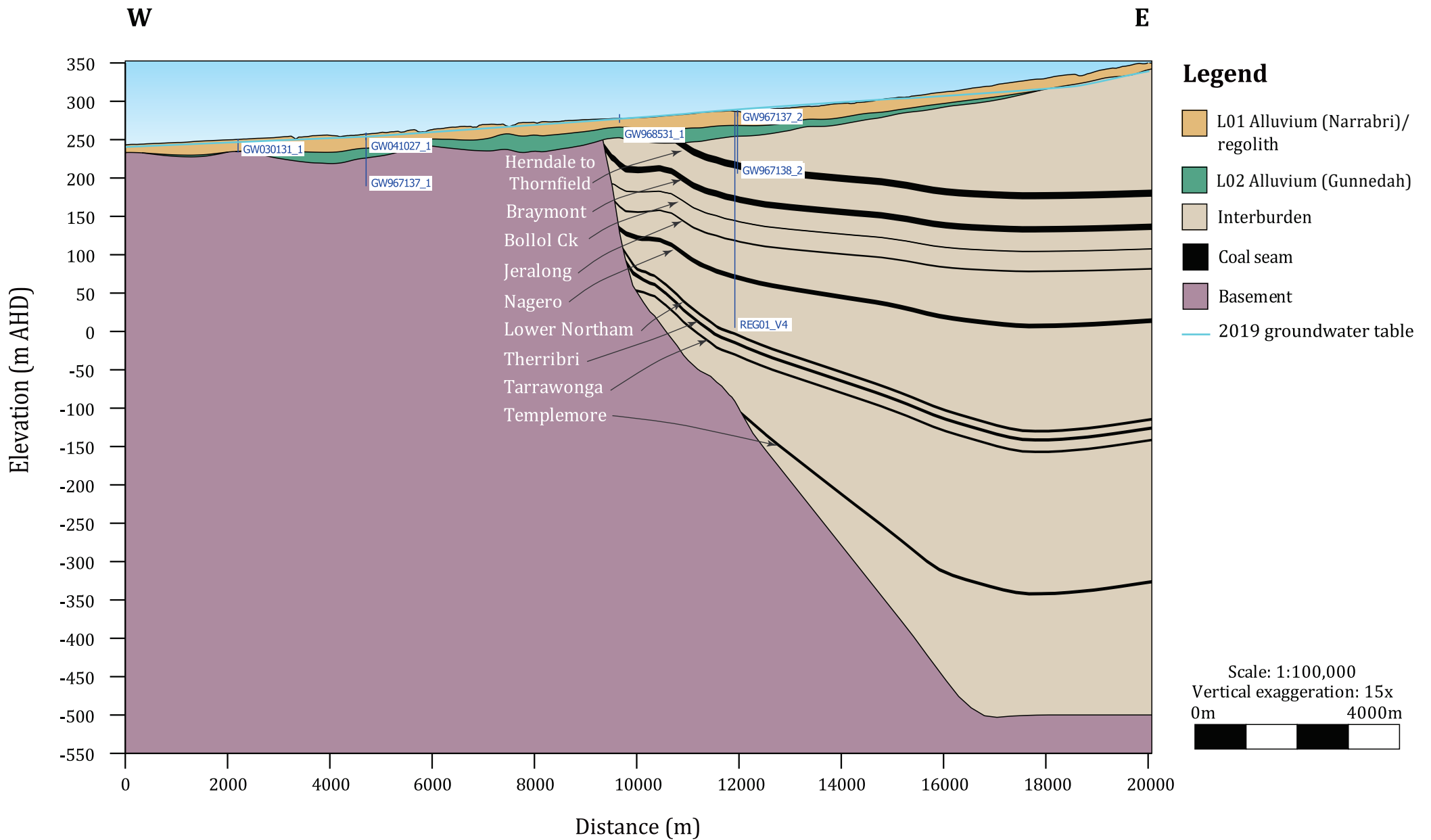
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Cross-section A (North to South) with 2019 groundwater table

Figure C 2

Boggabri MOD8 (G1850W)



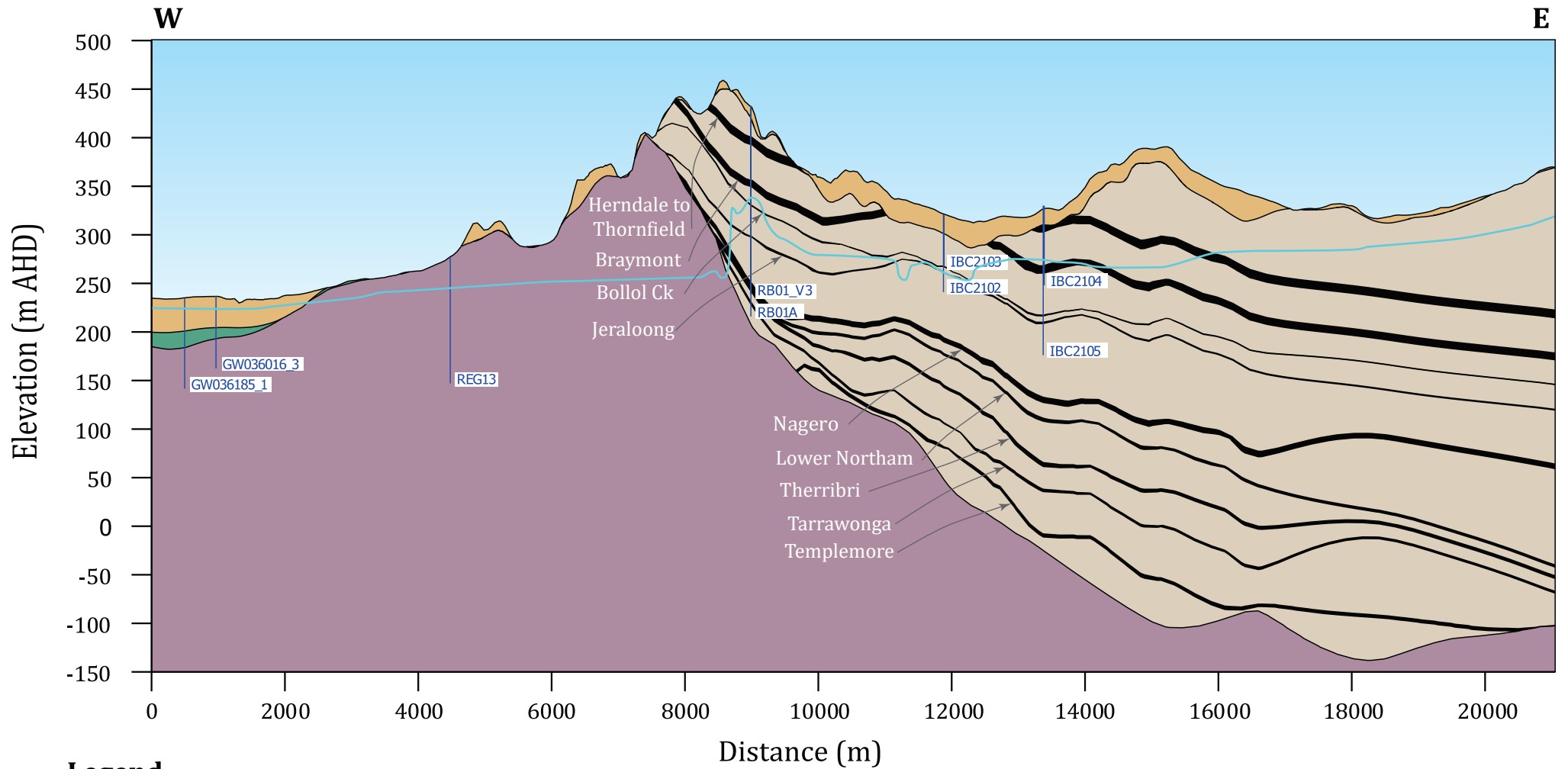


Cross-section B (West to East) with 2019 groundwater table

Figure C 3

Boggabri MOD8 (G1850W)





Legend

- L01 Alluvium (Narrabri) / regolith
- L02 Alluvium (Gunnedah)
- Interburden
- Coal seam
- Basement
- 2019 groundwater table

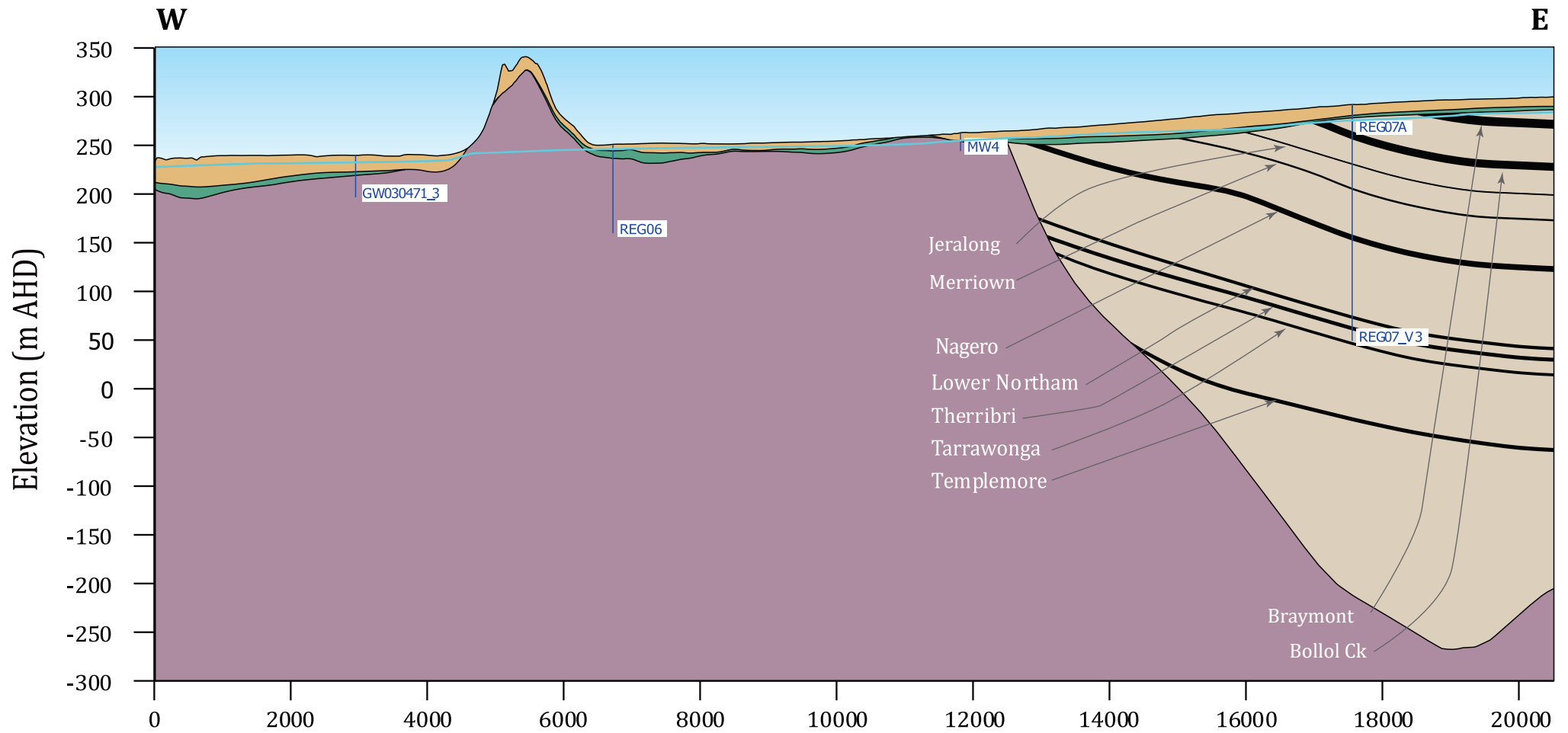
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Cross-section C (West to East) with 2019 groundwater table

Figure C 4

Boggabri MOD8 (G1850W)





Legend

- L01 Alluvium (Narrabri) / regolith
- L02 Alluvium (Gunnedah)
- Interburden
- Coal seam
- Basement
- 2019 groundwater table

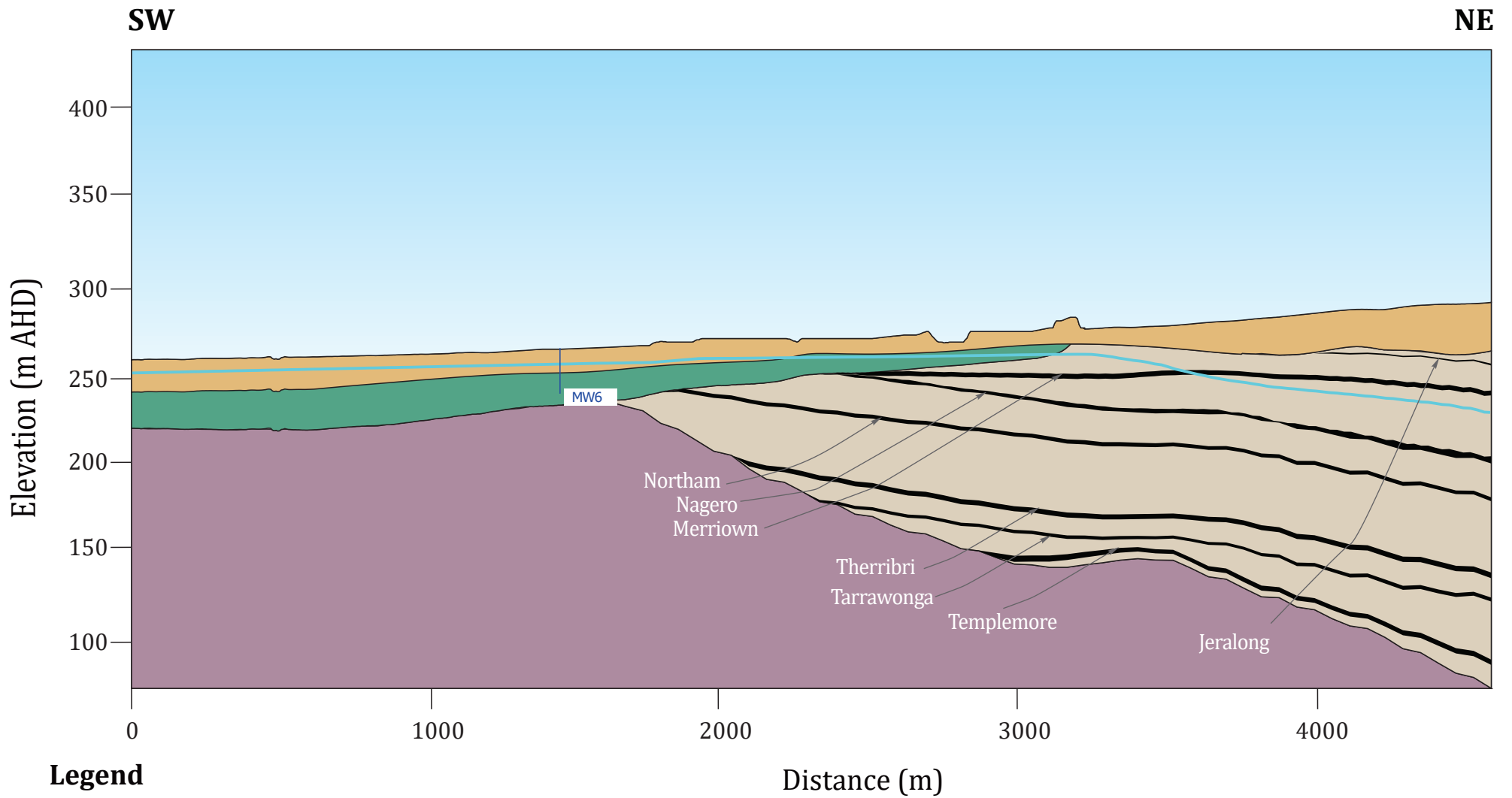
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Cross-section D (West to East) with 2019 groundwater table

Figure C 5

Boggabri MOD8 (G1850W)





Legend

- L01 Alluvium (Narrabri) / regolith
 - L02 Alluvium (Gunnedah)
 - Interburden
- Coal seam
 - Basement
 - 2019 groundwater table

Scale: 1:100,000
 Vertical exaggeration: 15x
 0m 4000m

Cross-section E (Southwest to Northeast) with 2019 groundwater table

Figure C 6

Boggabri MOD8 (G1850W)



Appendix D

Total groundwater inflows approved mining vs MOD 8

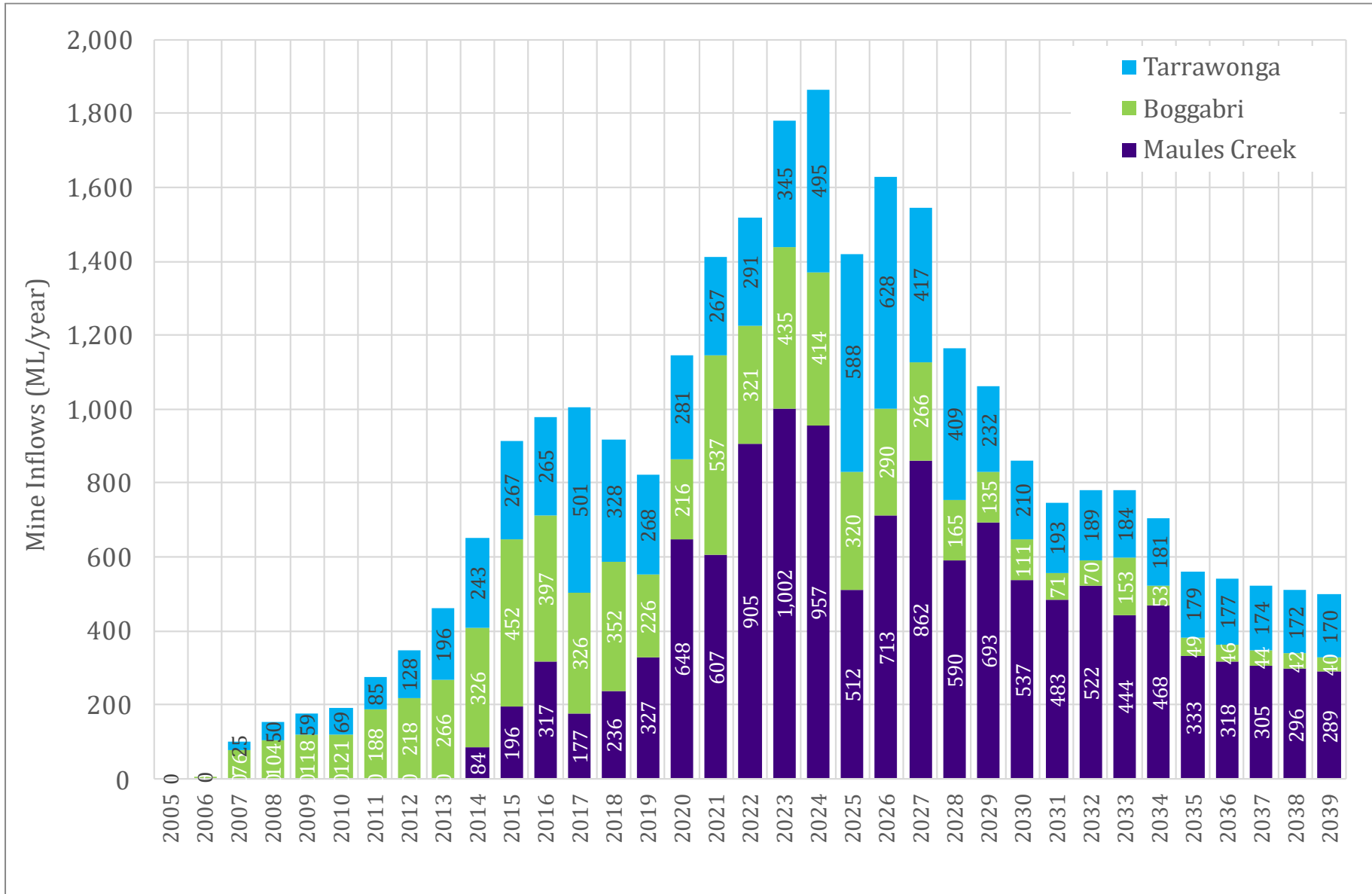


Figure D 1 Simulated inflows per mine – approved mining

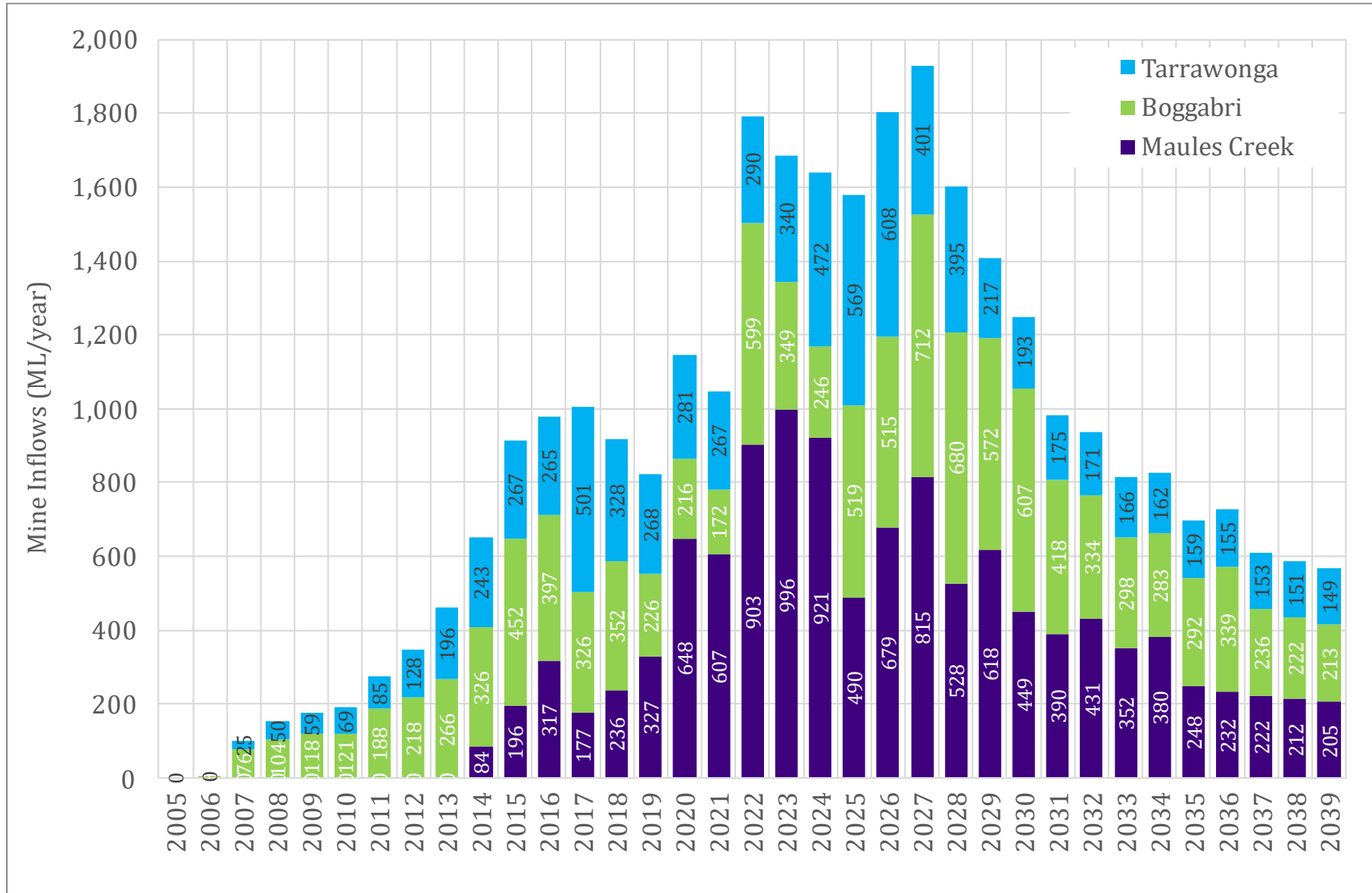
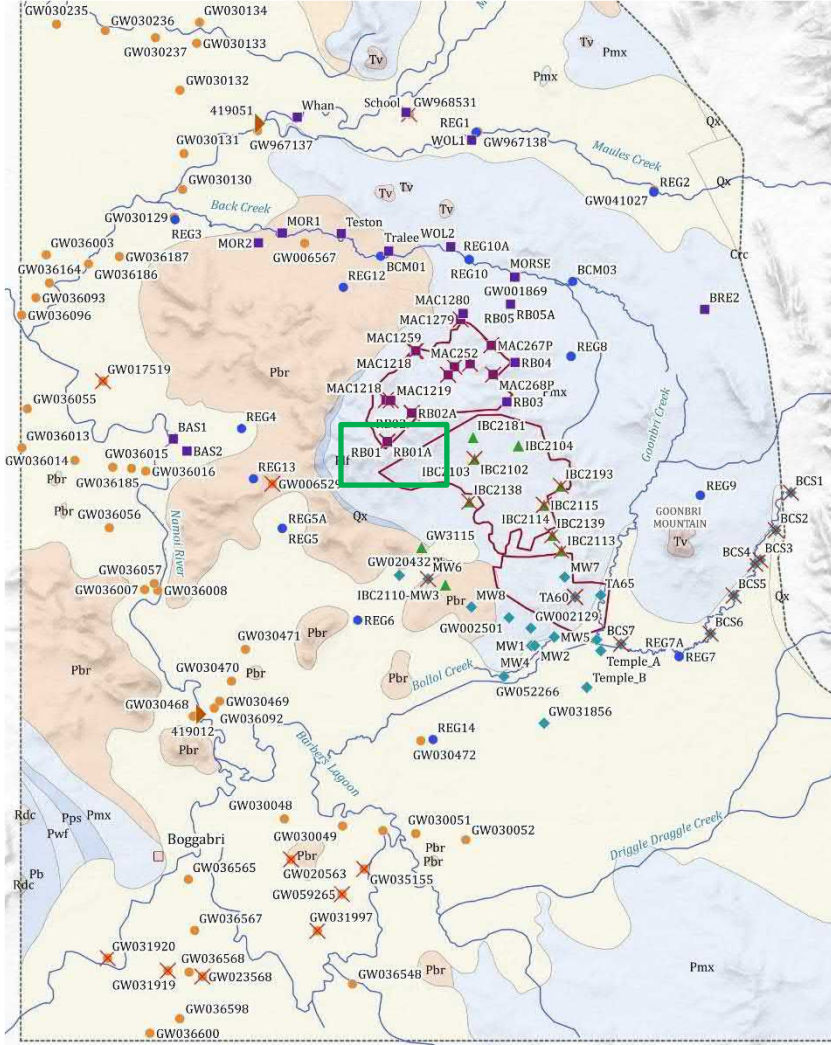


Figure D 2 Simulated inflows per mine – MOD 8

Appendix E

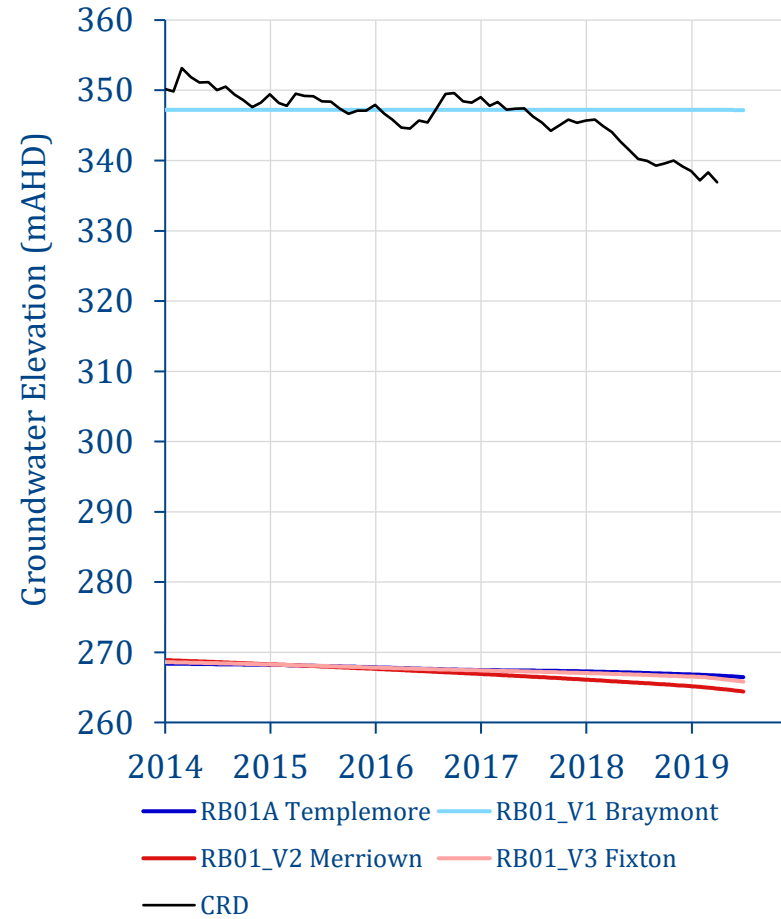
Calibration hydrographs

RB01 - Permian

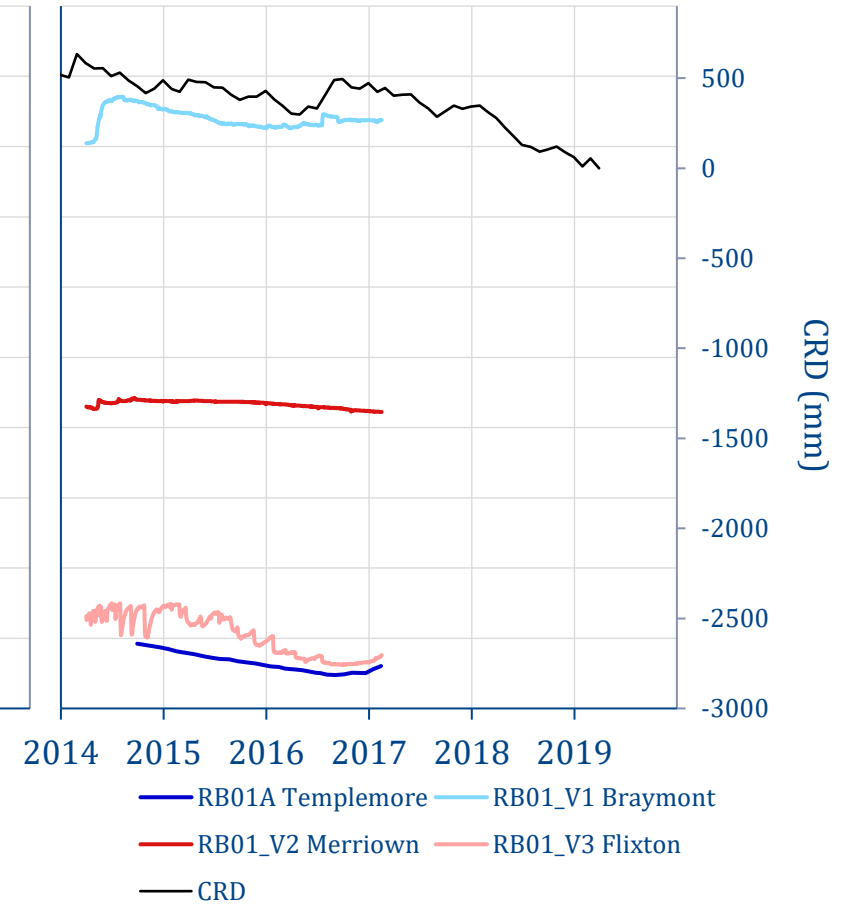


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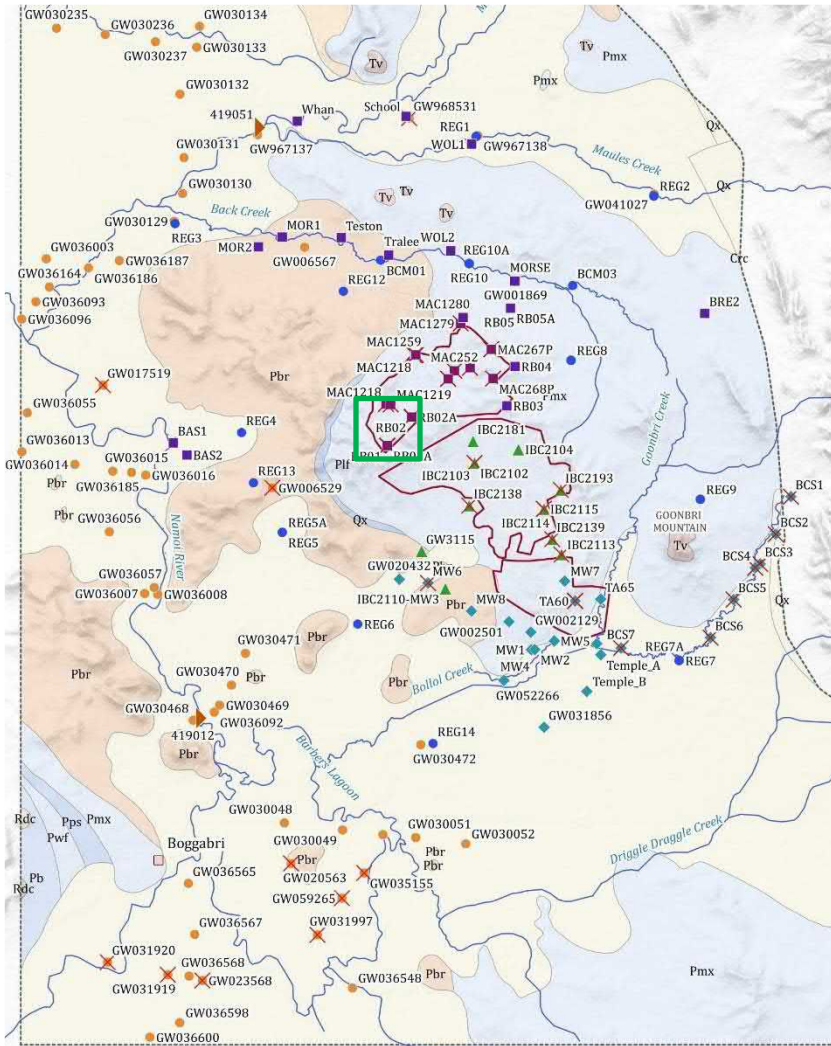
Simulation



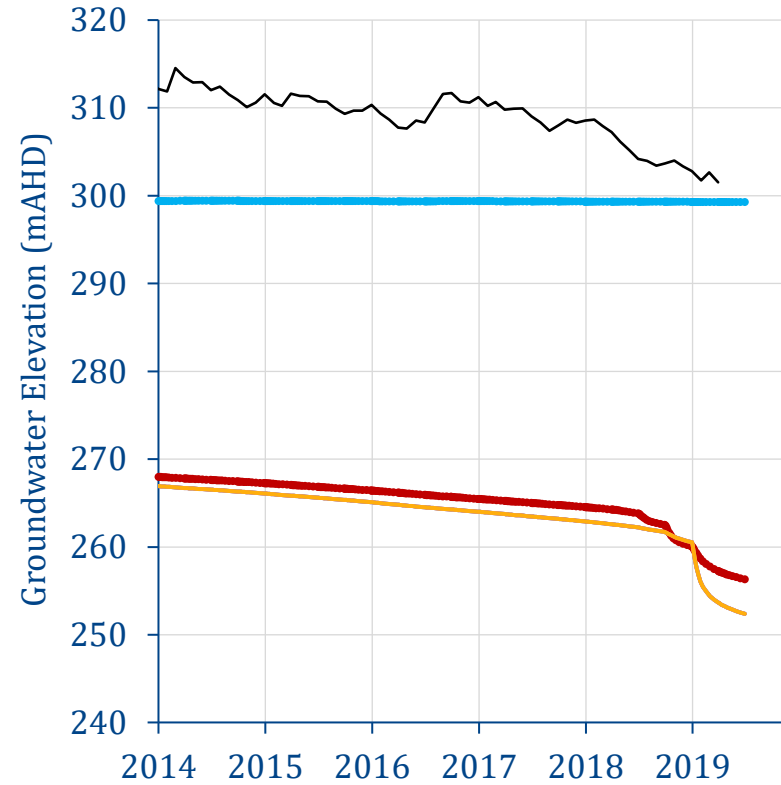
Observation



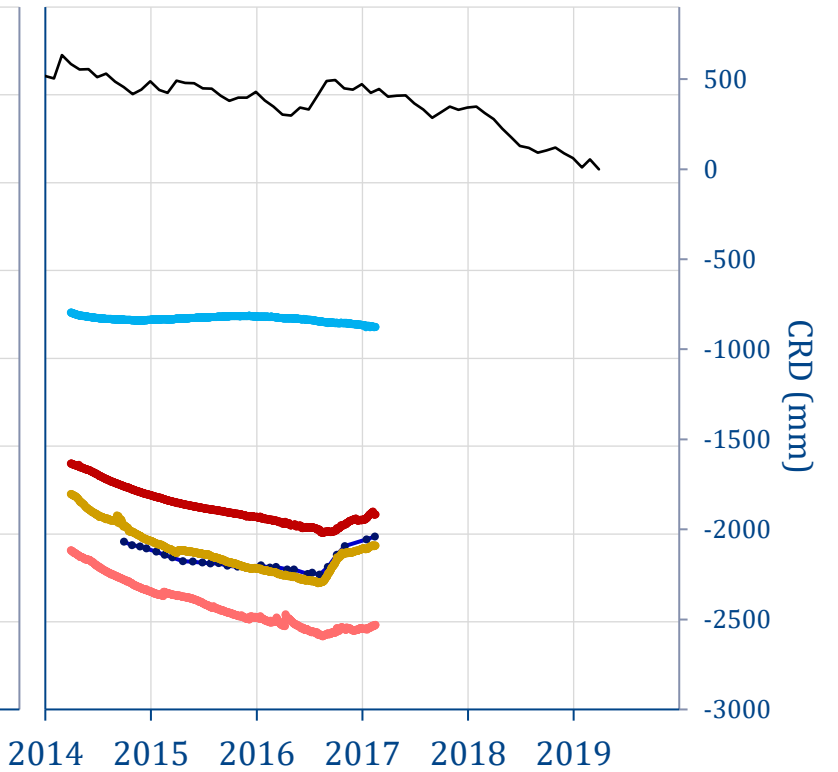
RB02 - Permian



Simulation



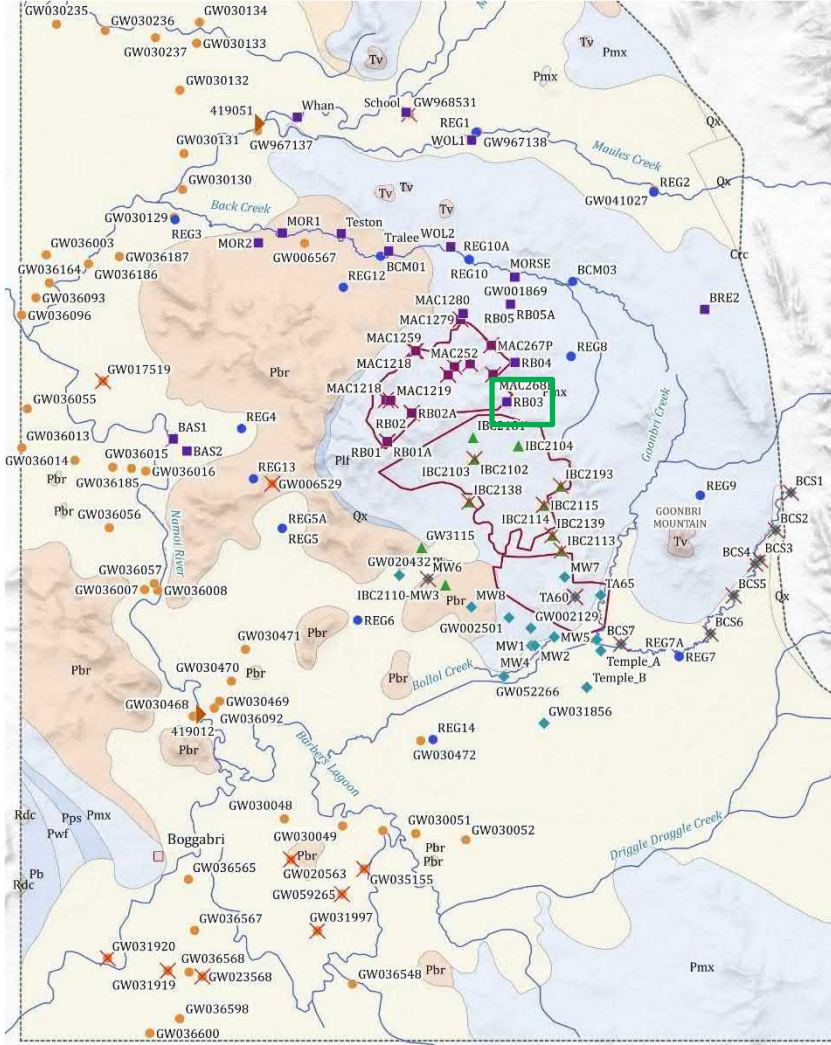
Observation



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- RB02_V1 Braymont
- RB02_V2 Merriown
- RB02_V3 Nagero
- RB02_V4 Northam
- CRD

