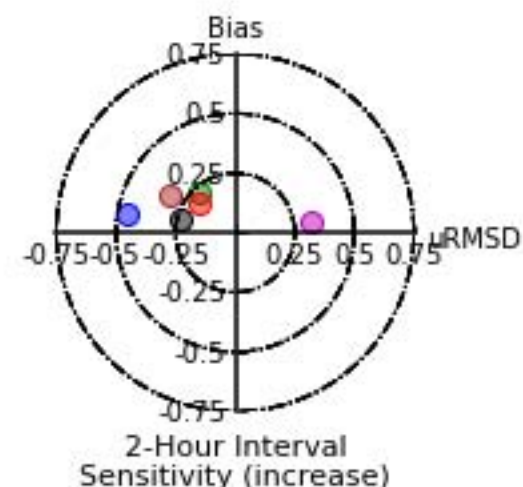
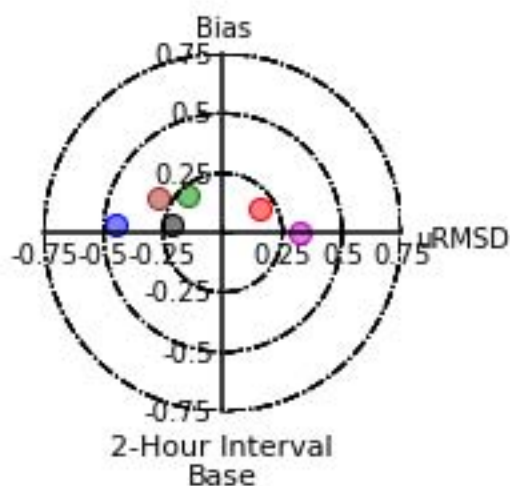
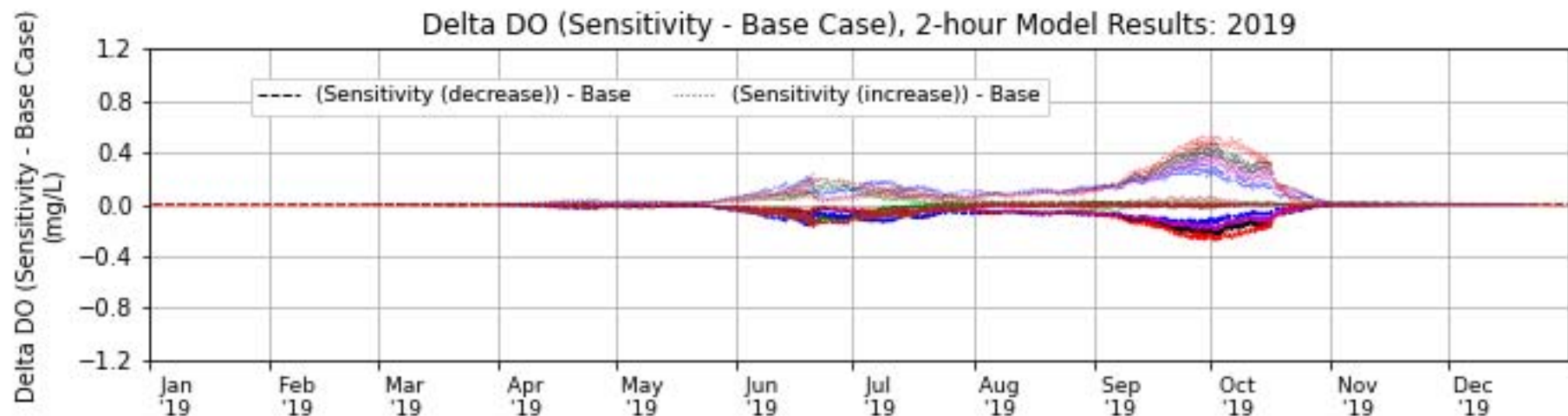


Appendix H: Sensitivity Analysis

This appendix is in connection with Section 4.6 in the main report – Evaluation of Model Accuracy, Reliability, and Uncertainty. It contains the model-predicted dissolved oxygen concentration changes relative to the base case, when each of the 20 parameters listed in Table 4-8 is increased or decreased by 10%.



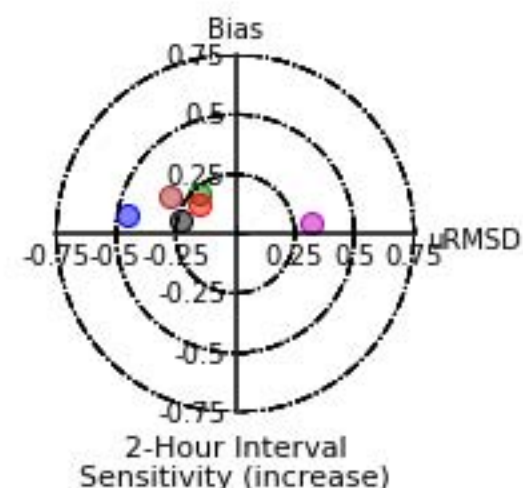
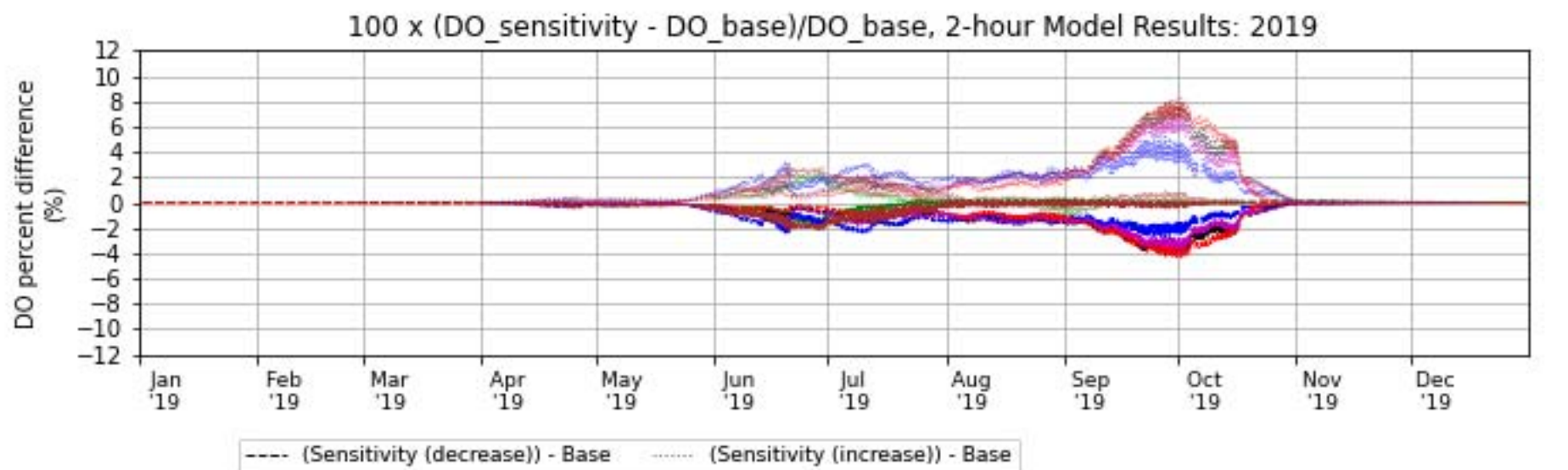
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Maximum Growth Rate Constant (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



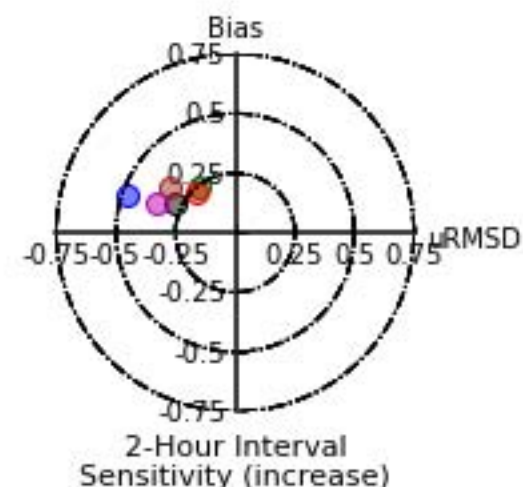
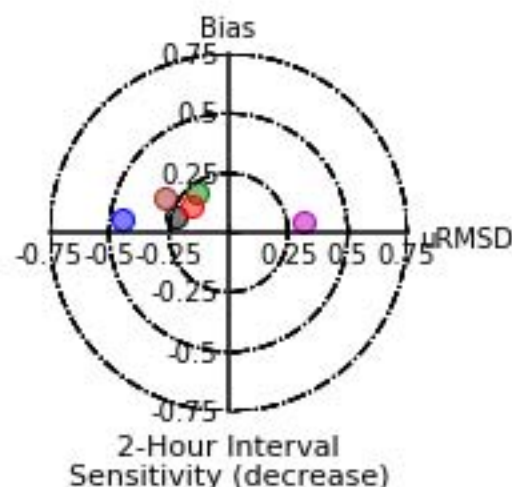
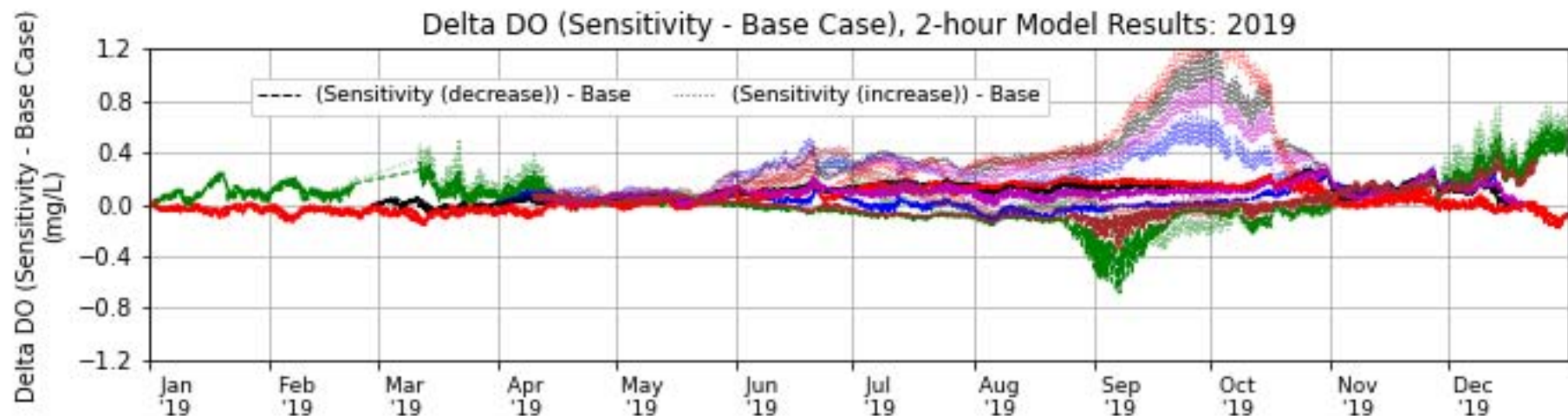
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Maximum Growth Rate Constant (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



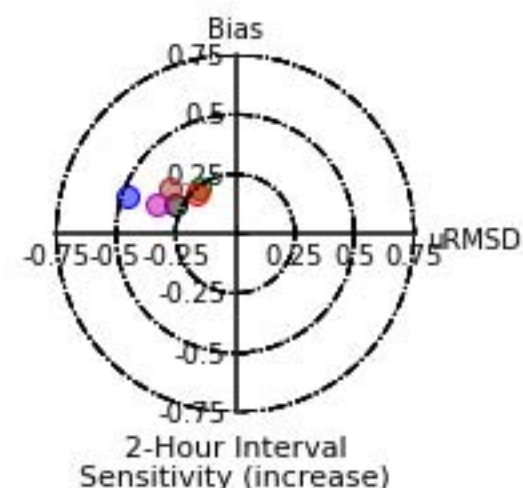
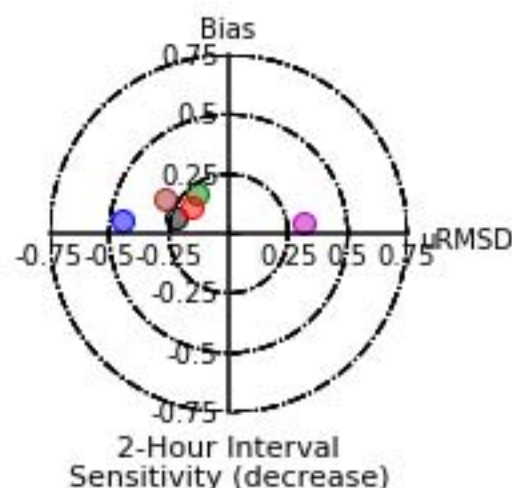
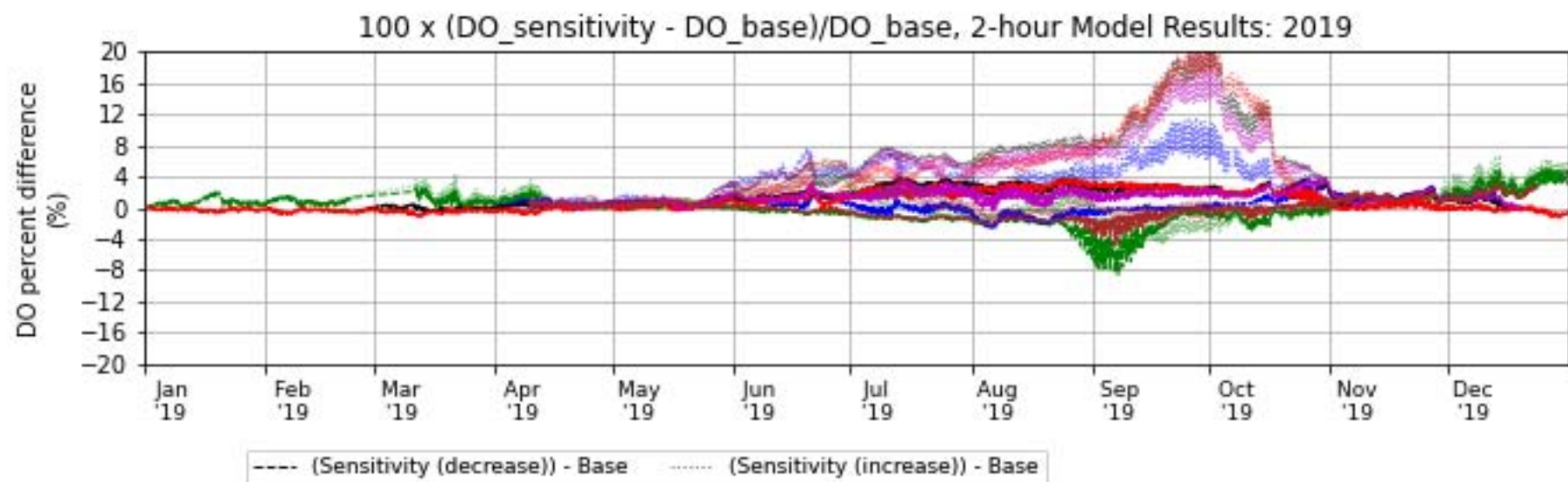
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Maximum Growth Rate Constant (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



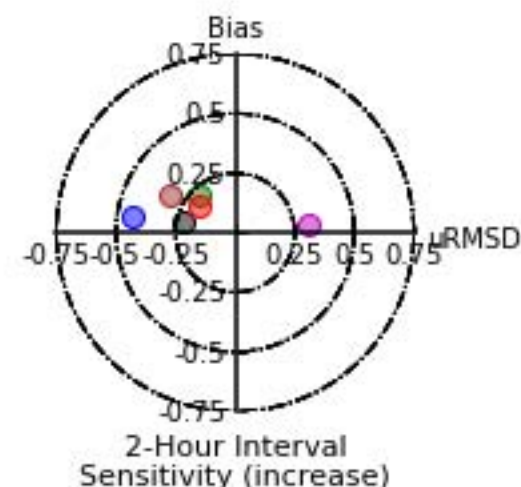
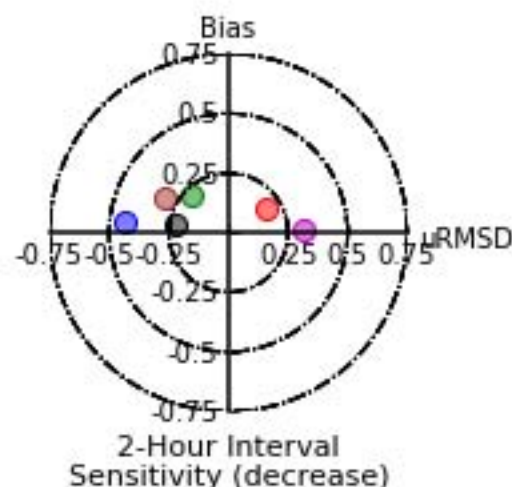
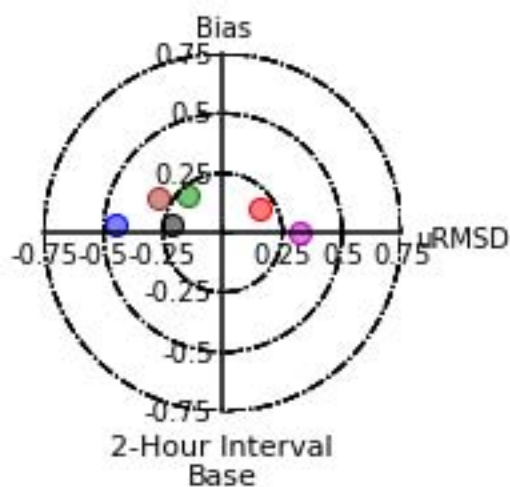
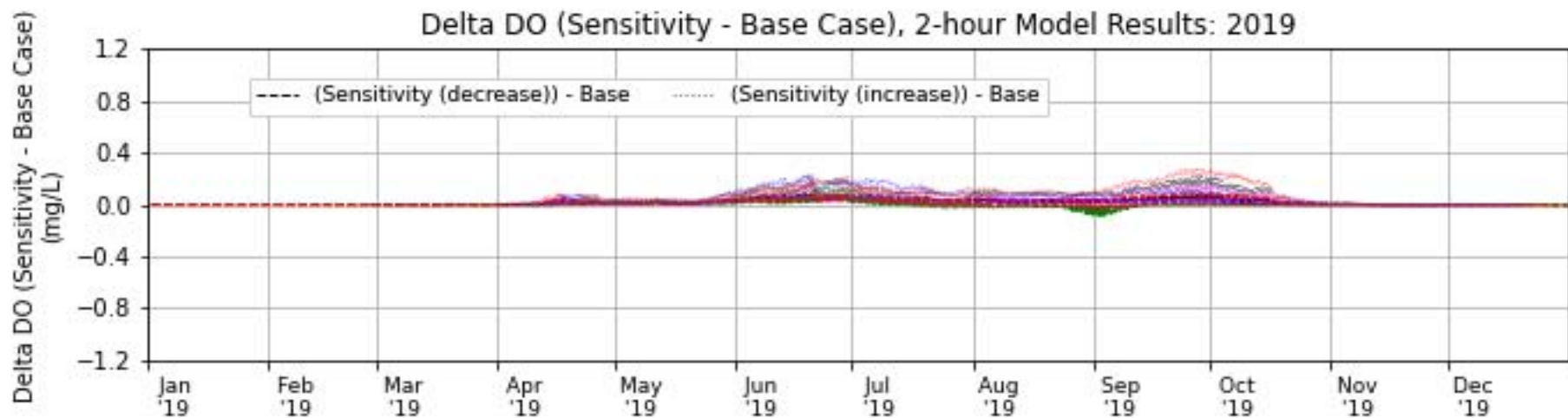
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Maximum Growth Rate Constant (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

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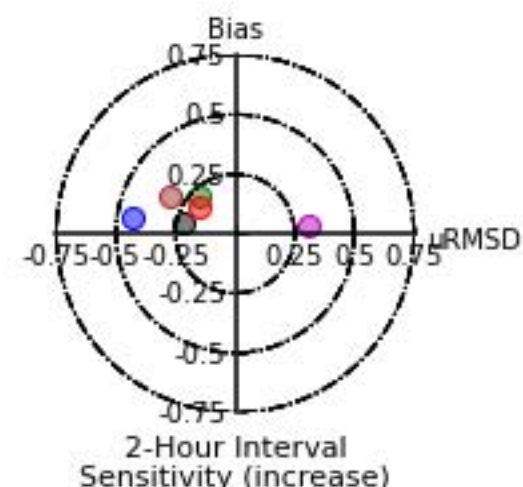
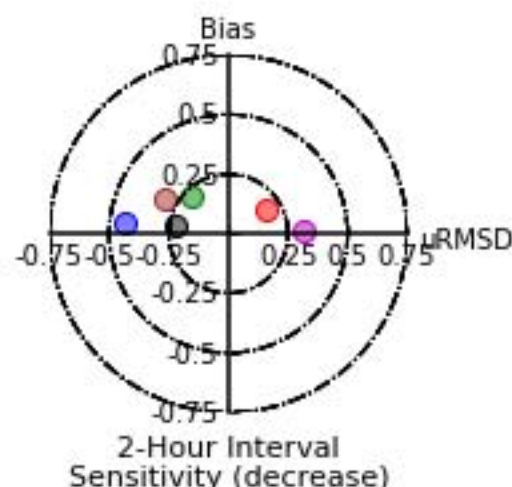
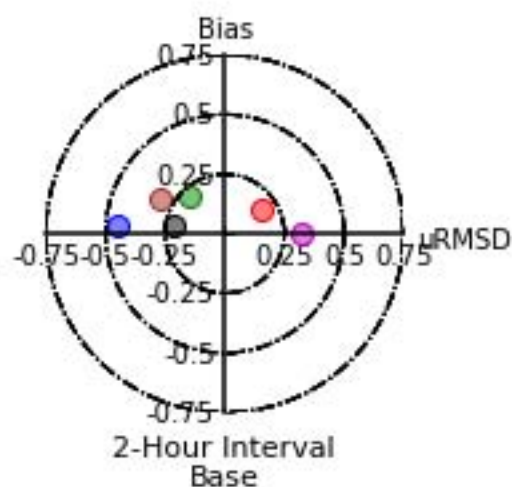
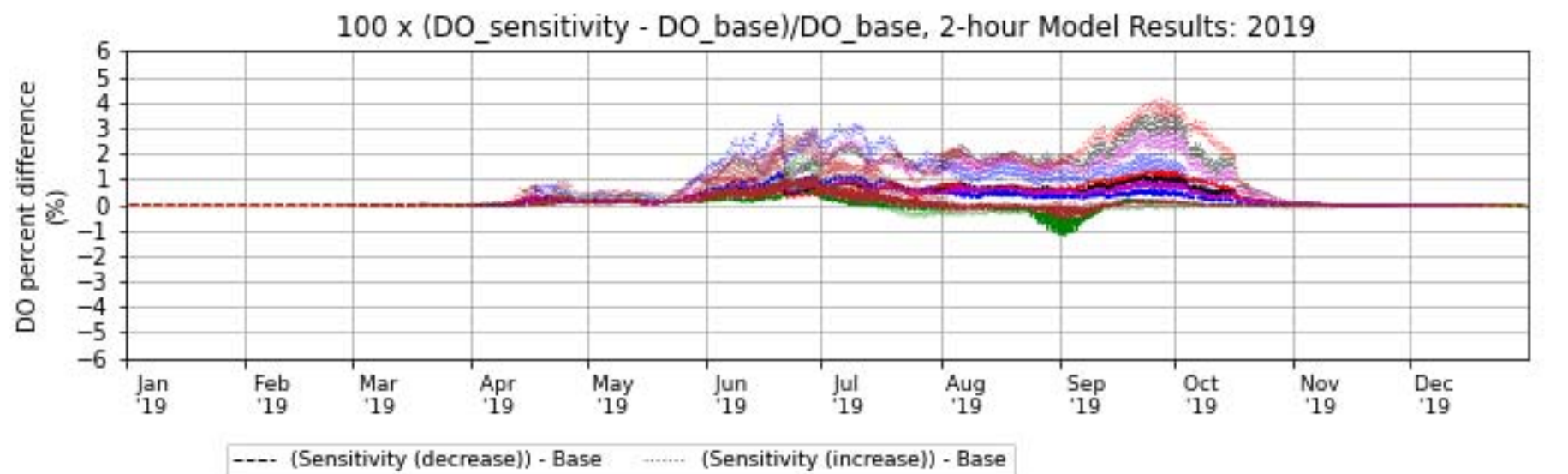
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island
 ● Chester
 ● Ben Franklin Bridge
 ● Pennypack Woods
 ● PWD Buoy B
 ● PWD Buoy P

Sensitivity Test: Phytoplankton Carbon to Chlorophyll Ratio

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



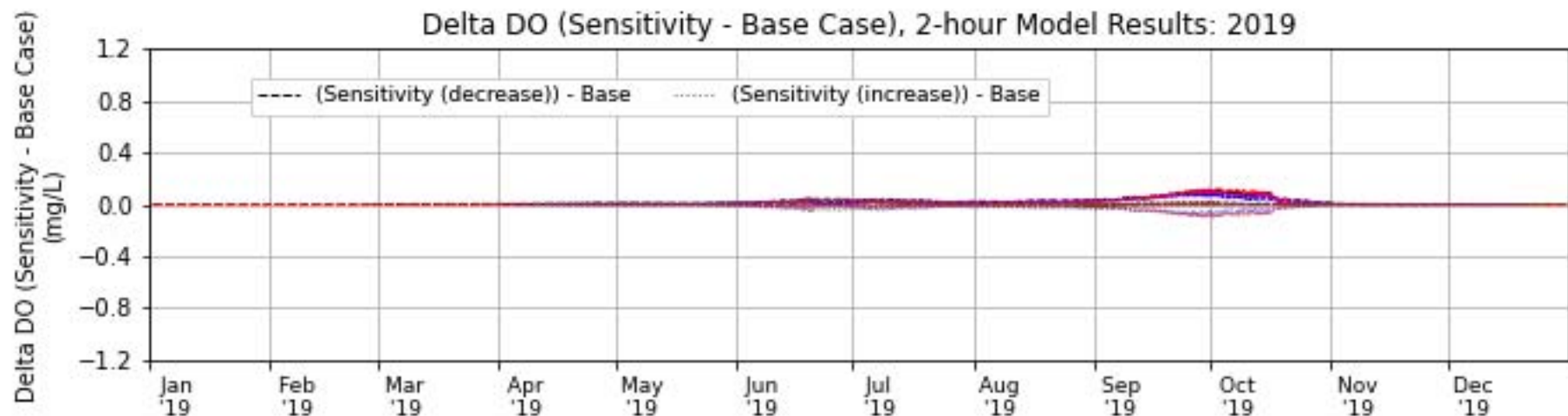
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Carbon to Chlorophyll Ratio

WASP 2-hour model results were used in this analysis.

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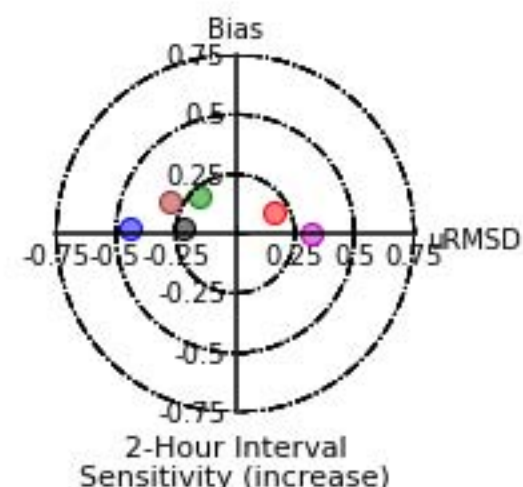
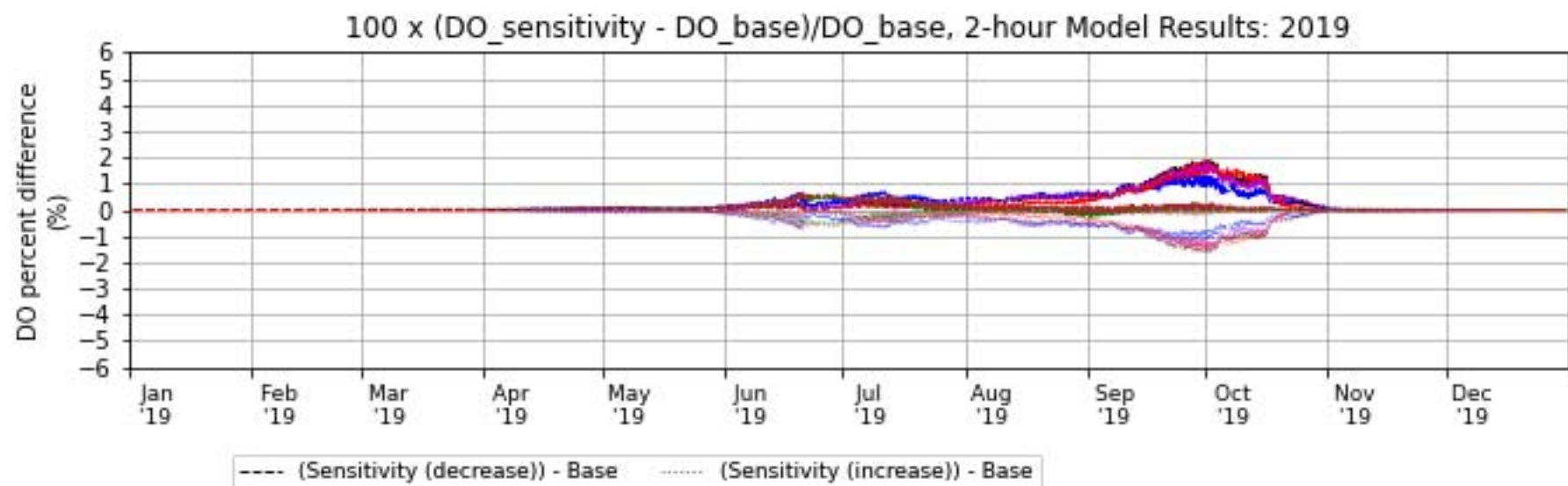
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Death Rate Constant (Non-Zoo Predation; Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



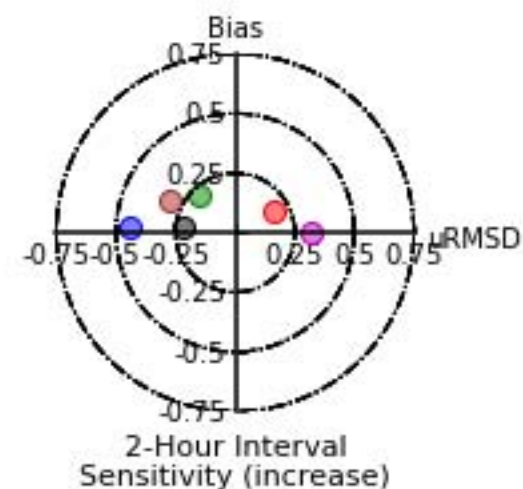
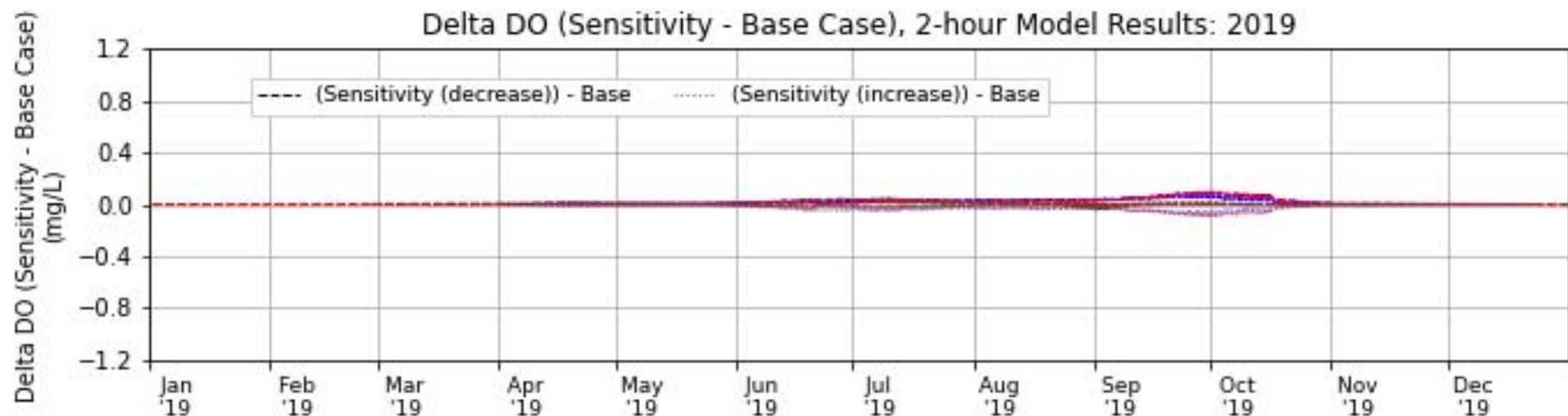
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Death Rate Constant (Non-Zoo Predation; Group 2)

WASP 2-hour model results were used in this analysis.

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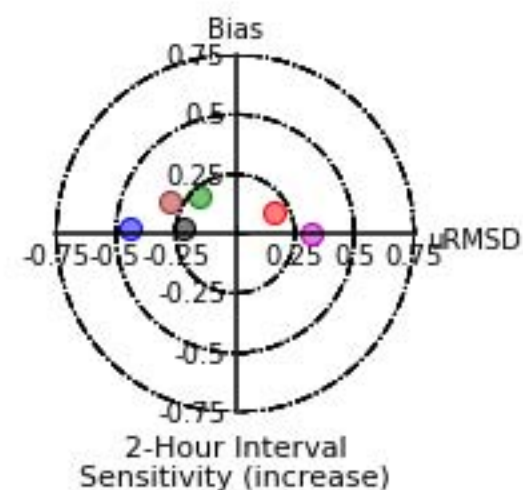
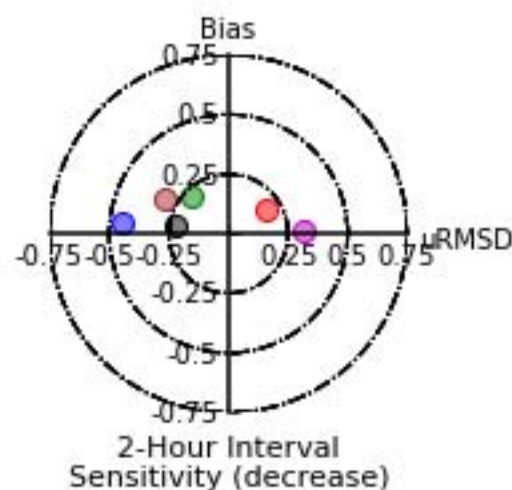
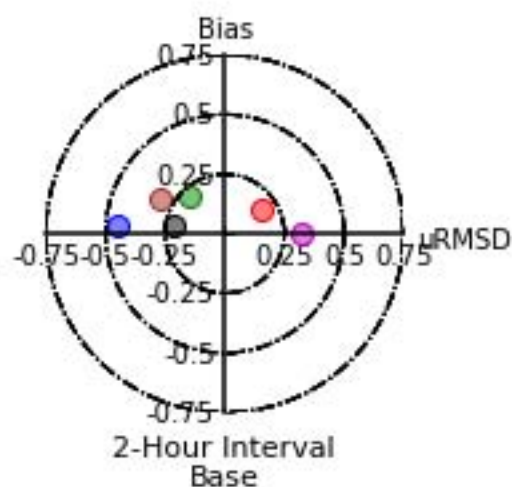
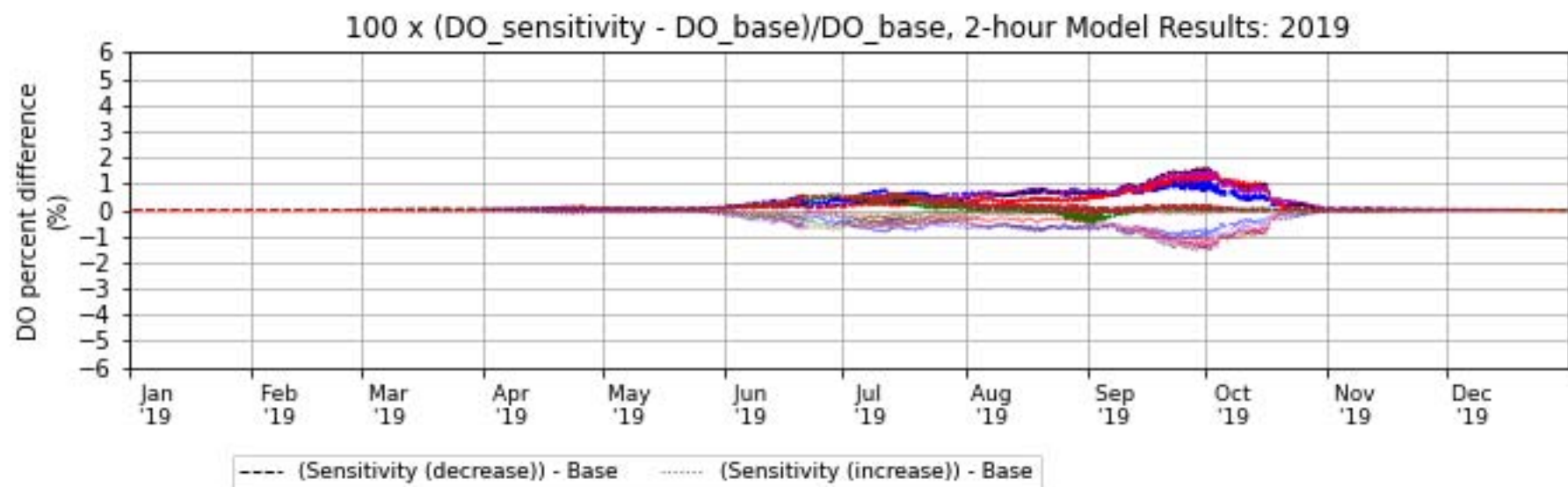
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Rate Constant (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