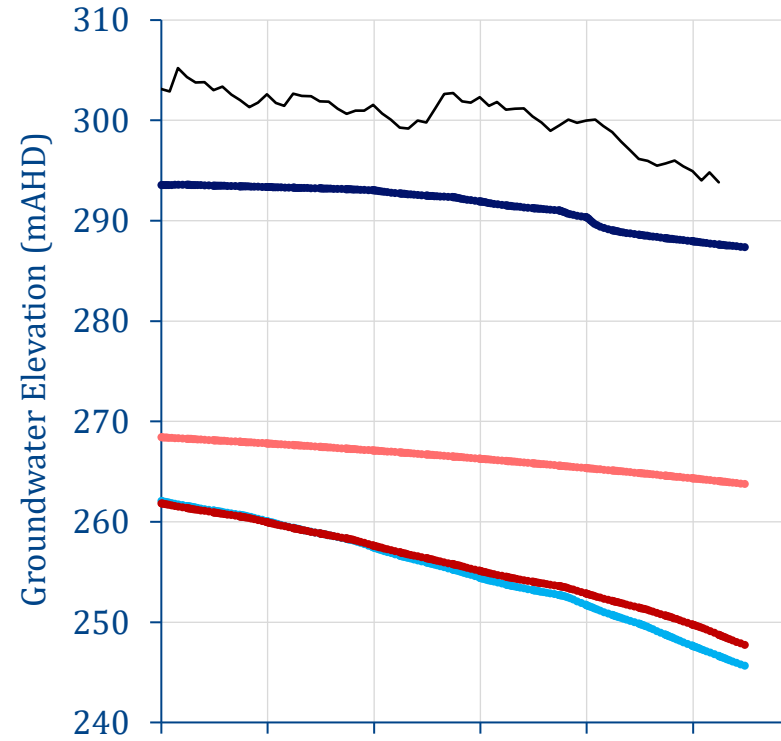
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- RB02_V2 Merriown
- RB02_V3 Nagero
- RB02_V4 Northam
- CRD

RB03 - Permian



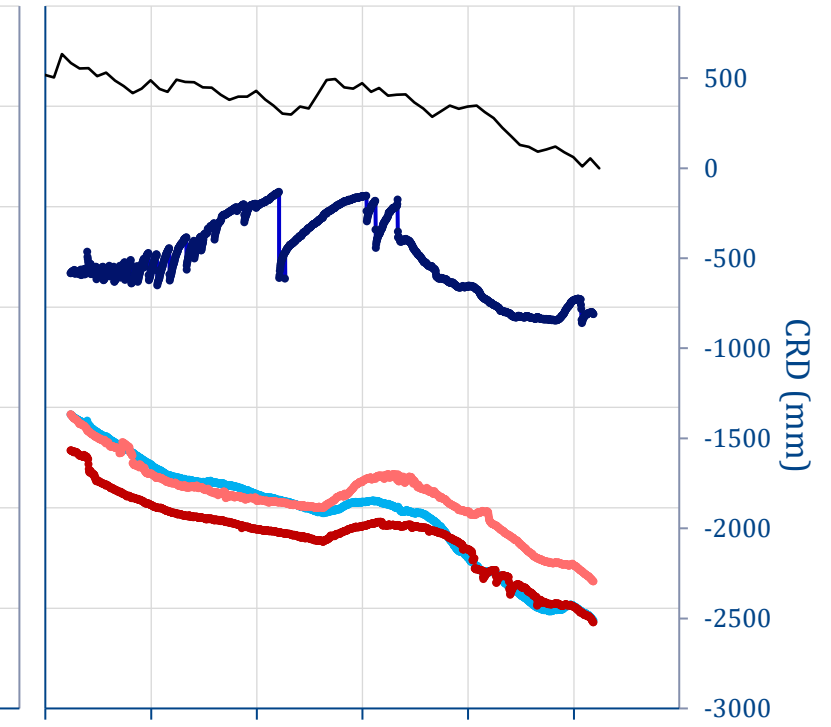
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Simulation



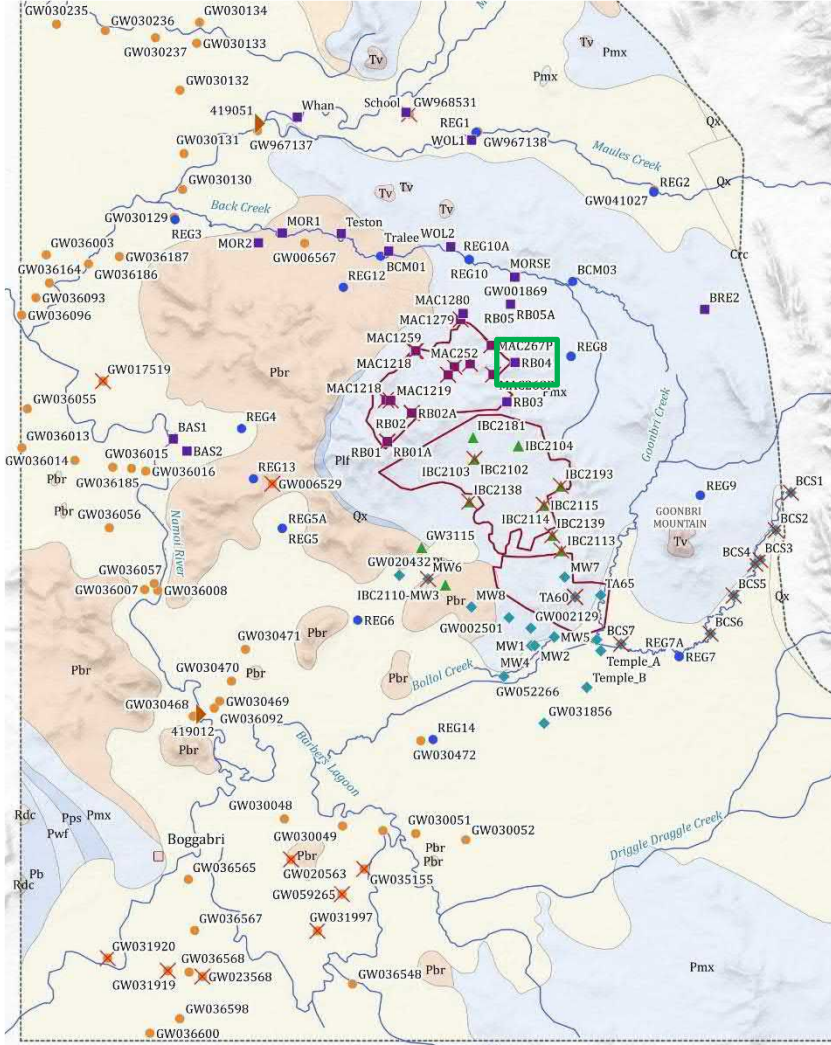
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 — RB03_V1 Braymont — RB03_V2 Merriown
 — RB03_V3 Nagero — RB03_V4 Templemore
 — CRD

Observation



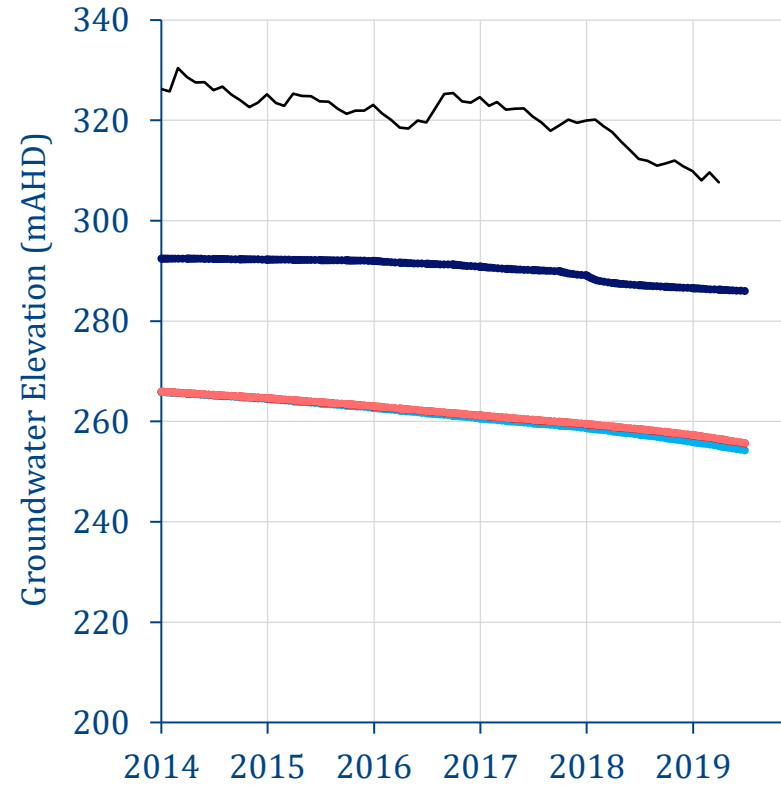
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 — RB03_V3 Nagero — RB03_V4 Templemore
 — CRD

RB04 - Permian



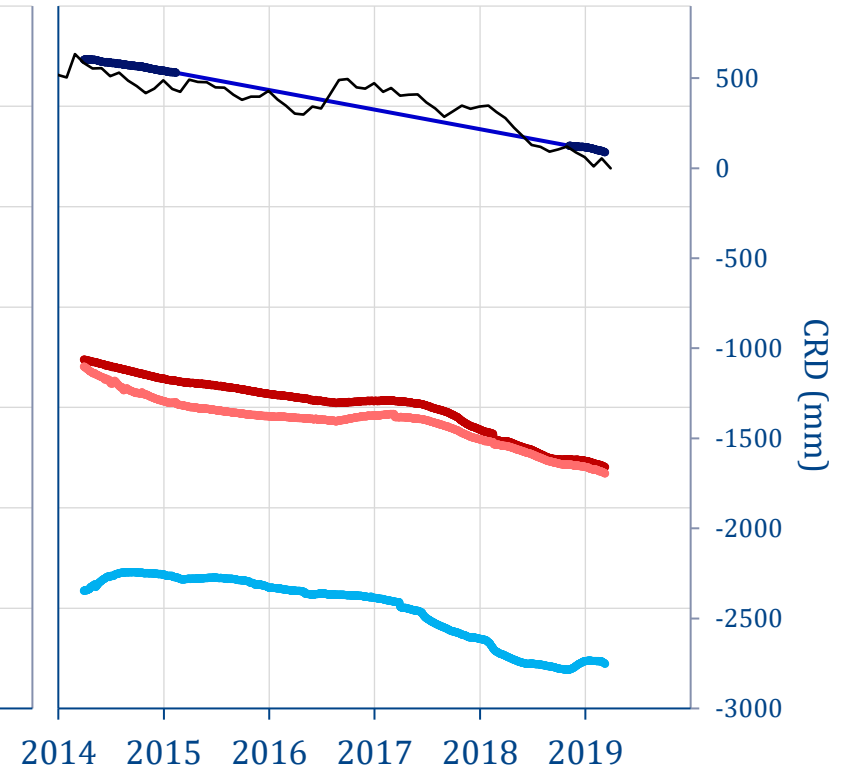
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Simulation



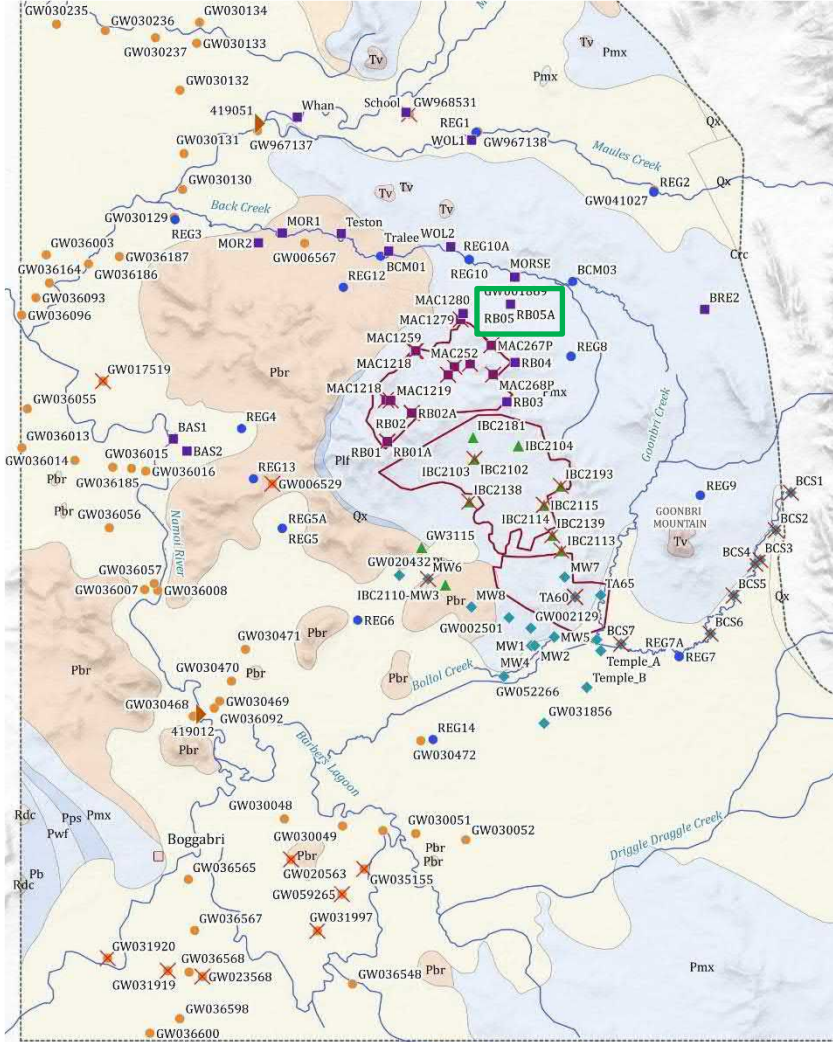
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- RB04_V2 Merriown
- RB04_V3 Nagero
- RB04_V4 L.Northam
- CRD

Observation



- RB04_V1 Braymont
- RB04_V2 Merriown
- RB04_V3 Nagero
- RB04_V4 L.Northam
- CRD

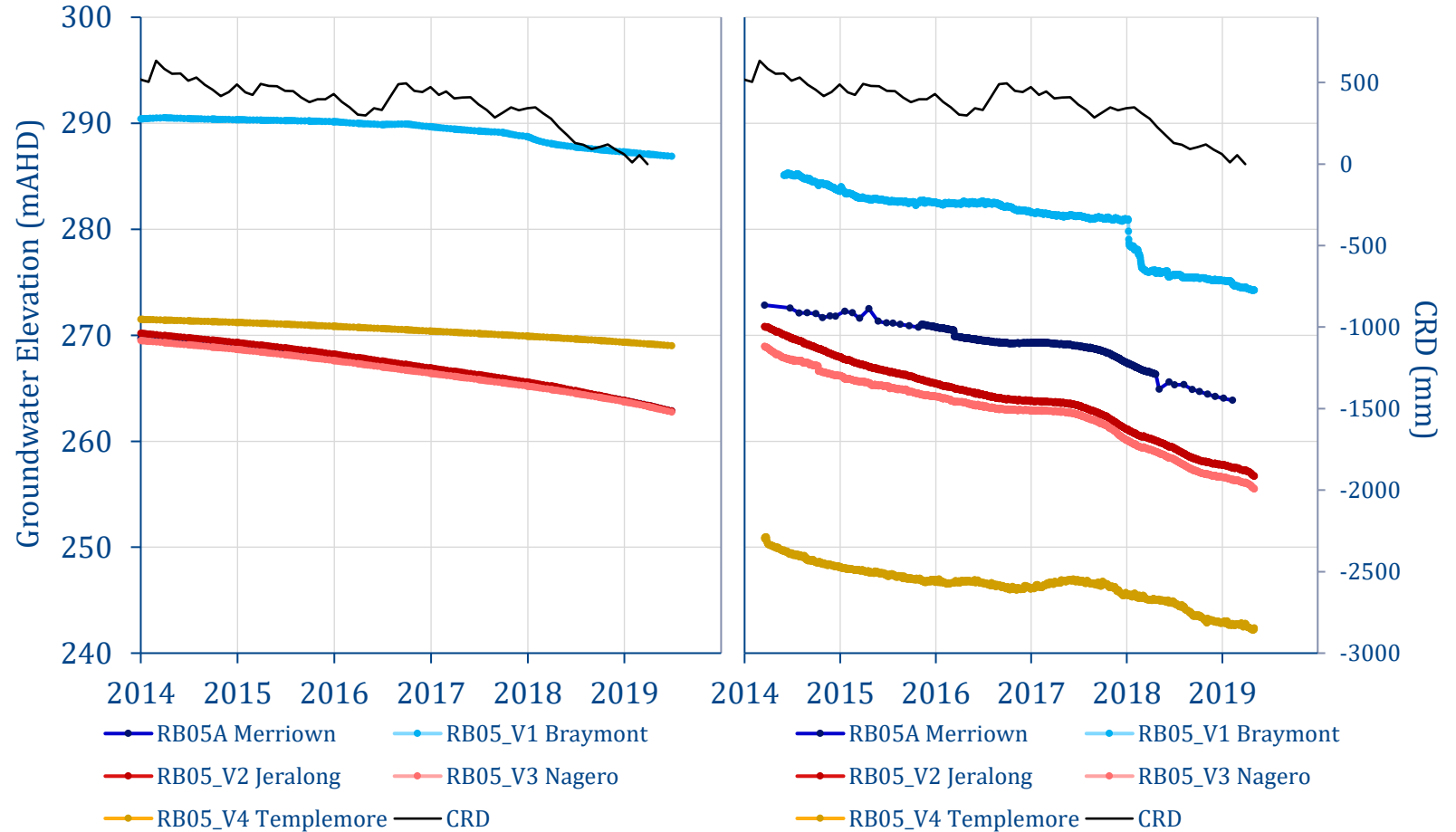
RB05 - Permian



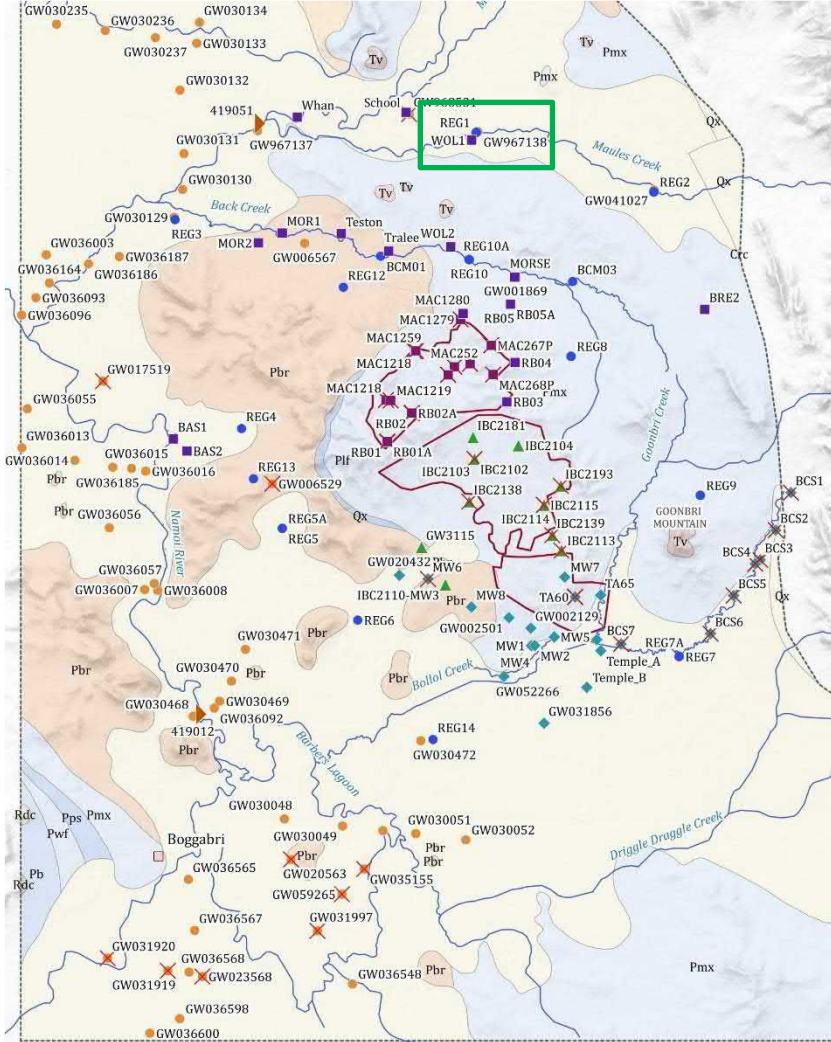
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Simulation

Observation

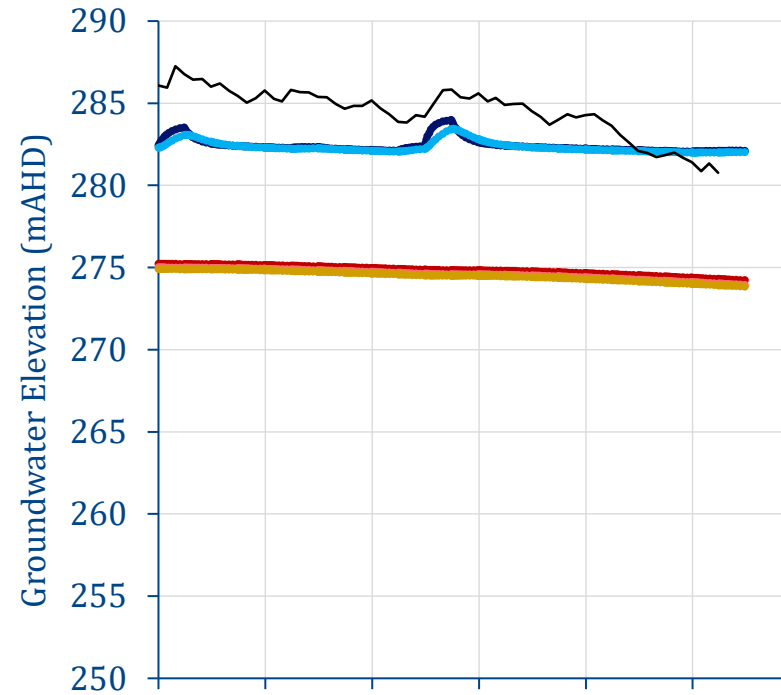


REG01 - Permian



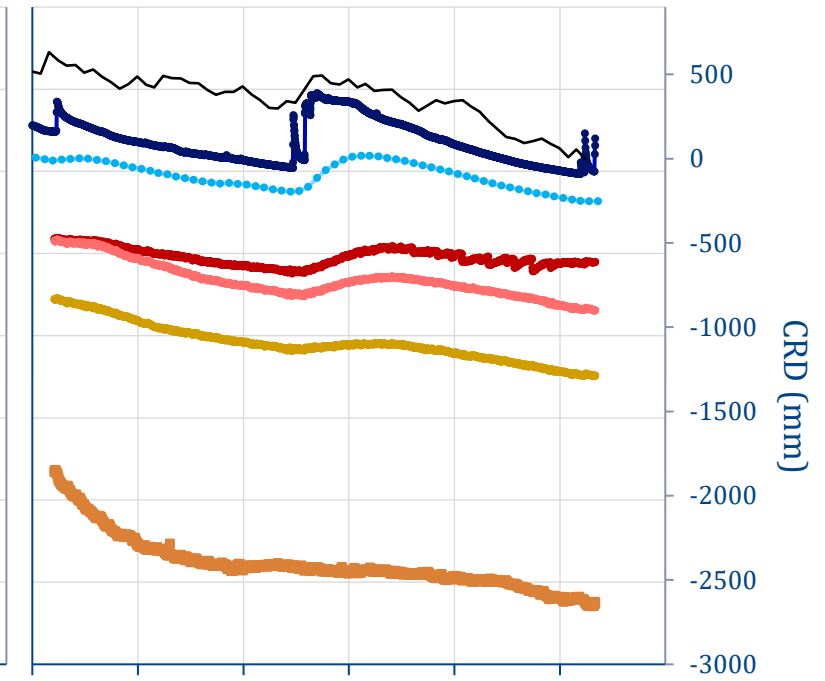
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Simulation



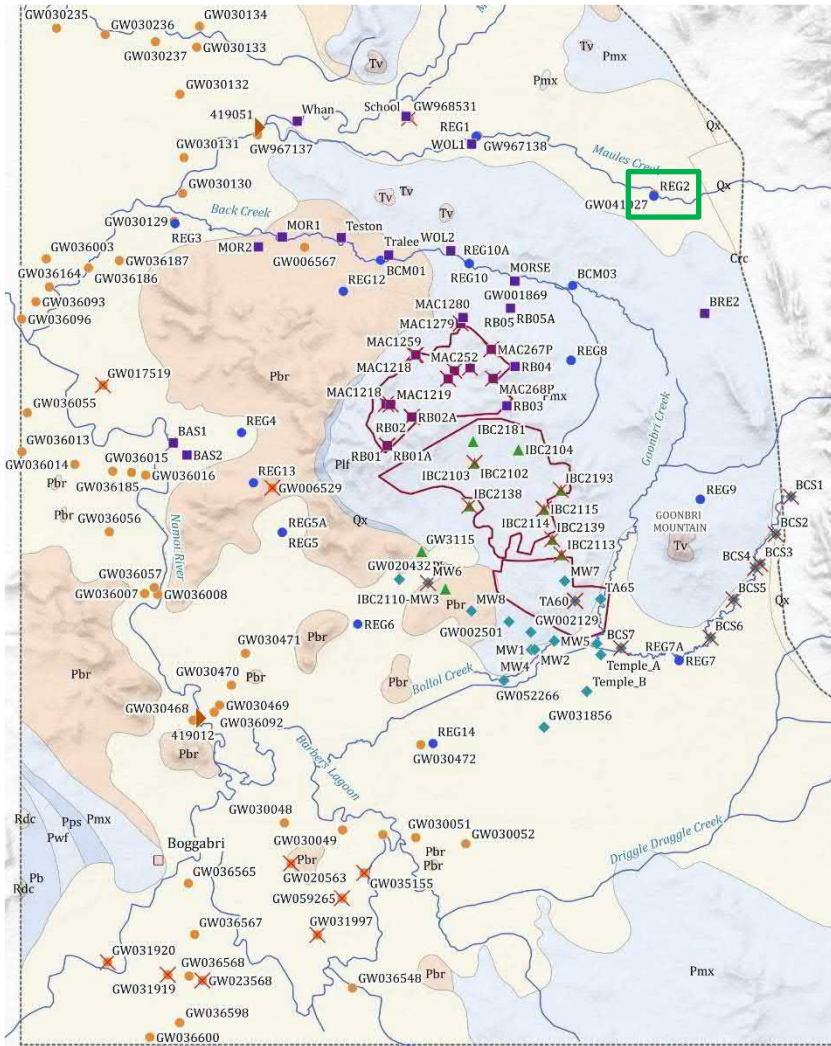
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- GW967138_2 Alluvium
- REG01_V1 Jeralong
- REG01_V2 Merriown
- REG01_V3 Nagero
- REG01_V4 Therribri
- CRD

Observation



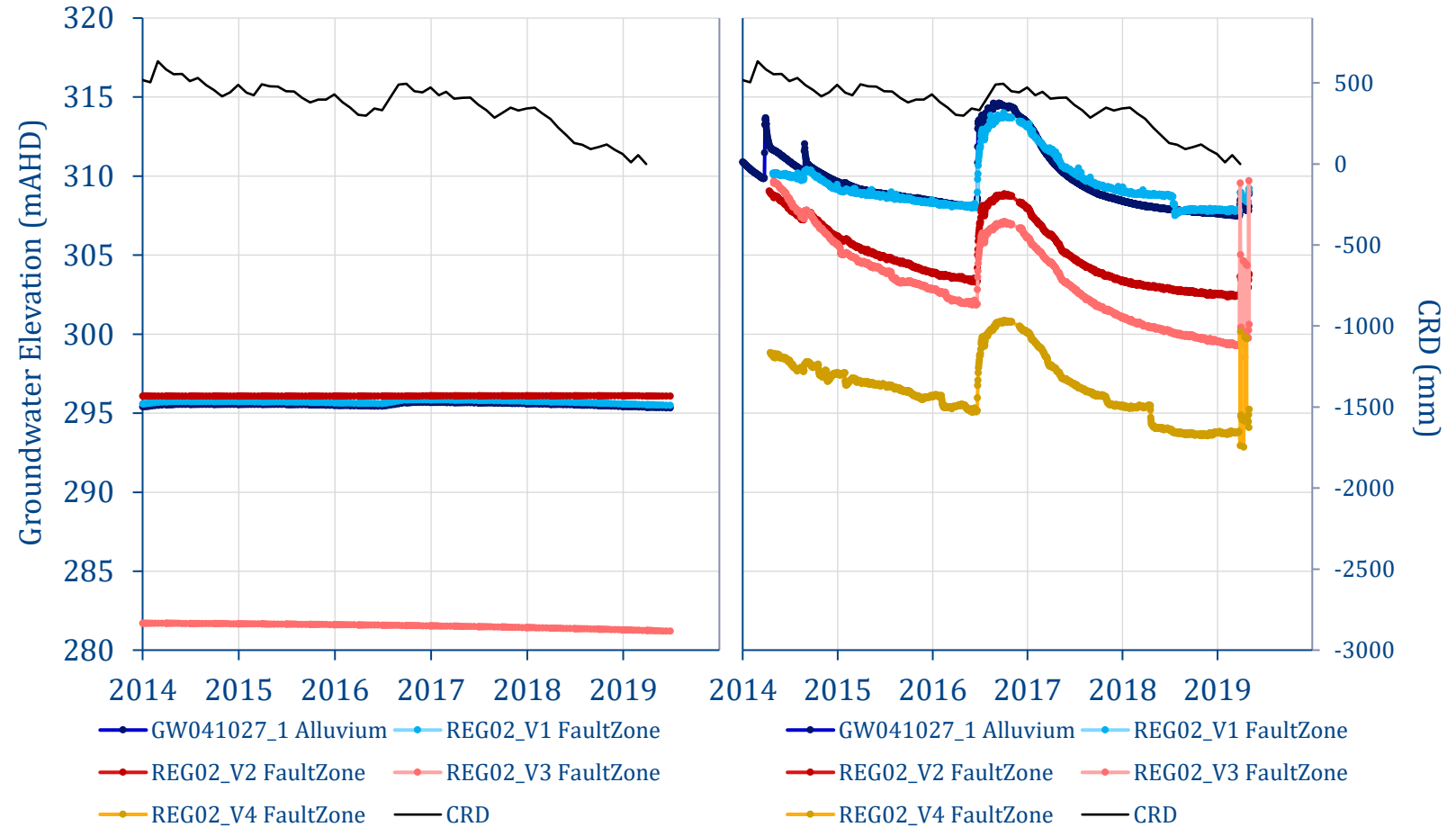
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- GW967138_2 Alluvium
- REG01_V1 Jeralong
- REG01_V2 Merriown
- REG01_V3 Nagero
- REG01_V4 Therribri
- CRD

REG02 - Permian

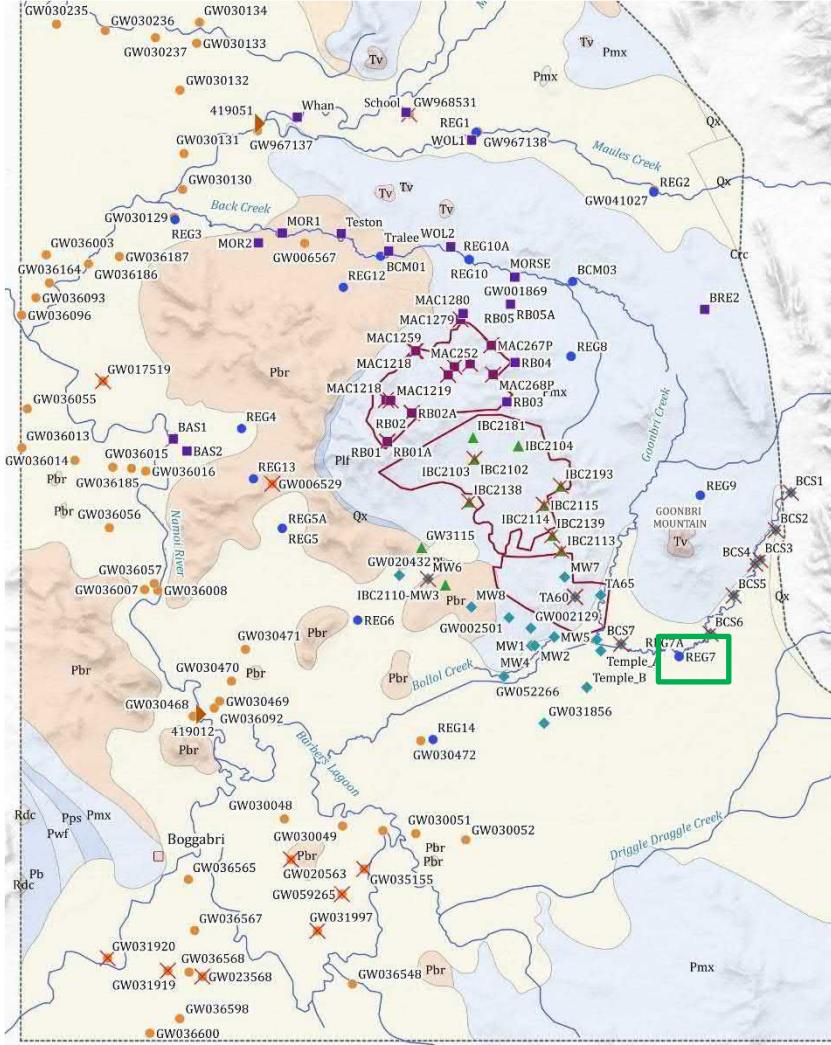


Simulation

Observation

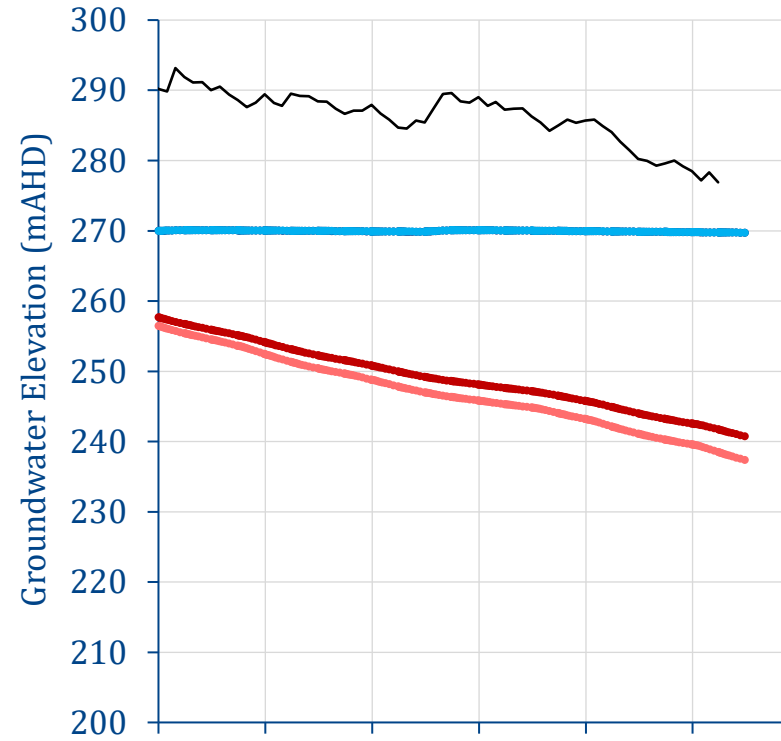


REG07 - Permian



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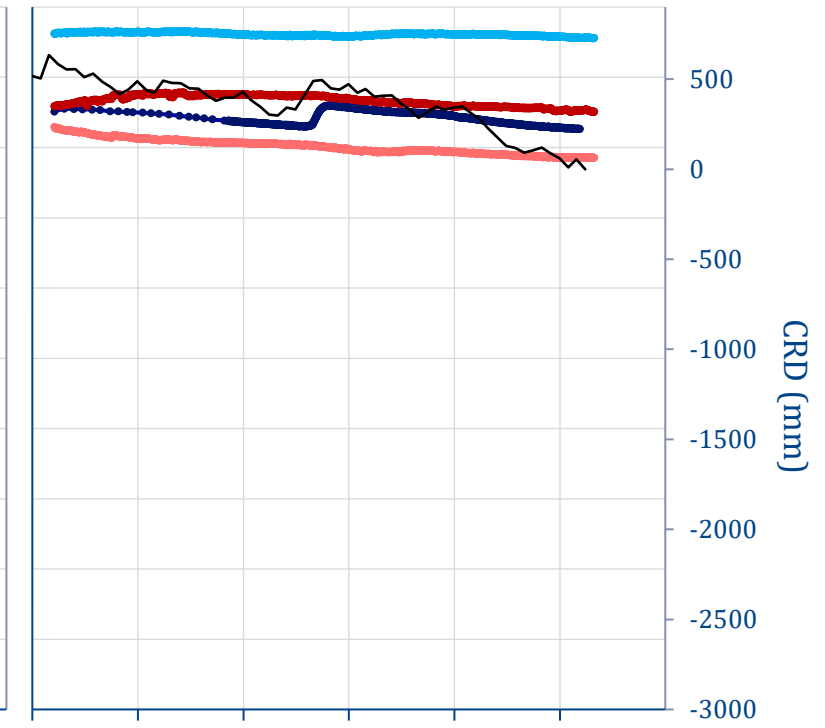
Simulation



2014 2015 2016 2017 2018 2019

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—●— REG07_V2 Merriown —●— REG07_V3 Nagero
—●— CRD