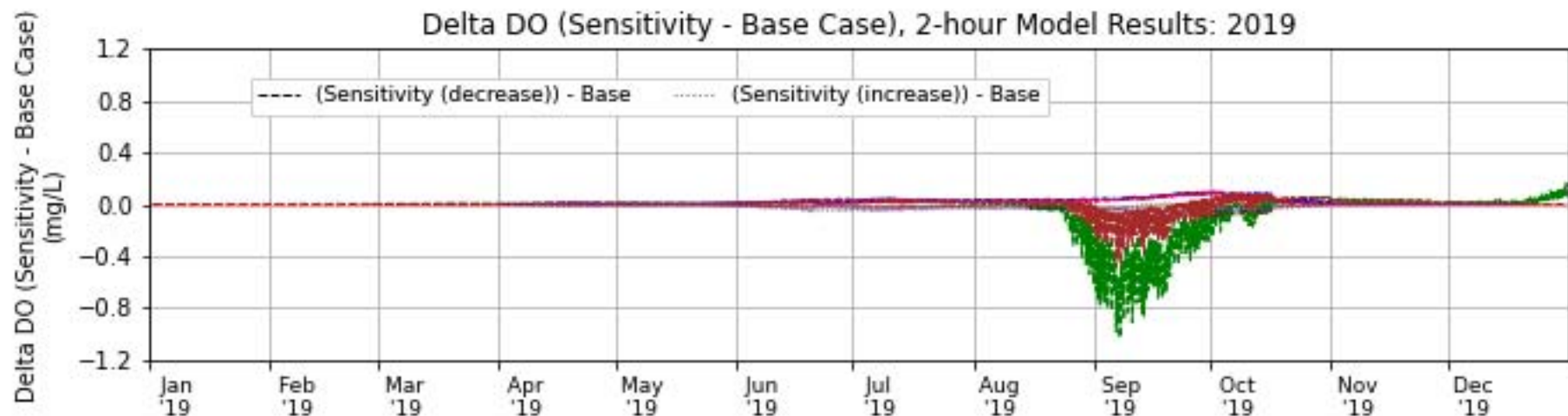
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Rate Constant (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



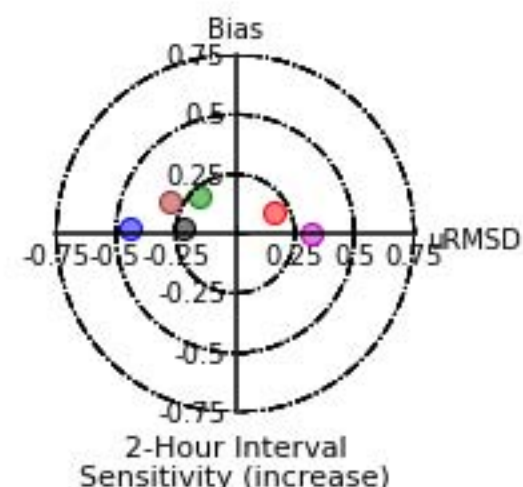
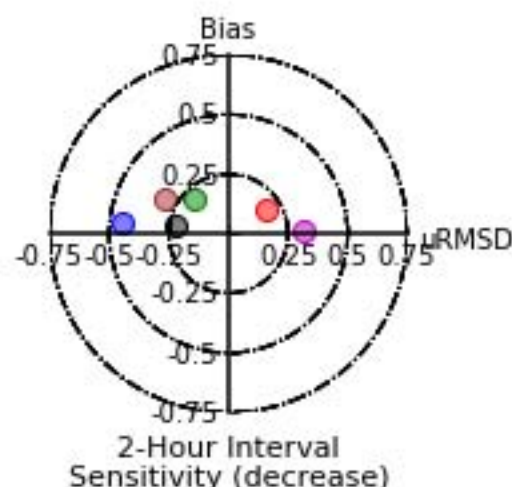
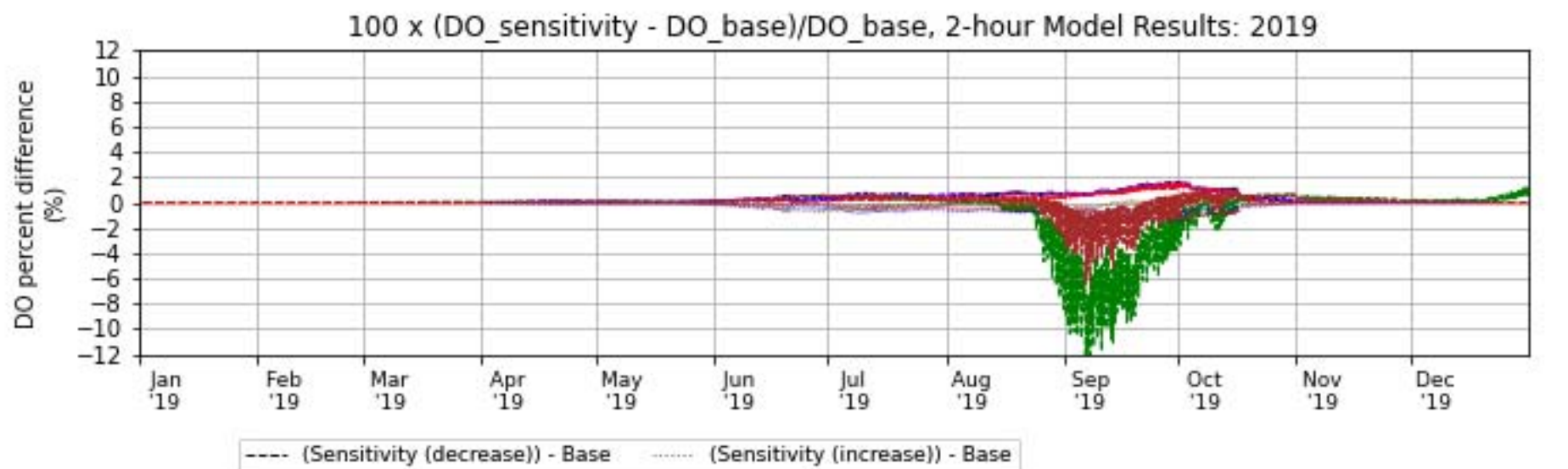
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Rate Constant (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



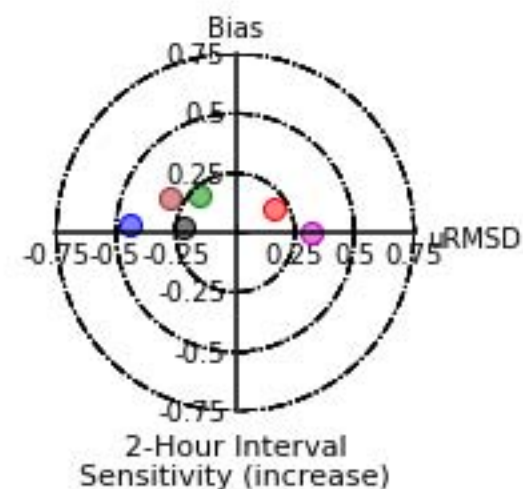
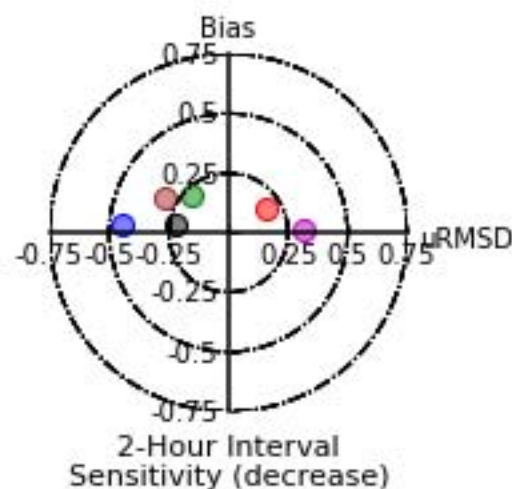
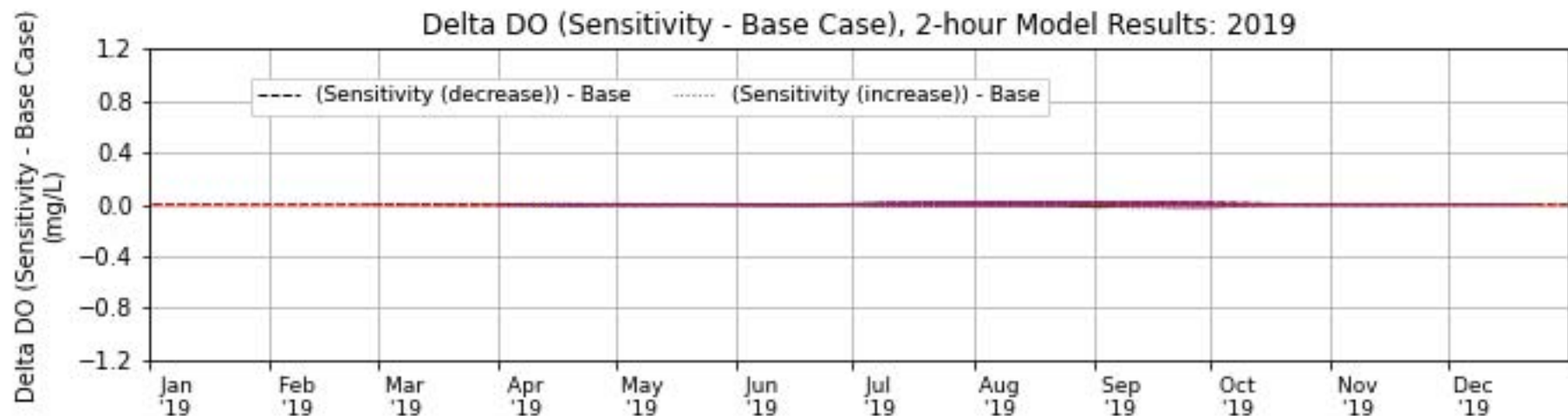
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Rate Constant (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

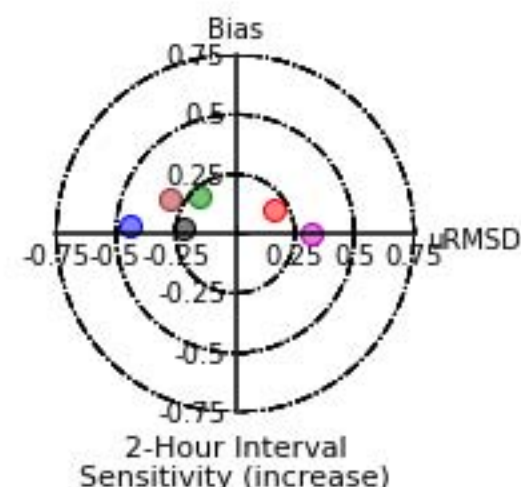
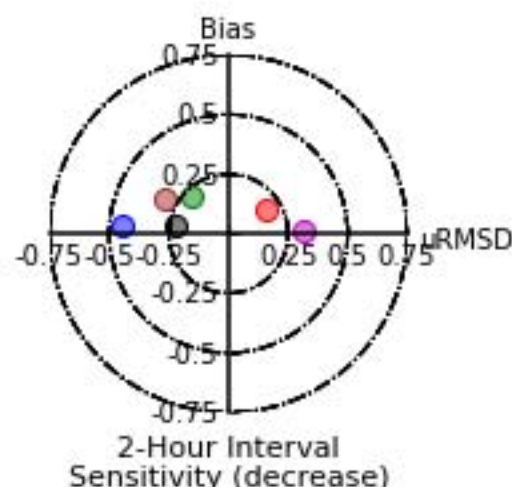
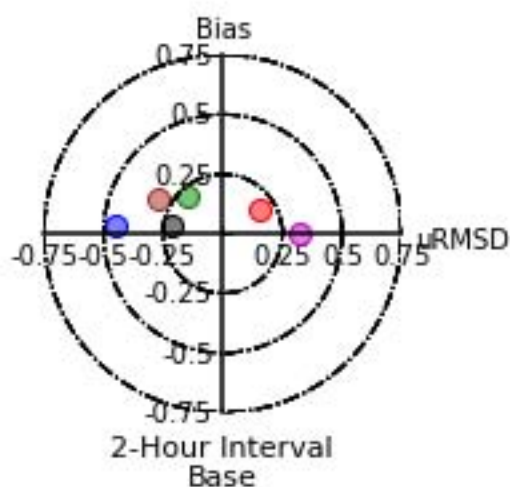
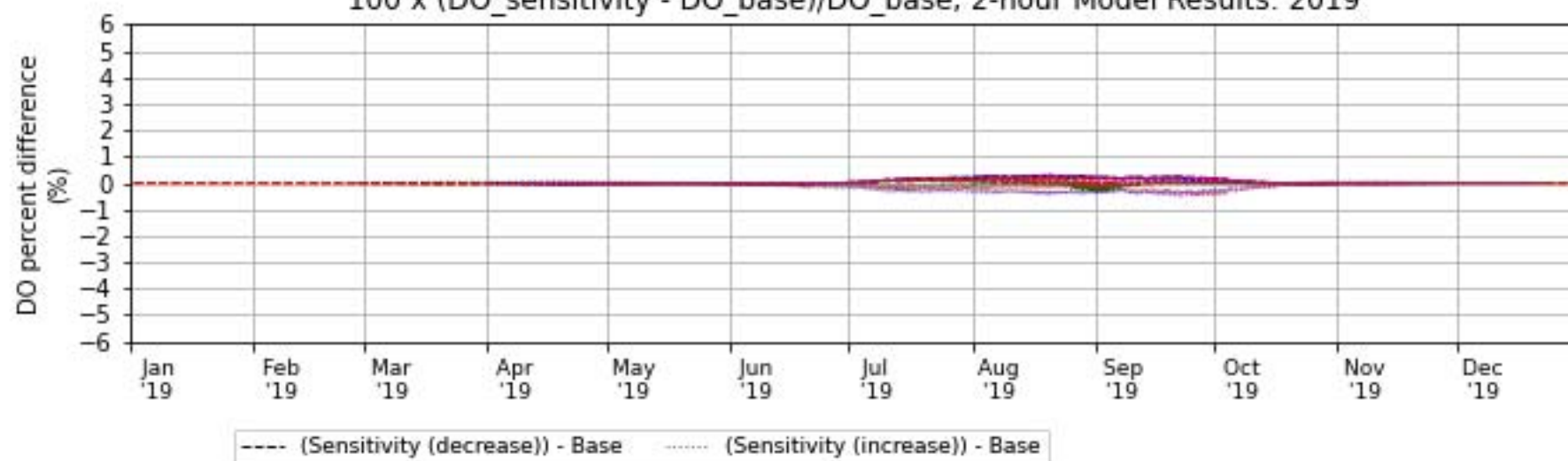
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Temperature Coefficient (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



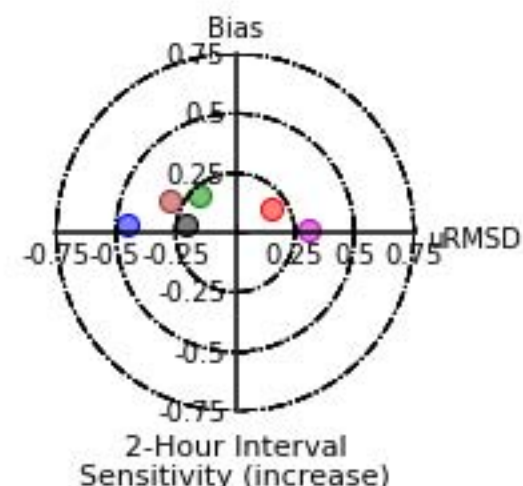
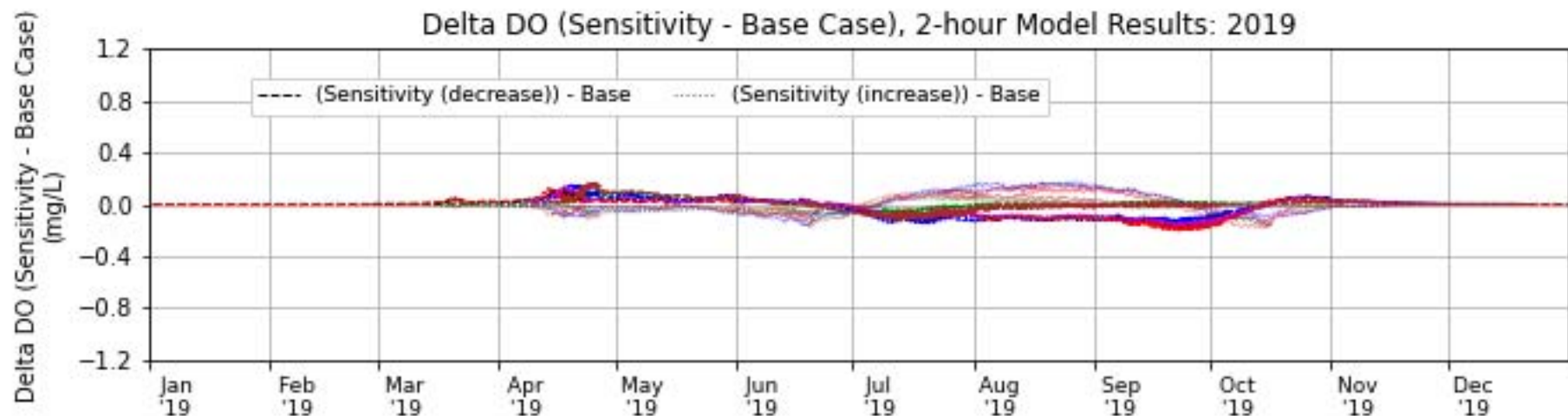
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Respiration Temperature Coefficient (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



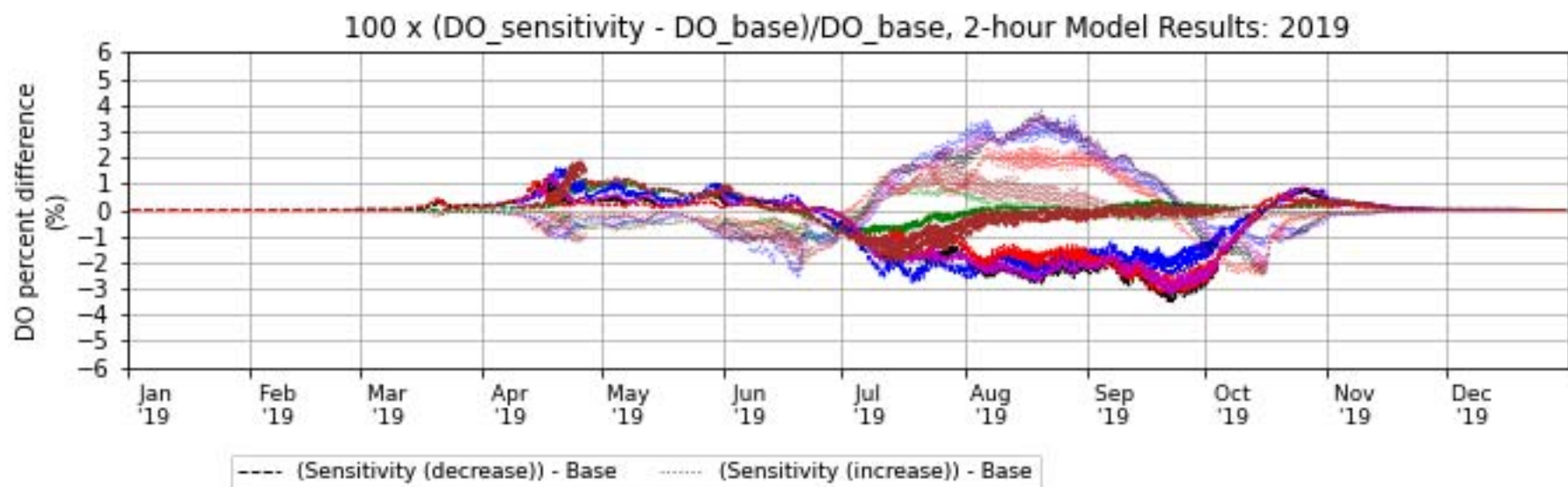
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Optimal Temperature for Growth (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



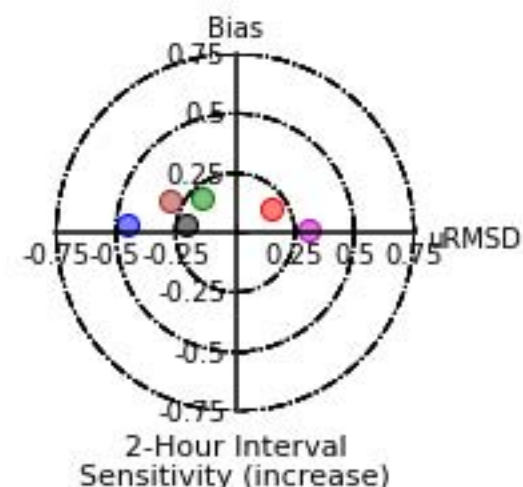
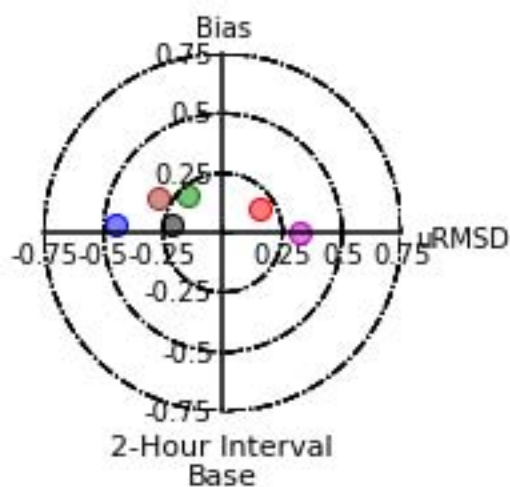
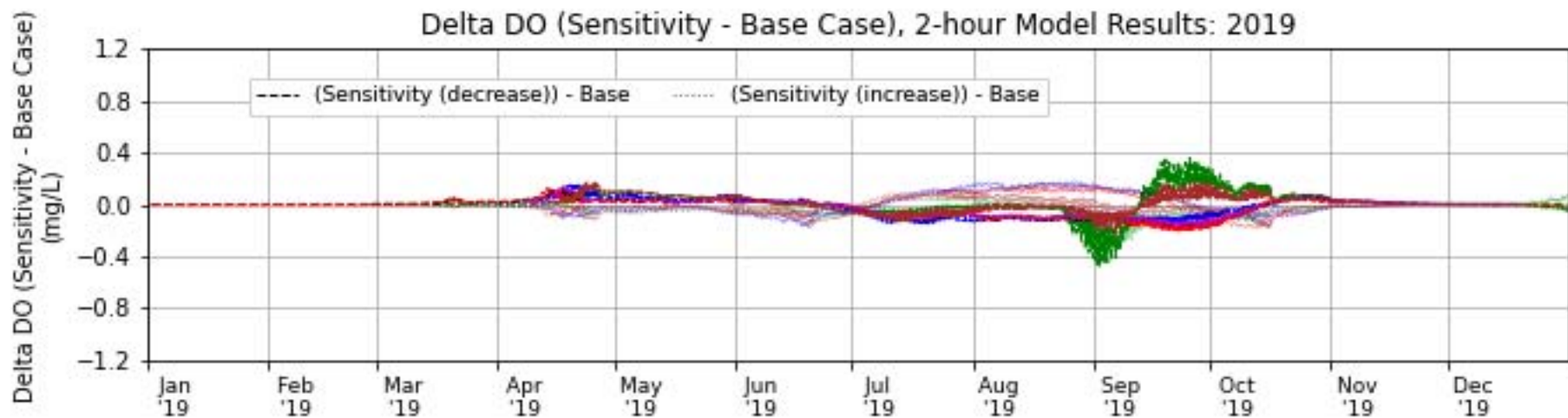
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Optimal Temperature for Growth (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



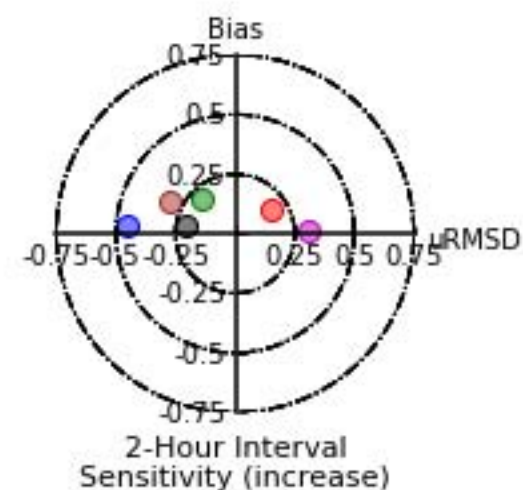
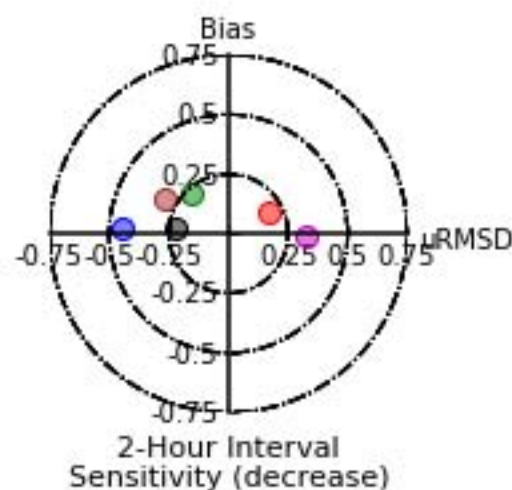
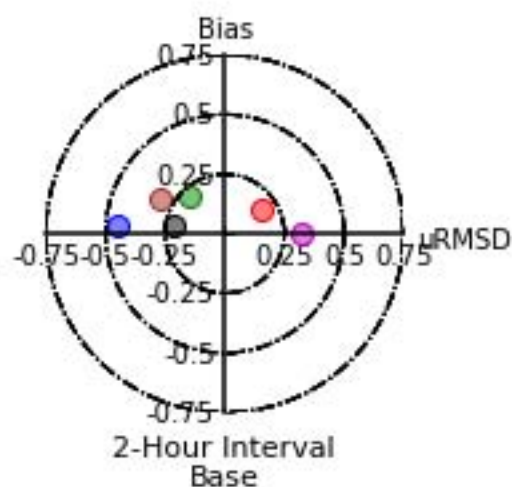
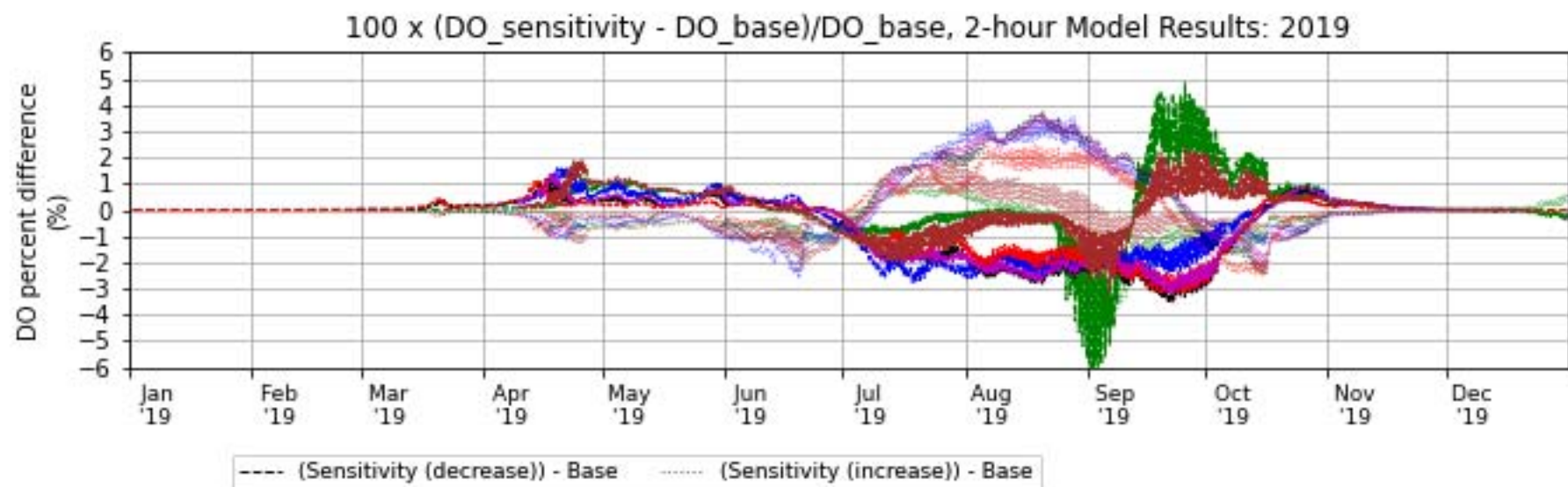
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island
 ● Chester
 ● Ben Franklin Bridge
 ● Pennypack Woods
 ● PWD Buoy B
 ● PWD Buoy P

Sensitivity Test: Optimal Temperature for Growth (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



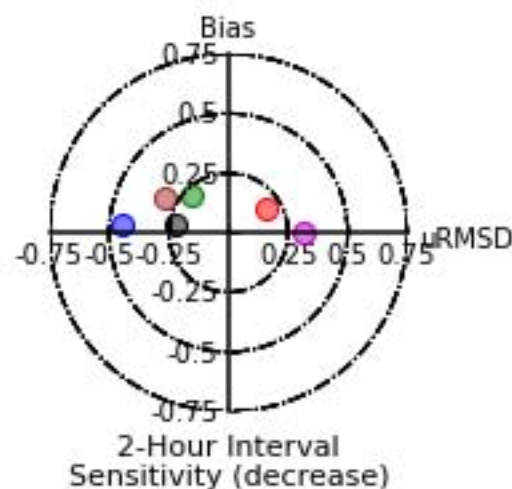
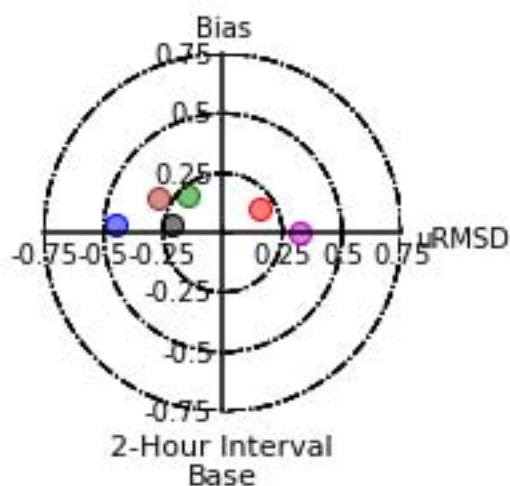
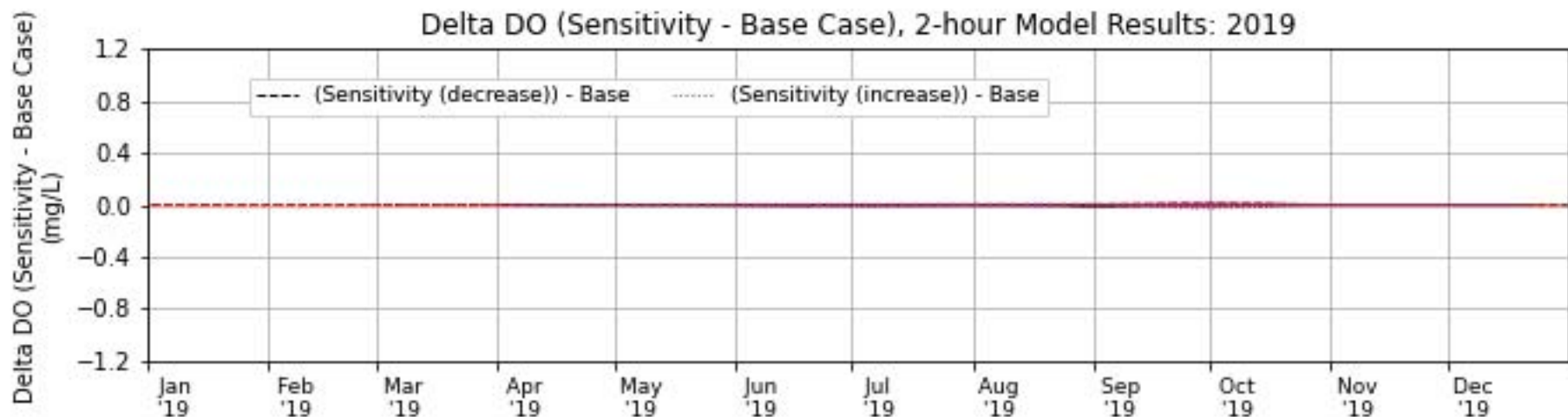
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Optimal Temperature for Growth (Group 1,2,3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