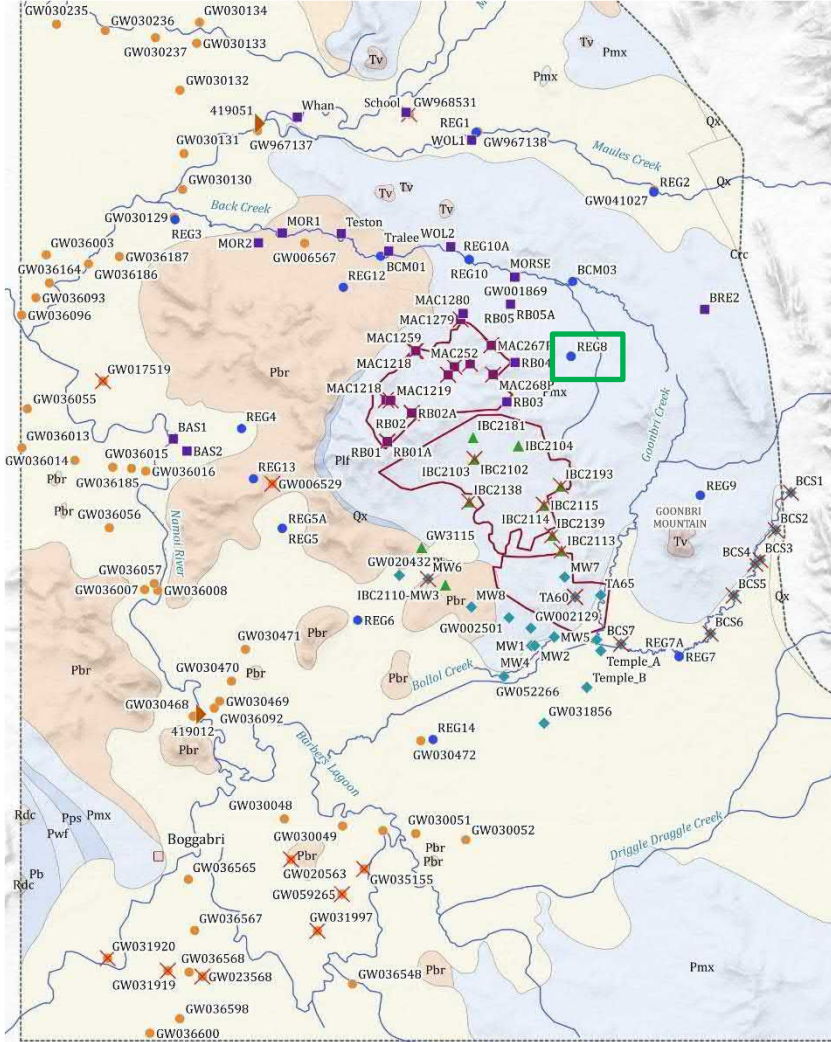
Observation



2014 2015 2016 2017 2018 2019

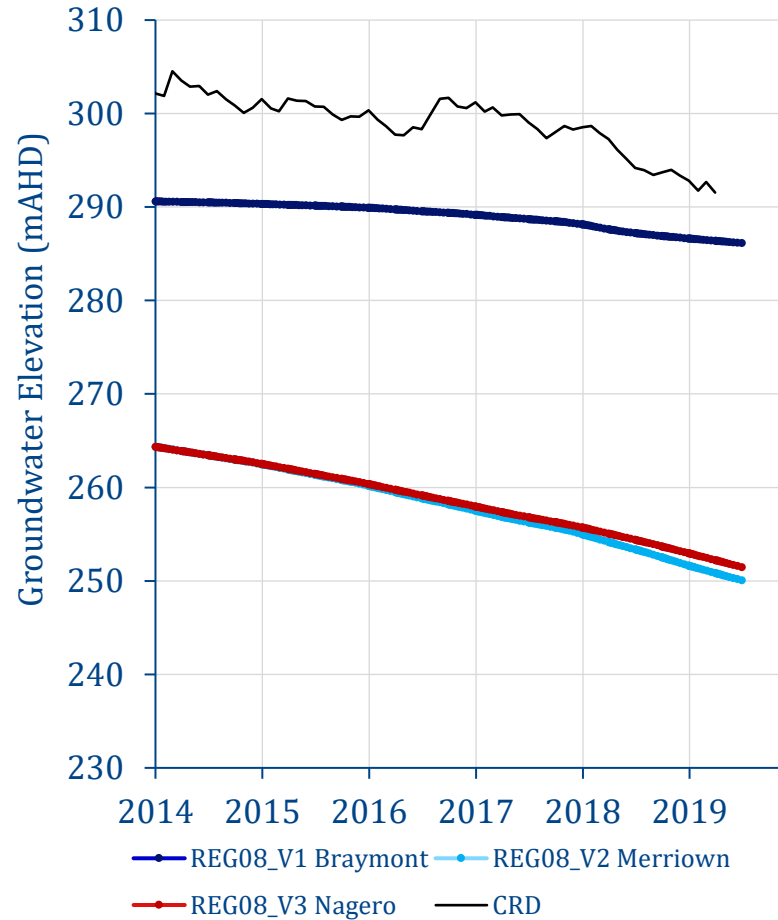
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—●— REG07_V2 Merriown —●— REG07_V3 Nagero
—●— CRD

REG08 - Permian

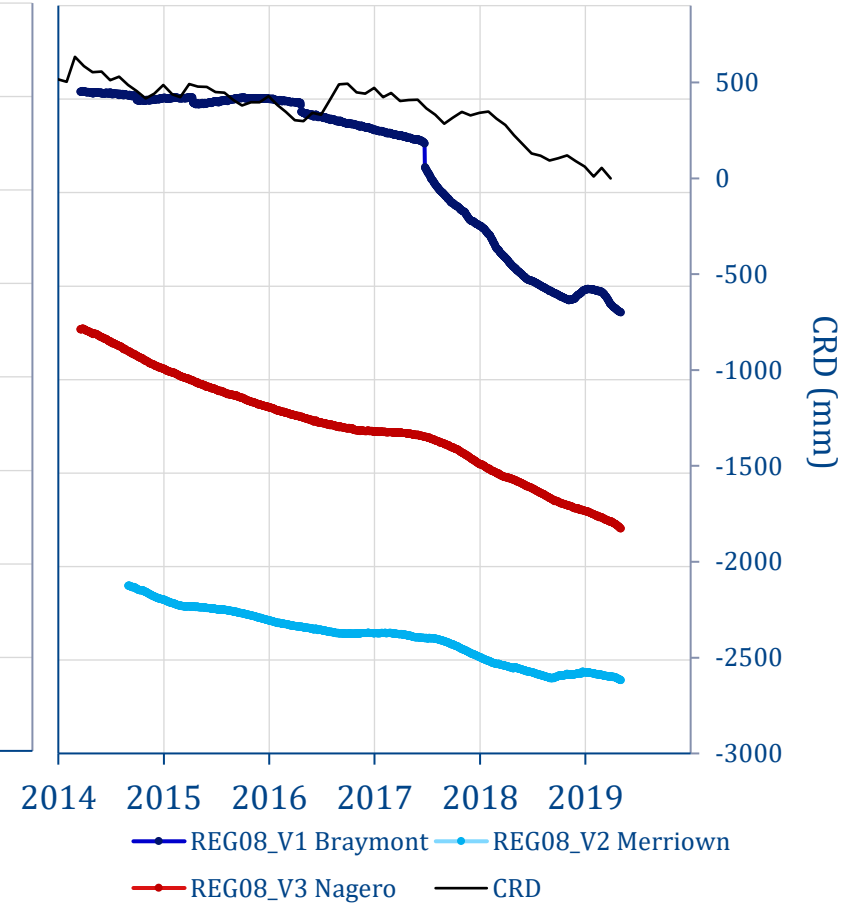


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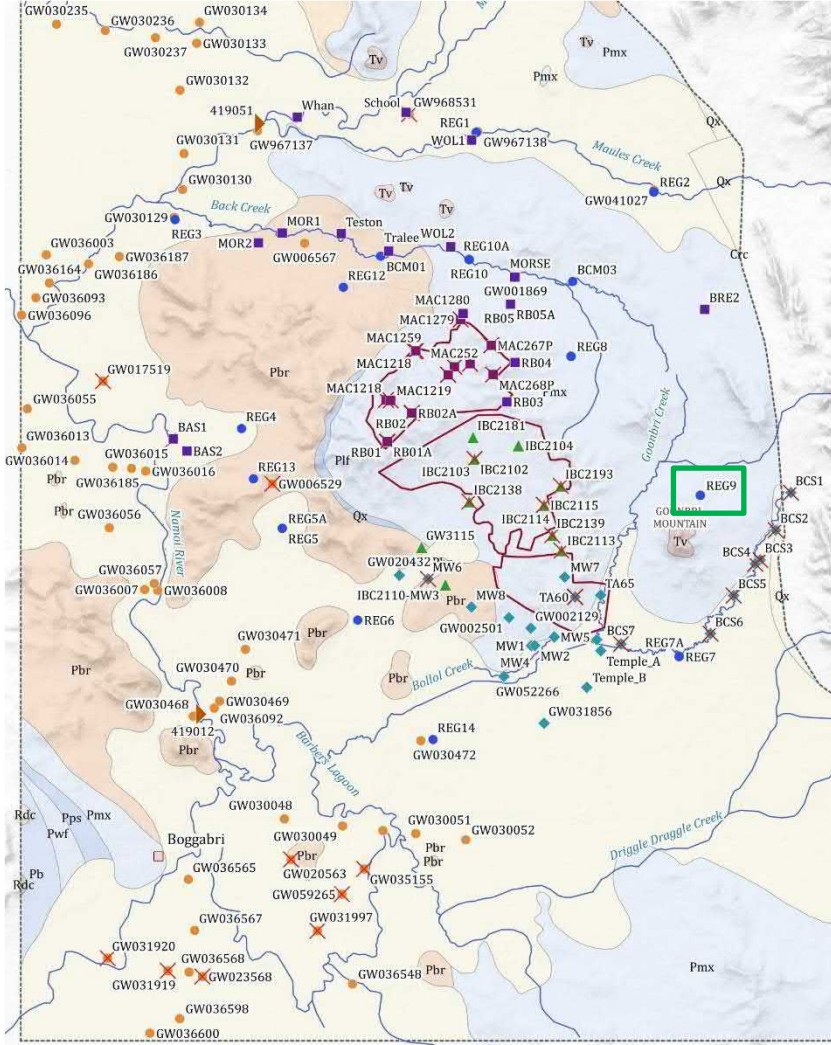
Simulation



Observation

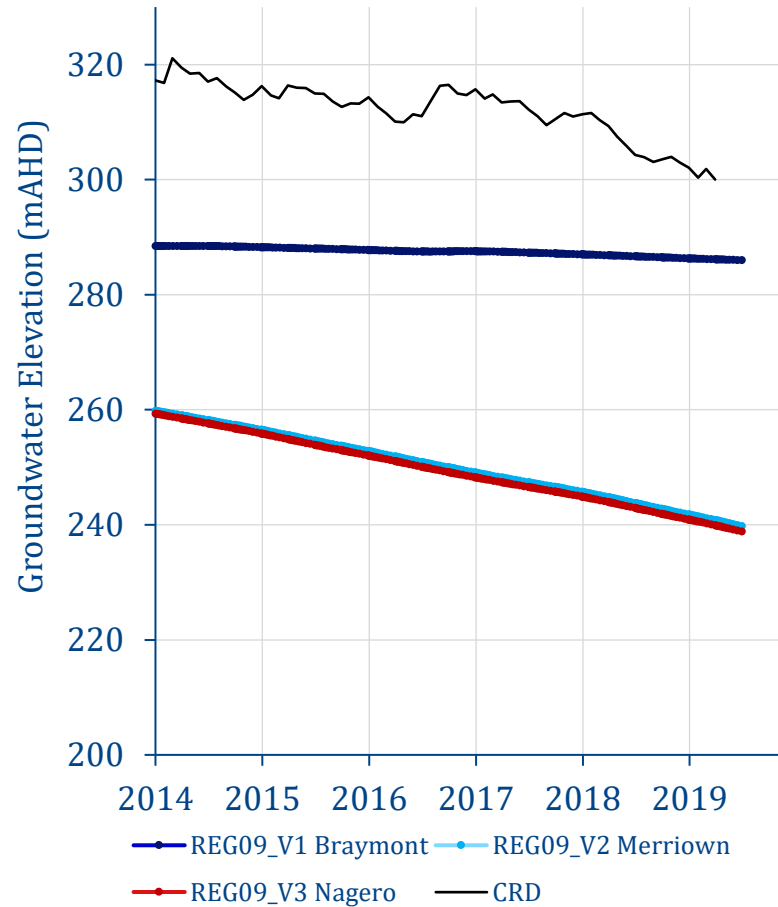


REG09 - Permian

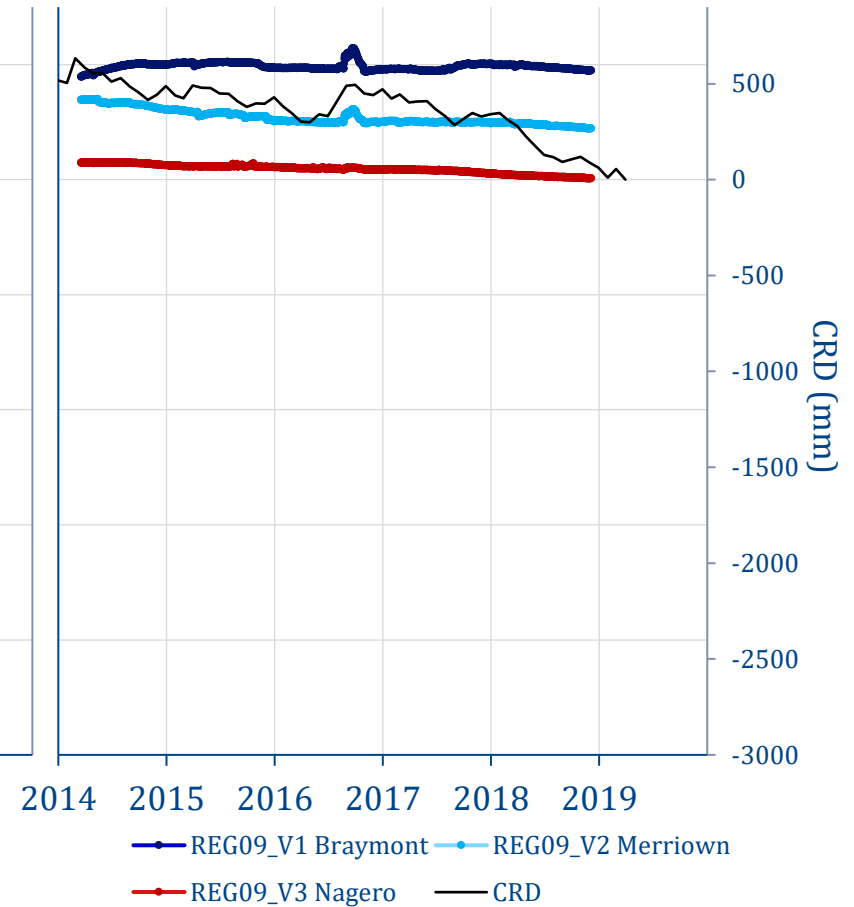


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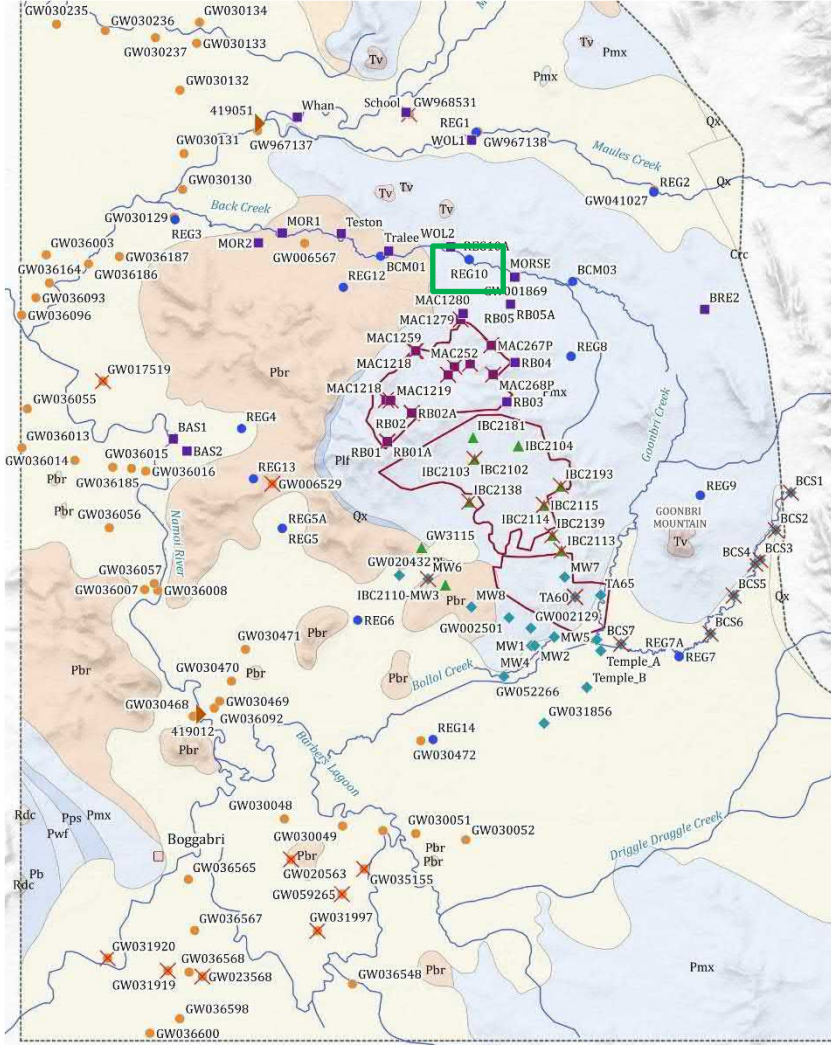
Simulation



Observation

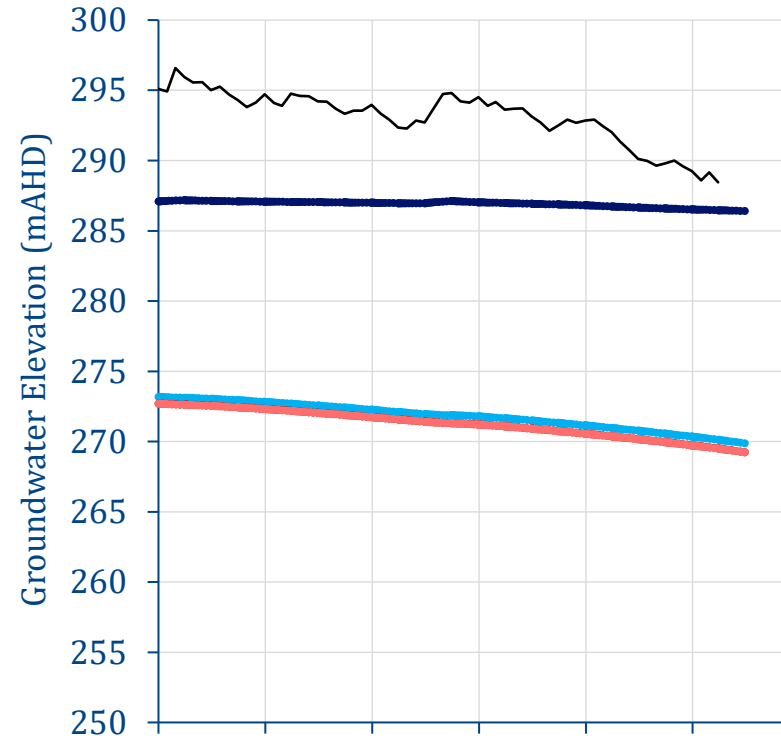


REG10 - Permian



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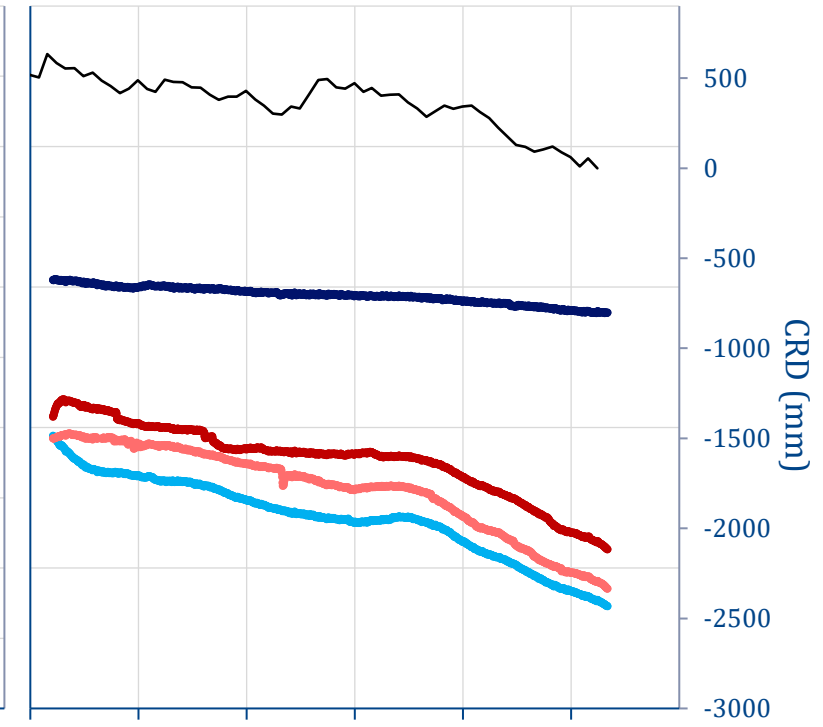
Simulation



2014 2015 2016 2017 2018 2019

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 ● REG10_V3 Nagero ● REG10_V4 U.Northam
 — CRD

Observation

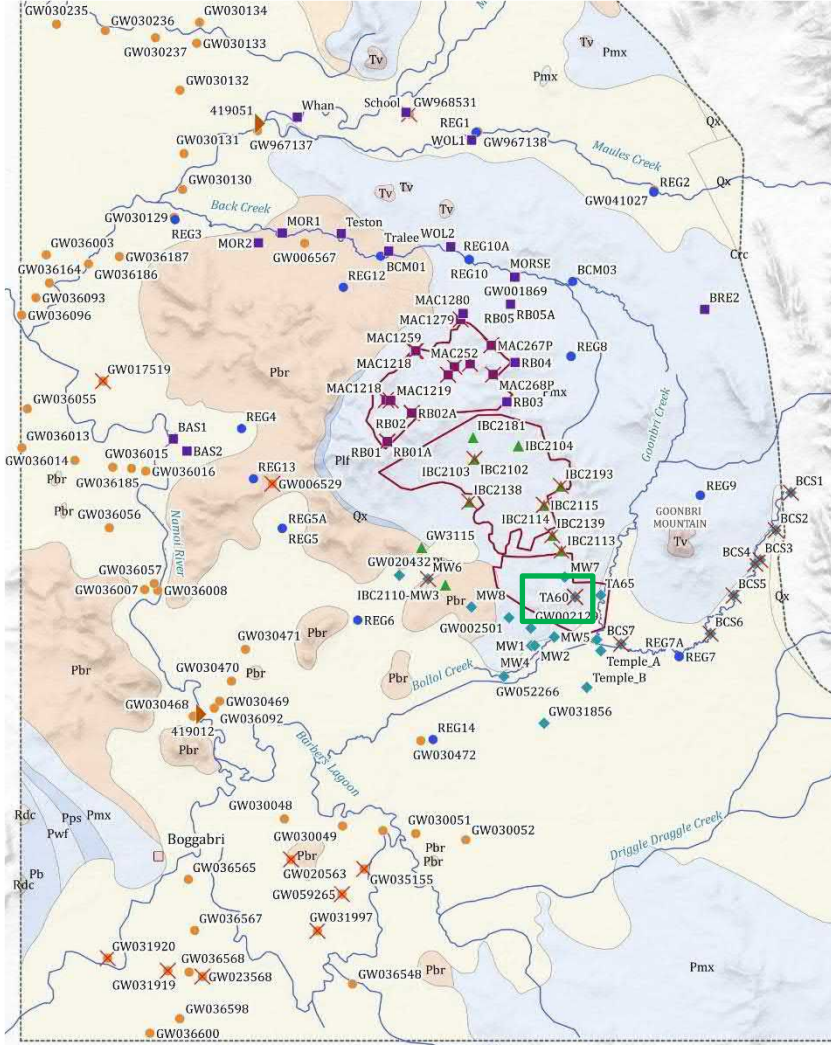


2014 2015 2016 2017 2018 2019

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 ● REG10_V3 Nagero ● REG10_V4 U.Northam
 — CRD

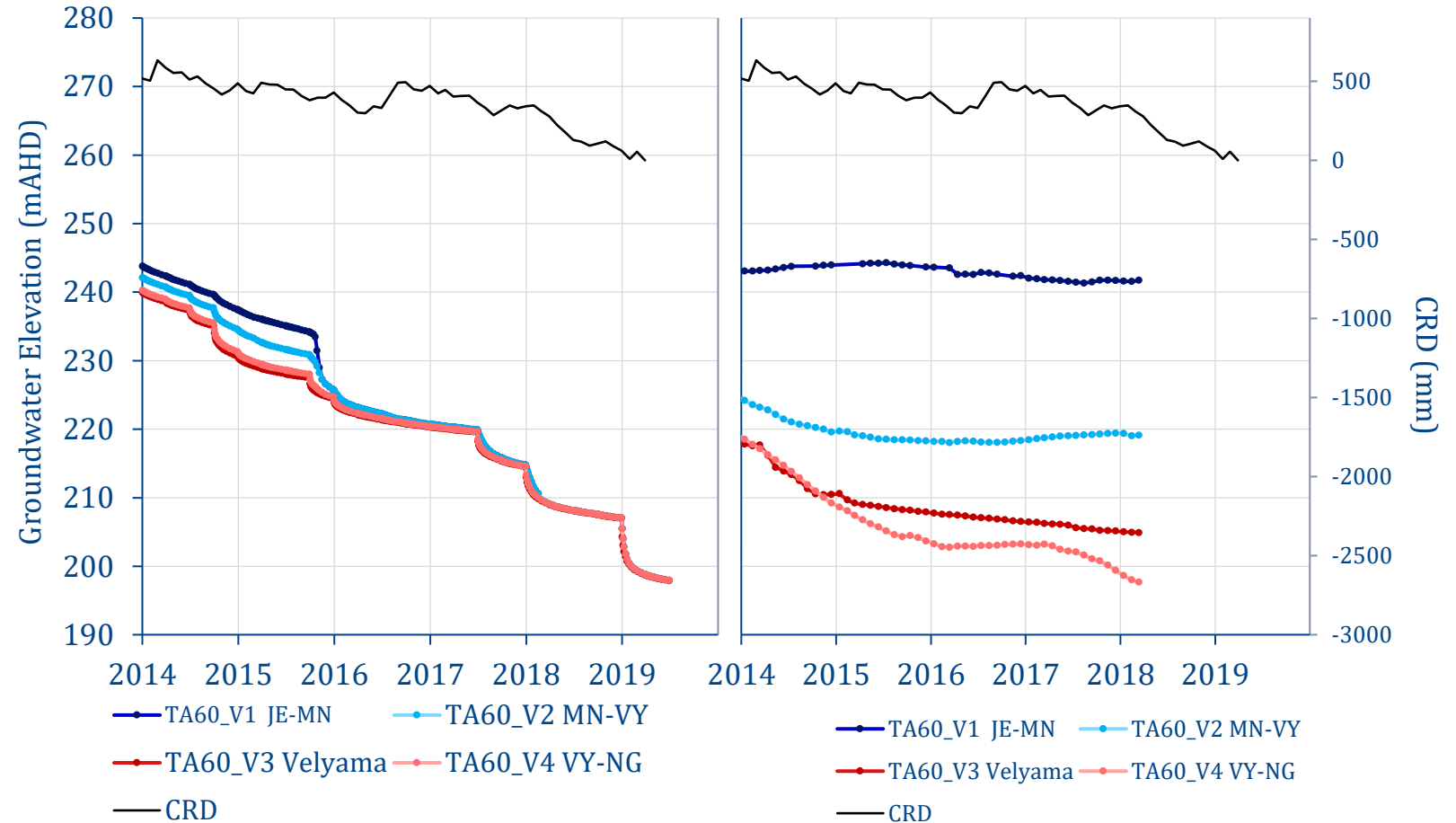


TA60 - Permian

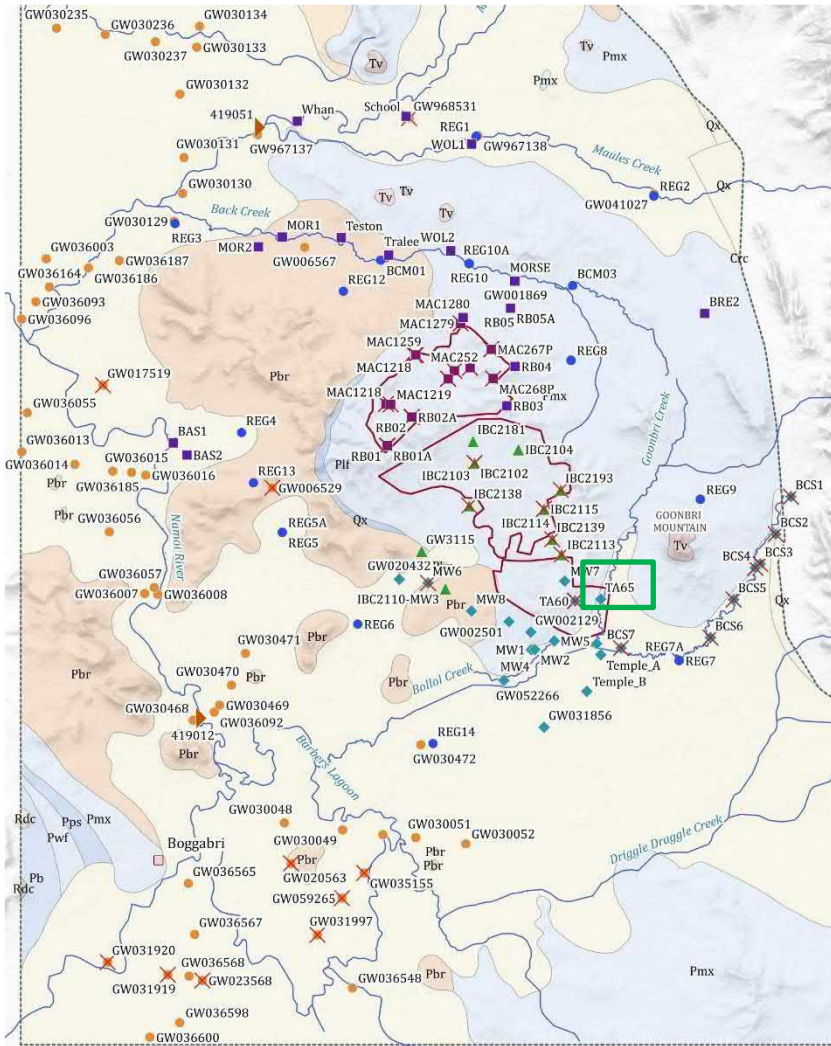


Simulation

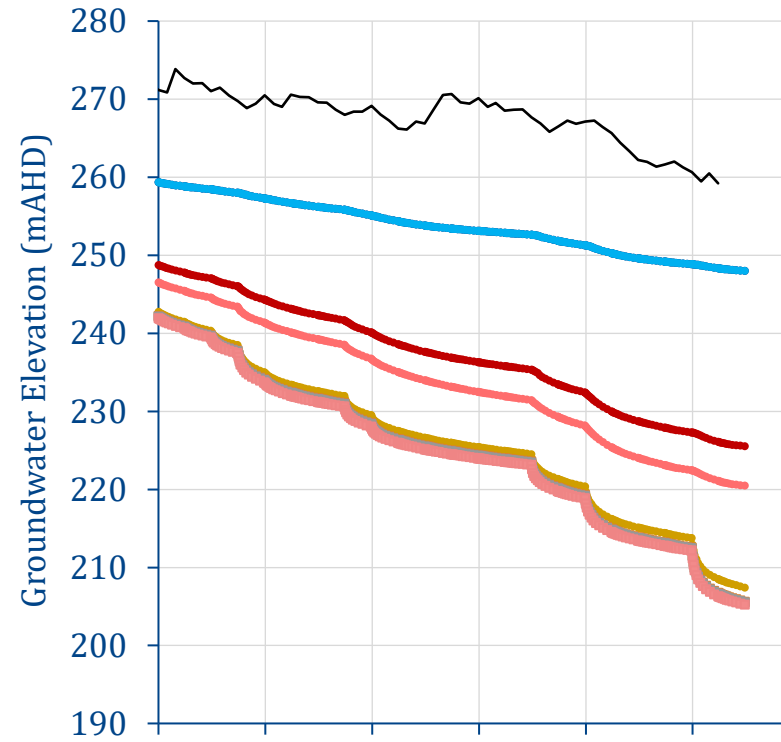
Observation



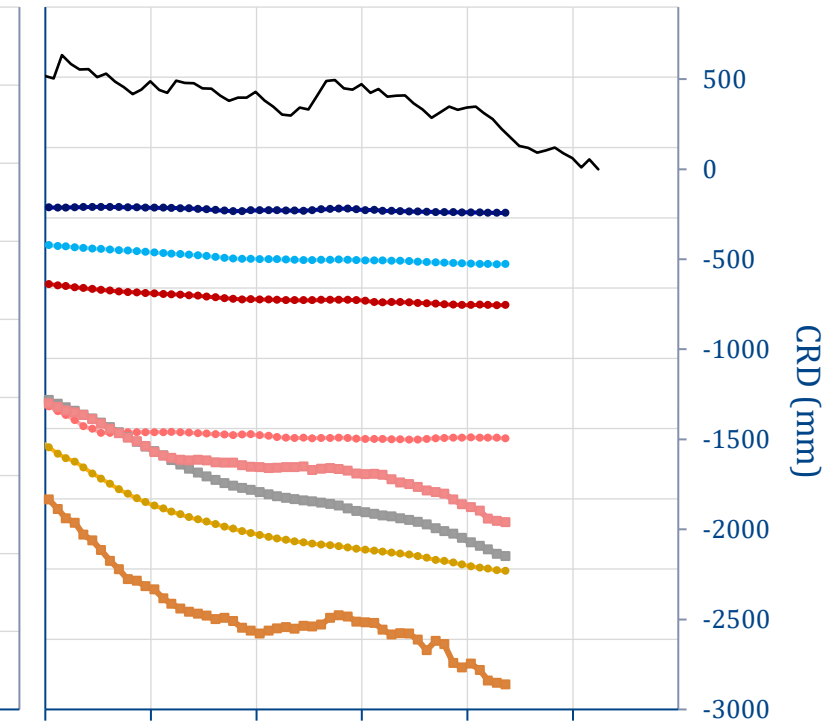
TA65 - Permian



Simulation



Observation

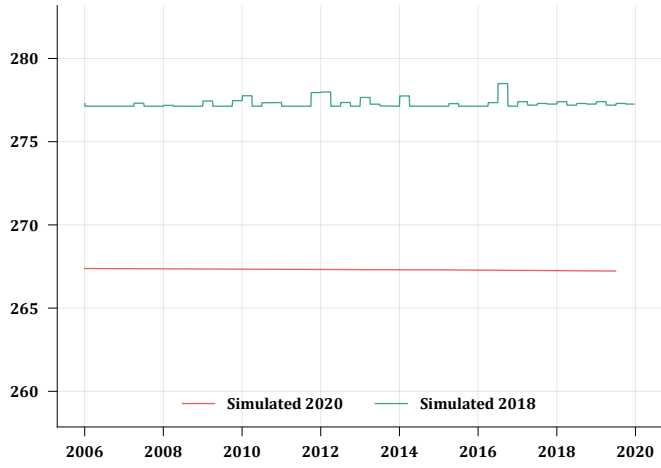
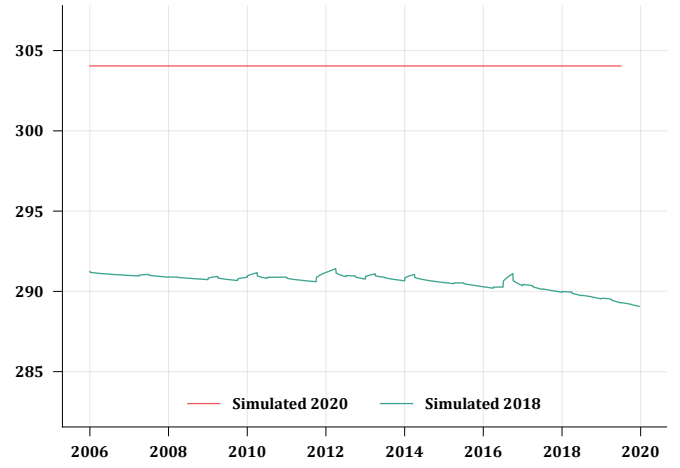
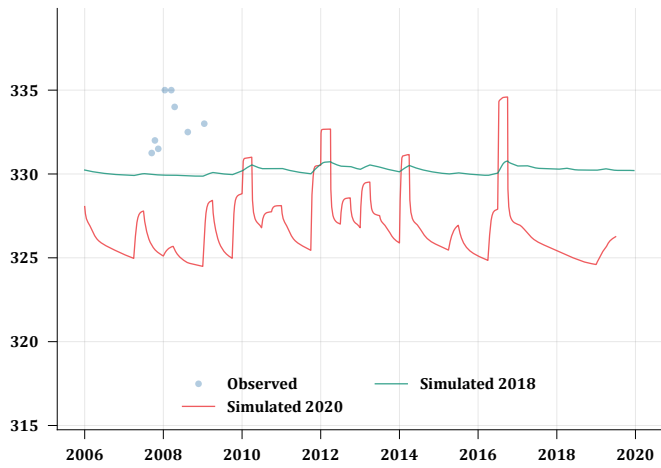
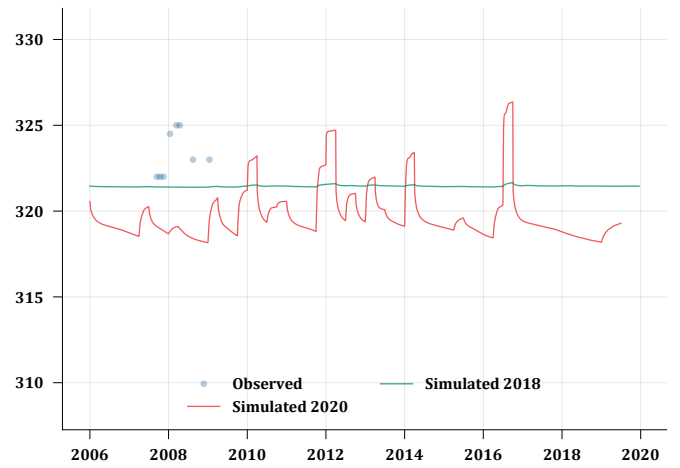
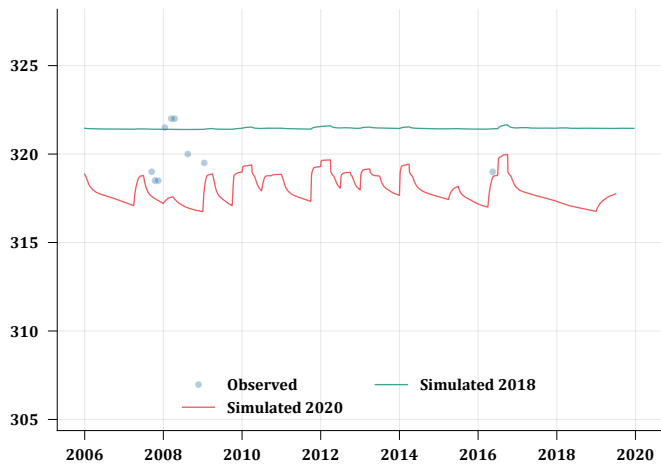
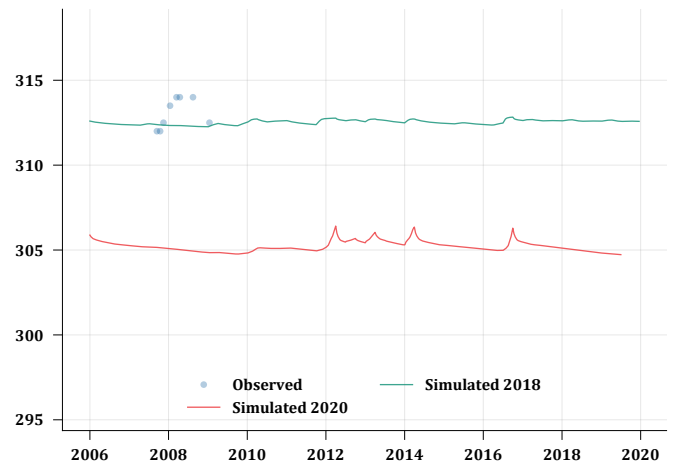
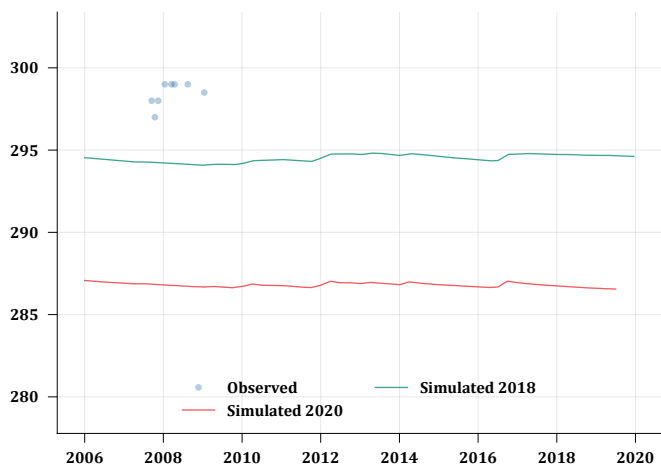
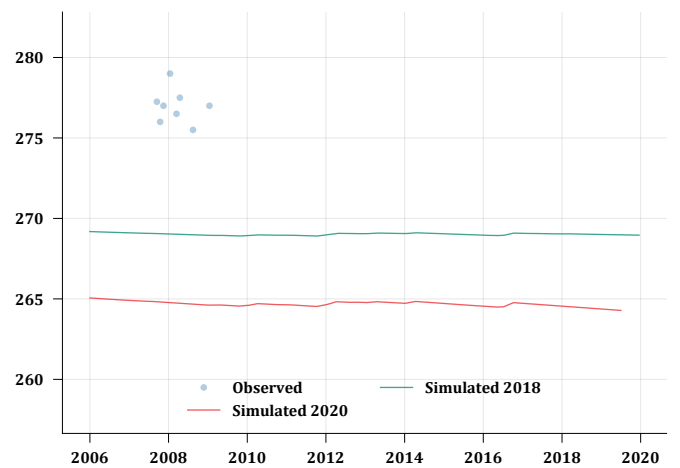