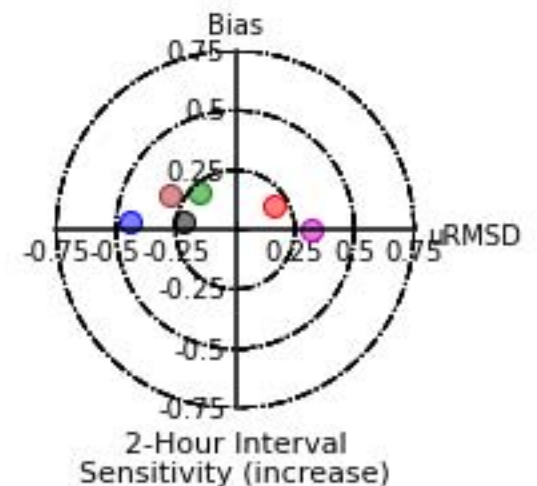
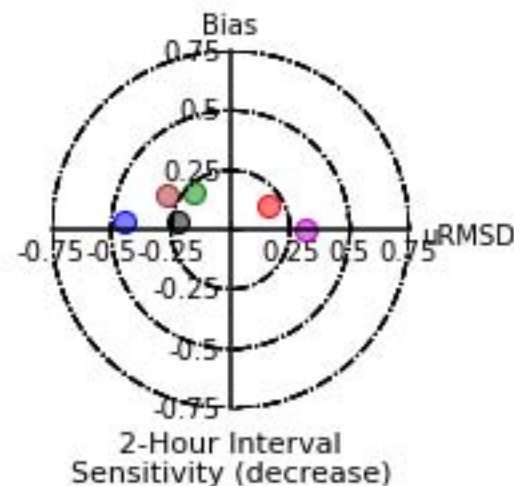
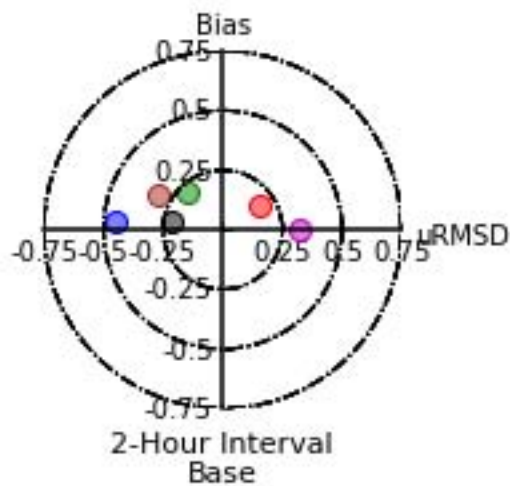
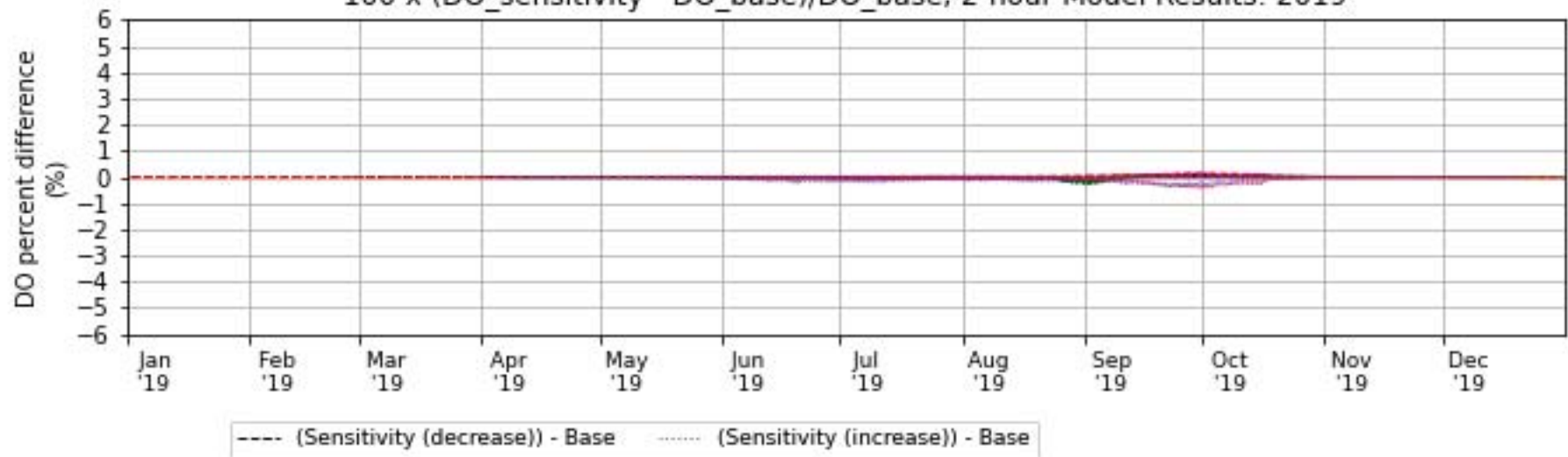
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Settling Rate (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



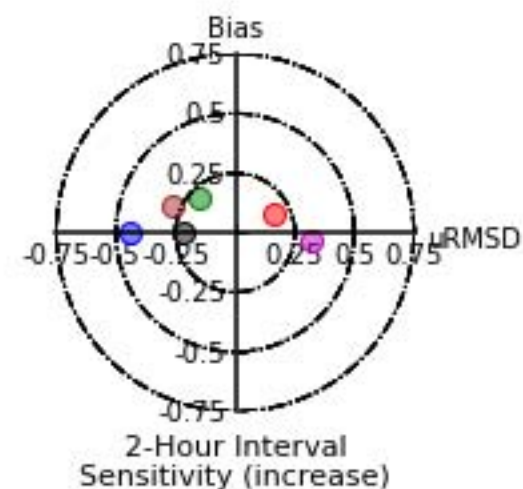
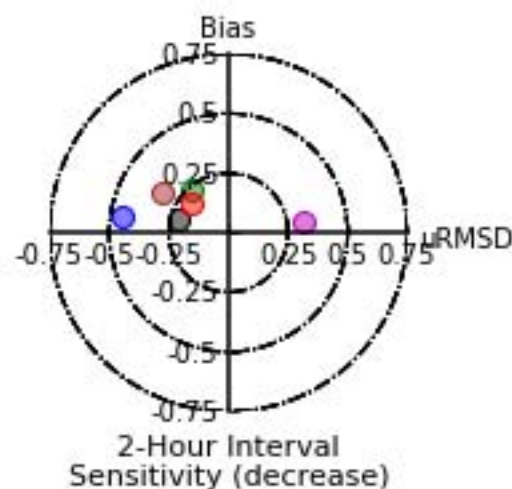
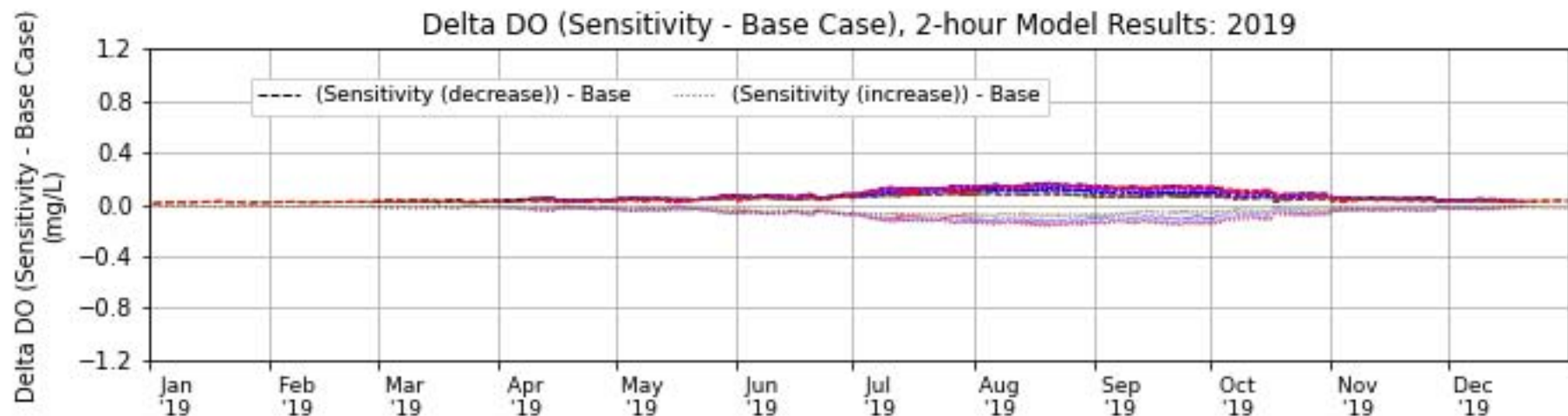
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Settling Rate (Group 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



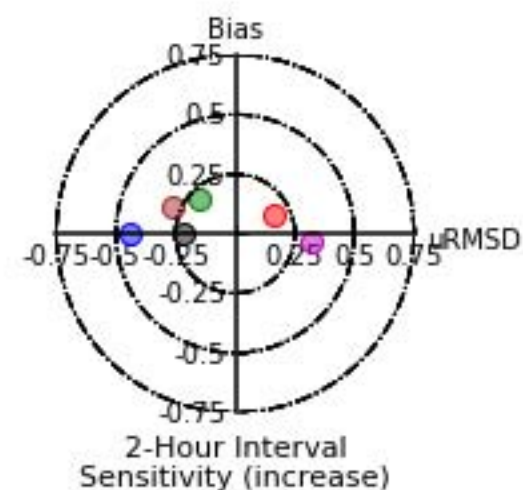
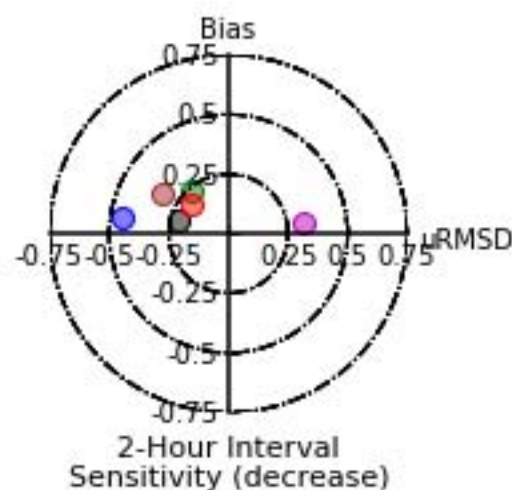
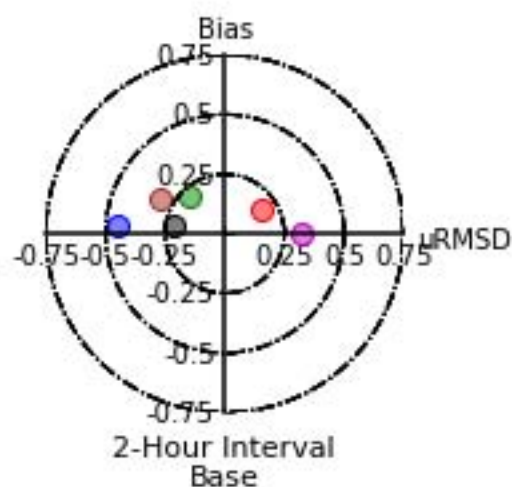
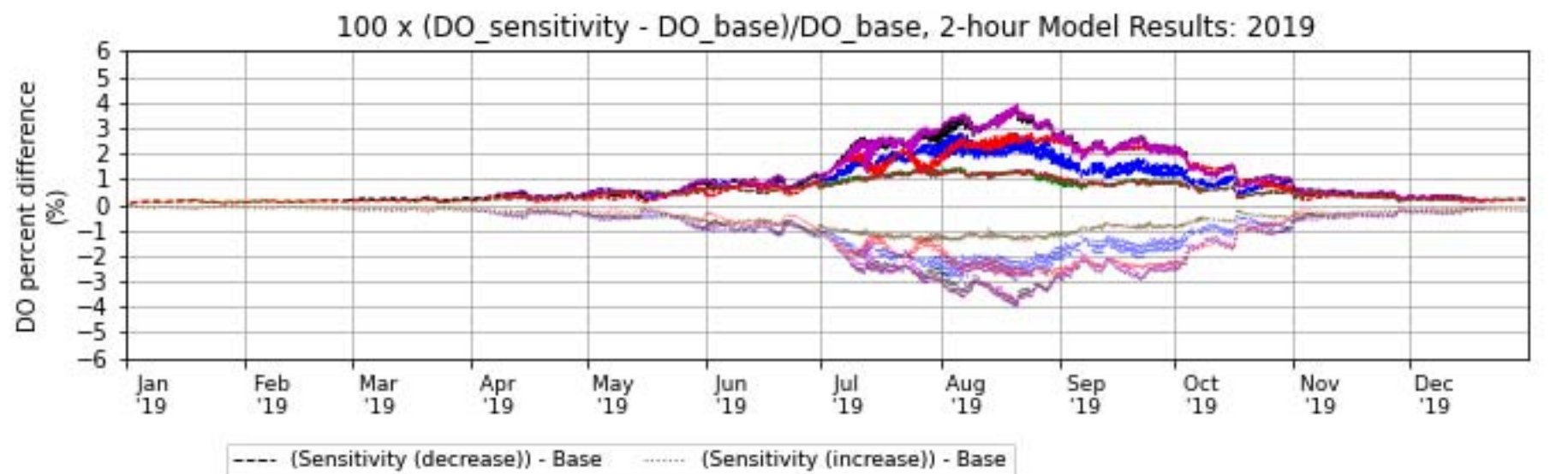
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Sediment Oxygen Demand

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



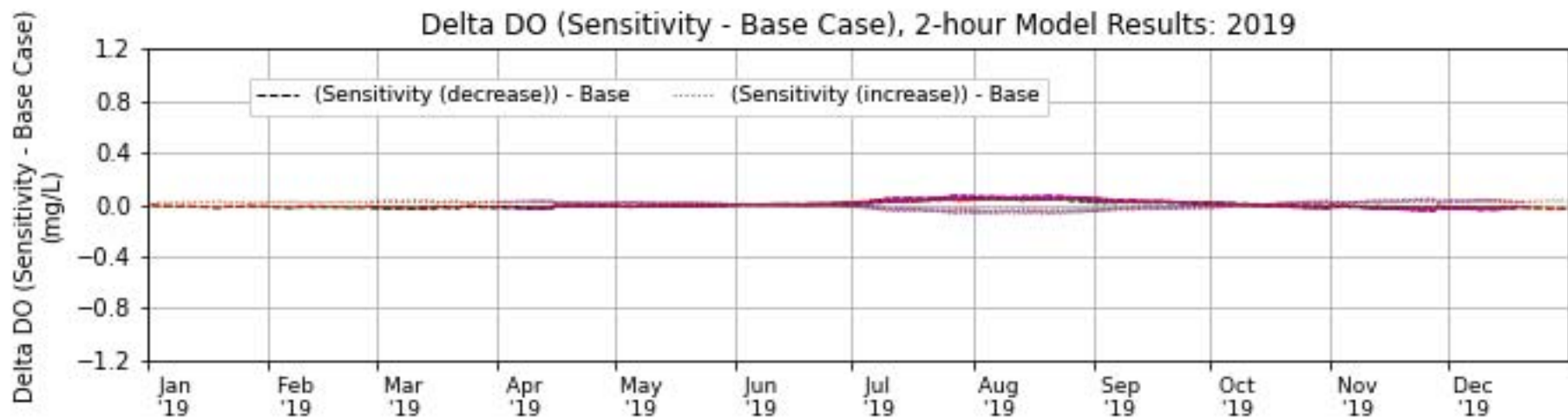
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Sediment Oxygen Demand

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

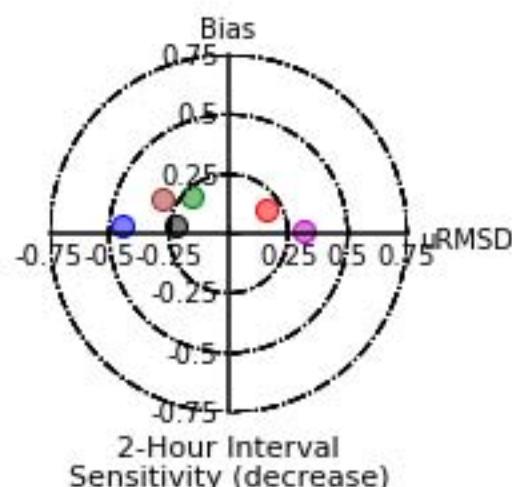
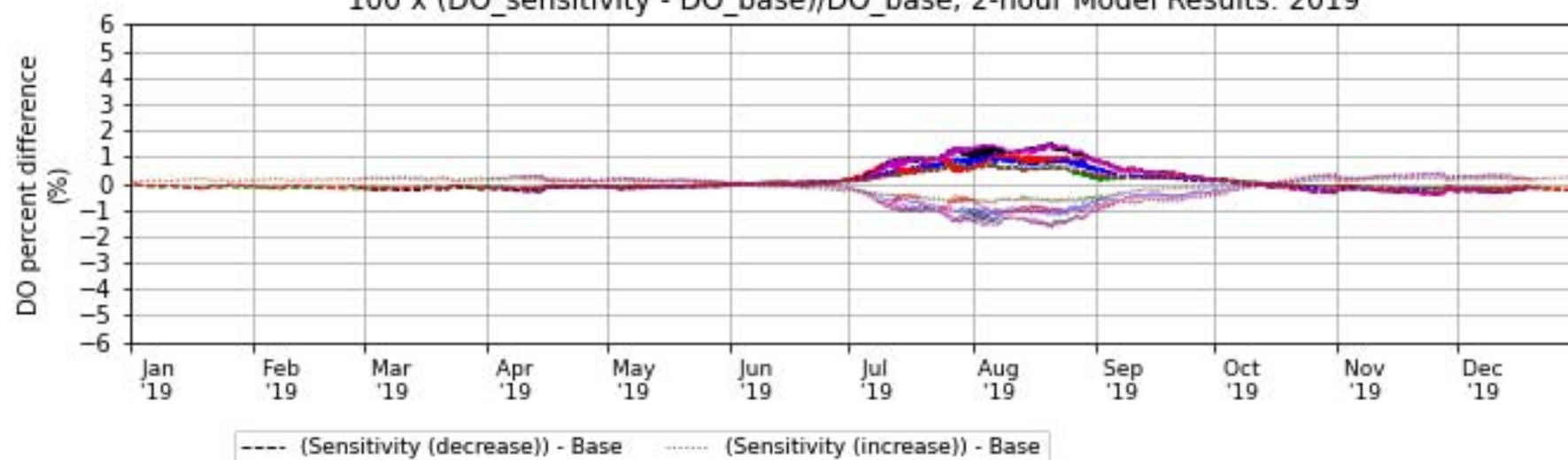
● Reedy Island
 ● Chester
 ● Ben Franklin Bridge
 ● Pennypack Woods
 ● PWD Buoy B
 ● PWD Buoy P