2014 2015 2016 2017 2018 2019

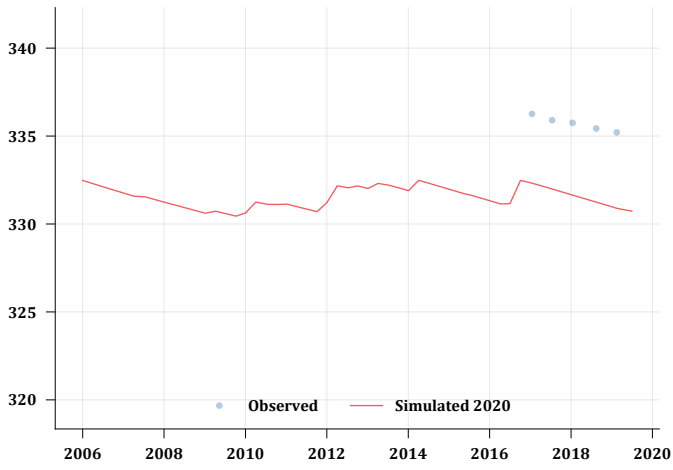
2014 2015 2016 2017 2018 2019

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- TA65_V4 ● TA65_V5 ● TA65_V6
- TA65_V7 ● TA65_V8 ● CRD

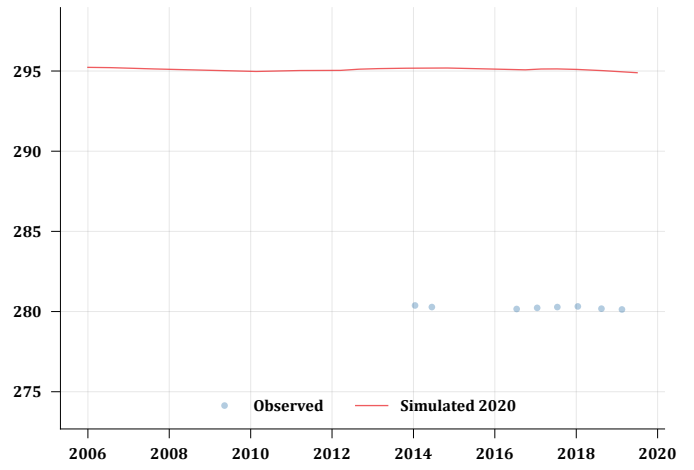
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BCM01**BCM03****BCS2****BCS3****BCS4****BCS5****BCS6****BCS7**