Sensitivity Test: Theta - SOD Temperature Correction

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



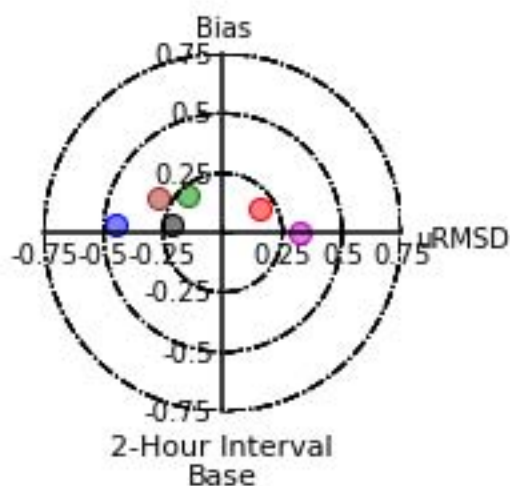
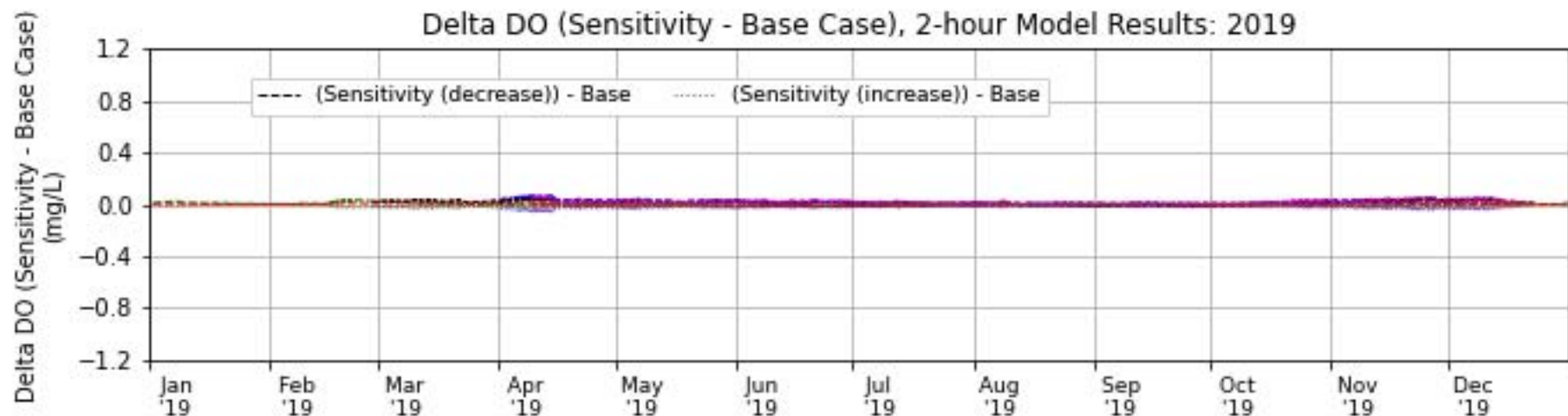
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Theta - SOD Temperature Correction

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

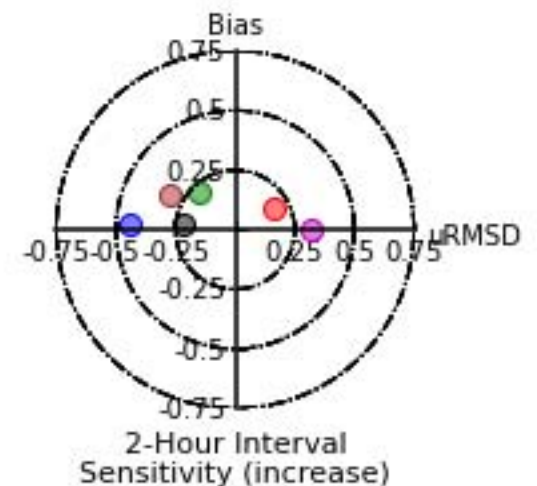
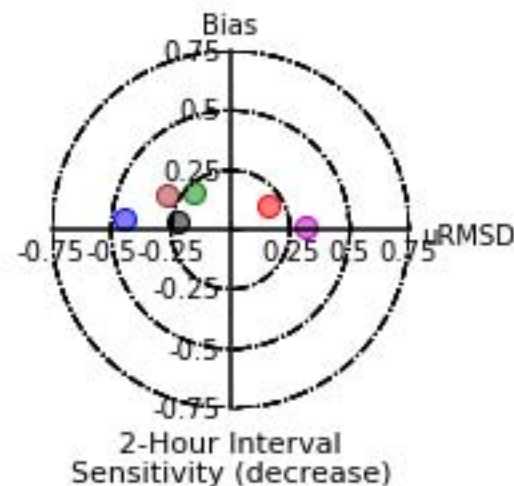
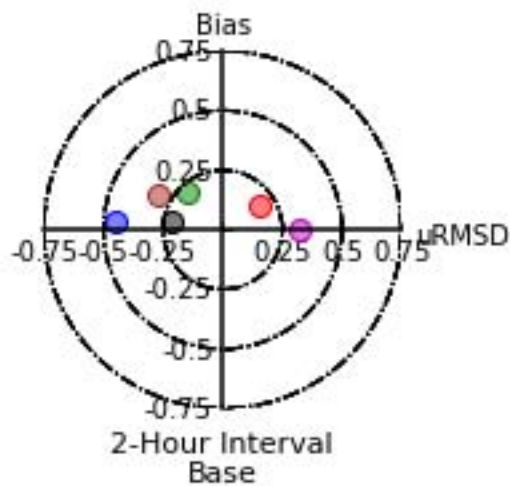
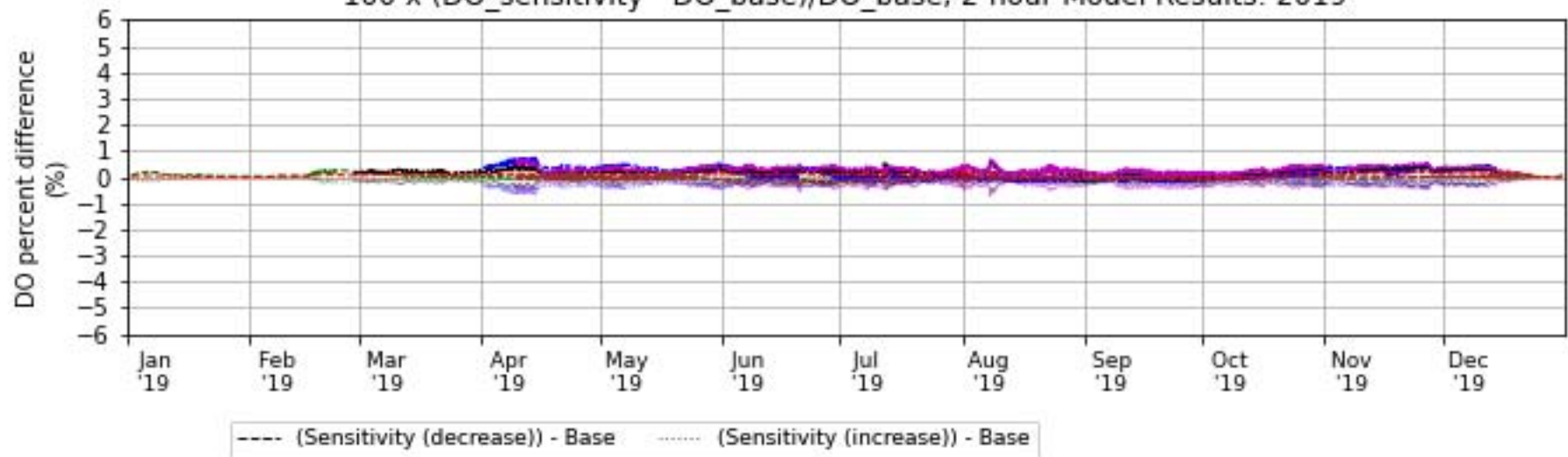
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Nitrification Rate Constant

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



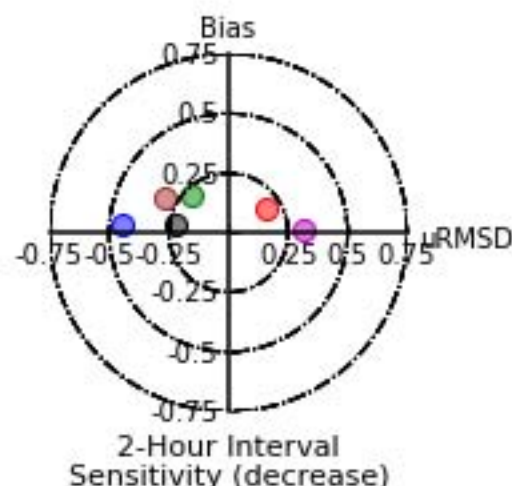
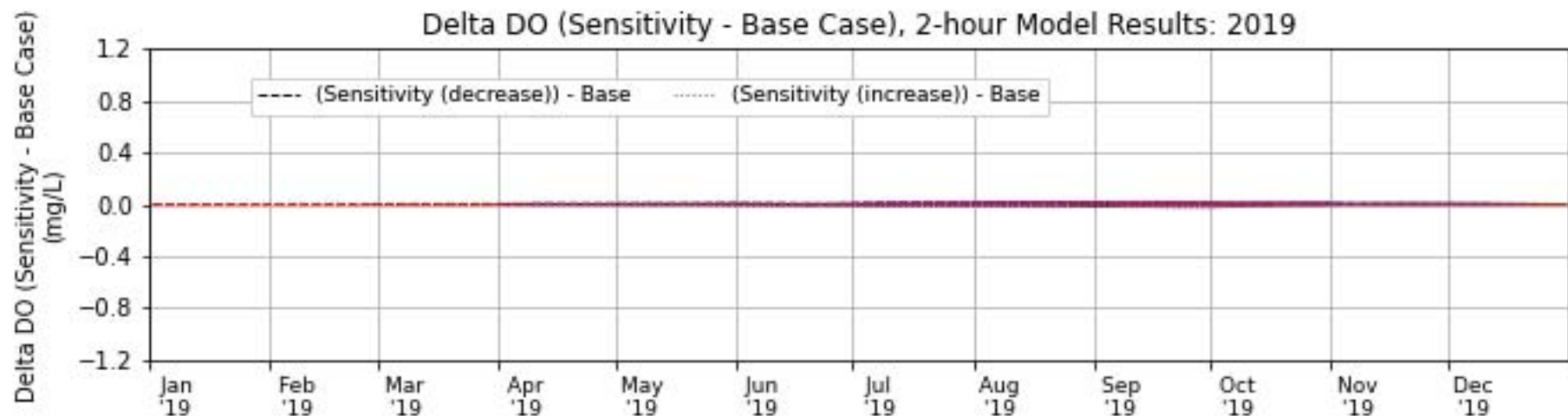
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Nitrification Rate Constant

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

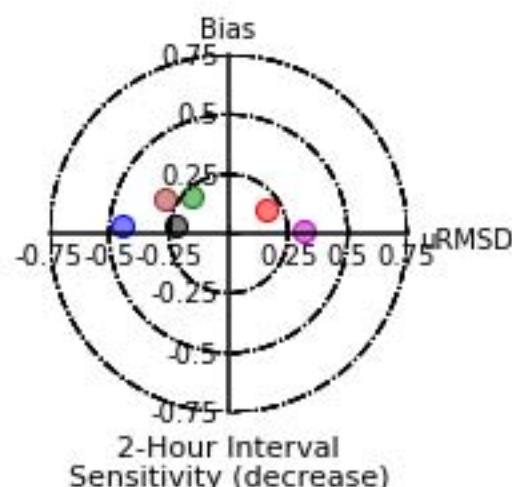
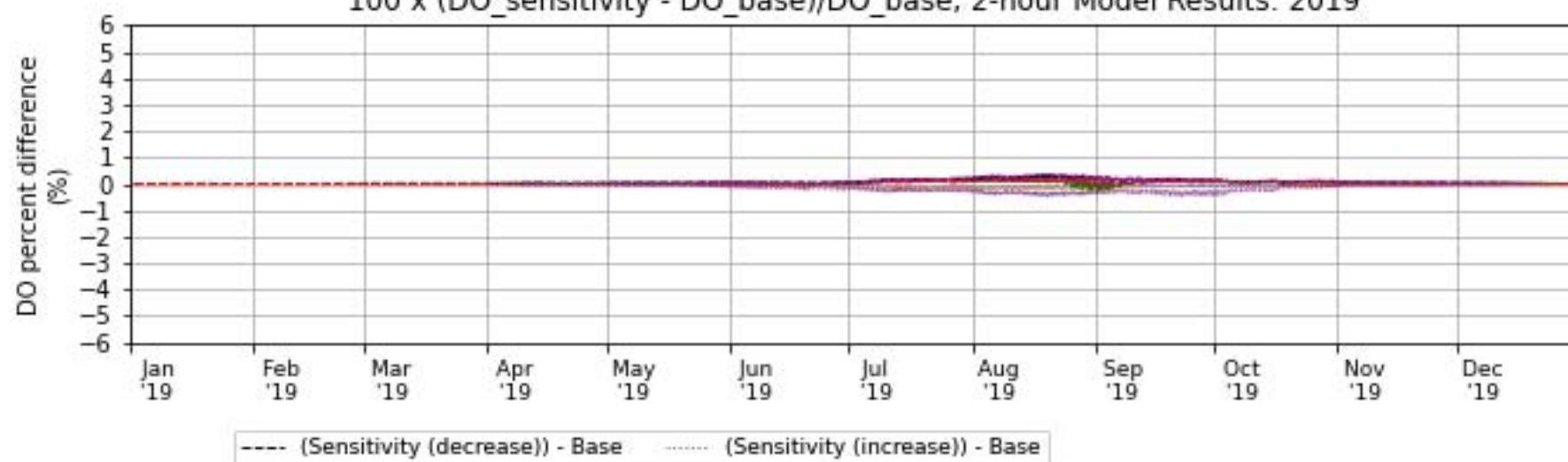
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Dissolved Organic Nitrogen Mineralization Rate Constant

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



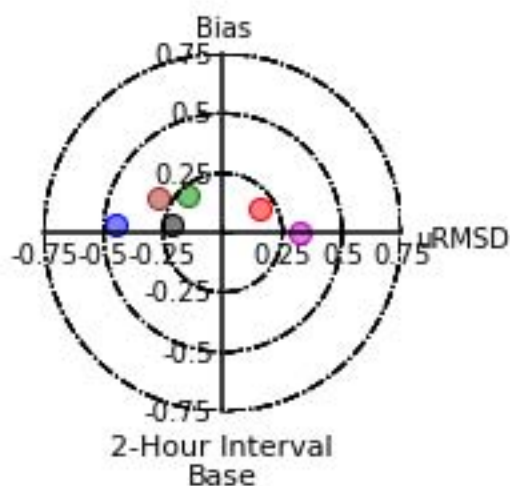
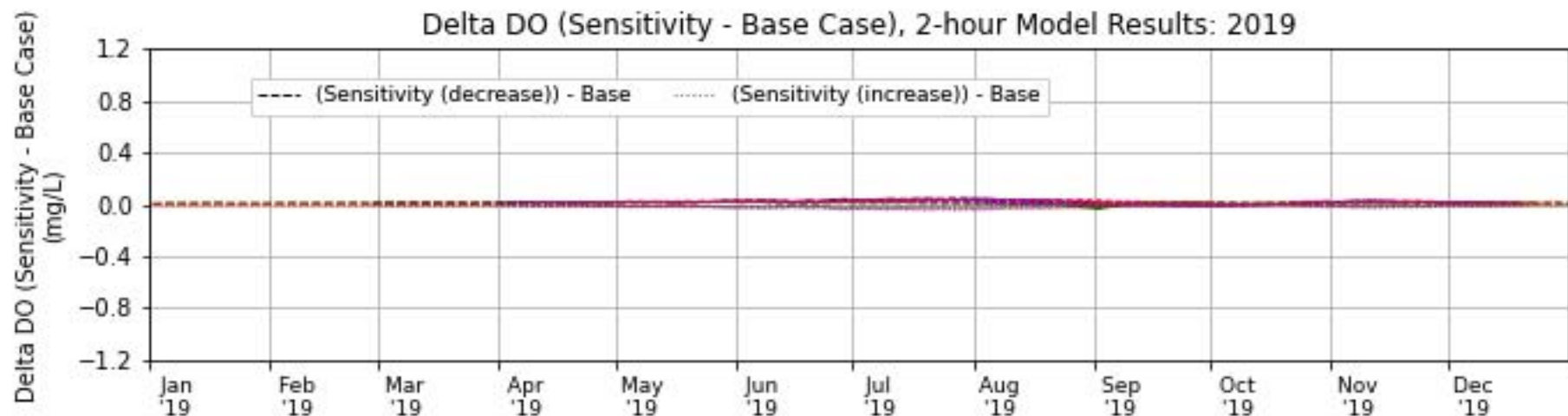
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Dissolved Organic Nitrogen Mineralization Rate Constant