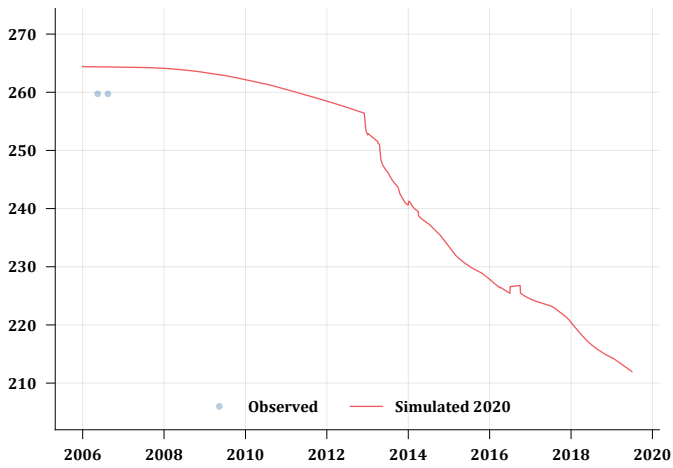
BRE2



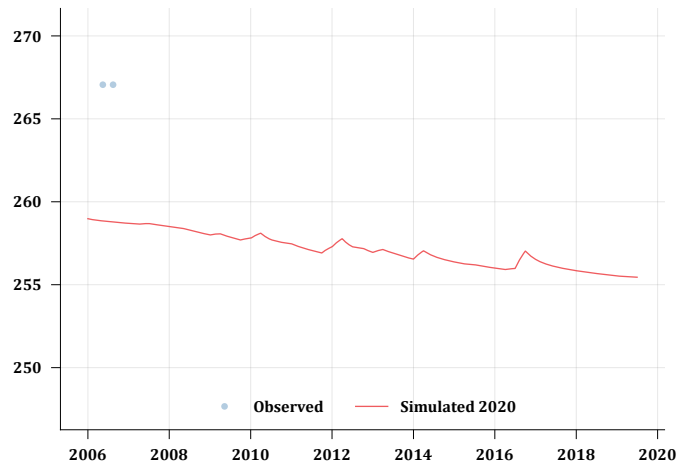
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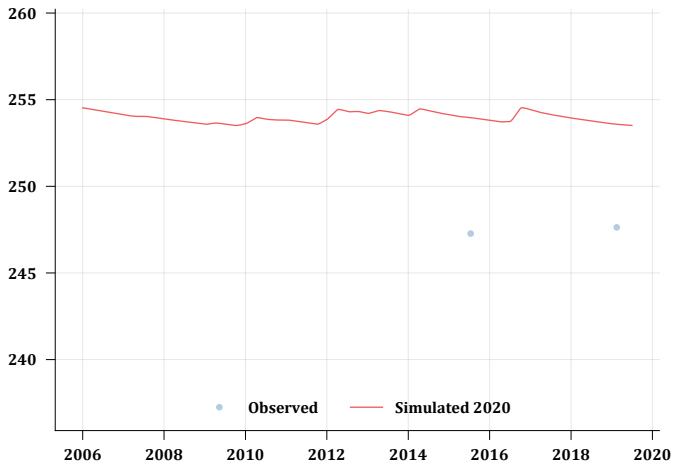
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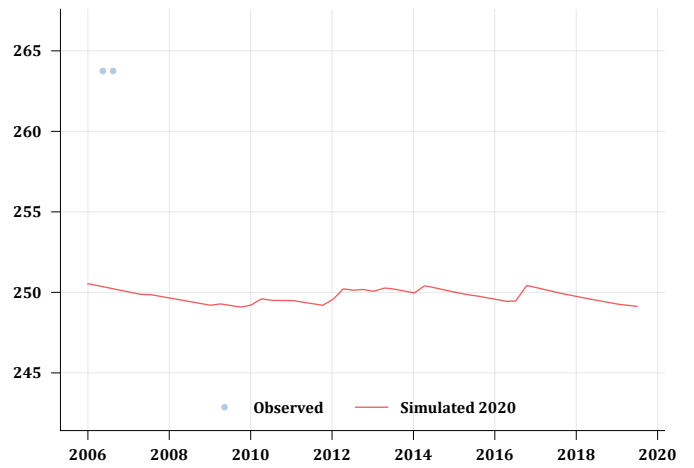
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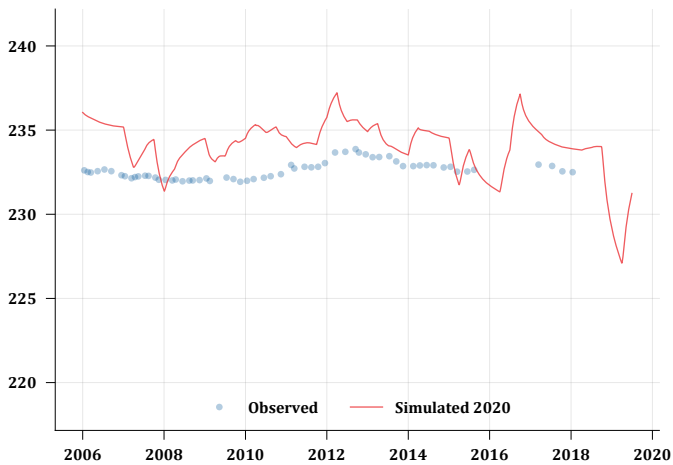
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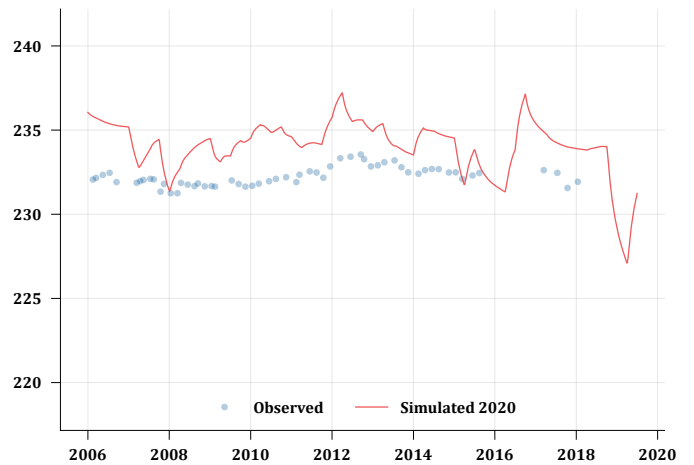
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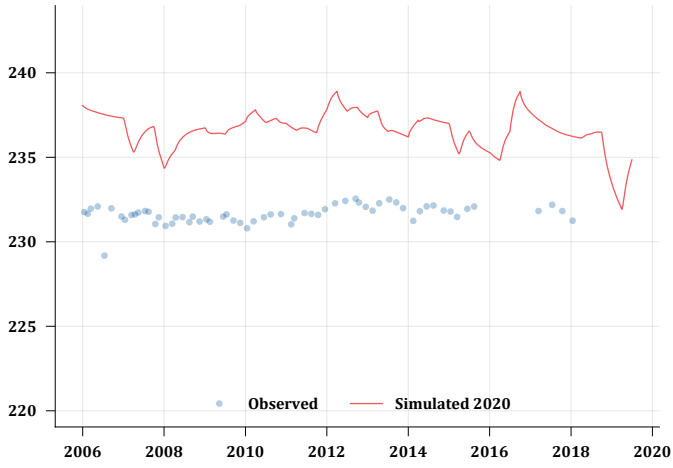
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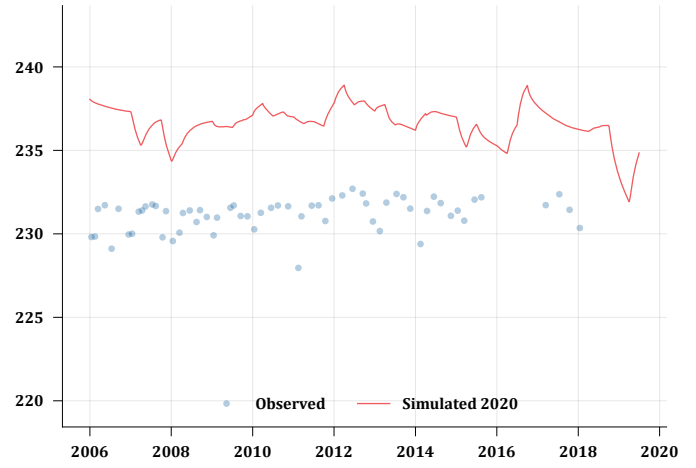
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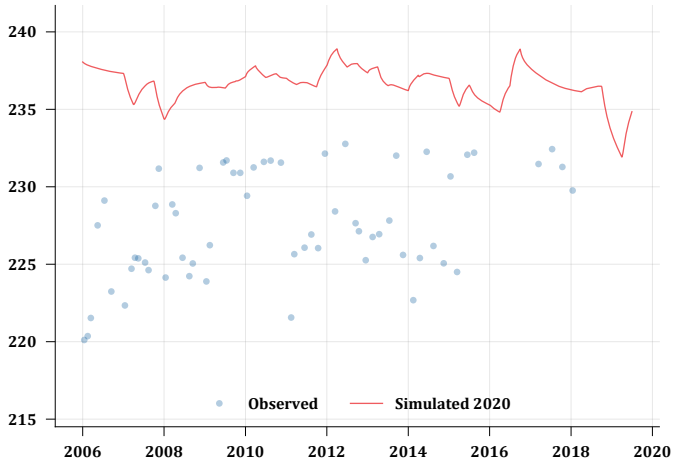
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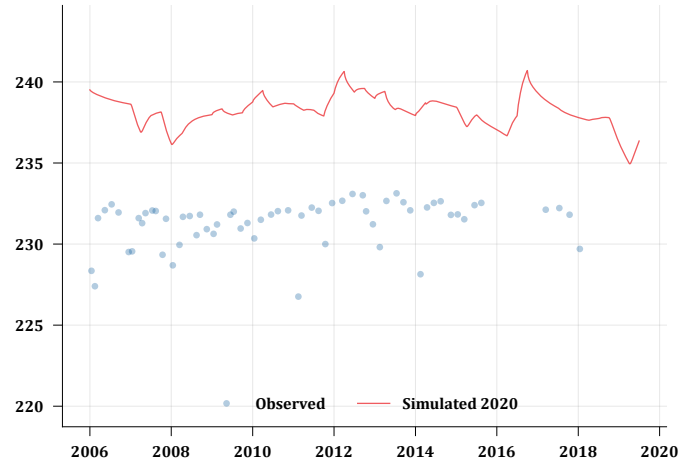
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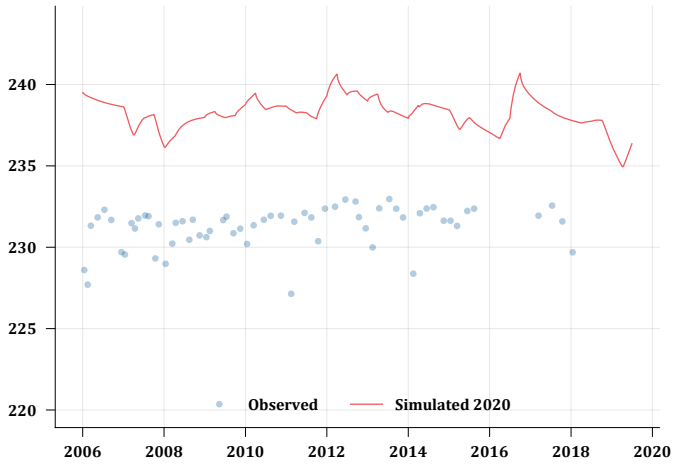
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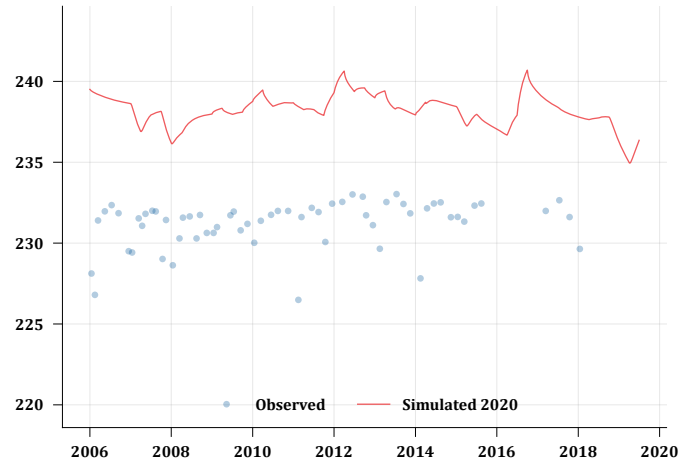
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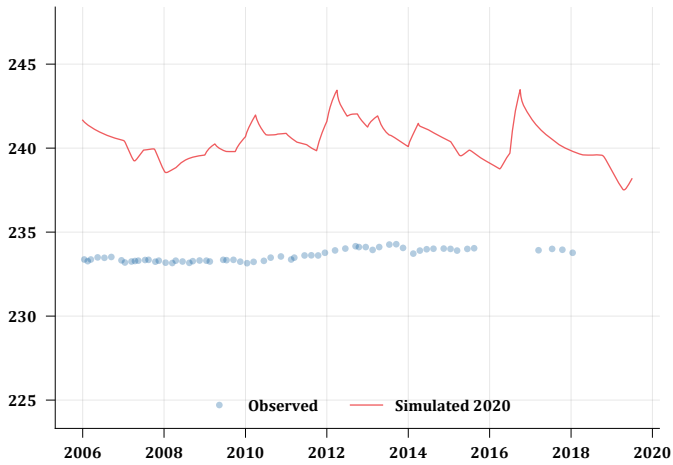
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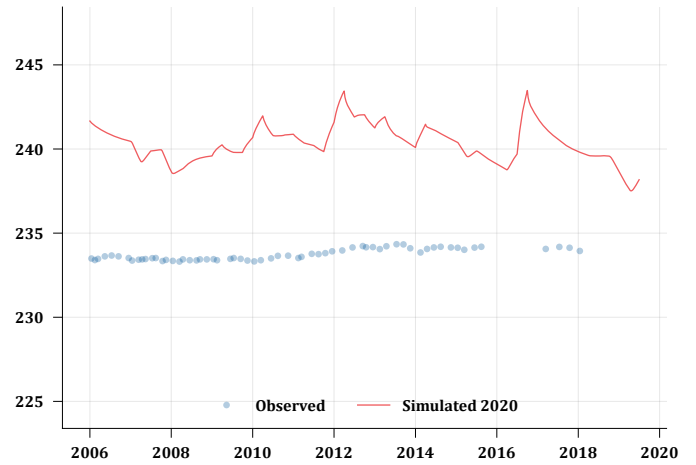
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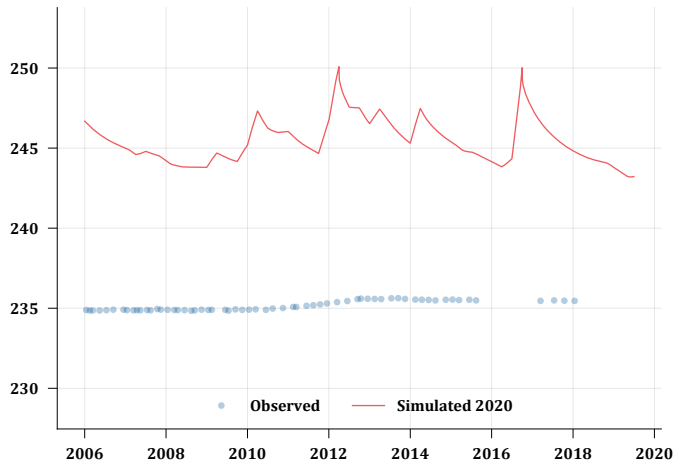
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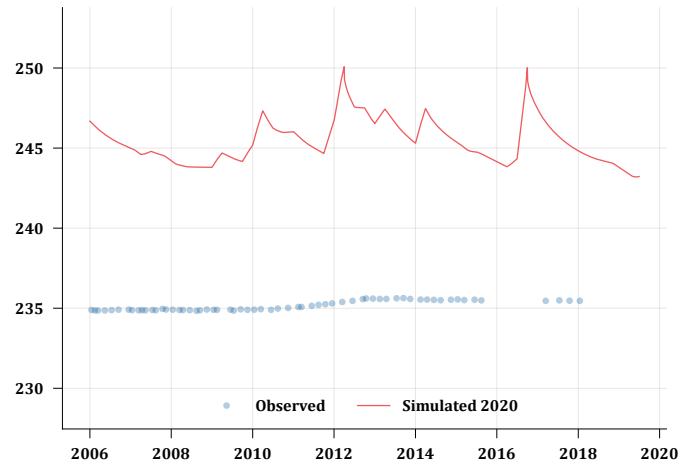
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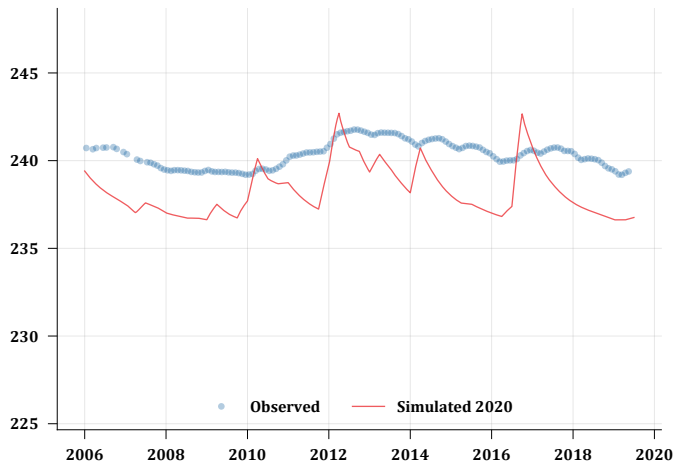
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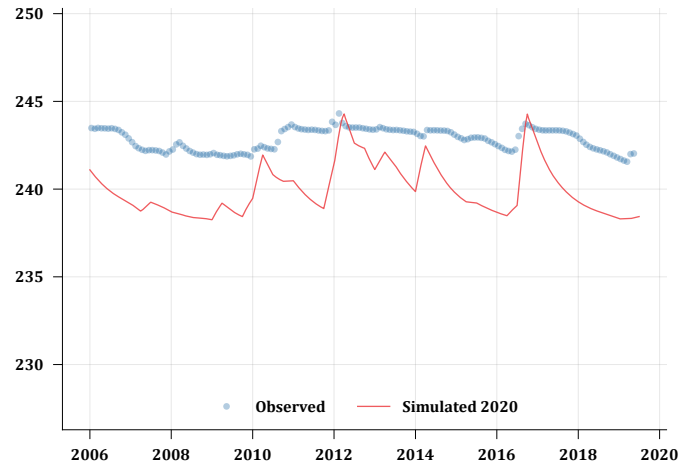
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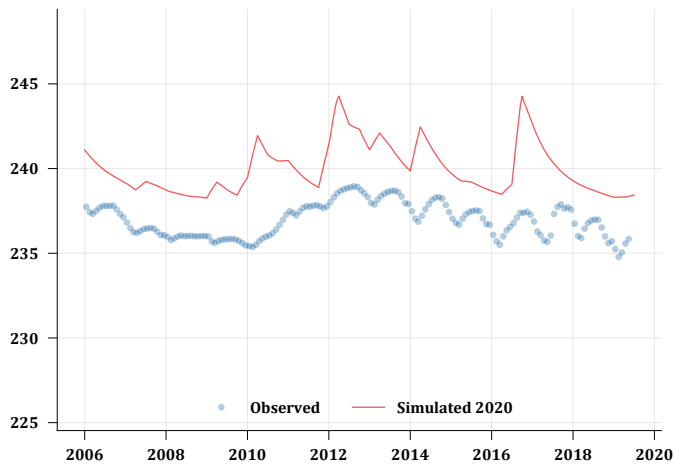
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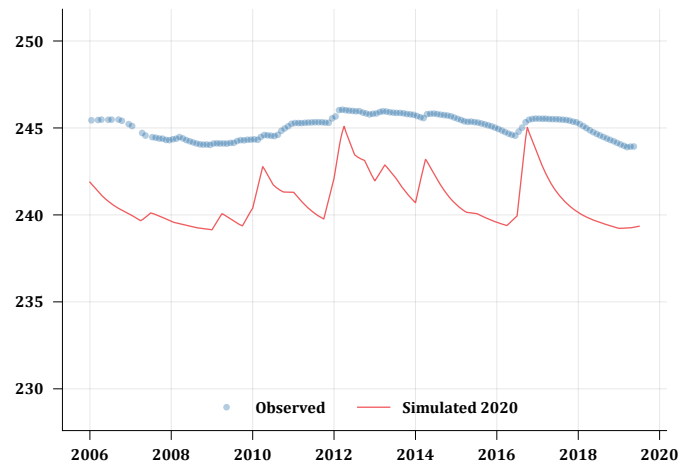
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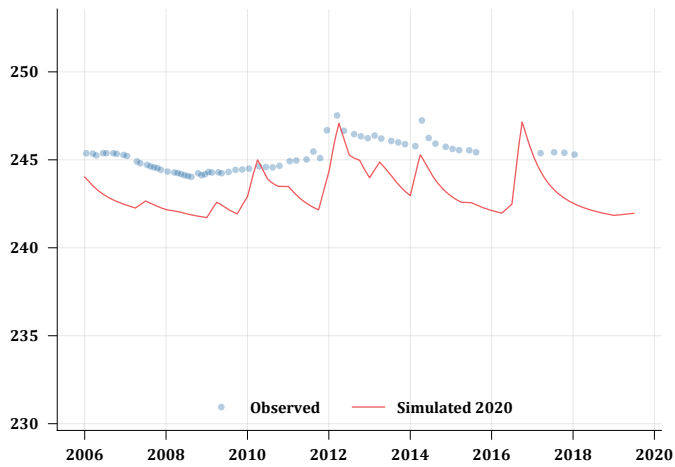
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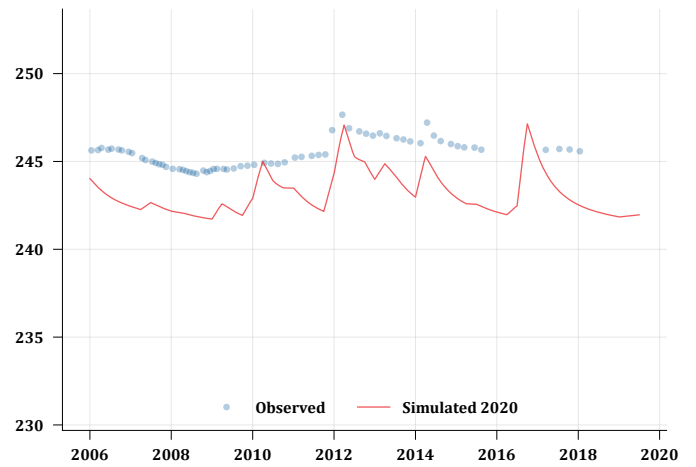
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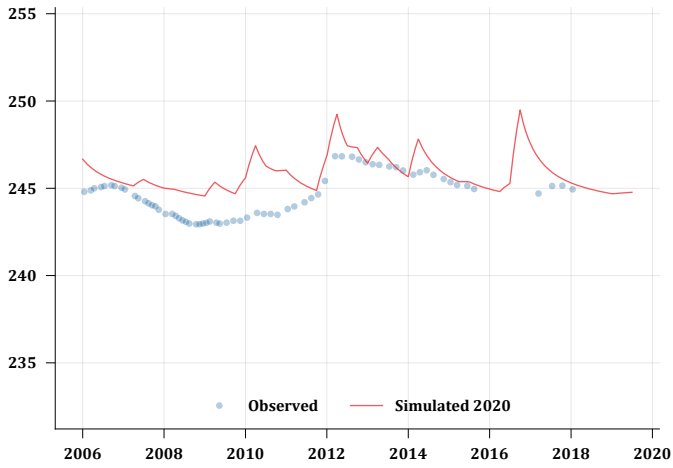
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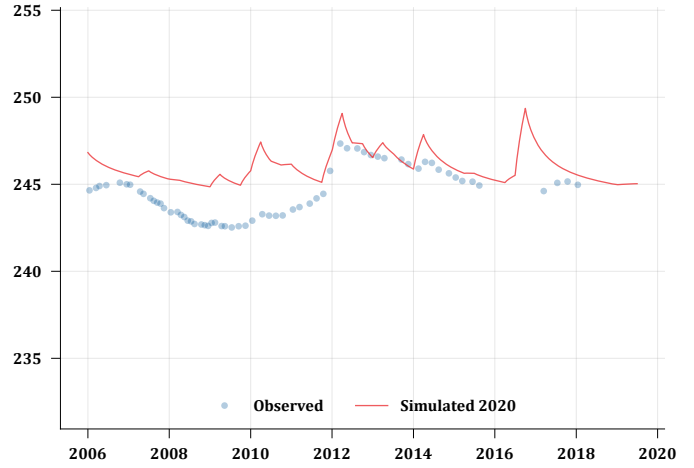
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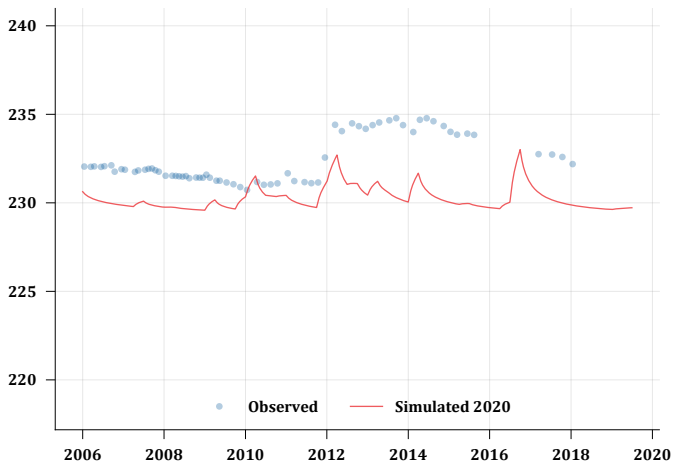
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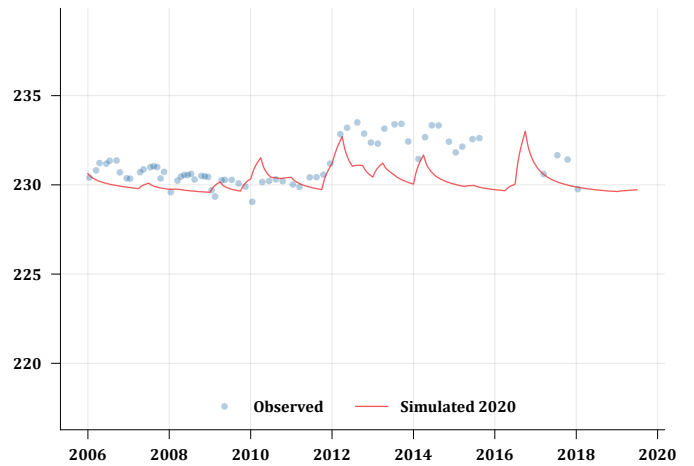
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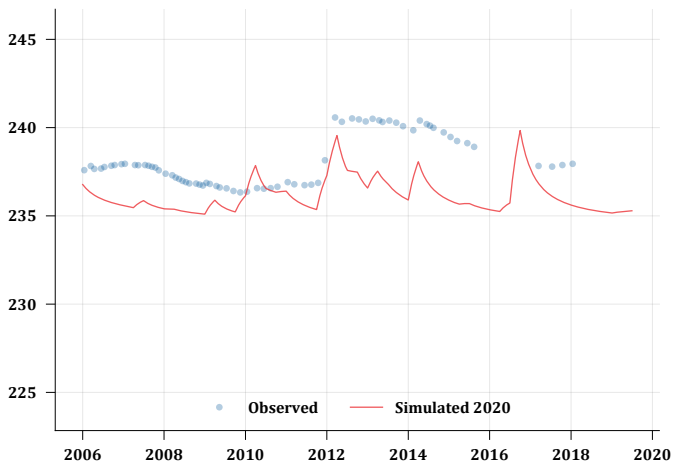
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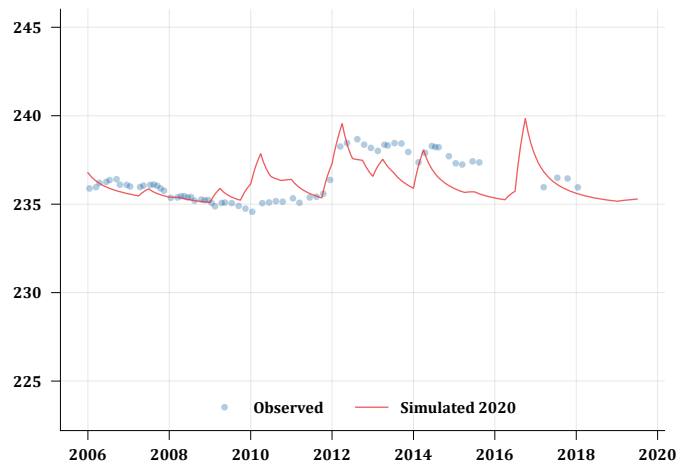
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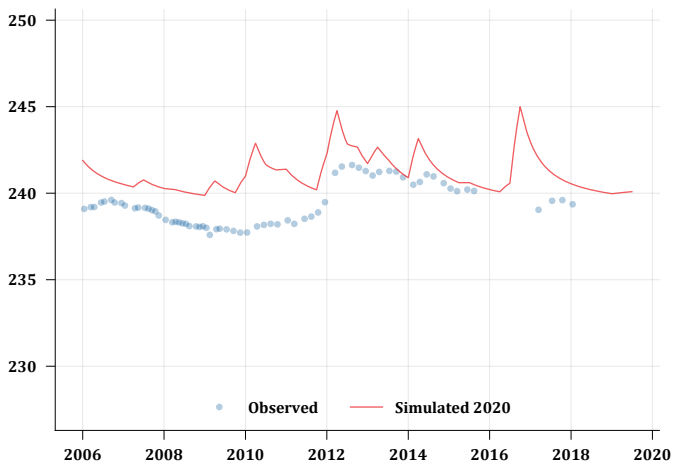
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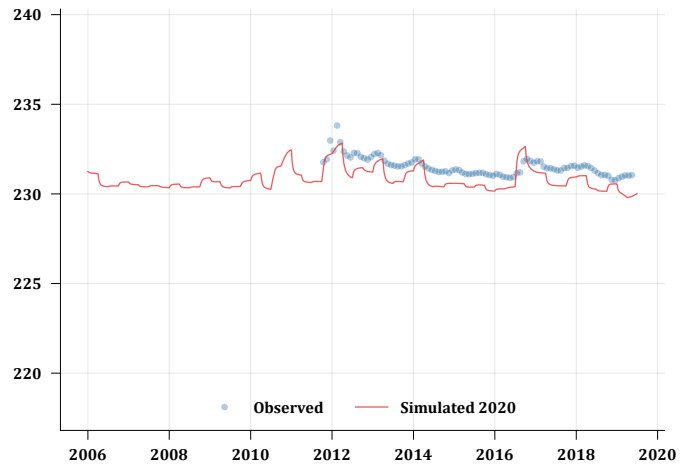
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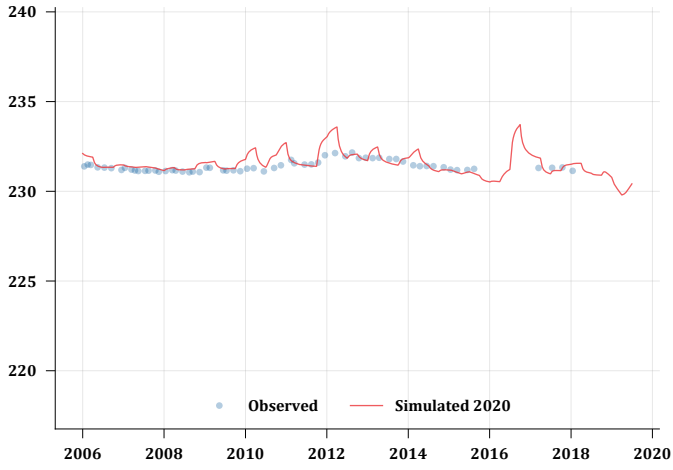
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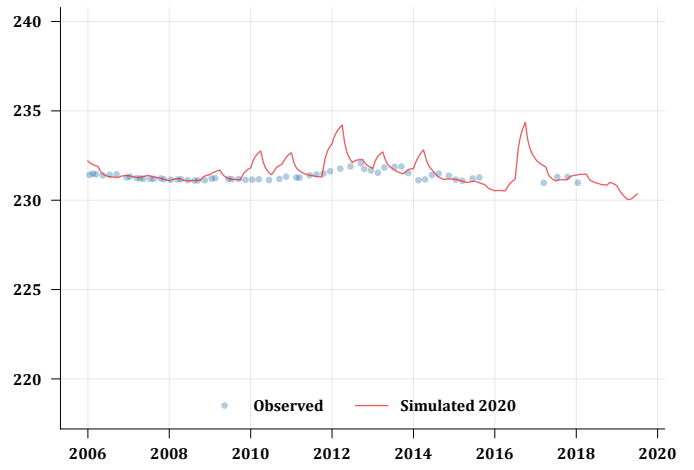
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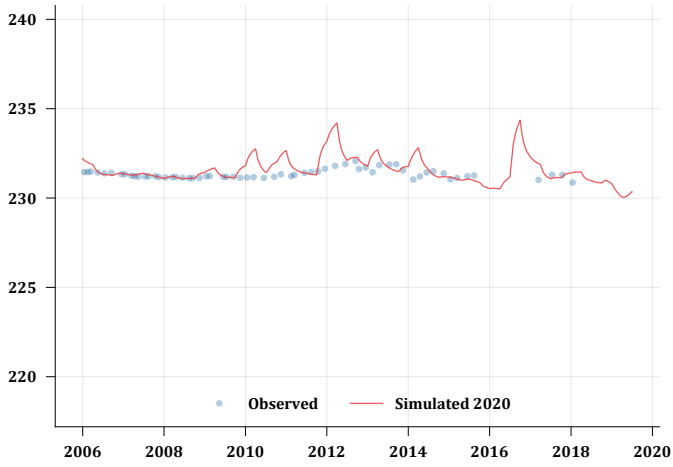
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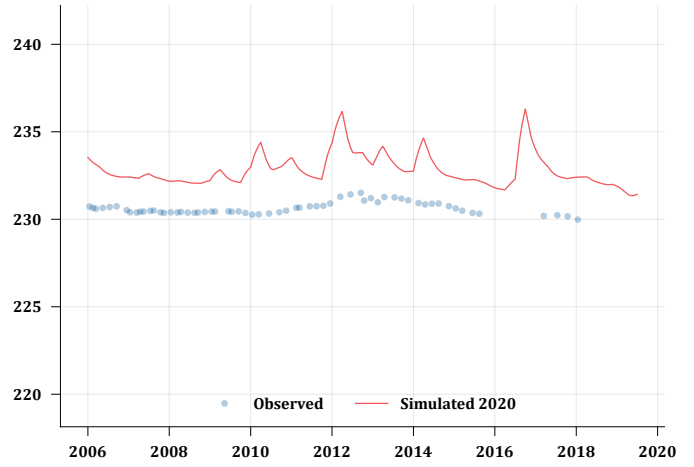
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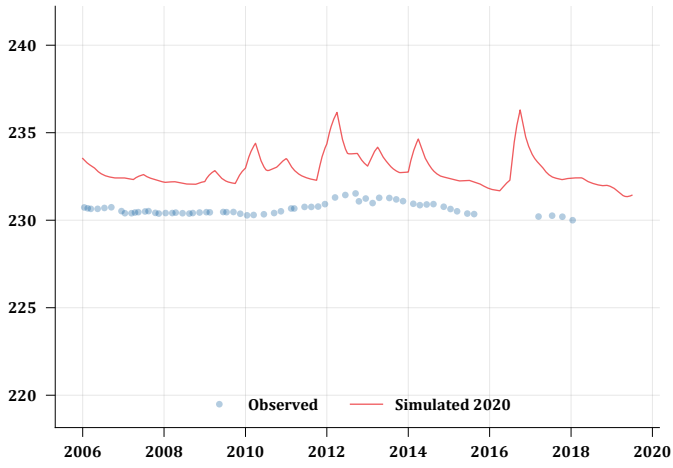
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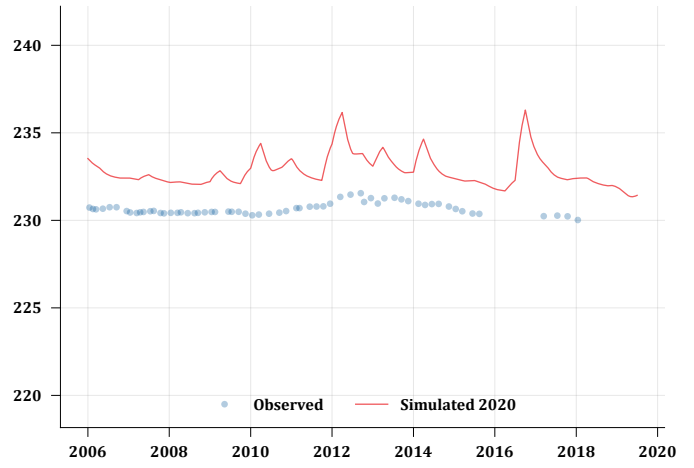
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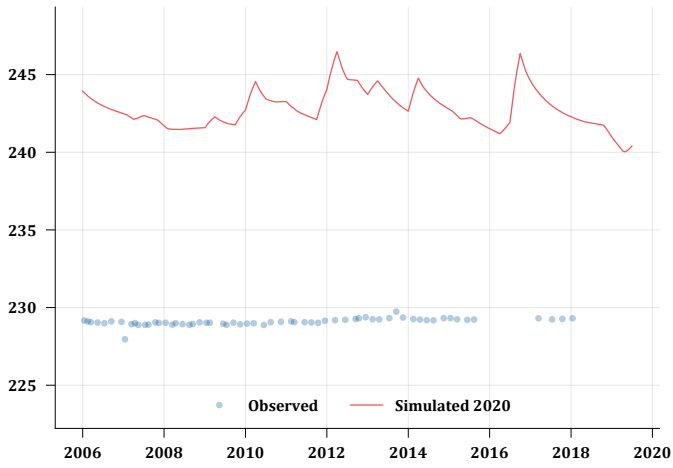
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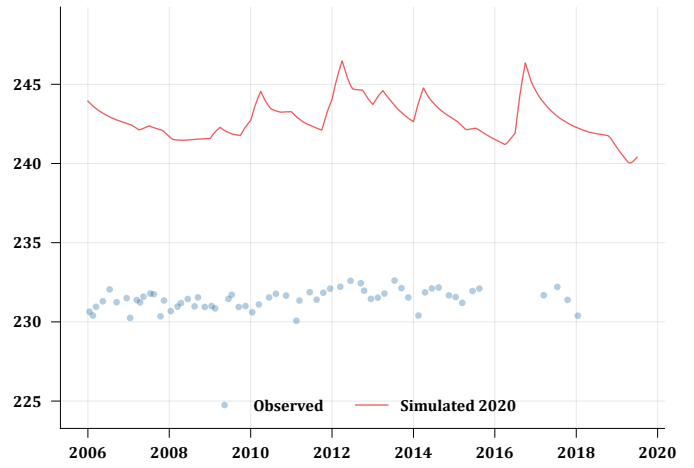
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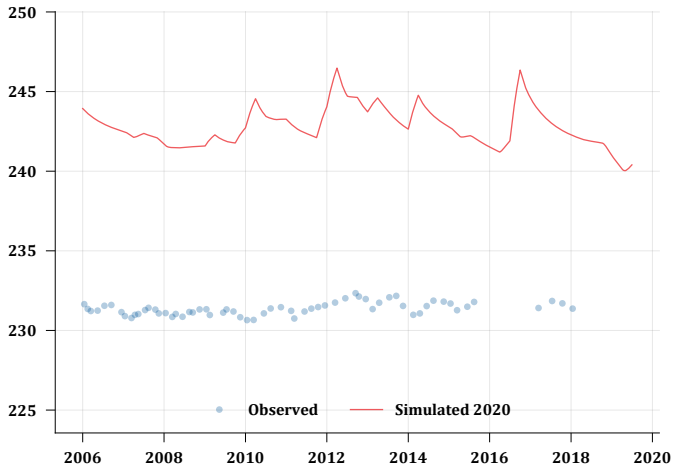
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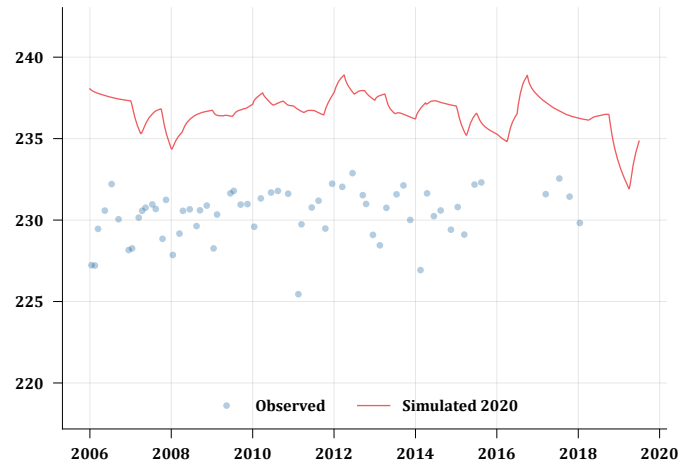
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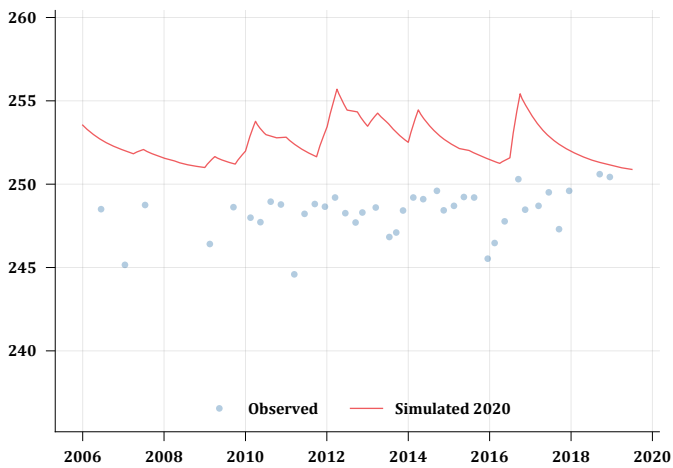
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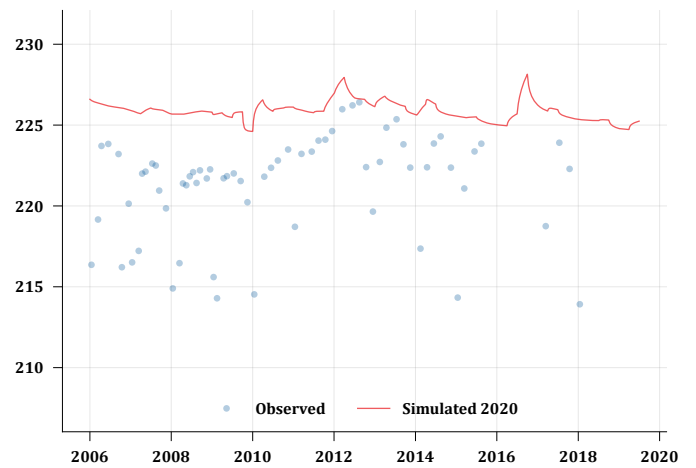
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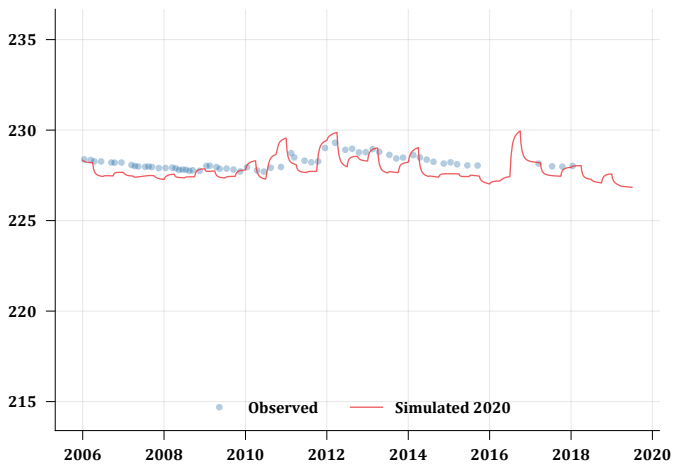
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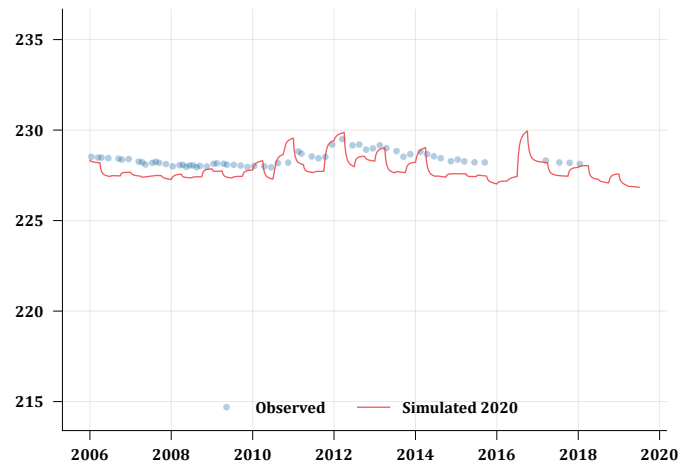
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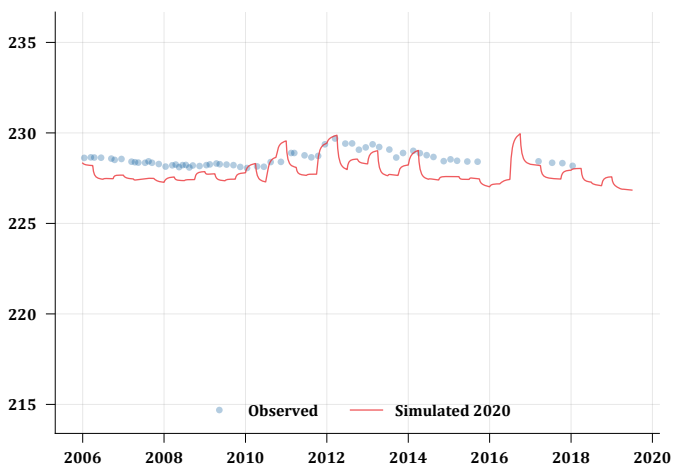
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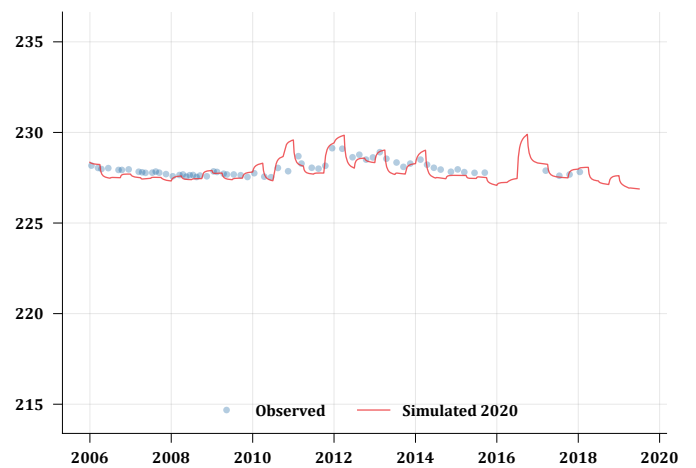
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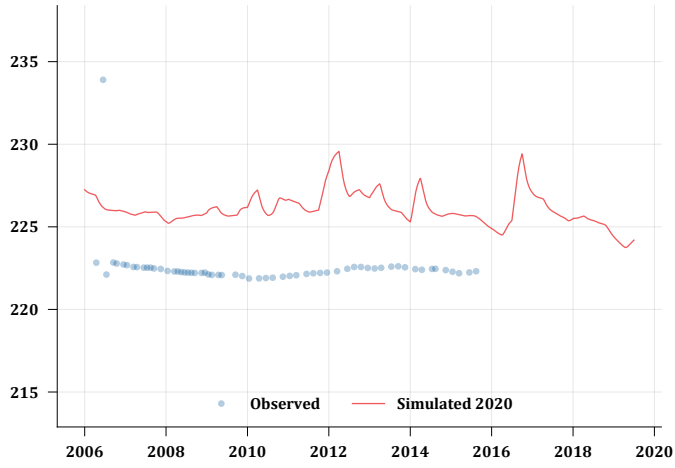
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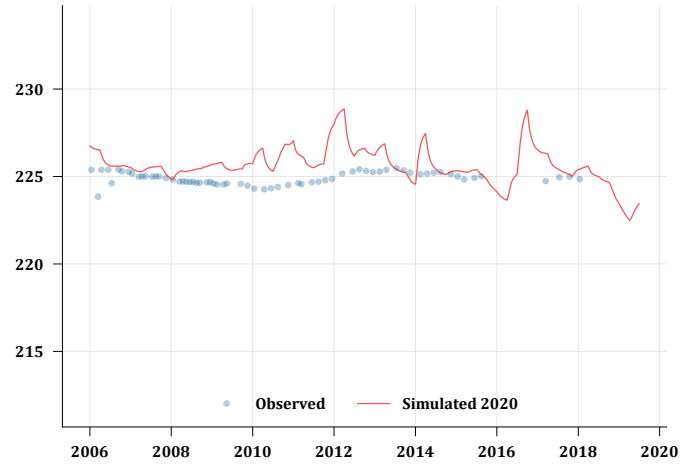
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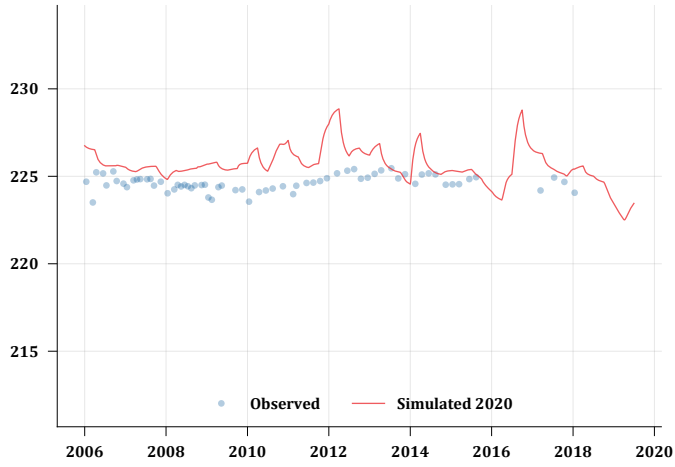
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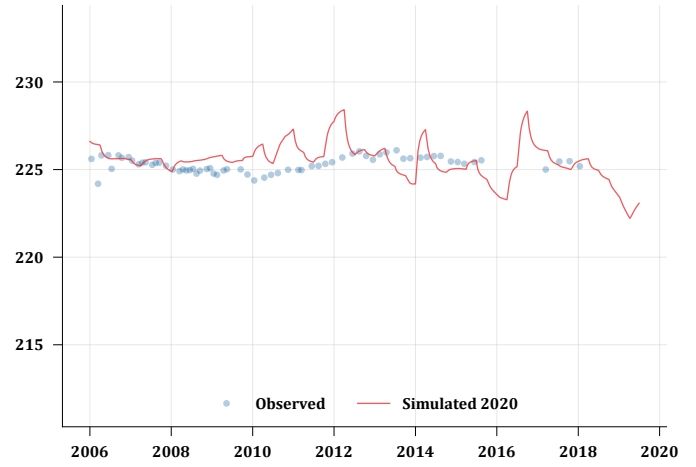
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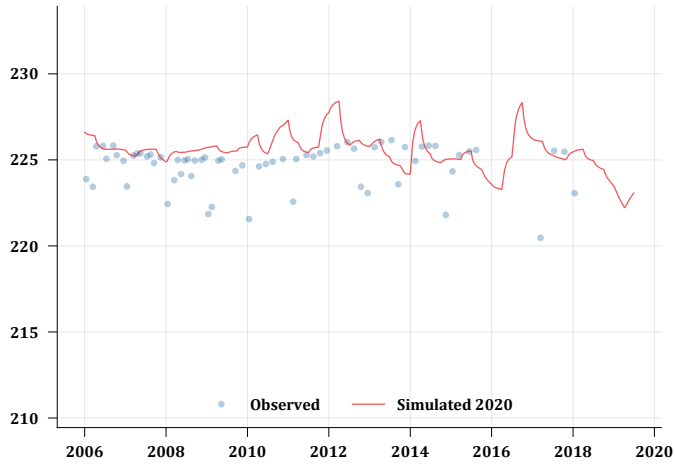
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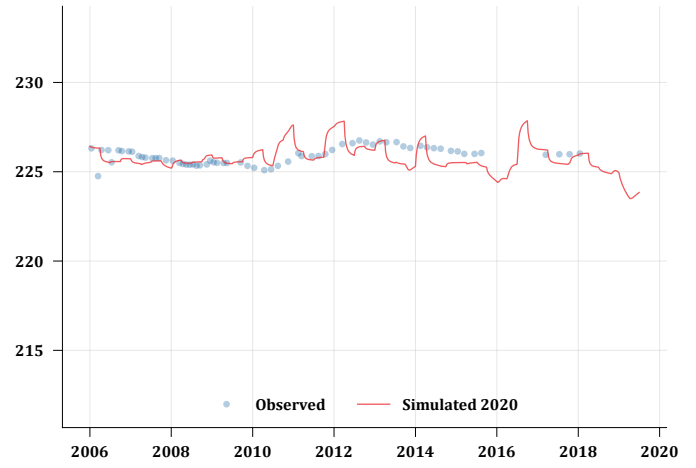
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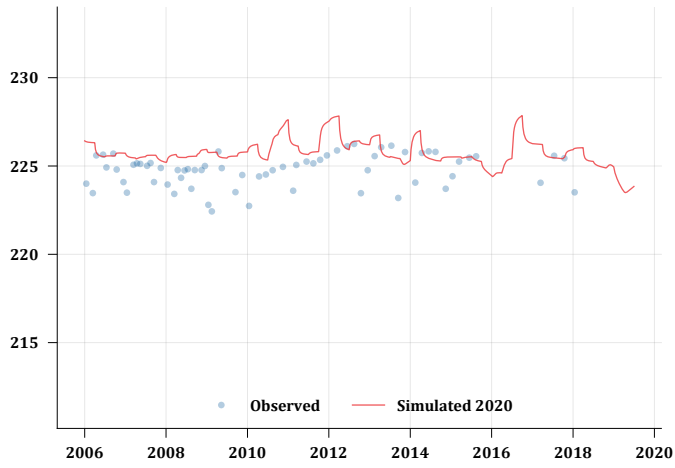
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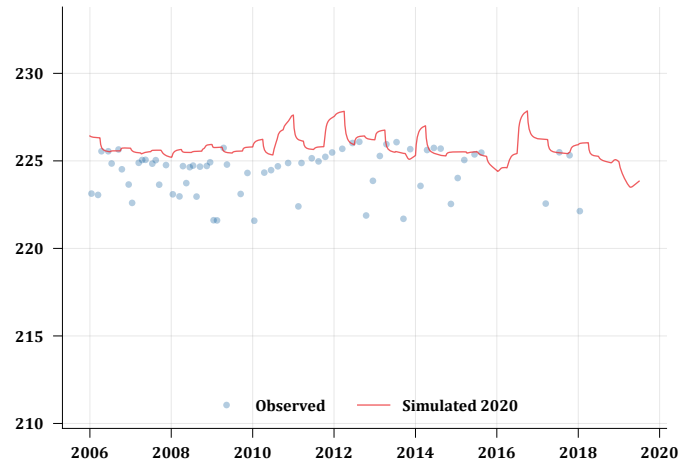
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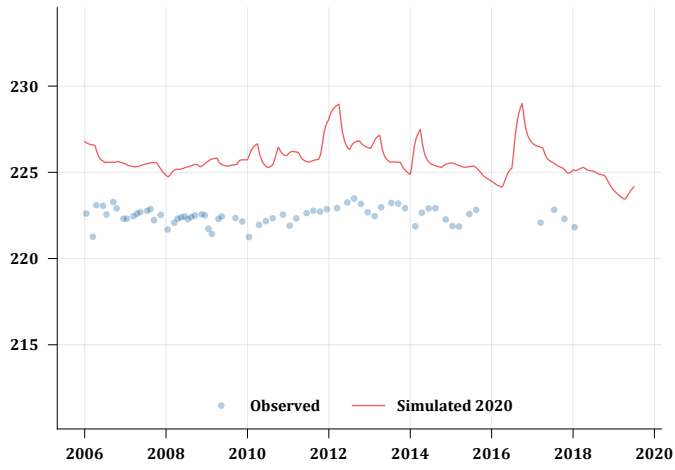
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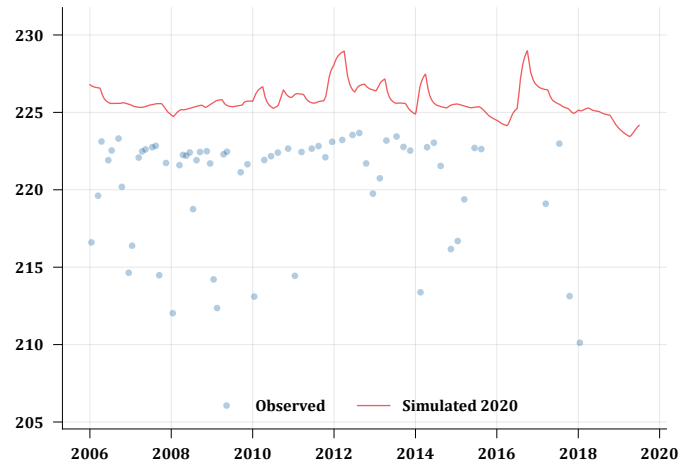
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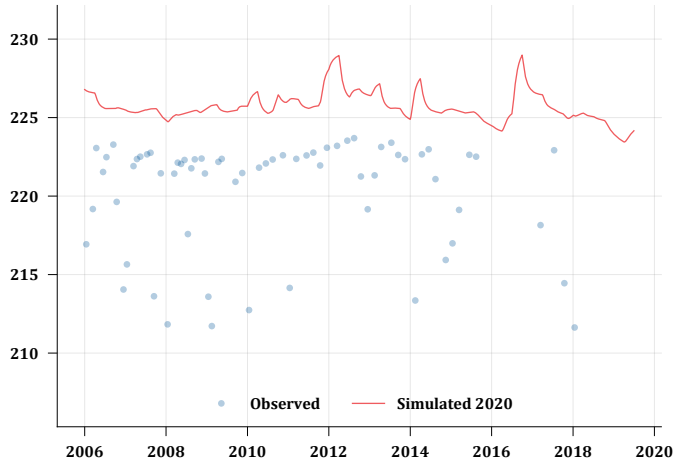
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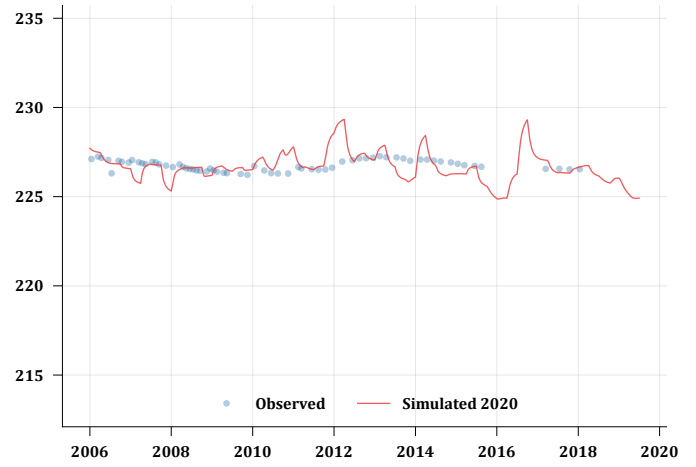
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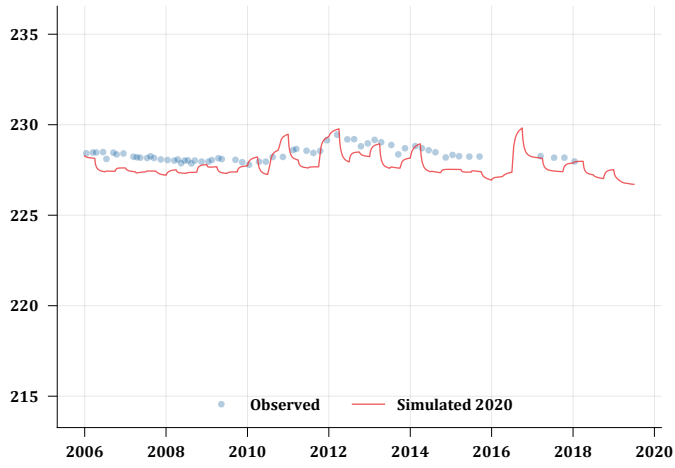
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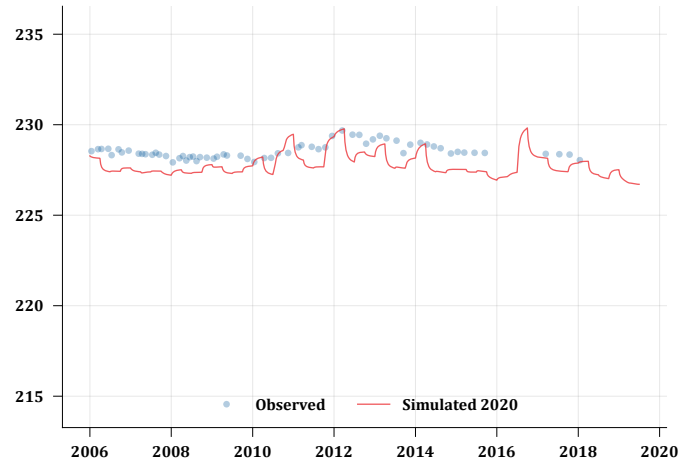
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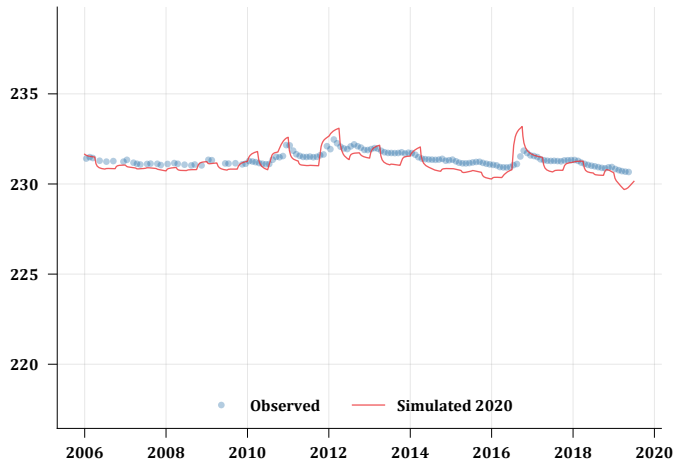
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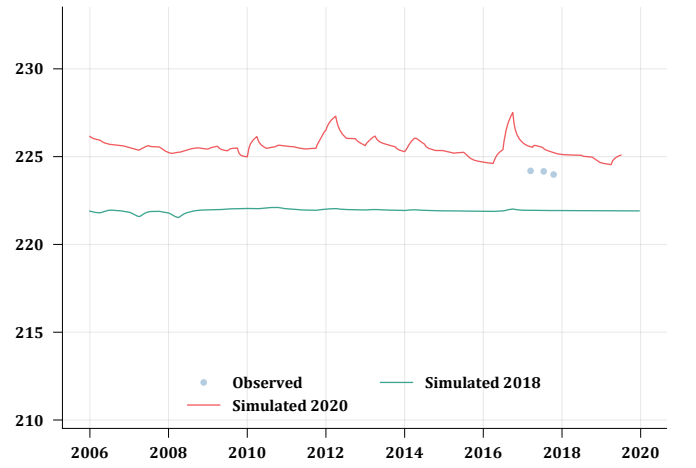
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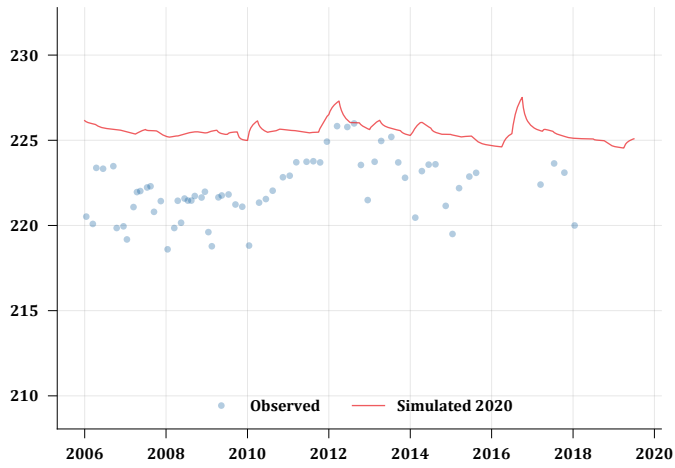
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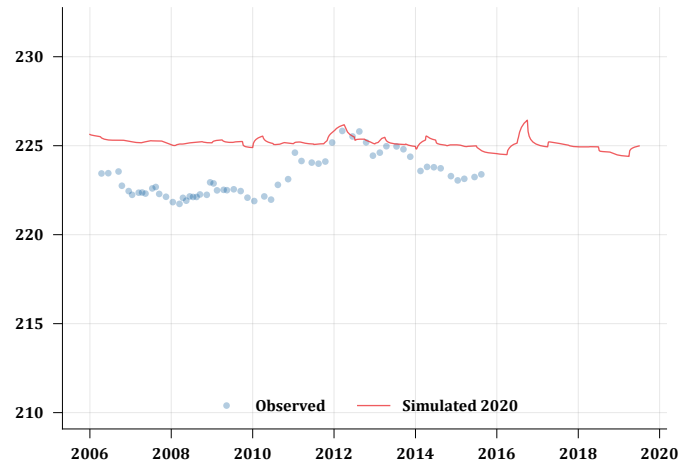
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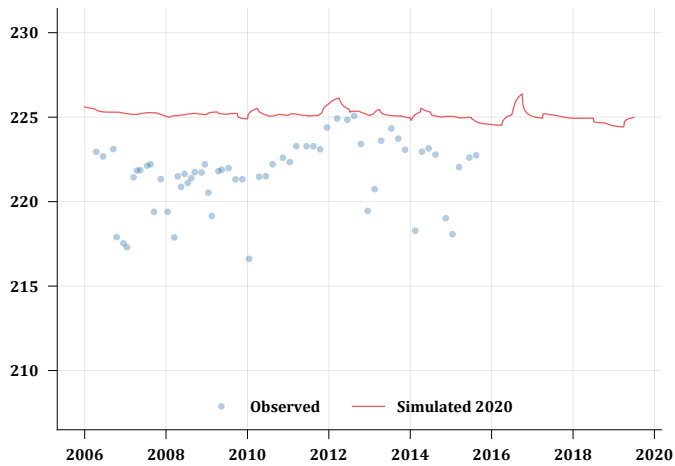
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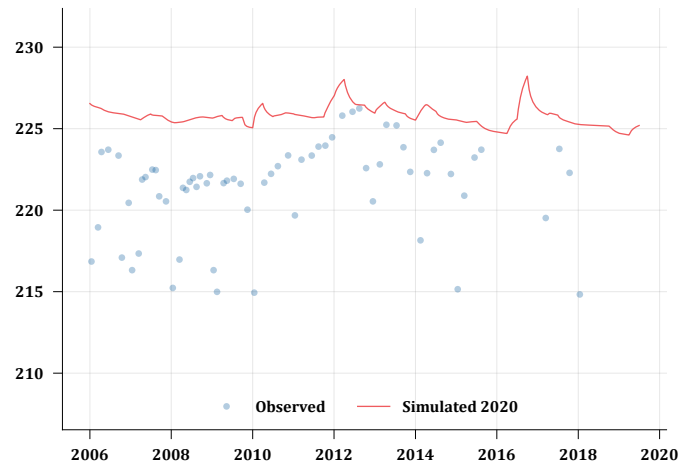
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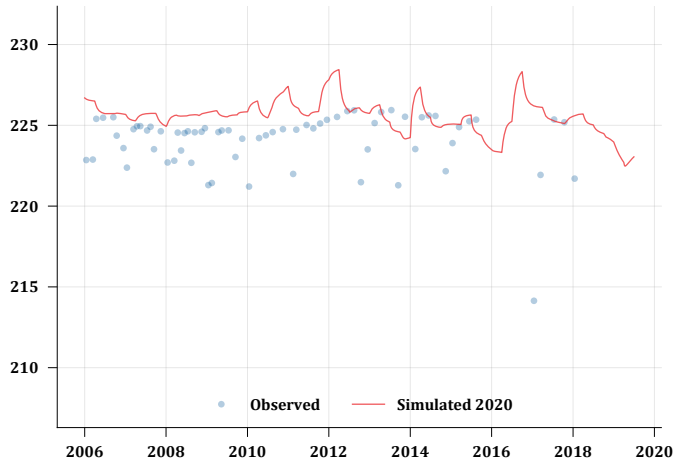
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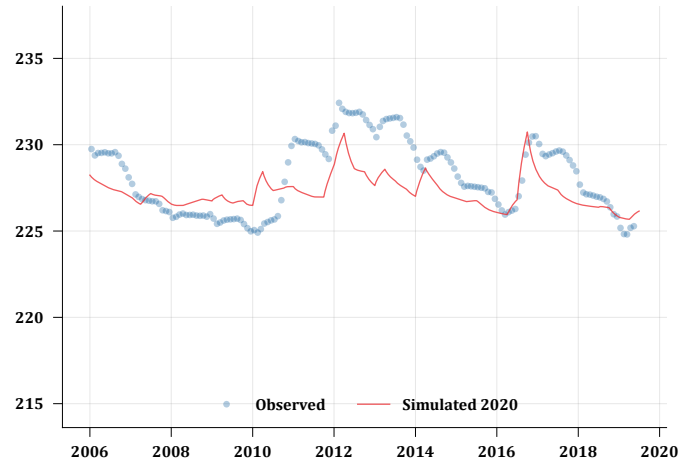
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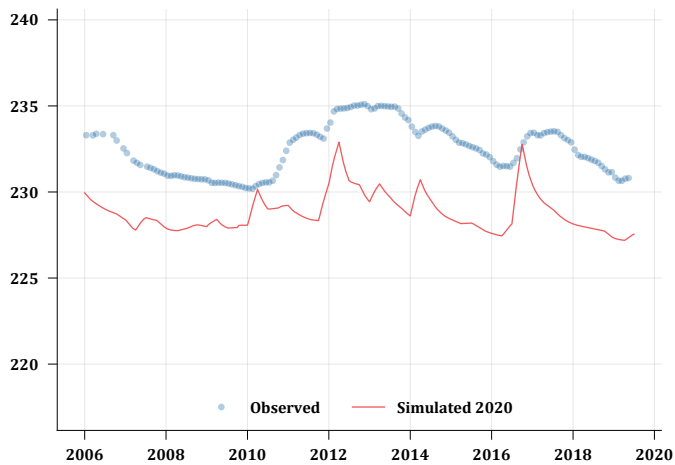
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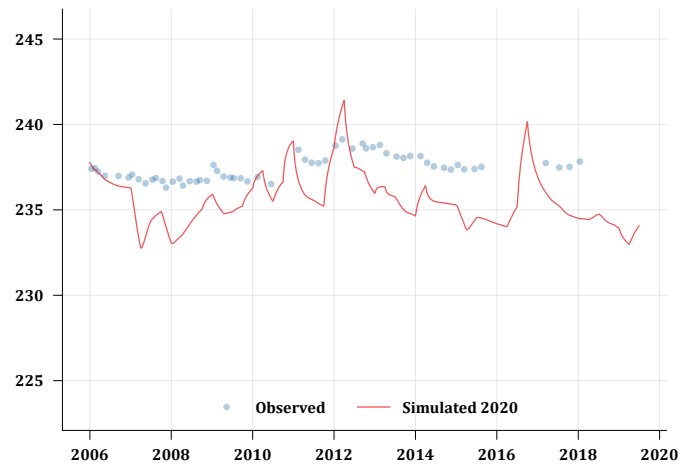
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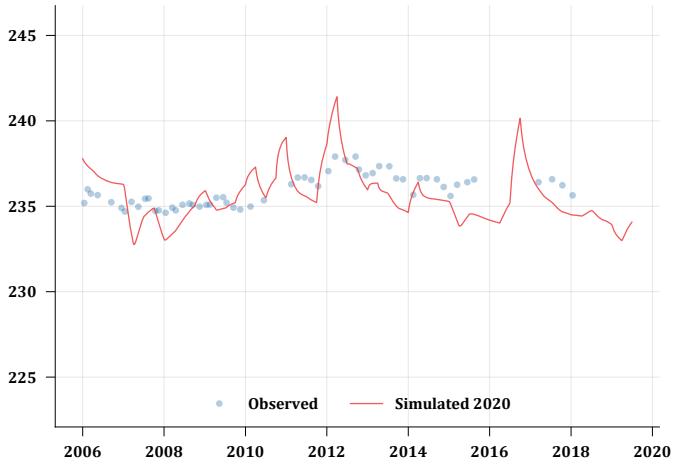
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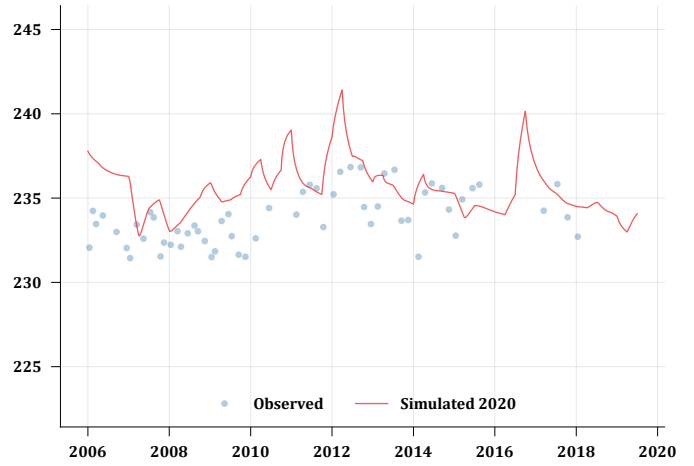
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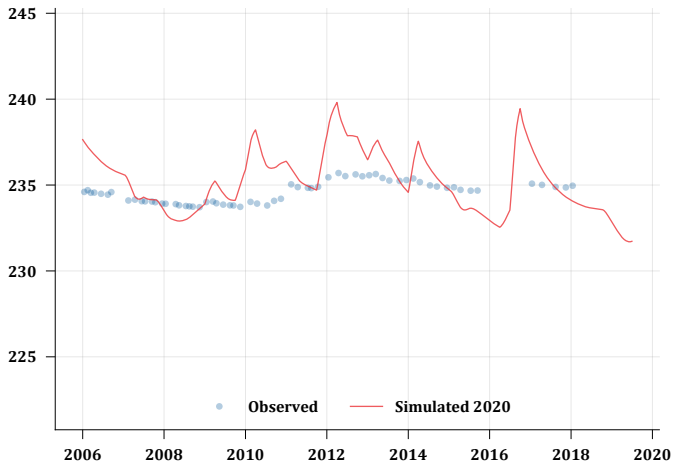
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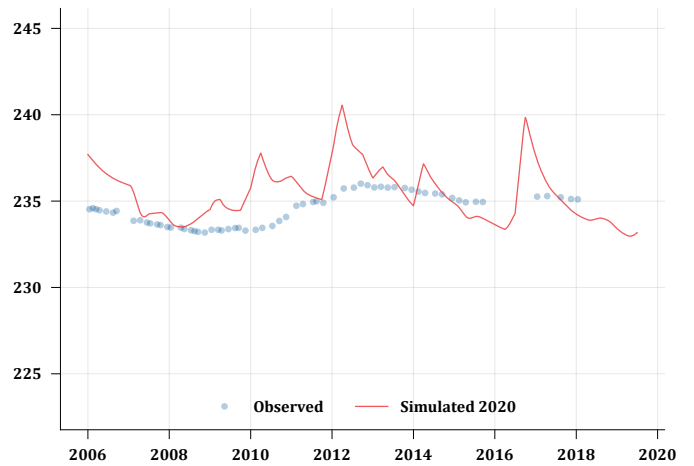
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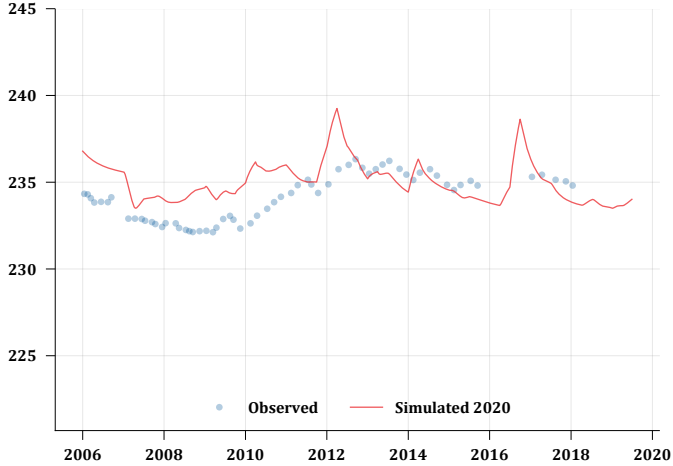
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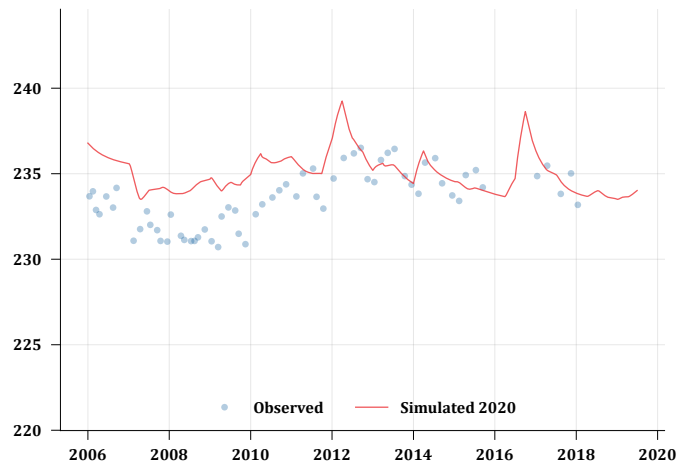
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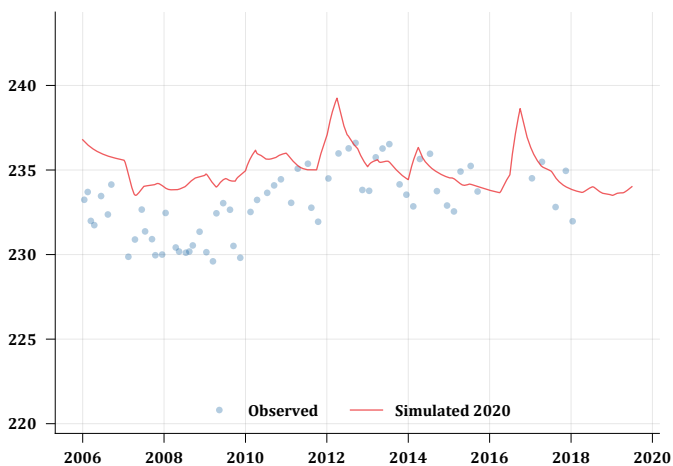
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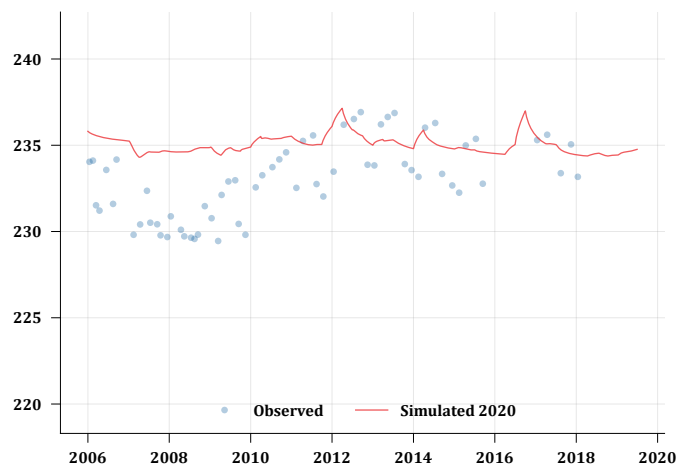
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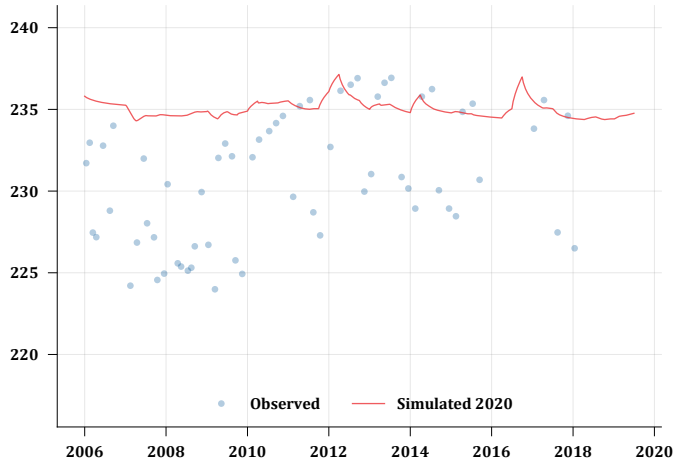
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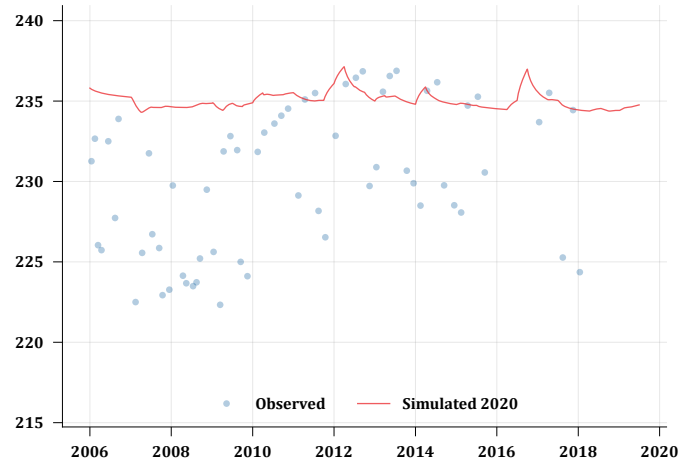
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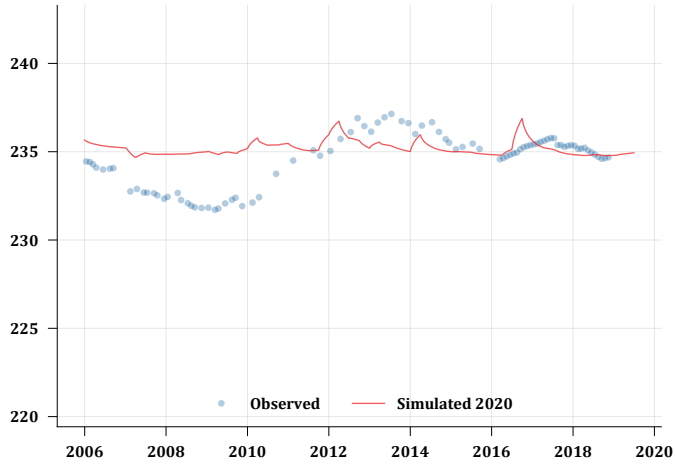
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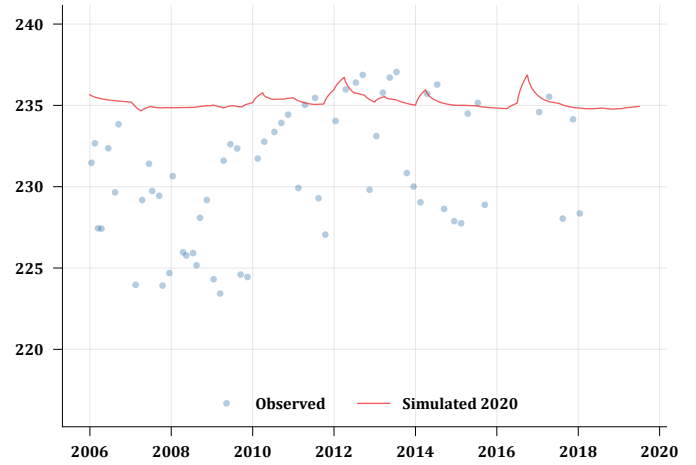
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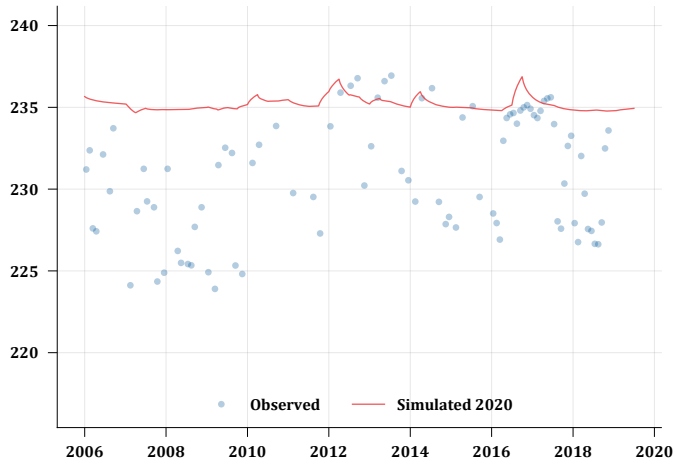
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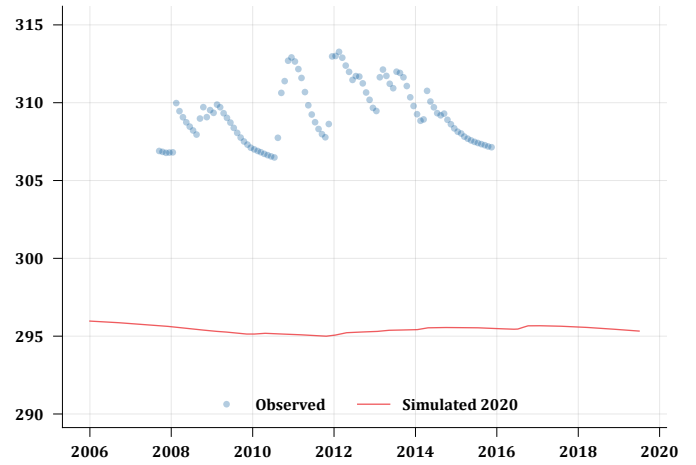
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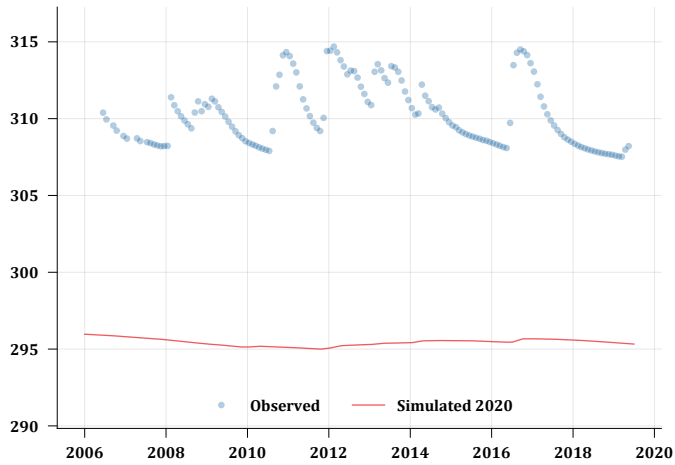
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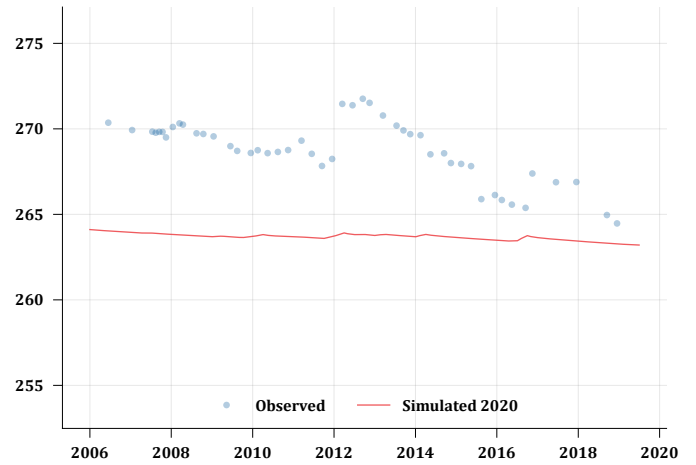
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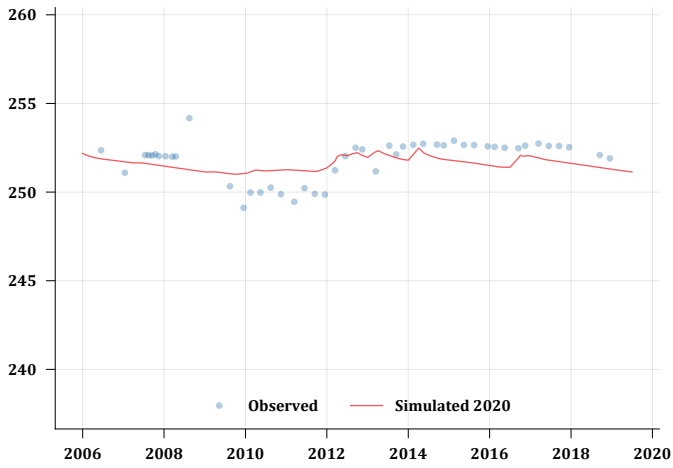
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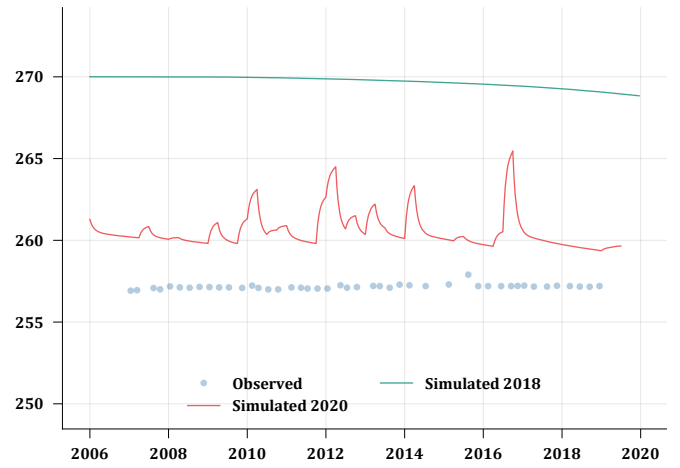
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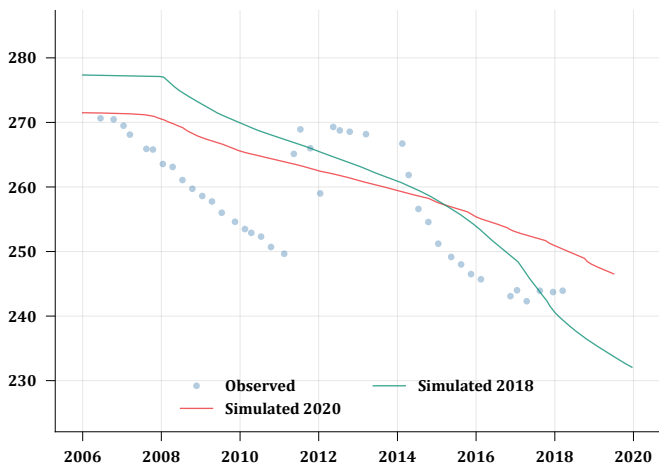
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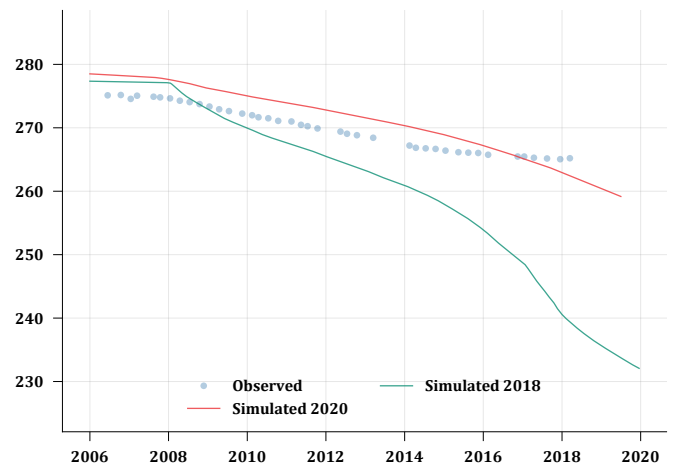
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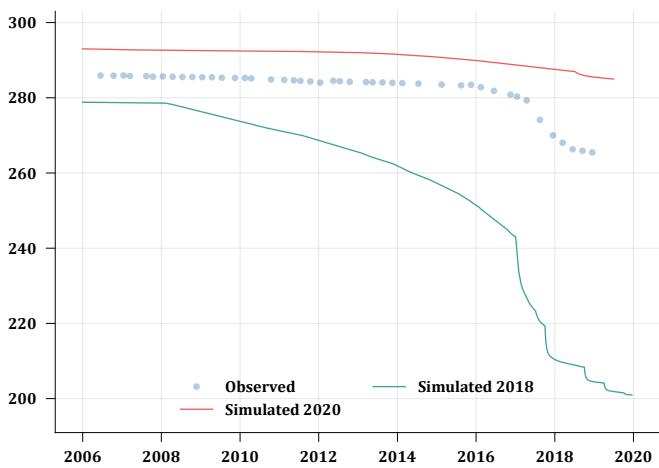
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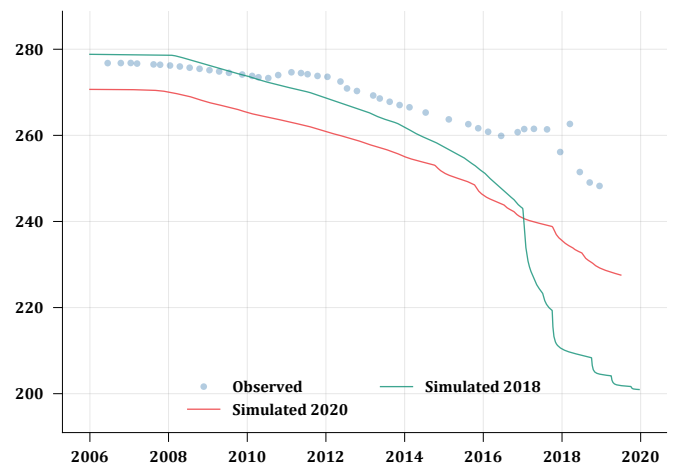
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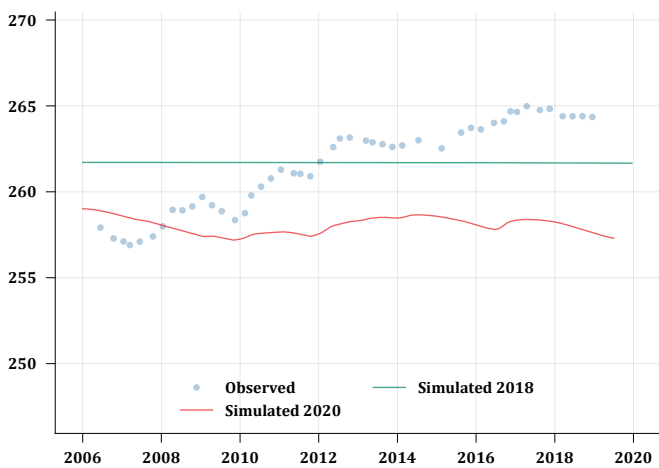
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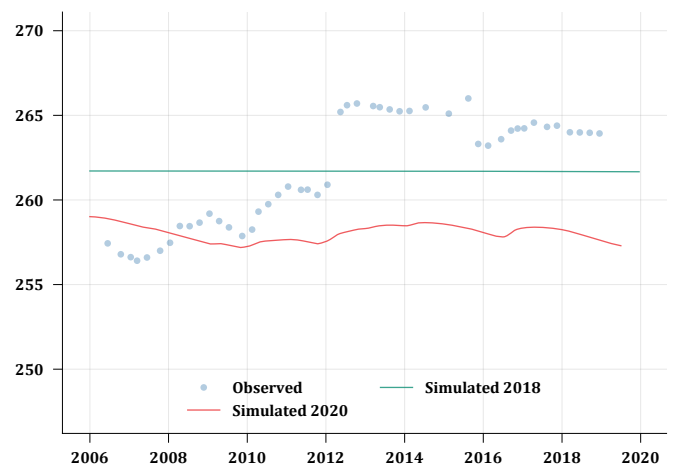
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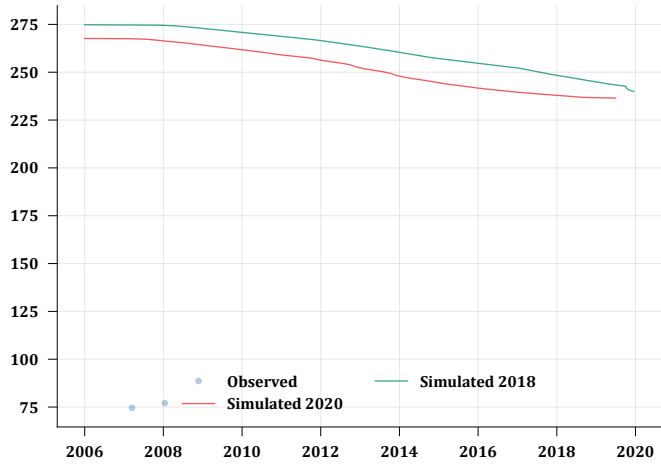
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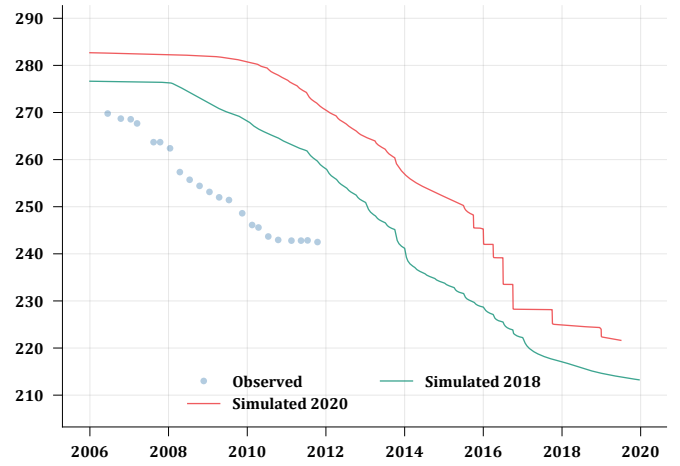
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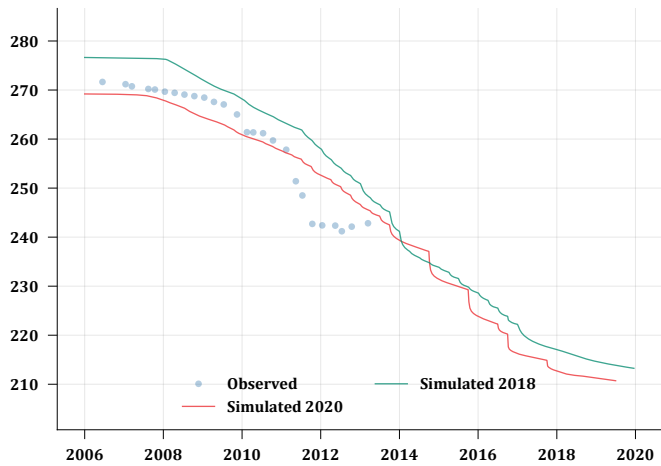
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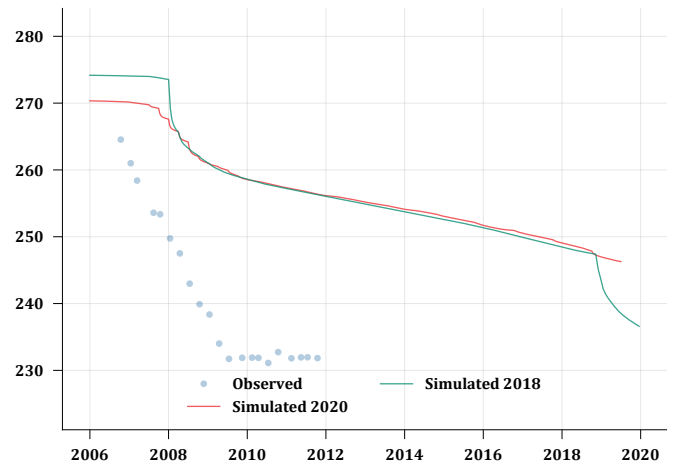
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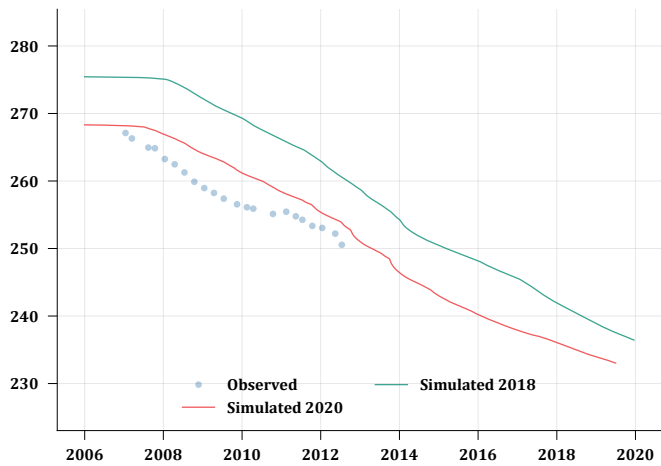
IBC2115