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

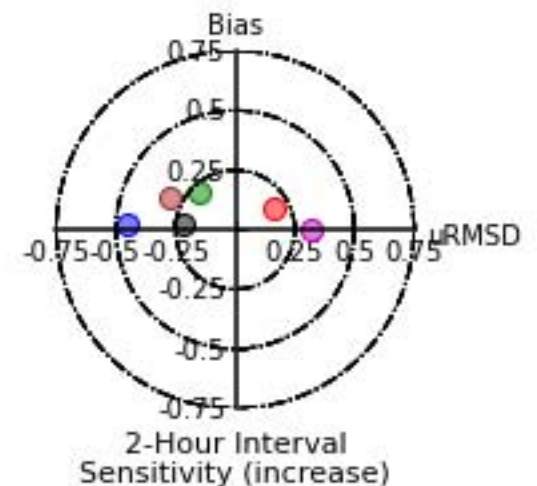
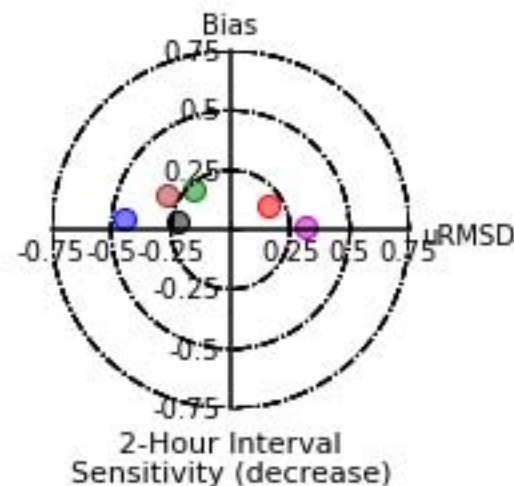
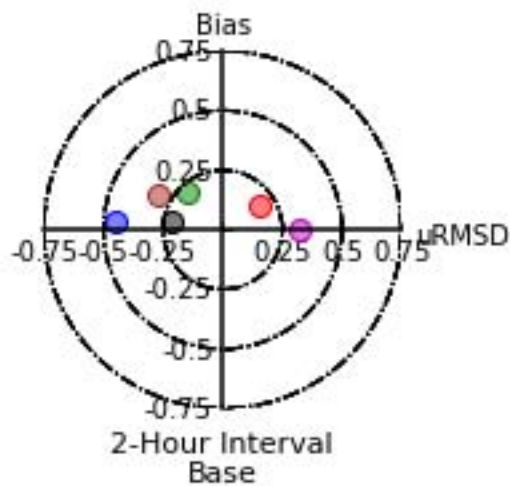
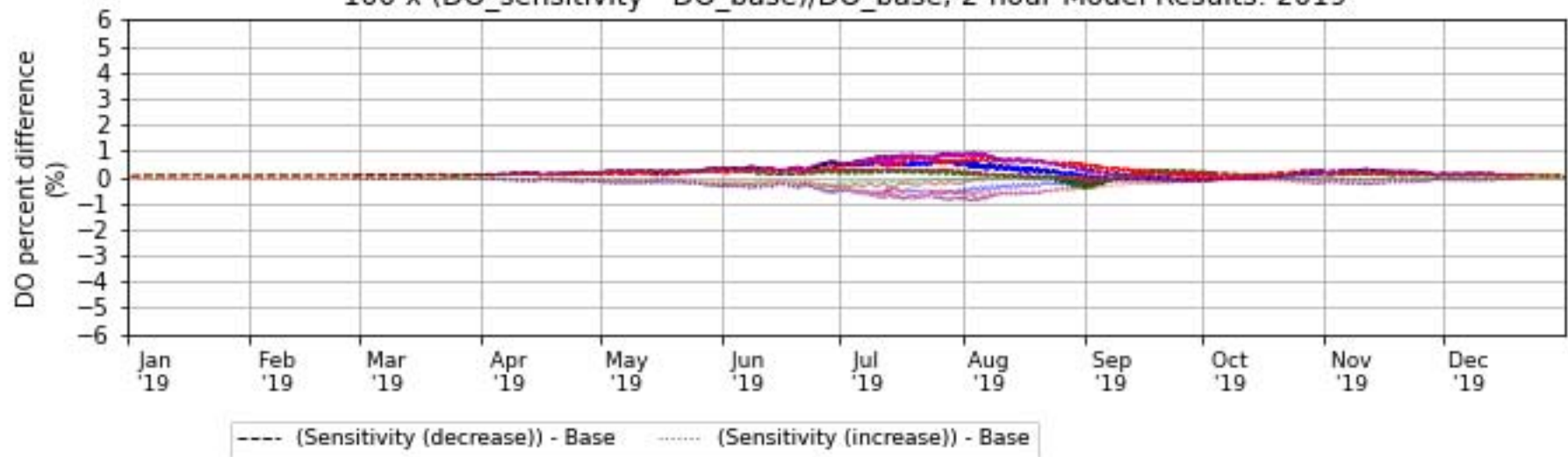
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: CBOD Decay Rate Constant (Watershed)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



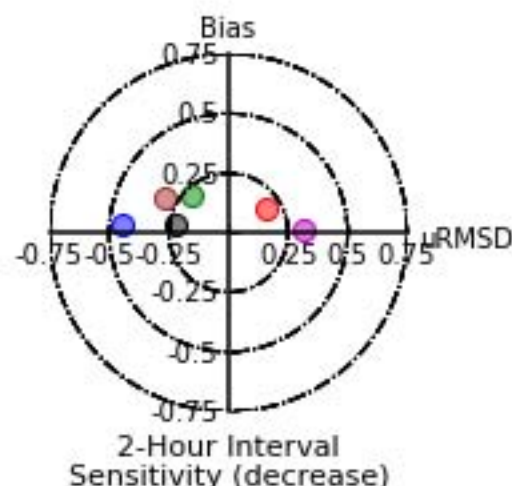
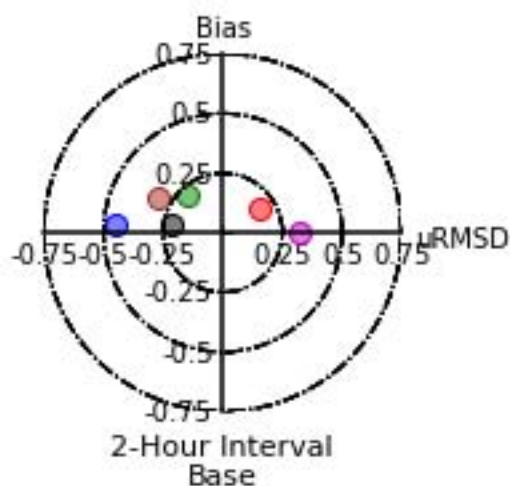
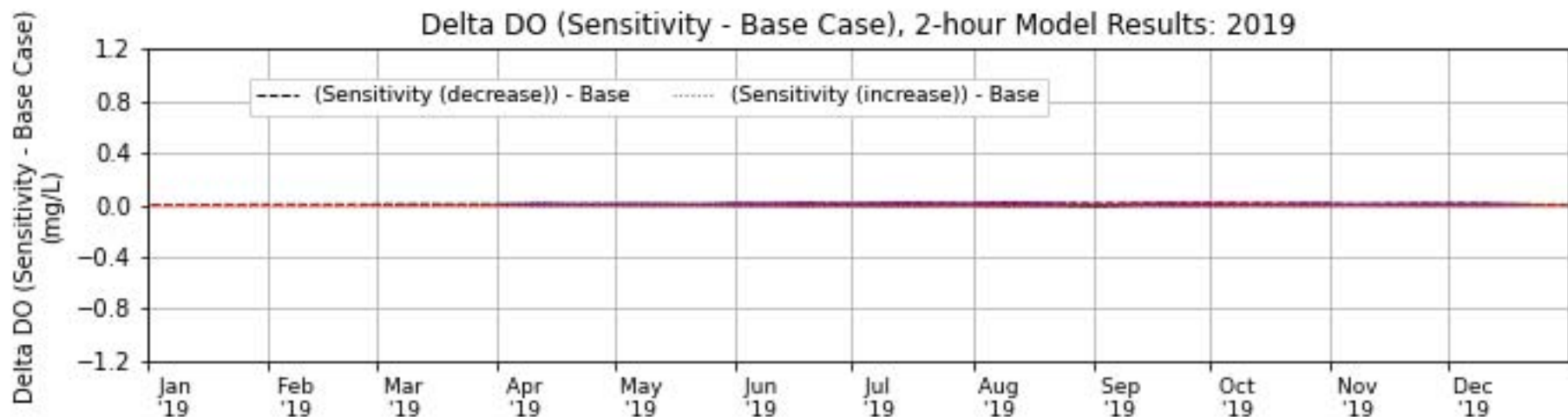
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: CBOD Decay Rate Constant (Watershed)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

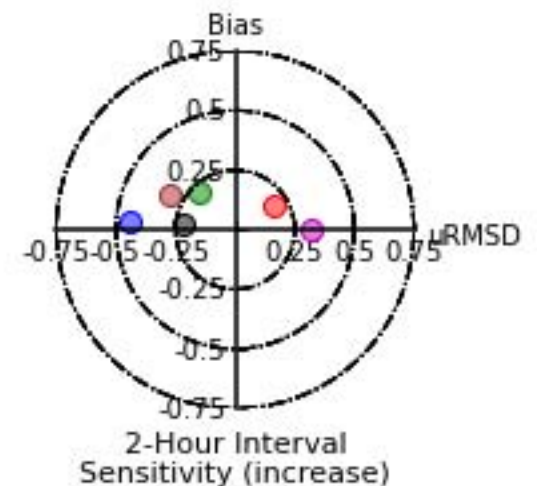
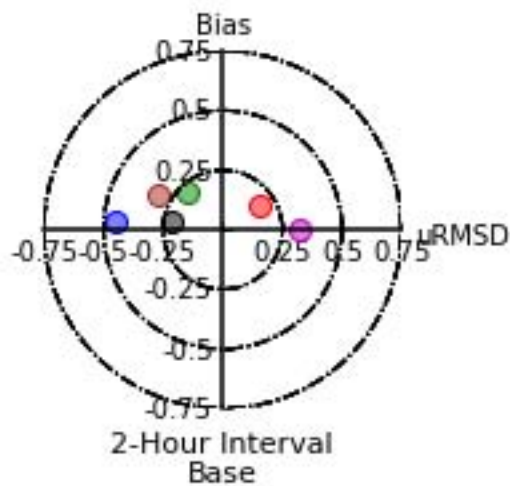
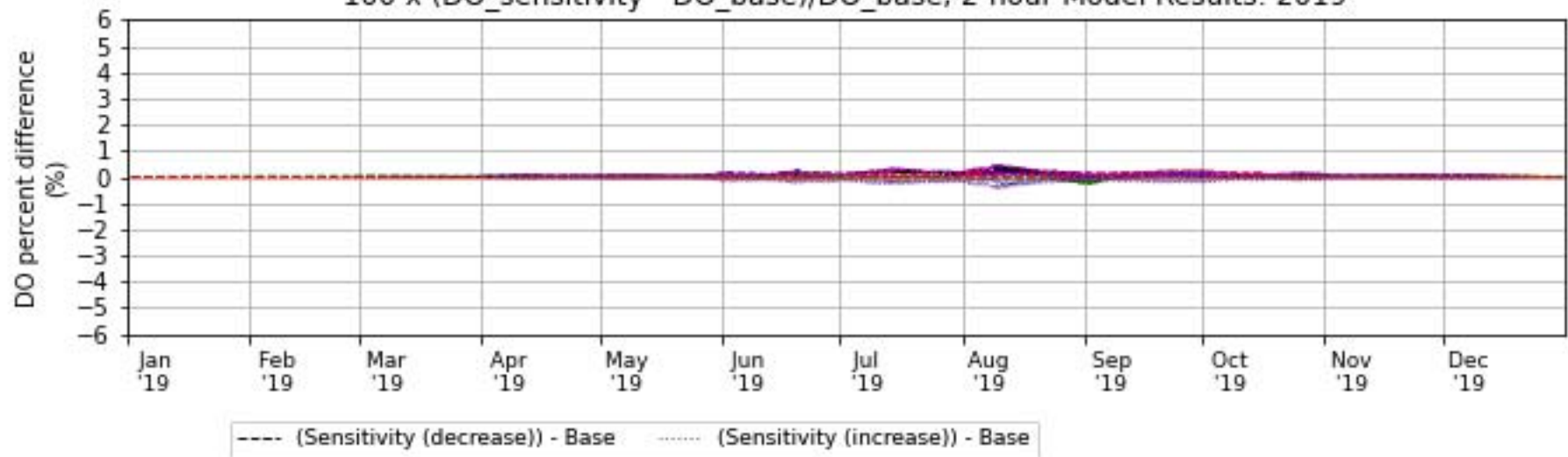
● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: CBOD Decay Rate Constant (Point Source)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01

100 x (DO_sensitivity - DO_base)/DO_base, 2-hour Model Results: 2019



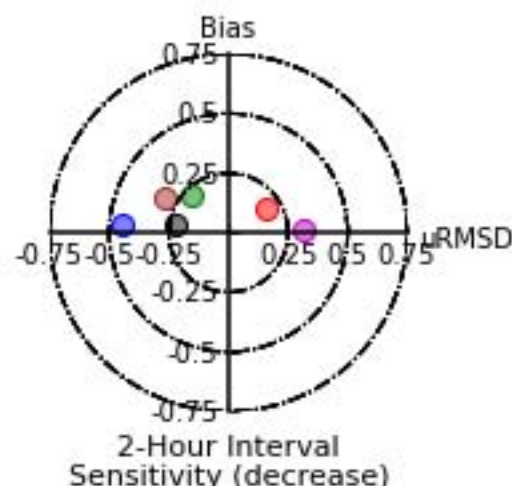
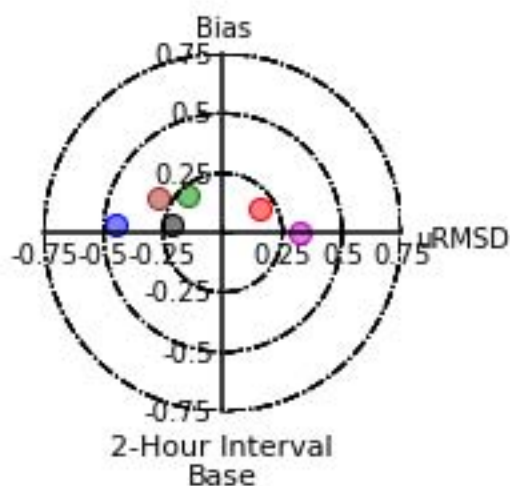
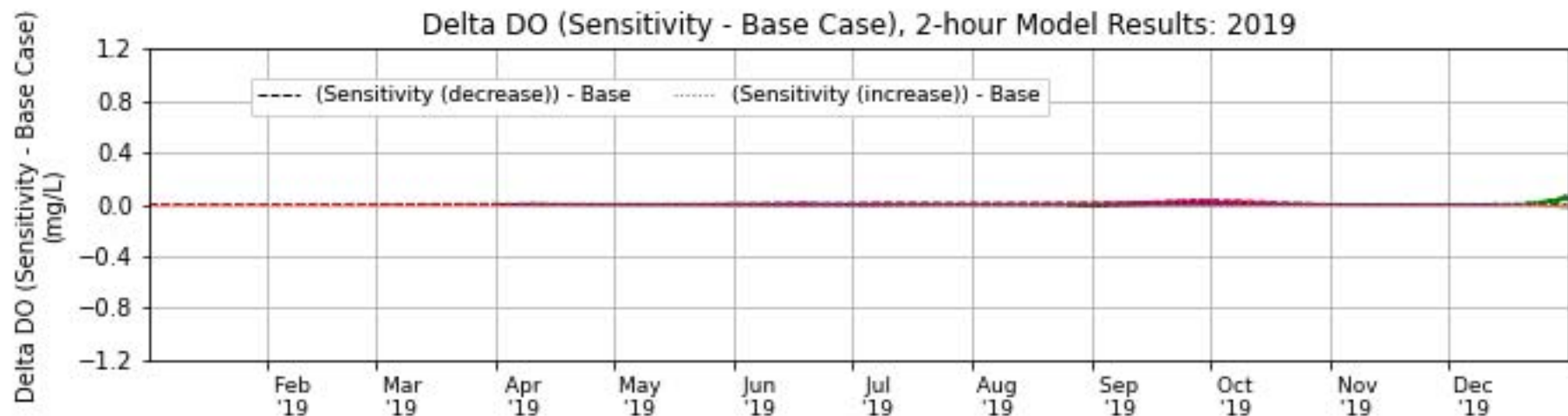
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: CBOD Decay Rate Constant (Point Source)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



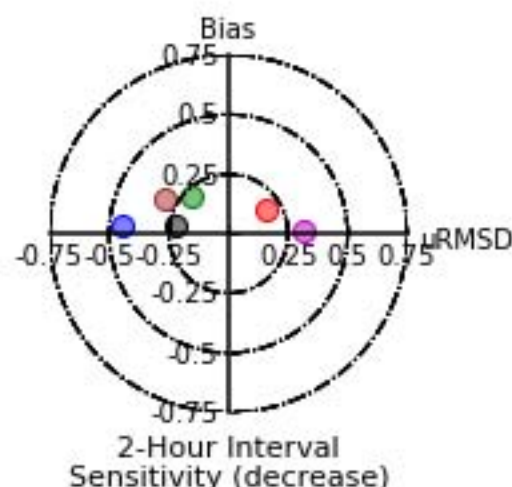
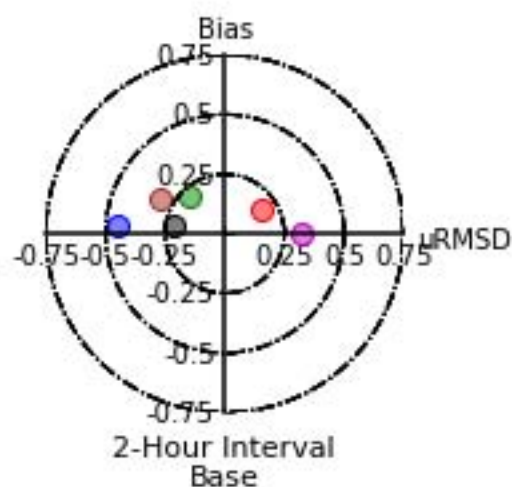
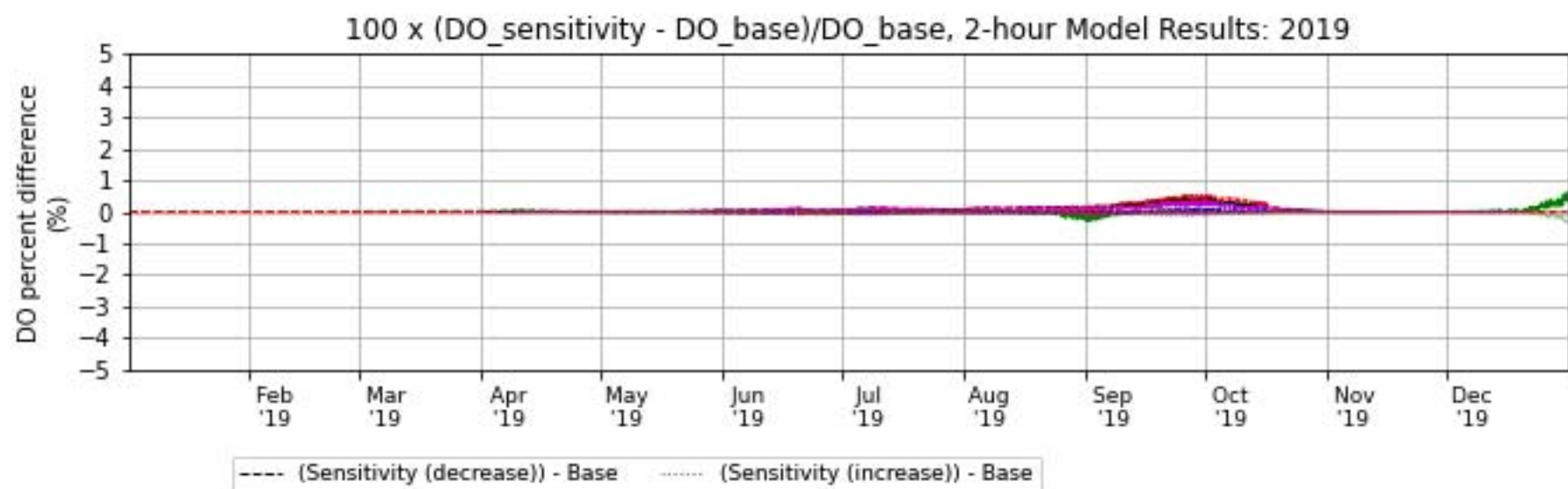
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 1)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