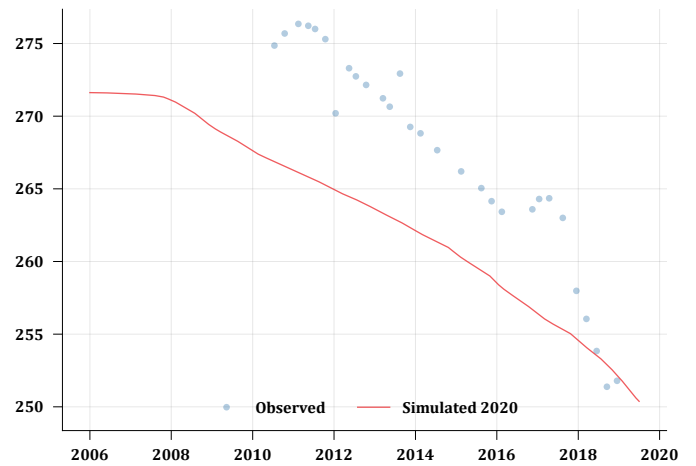
IBC2138



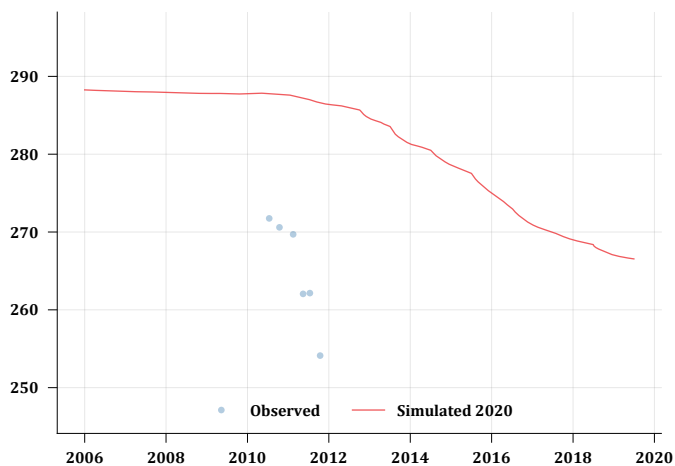
IBC2139



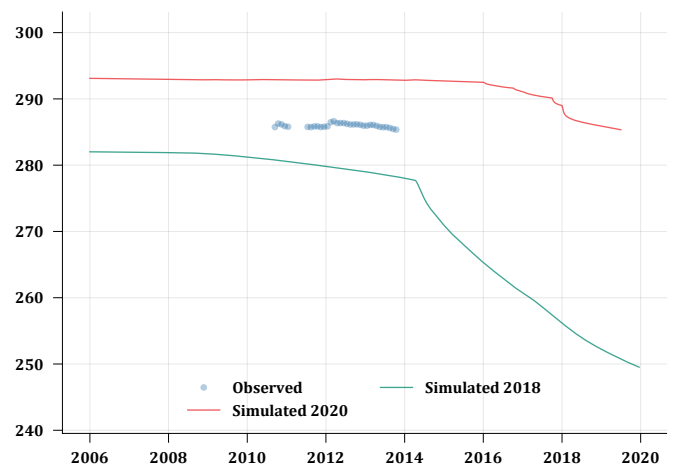
IBC2181



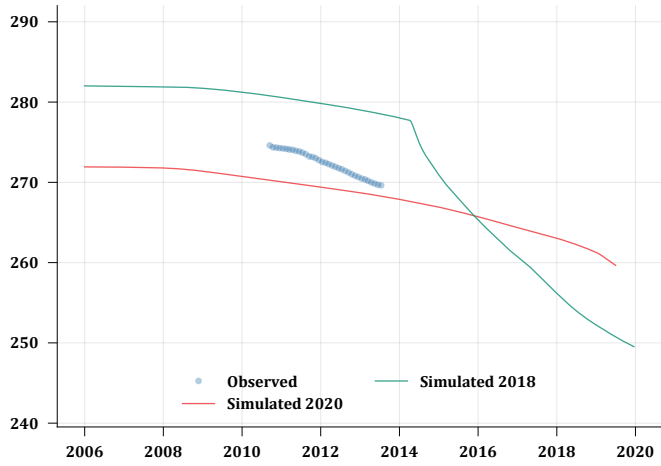
IBC2193



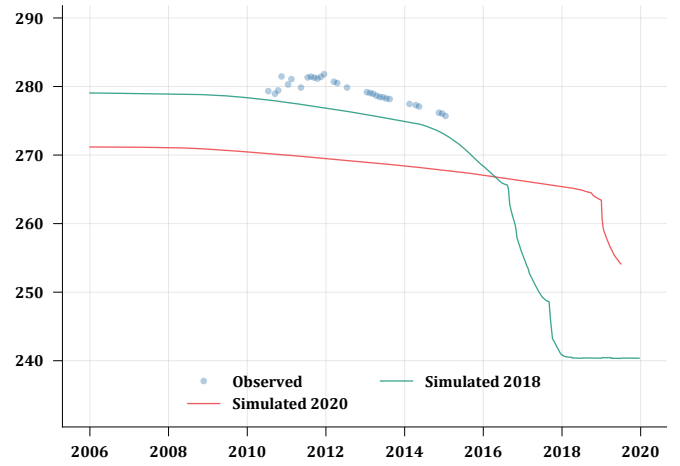
M267P_V1



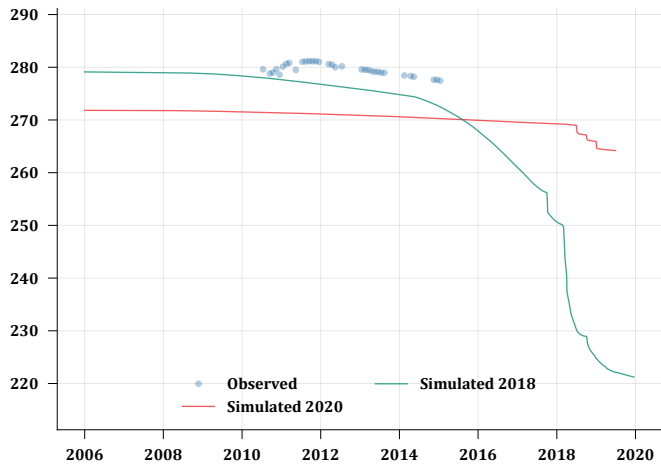
M267P_V2



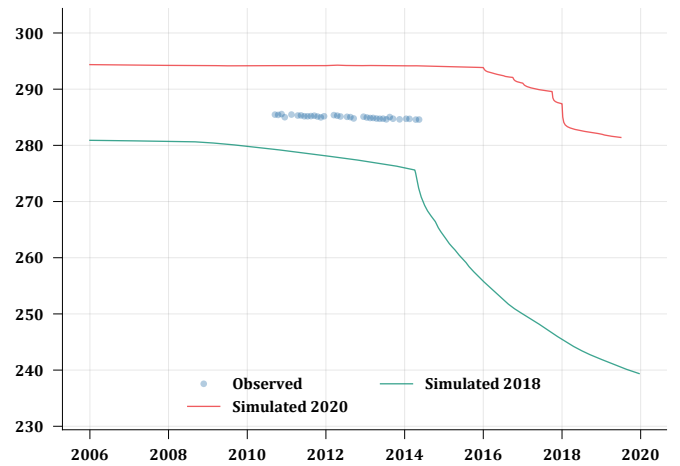
MAC1218



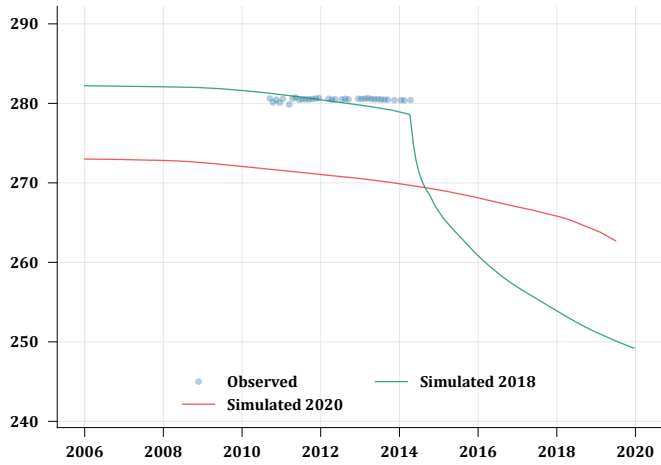
MAC1219



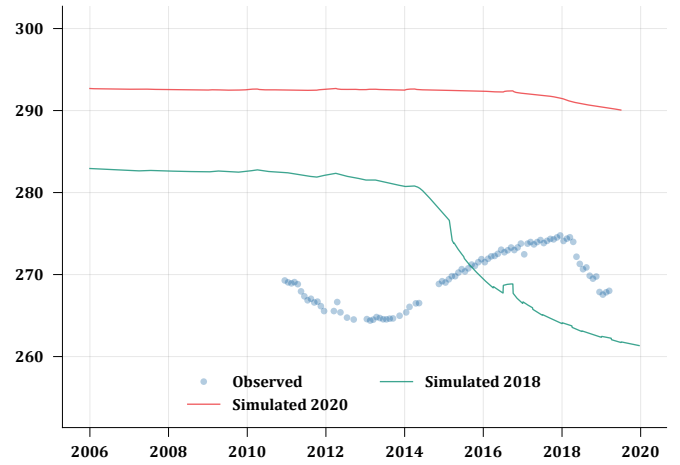
MAC1261



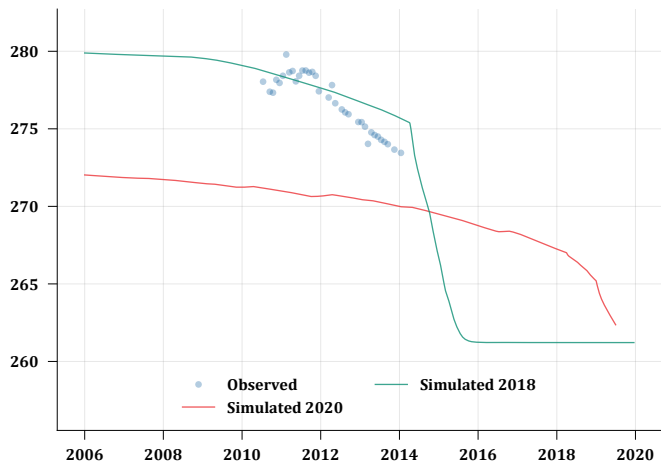
MAC1279



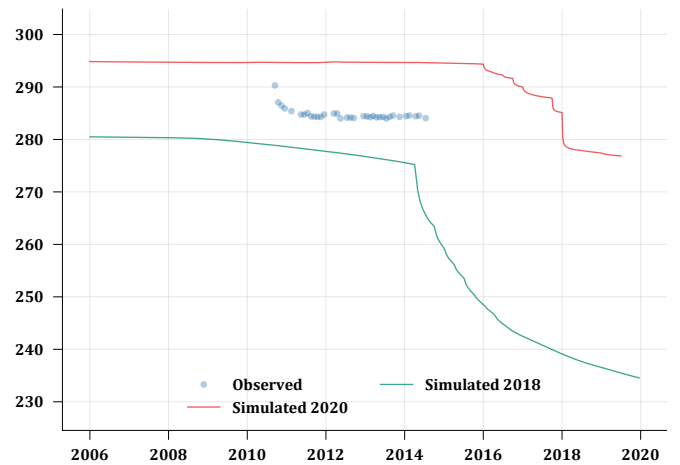
MAC1280



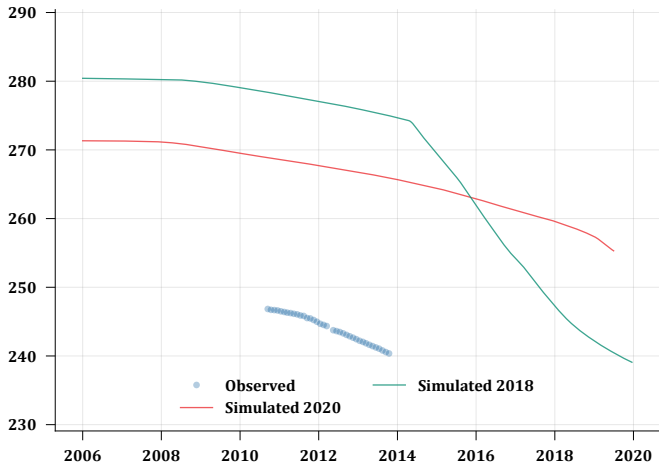
MAC1283



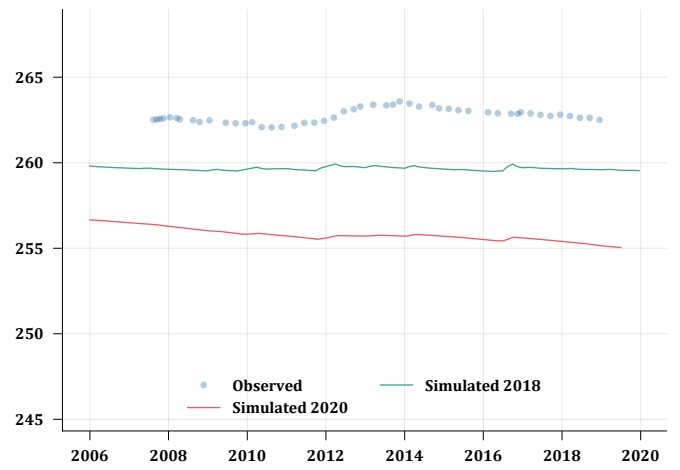
MAC252



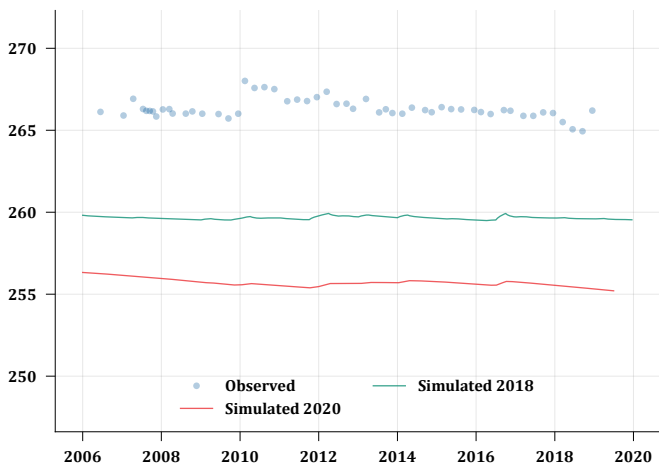
MAC268P



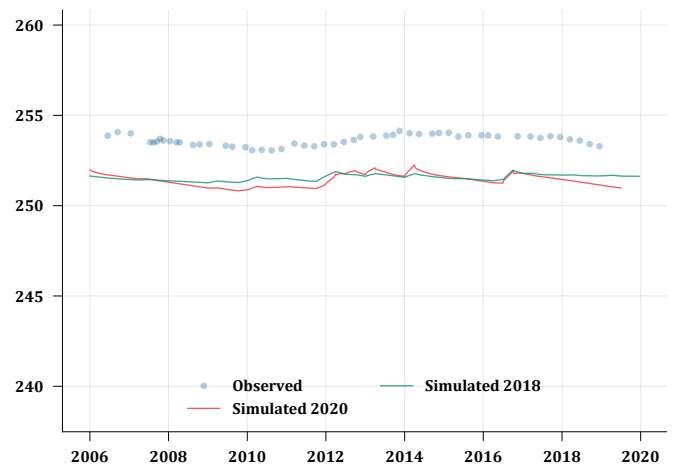
MW1



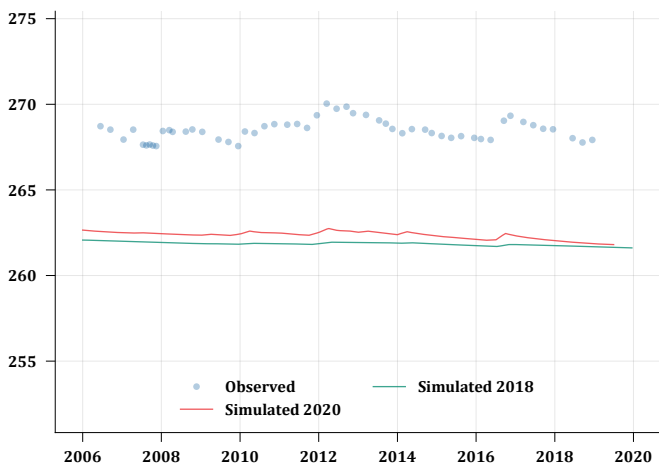
MW2



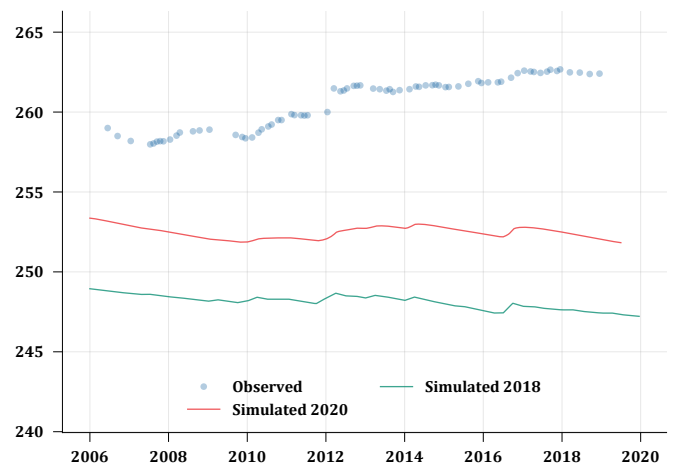
MW4



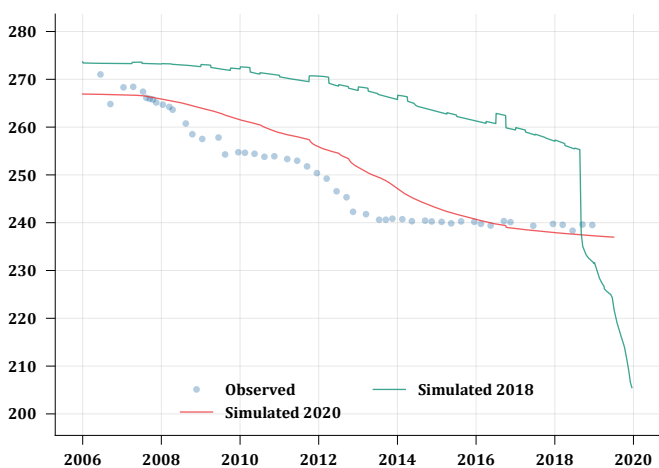
MW5



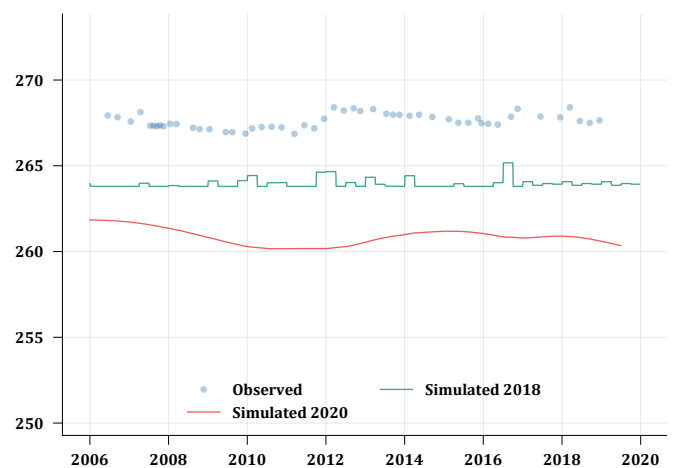
MW6



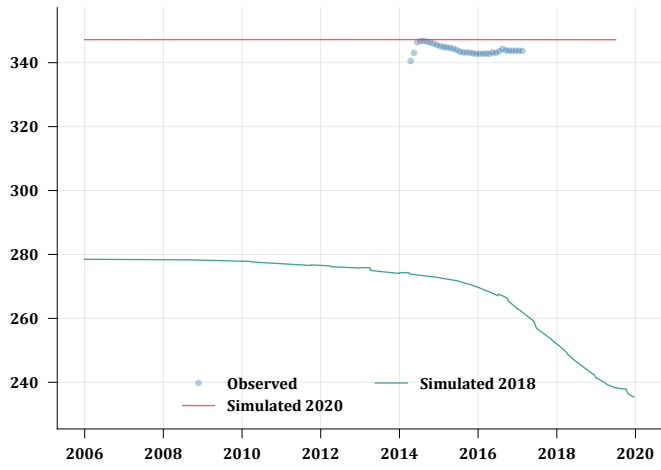
MW7



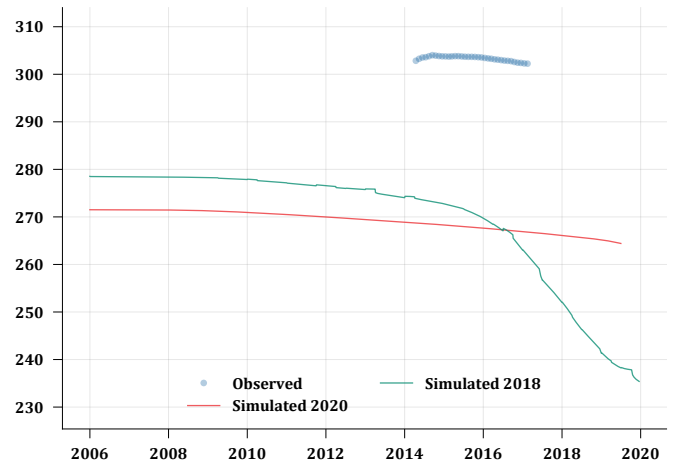
MW8



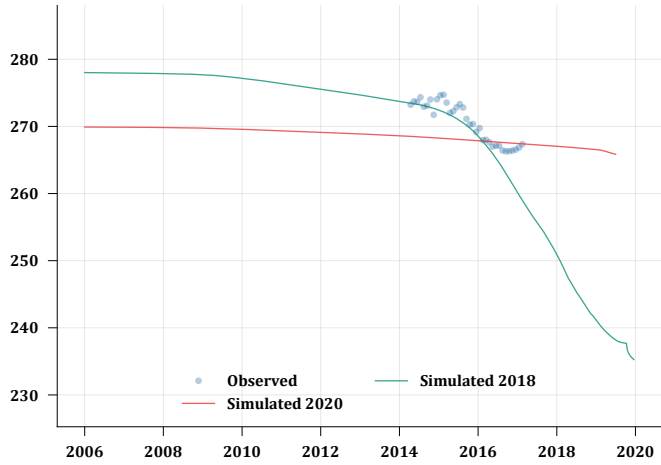
RB01_V1



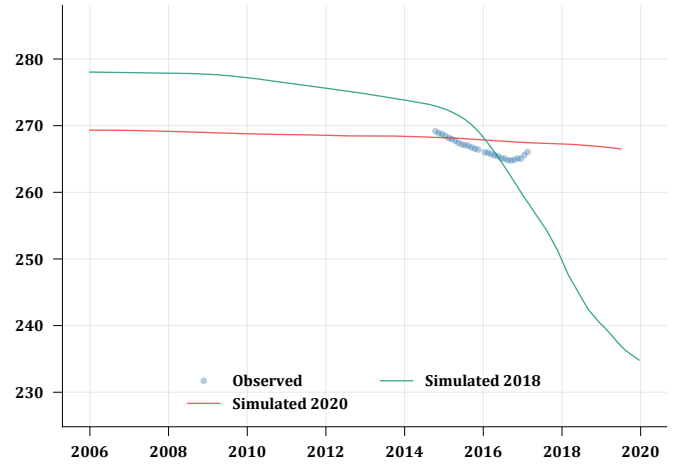
RB01_V2



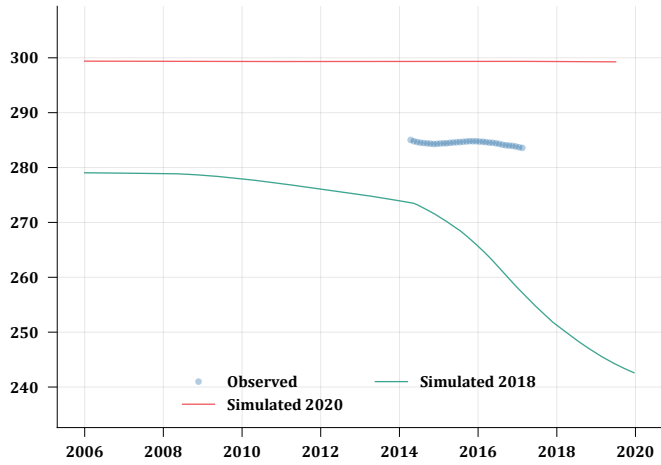
RB01_V3



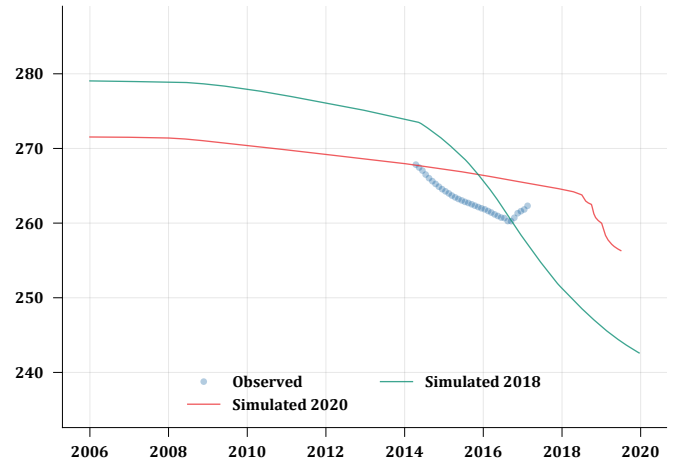
RB01A



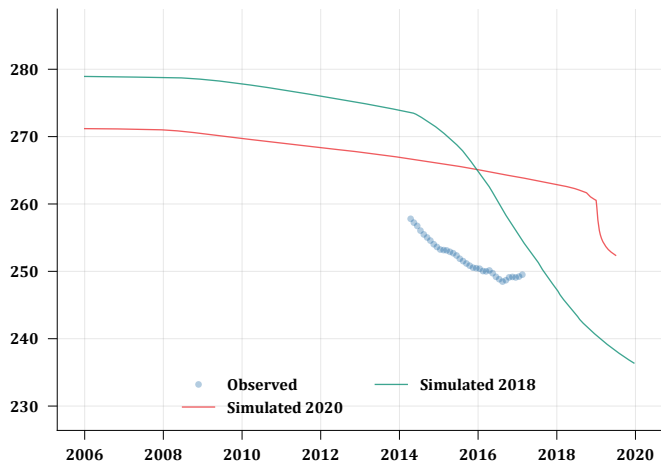
RB02_V1



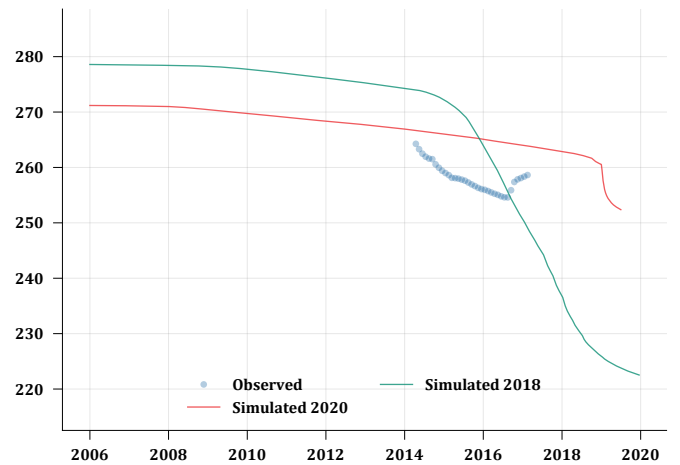
RB02_V2



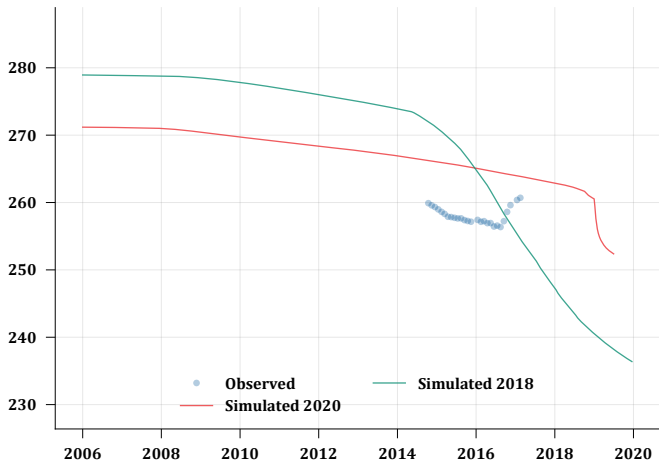
RB02_V3



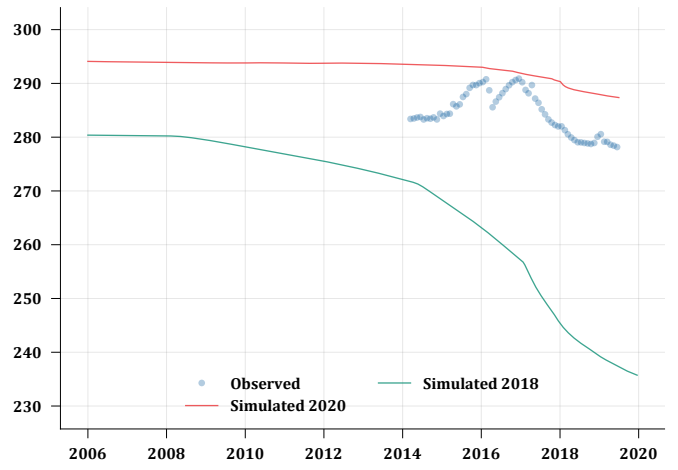
RB02_V4



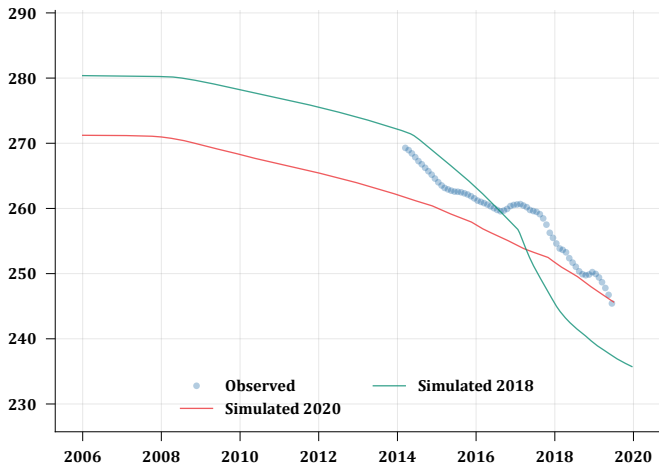
RB02A



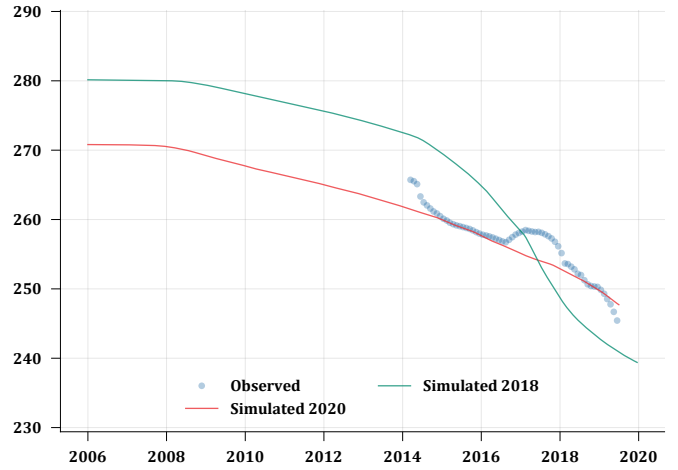
RB03_V1



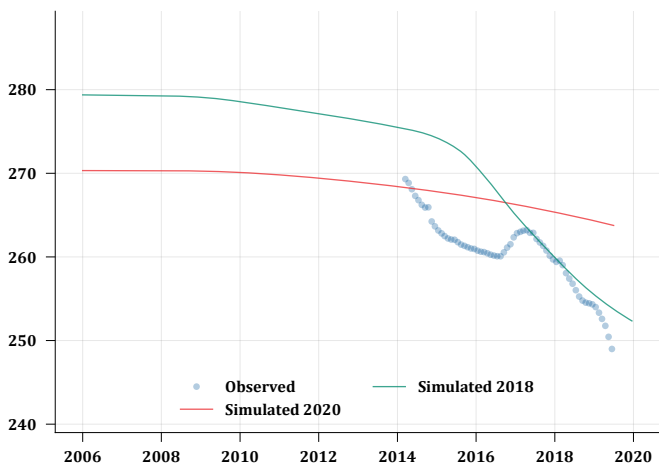
RB03_V2



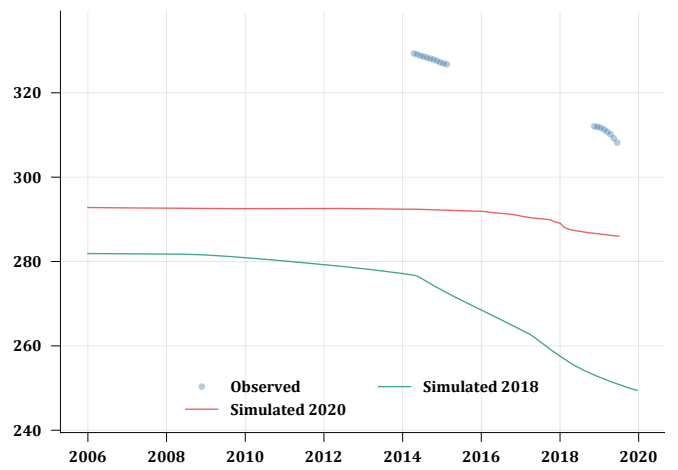
RB03_V3



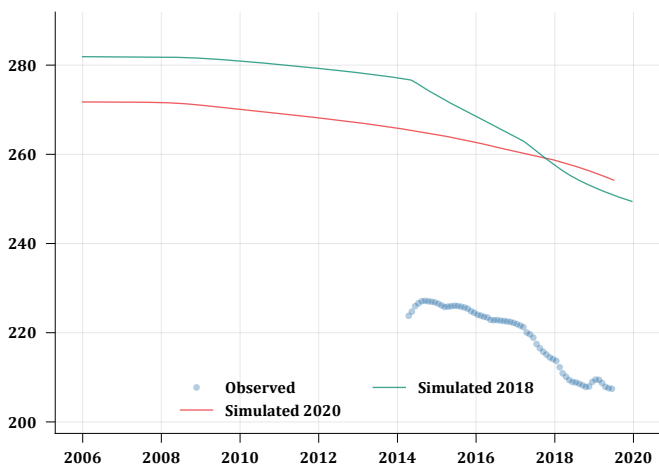
RB03_V4



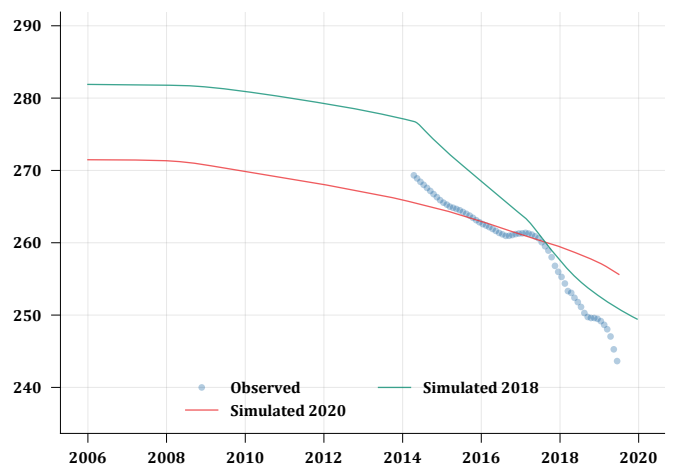
RB04_V1



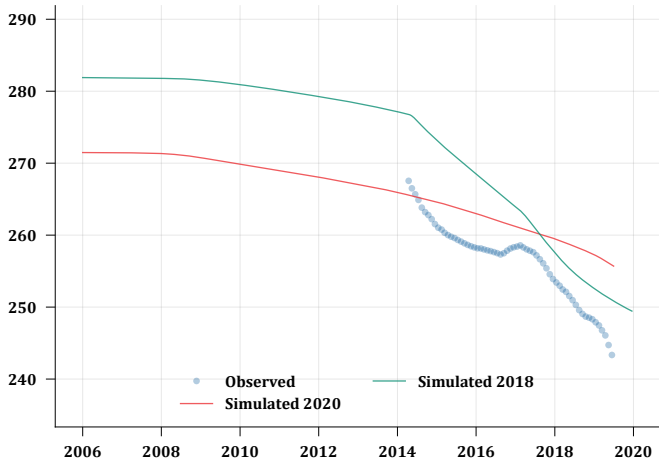
RB04_V2



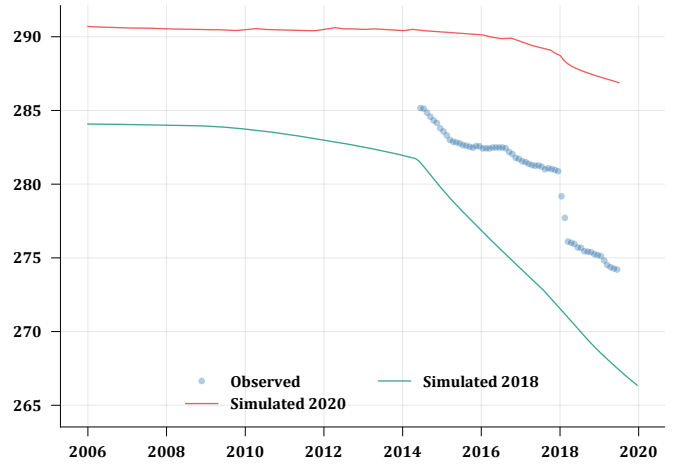
RB04_V3



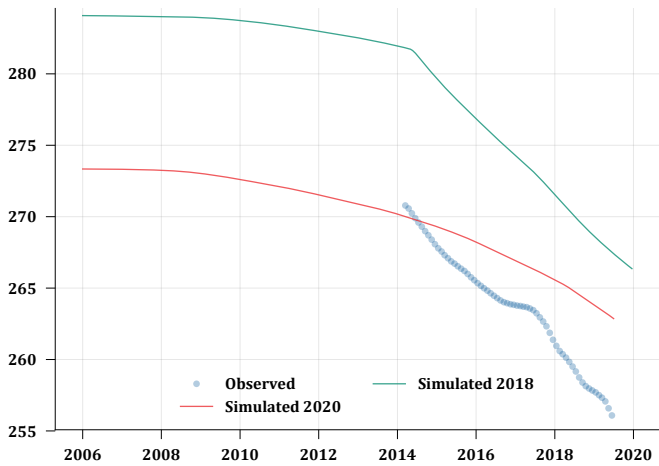
RB04_V4



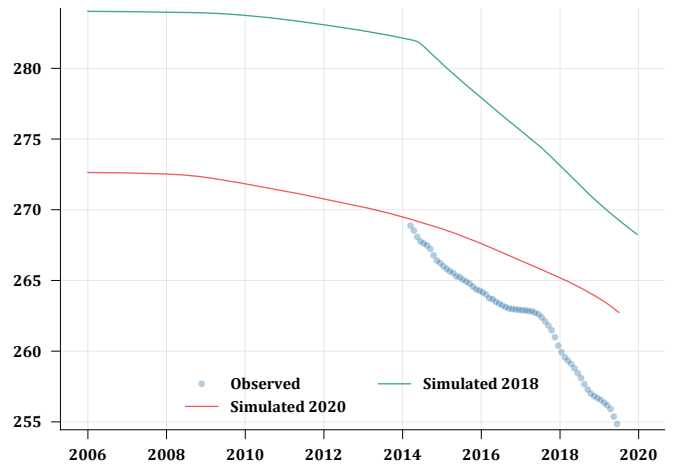
RB05_V1



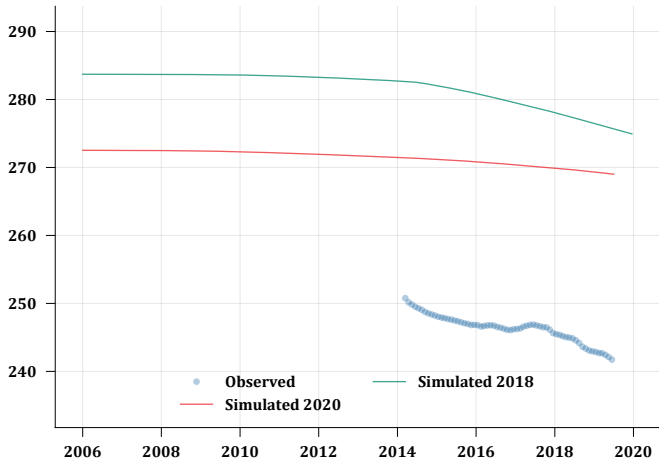
RB05_V2



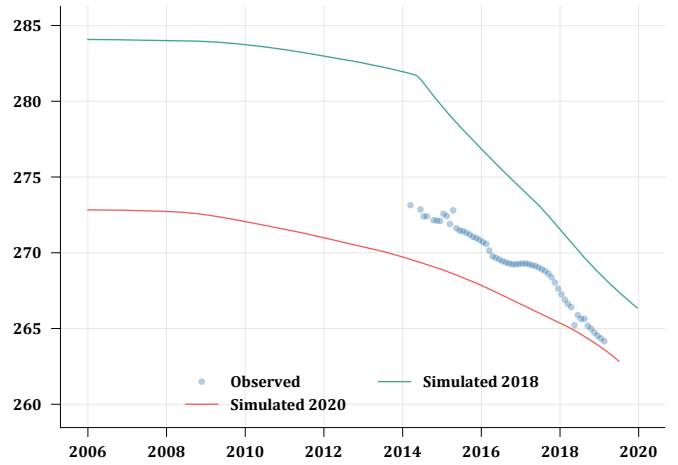
RB05_V3



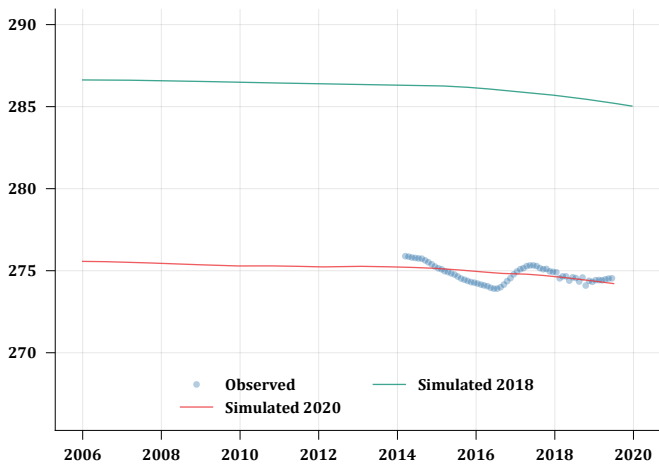
RB05_V4



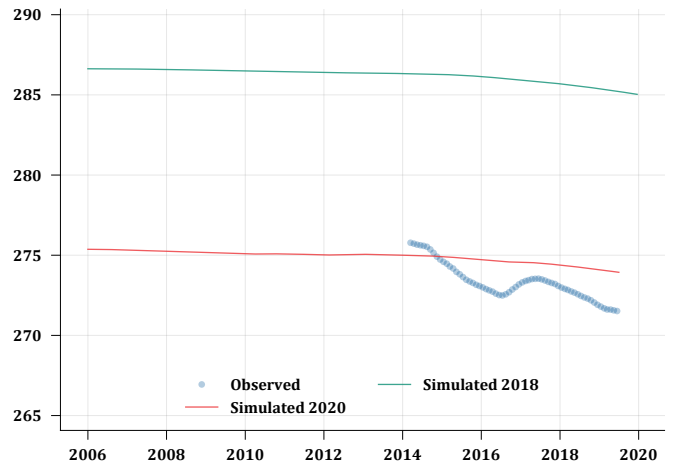
RB05A



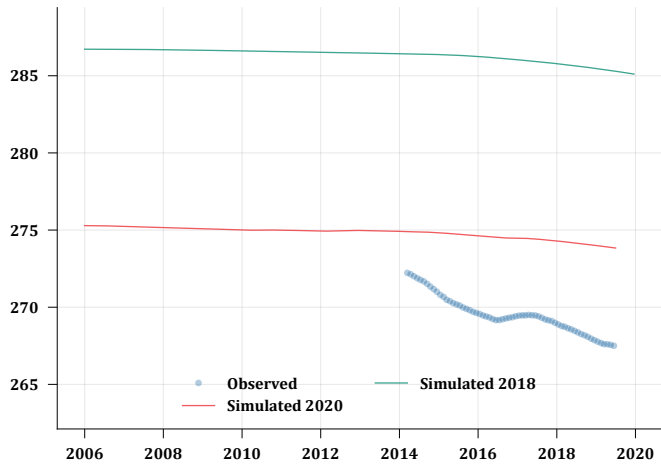
REG01_V1



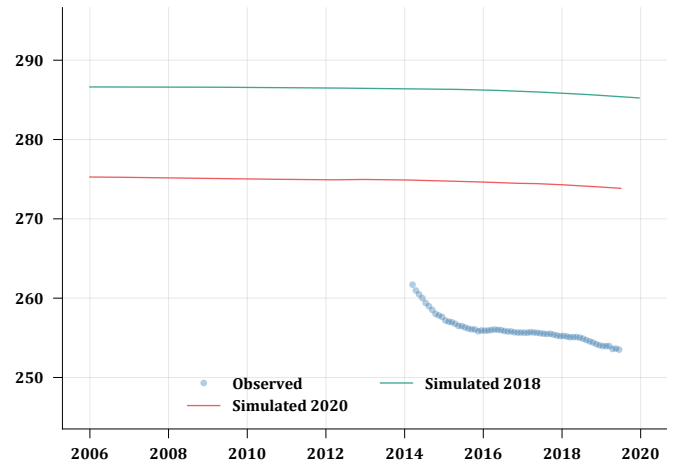
REG01_V2



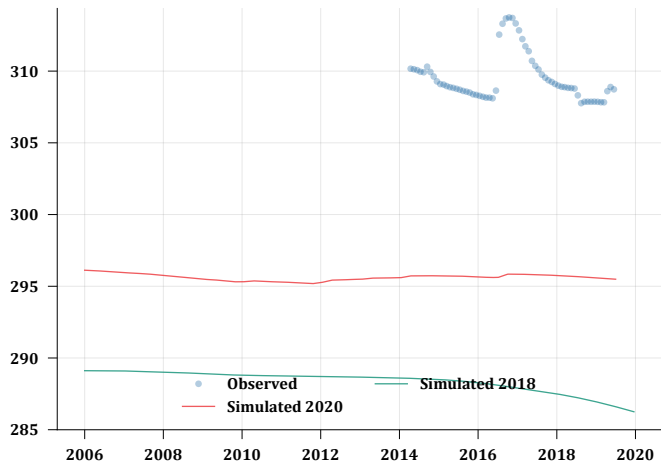
REG01_V3



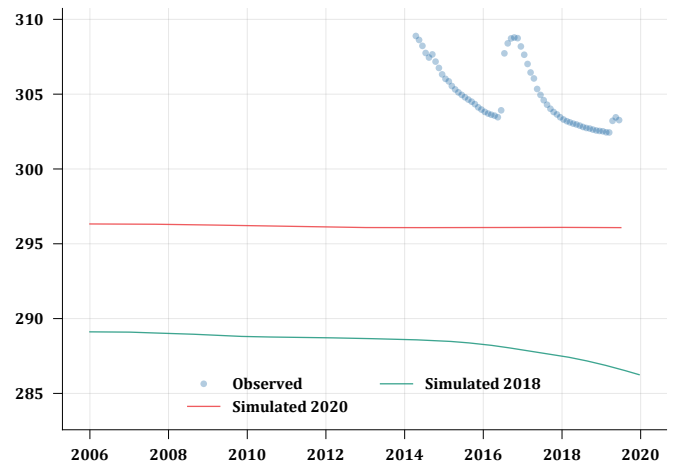
REG01_V4



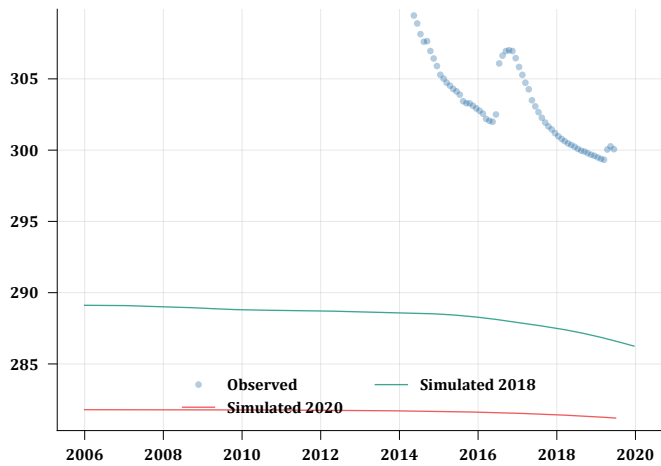
REG02_V1



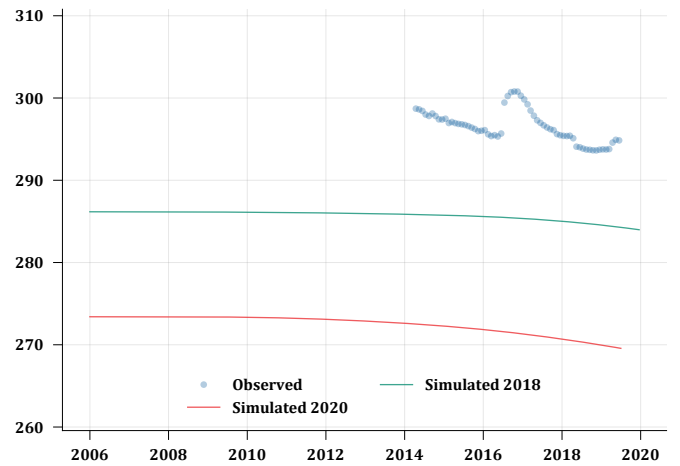
REG02_V2



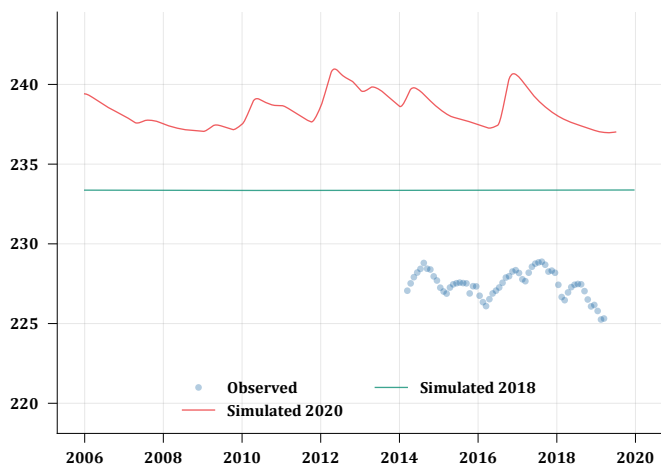
REG02_V3



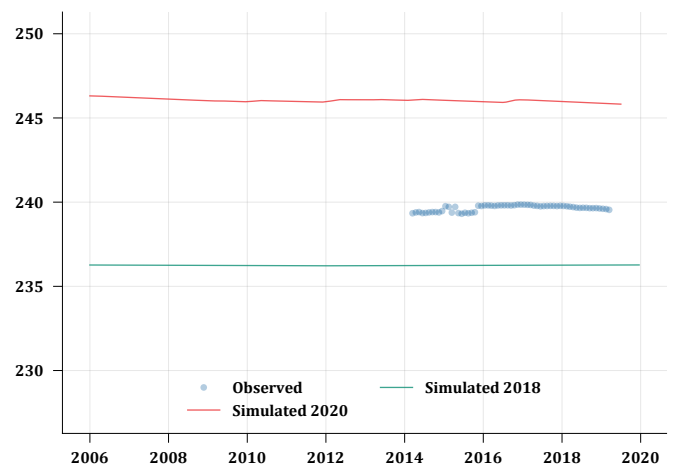
REG02_V4



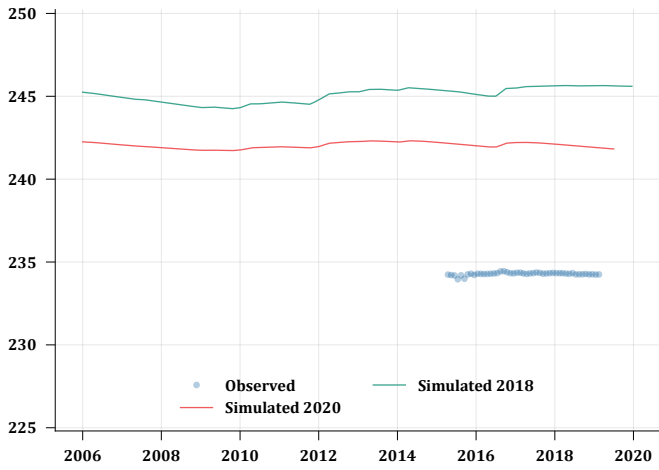
REG03



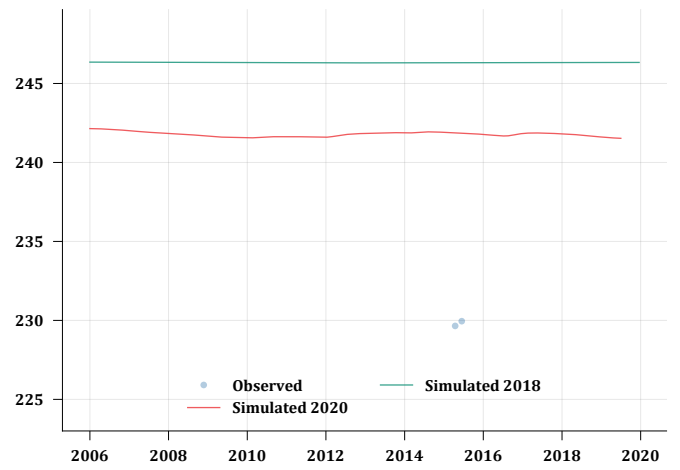
REG04



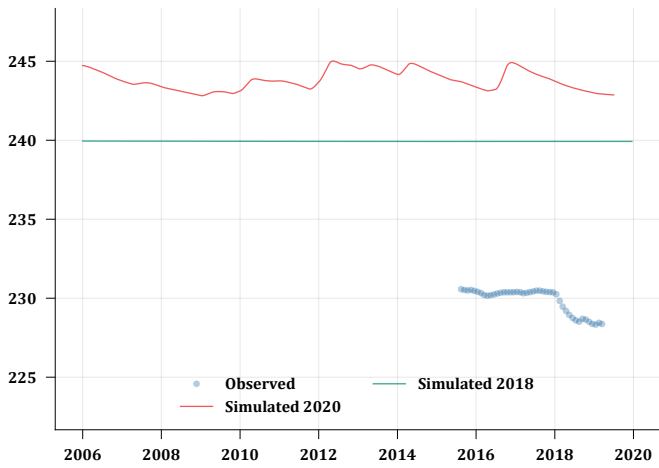
REG05A



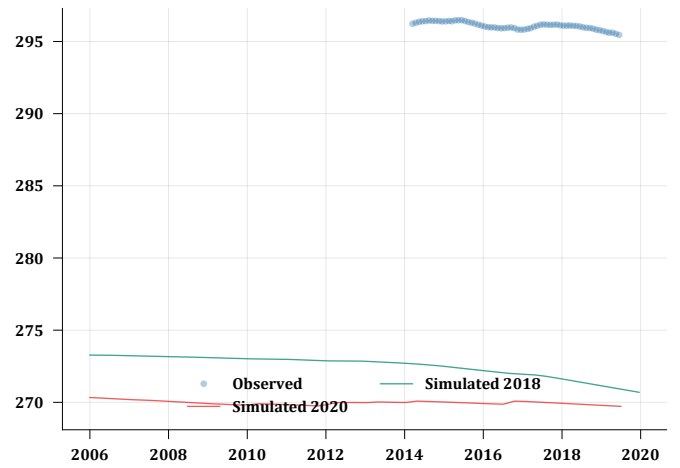
REG05B



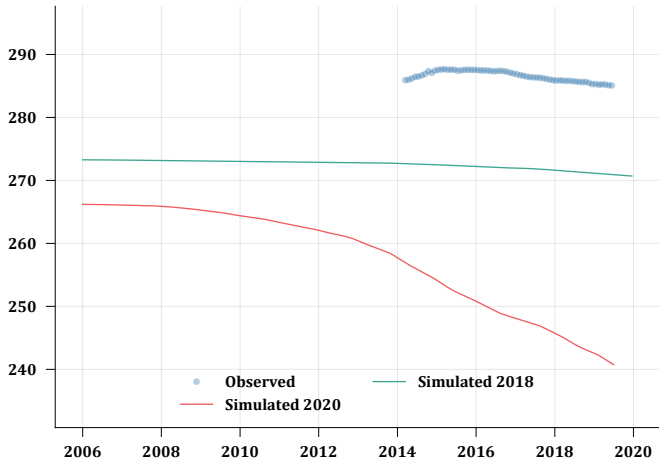
REG06



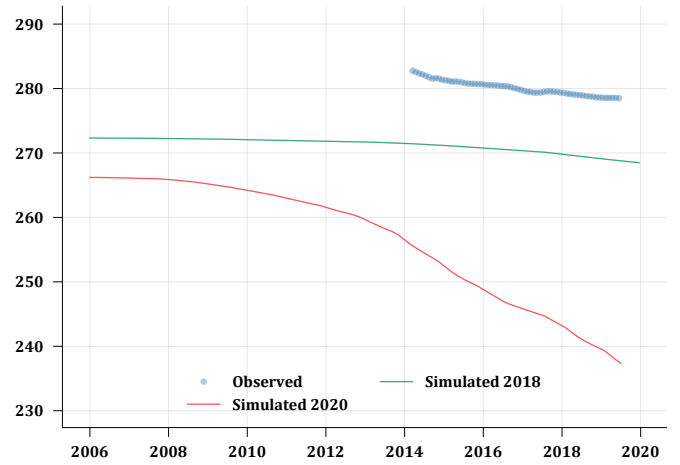
REG07_V1



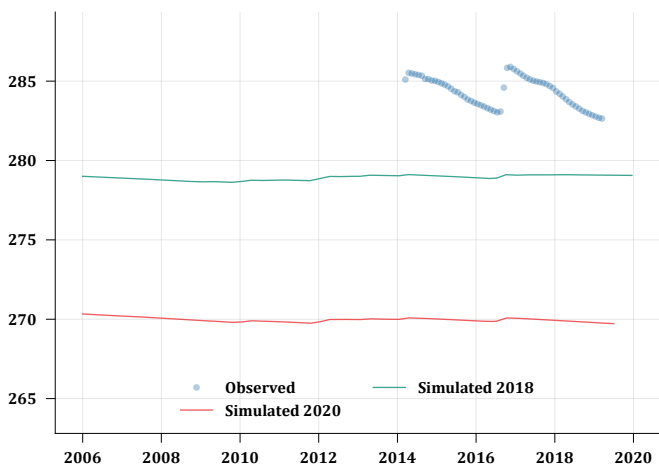
REG07_V2



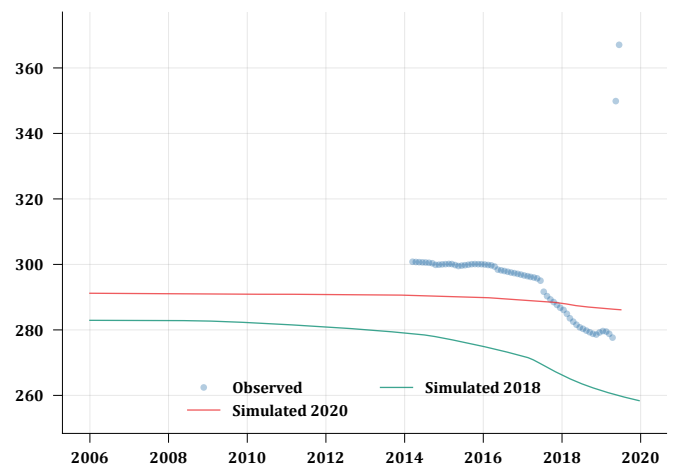
REG07_V3



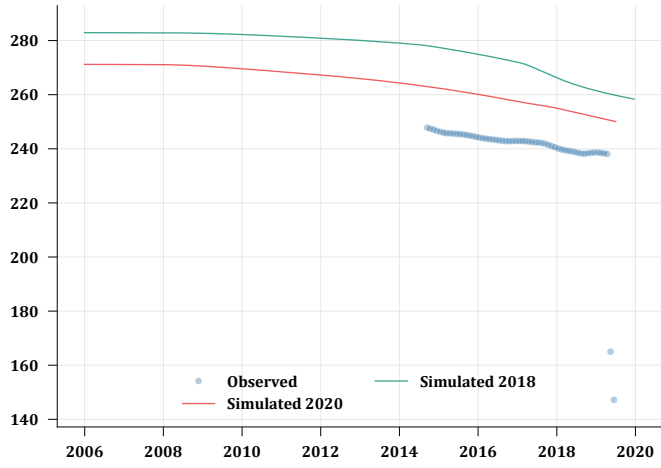
REG07A



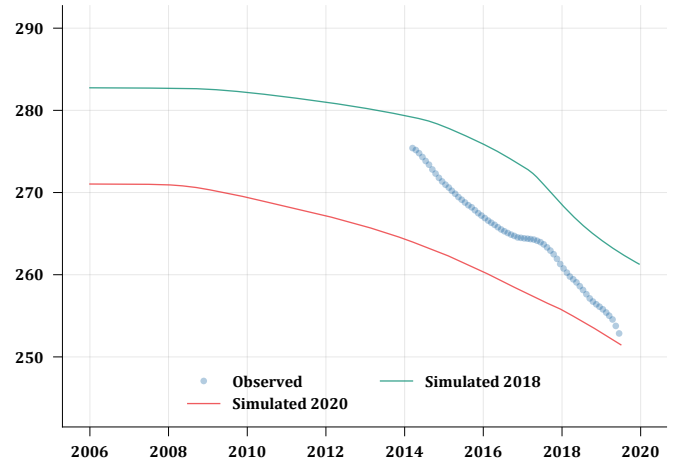
REG08_V1



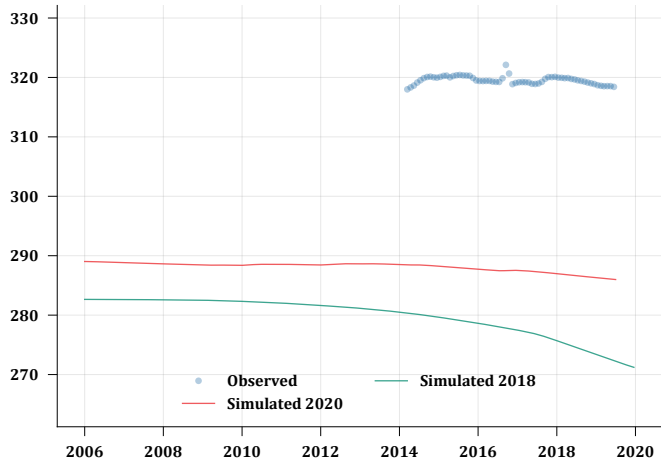
REG08_V2



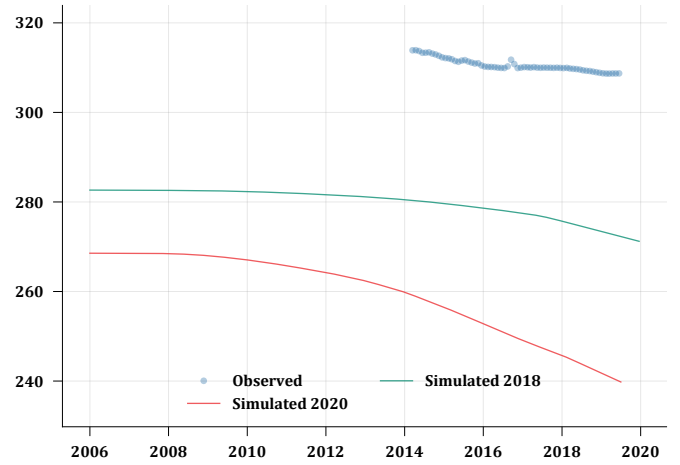
REG08_V3



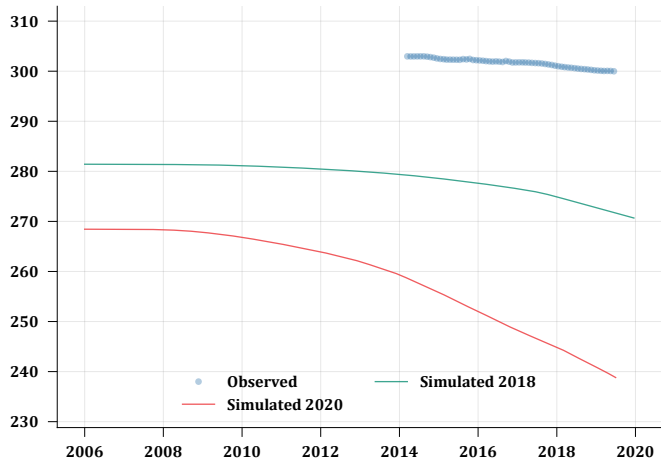
REG09_V1



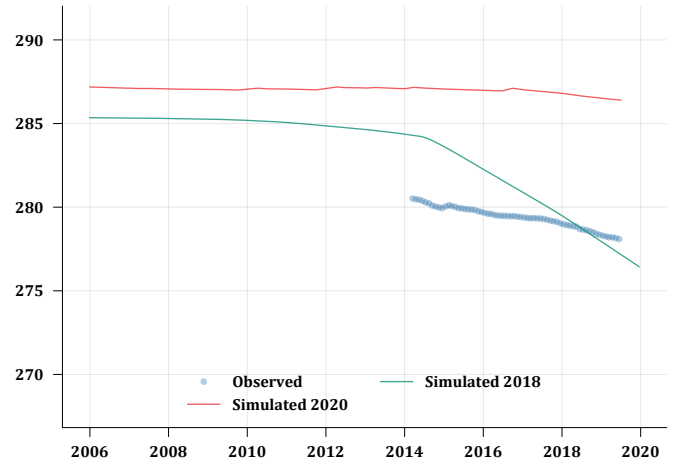
REG09_V2



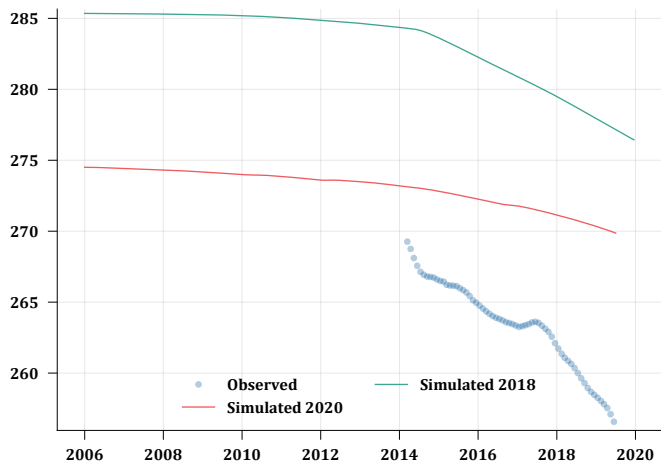
REG09_V3



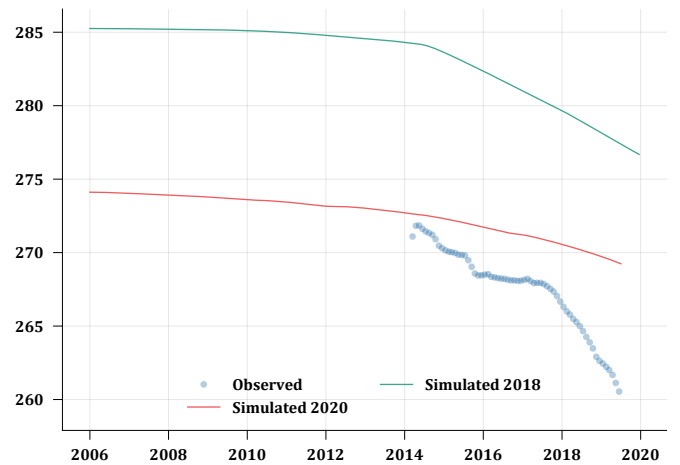
REG10_V1



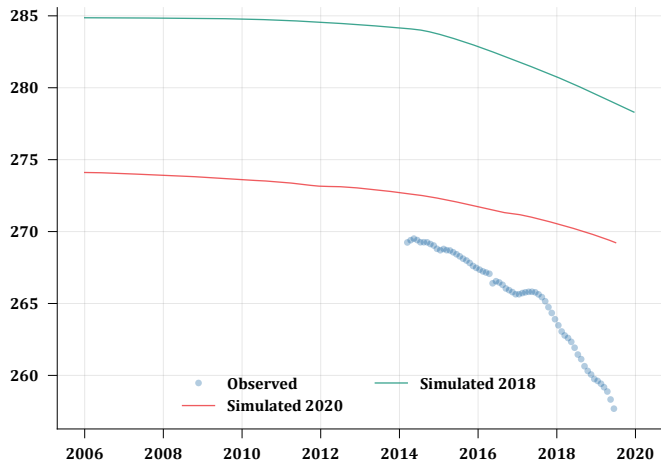
REG10_V2



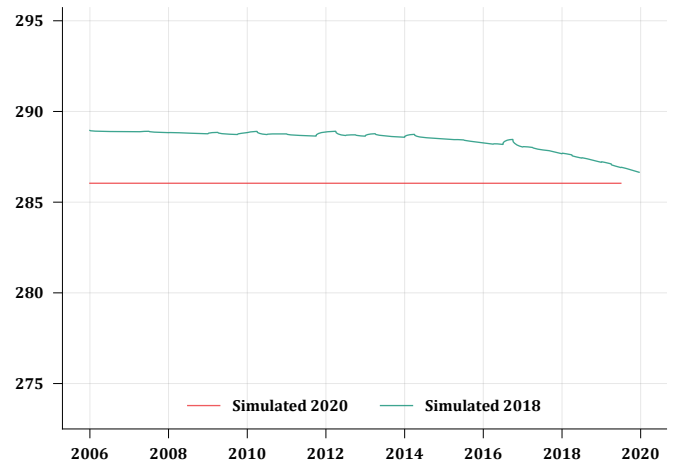
REG10_V3



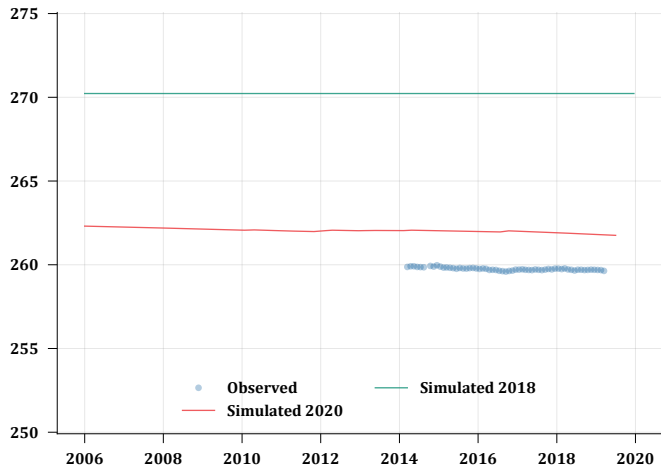
REG10_V4



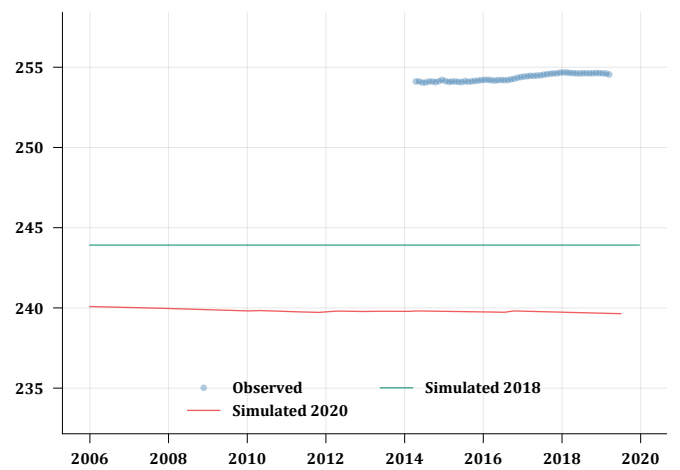
REG10A



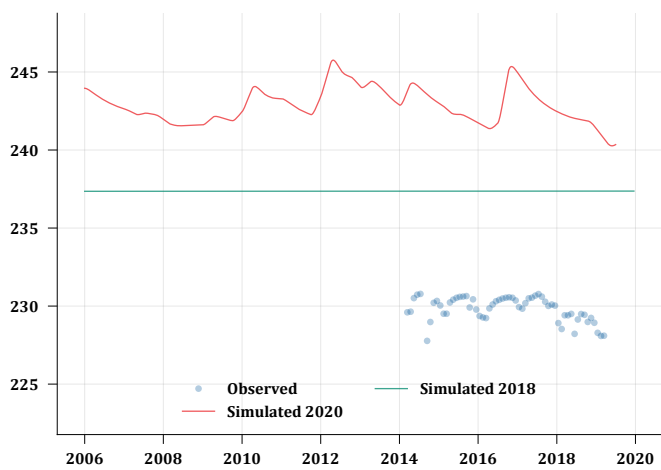
REG12



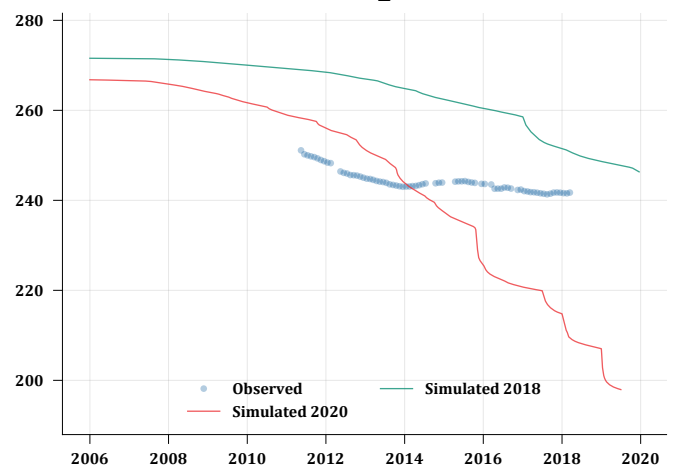
REG13



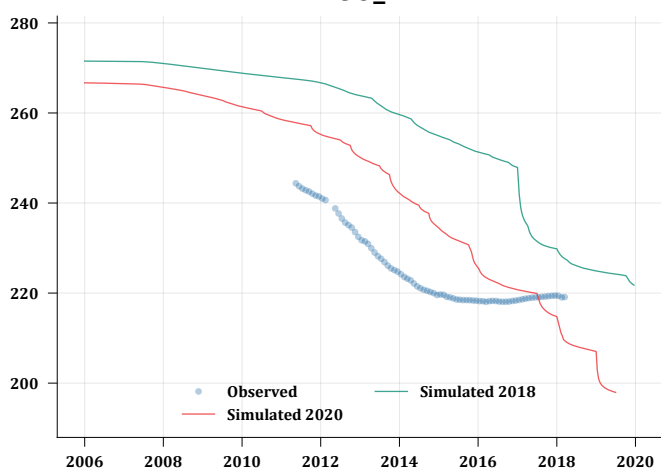
REG14



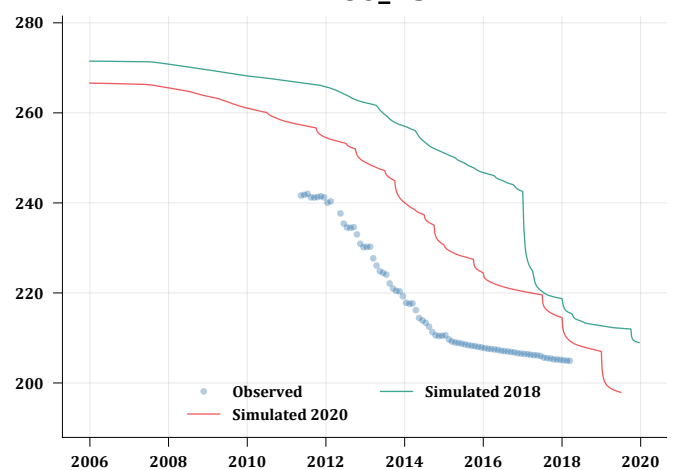
TA60_V1

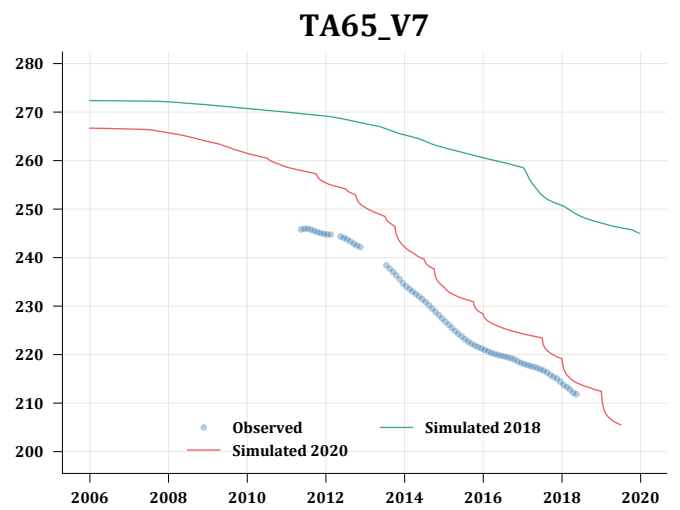
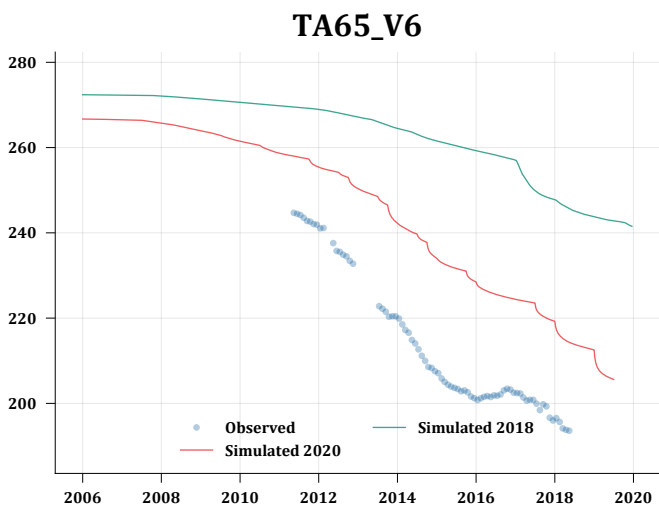
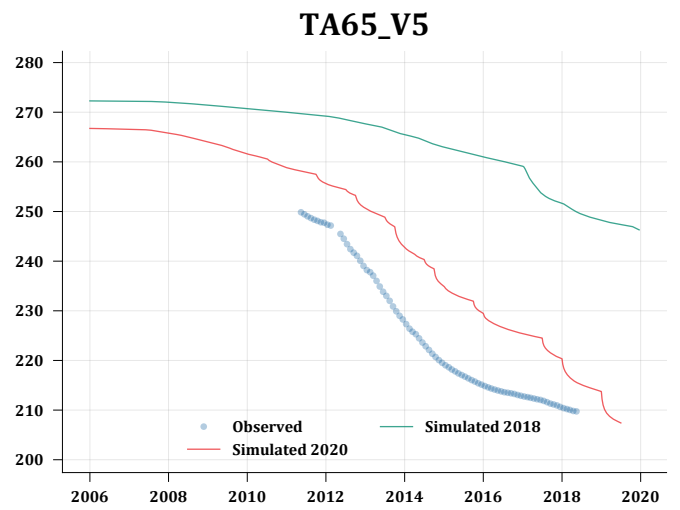
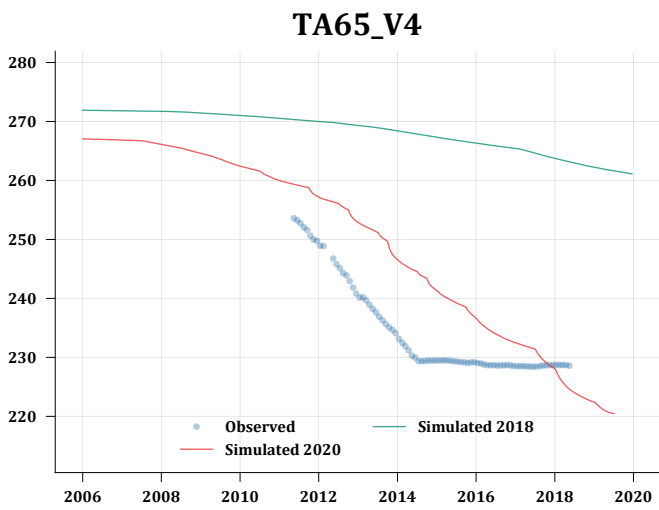
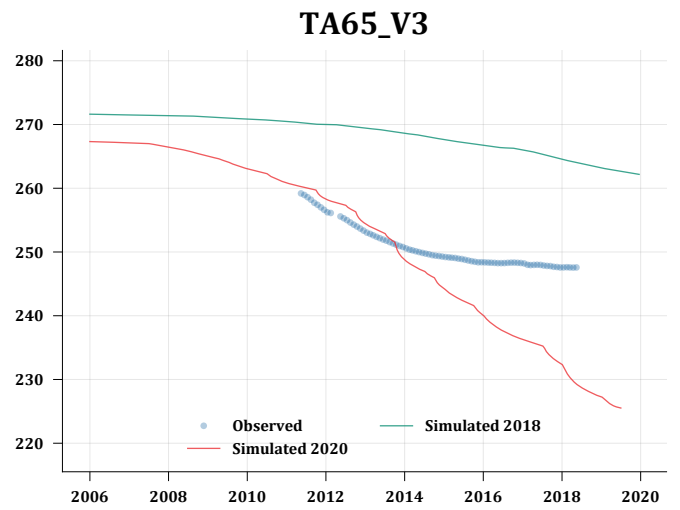
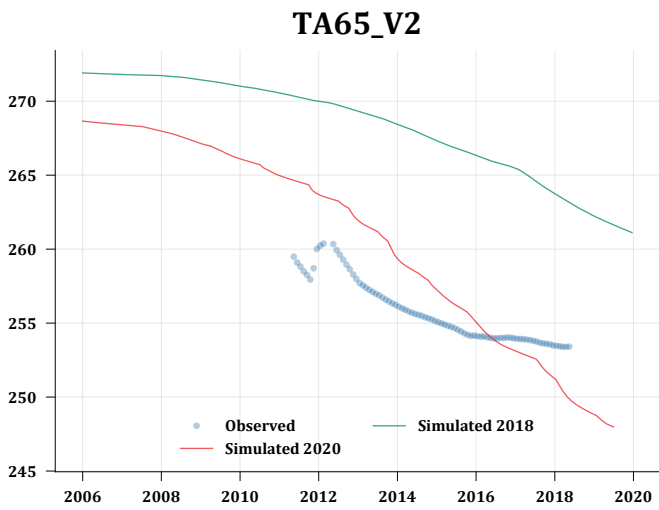
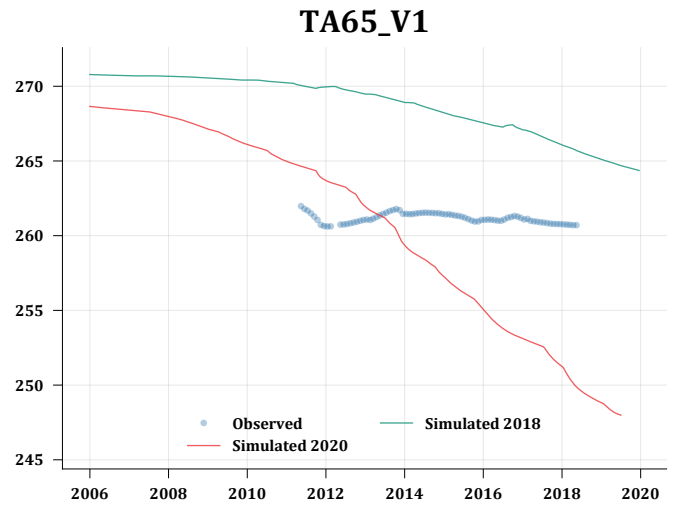
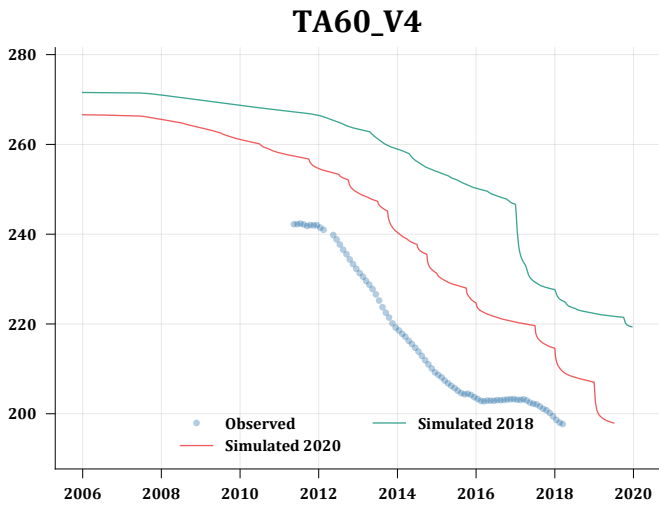


TA60_V2

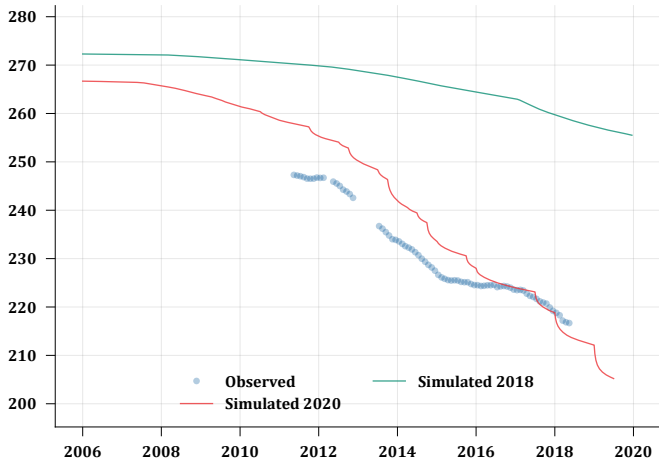


TA60_V3

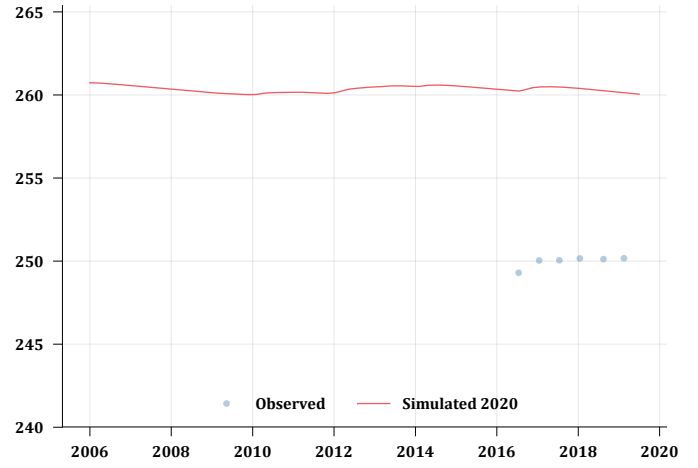




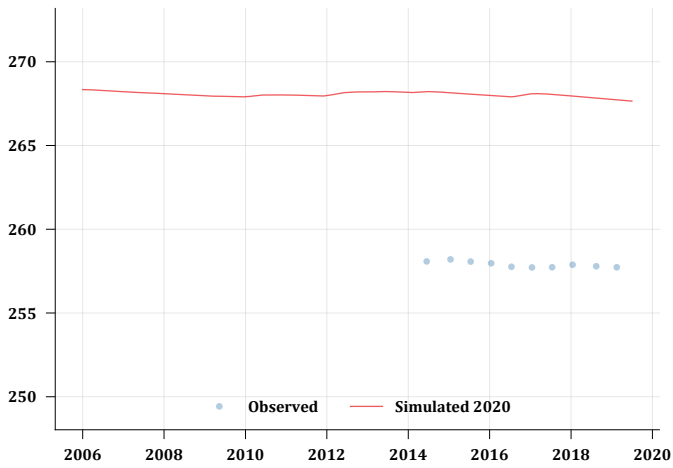
TA65_V8



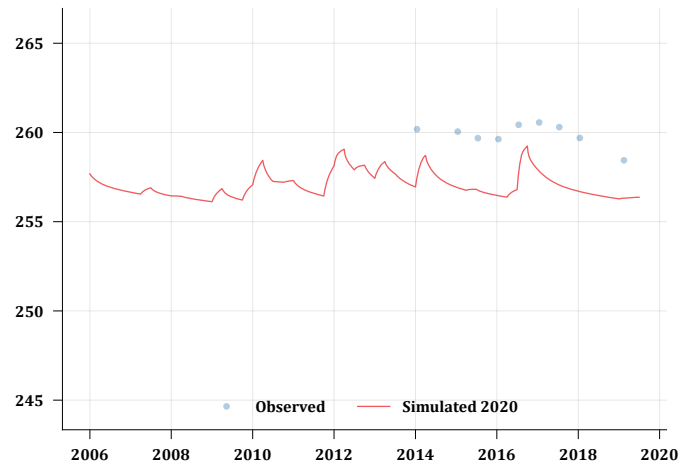
TESTON



TRALEE



WHAN



WOL1