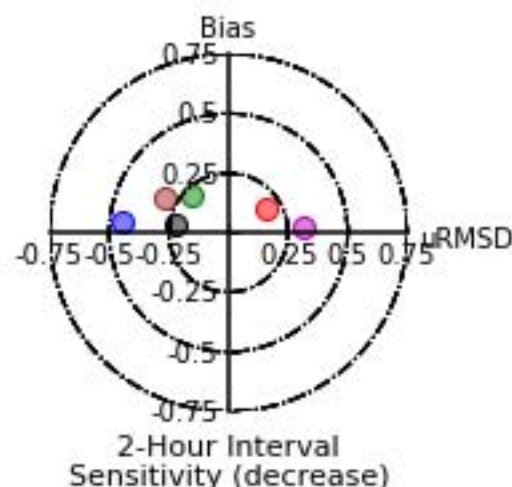
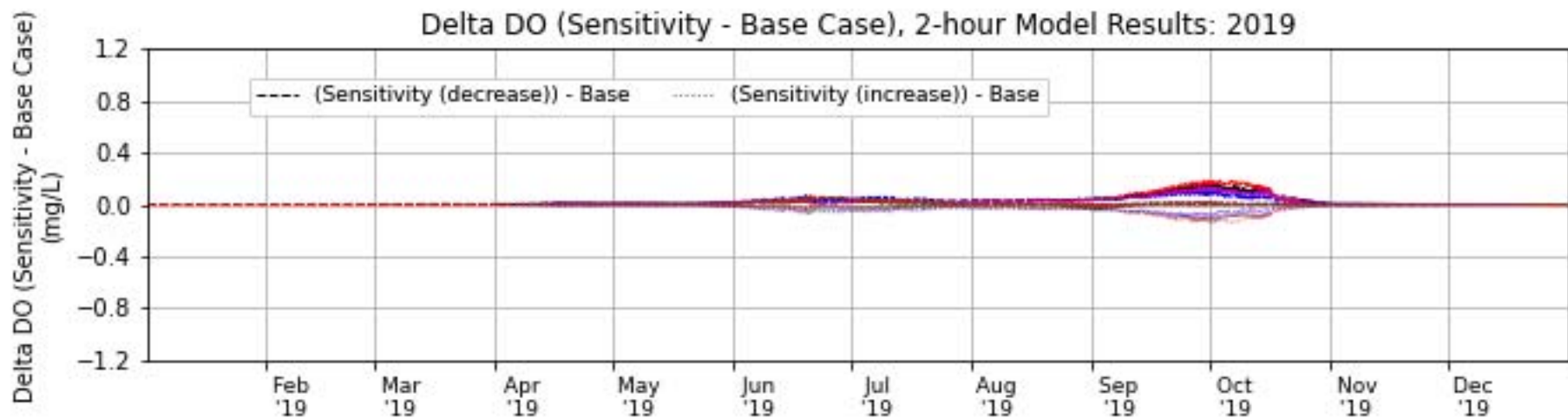
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 1)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



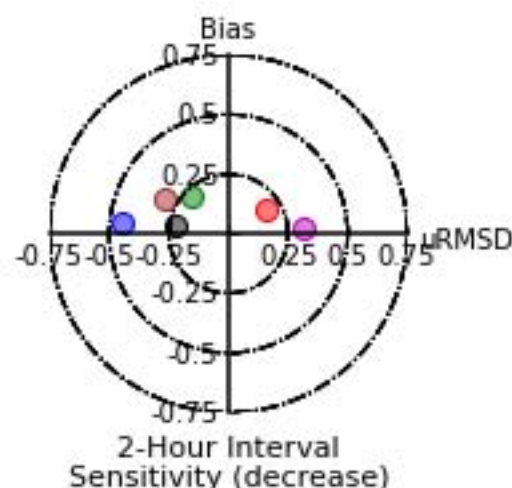
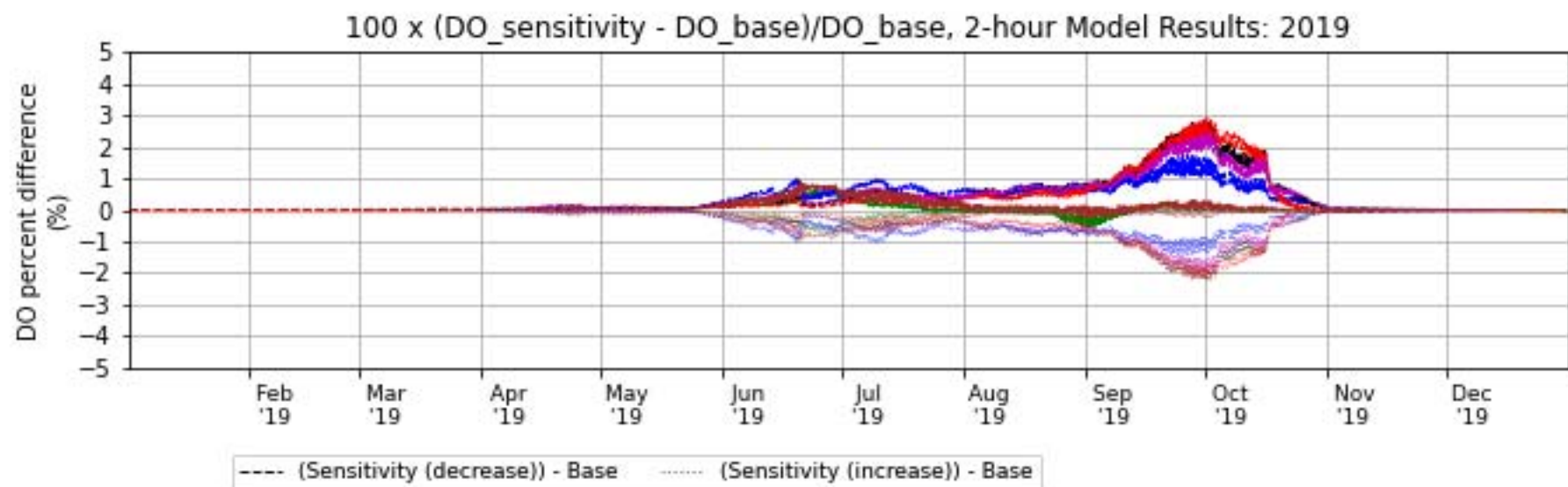
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island
 ● Chester
 ● Ben Franklin Bridge
 ● Pennypack Woods
 ● PWD Buoy B
 ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



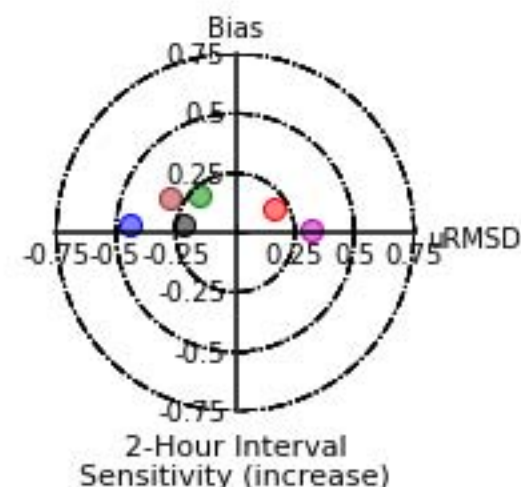
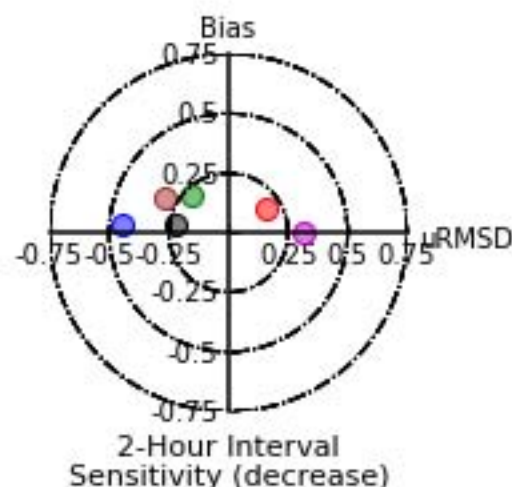
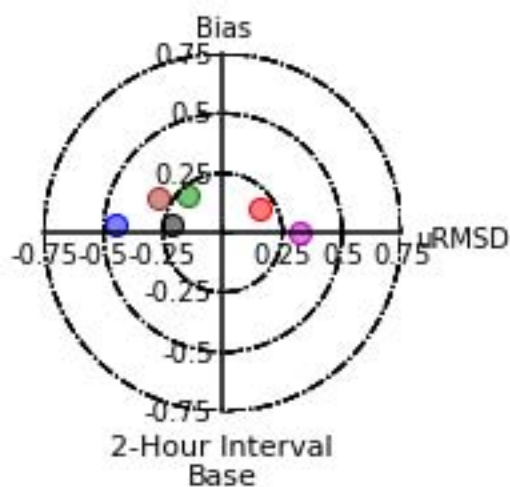
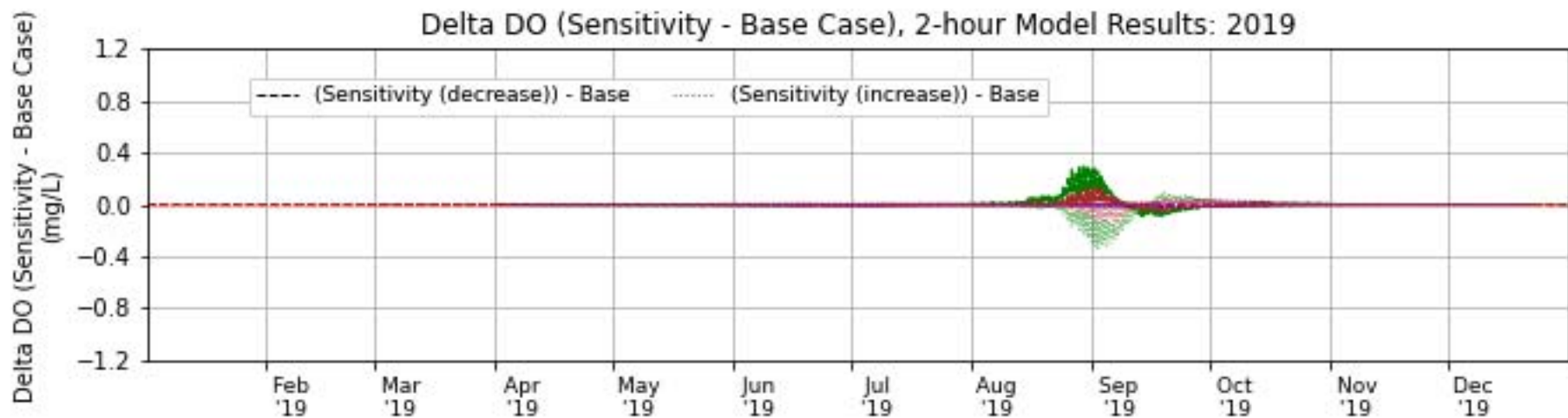
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 2)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



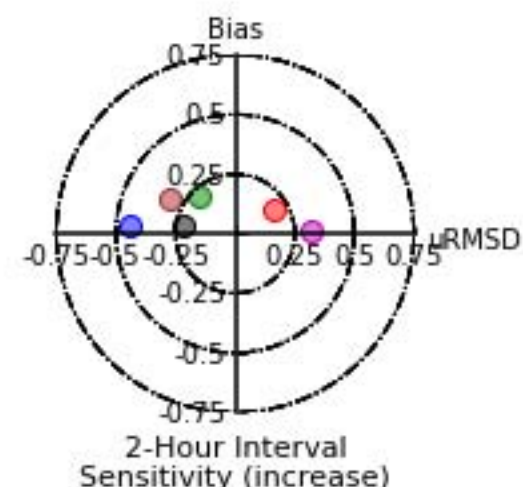
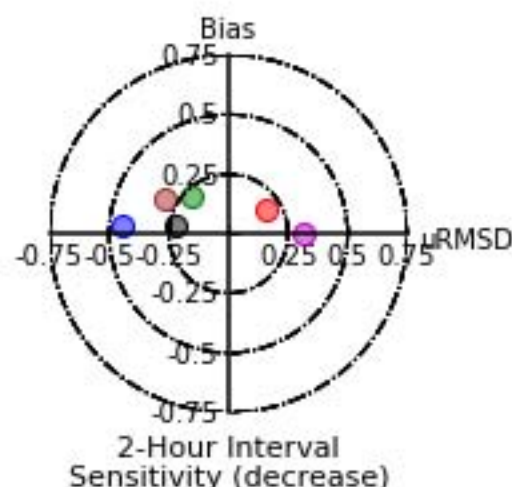
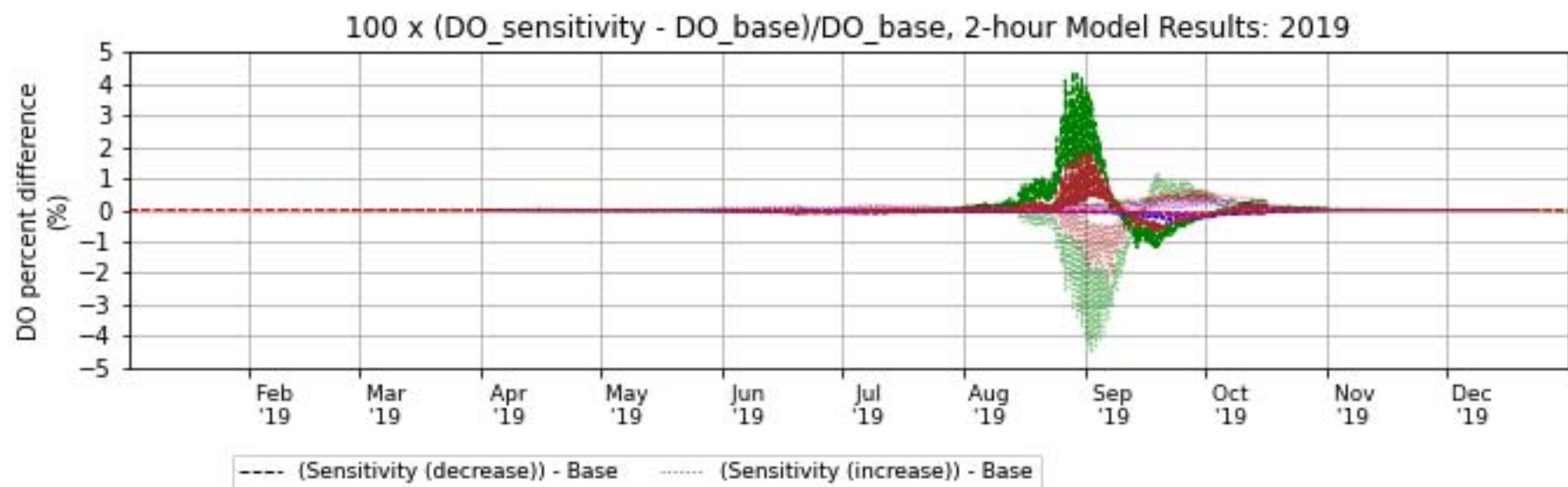
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island
 ● Chester
 ● Ben Franklin Bridge
 ● Pennypack Woods
 ● PWD Buoy B
 ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



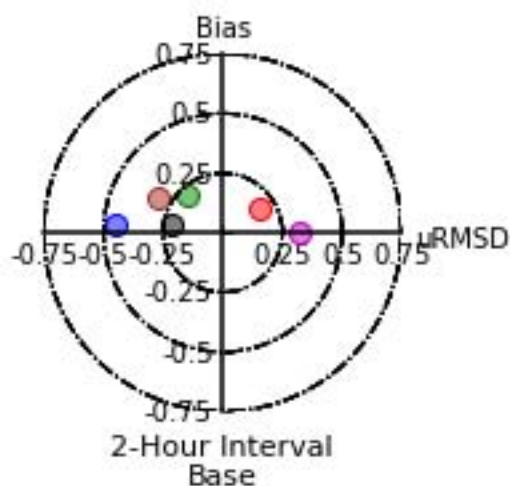
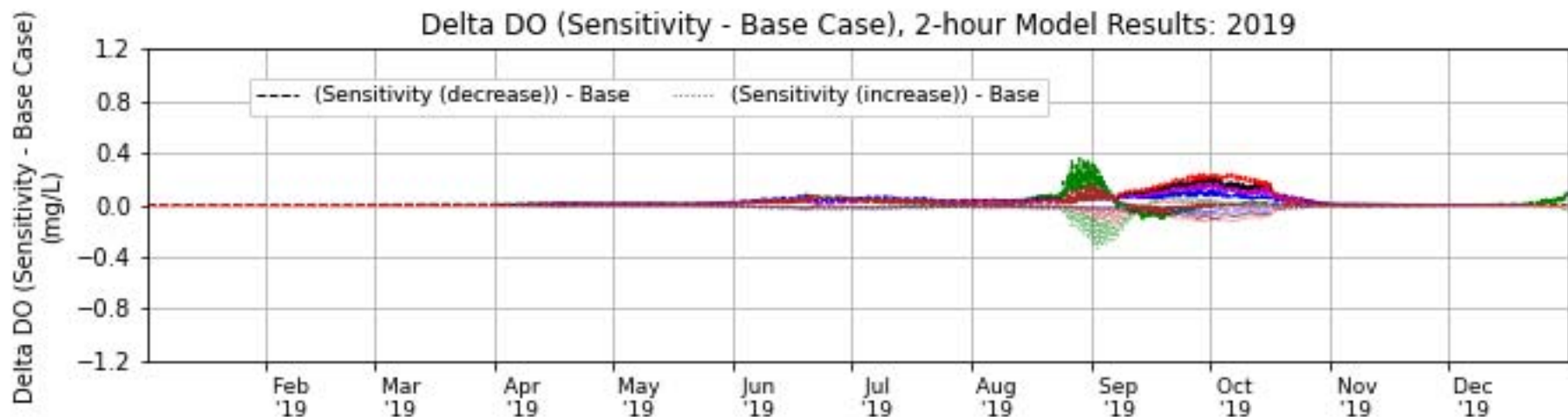
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl a 3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



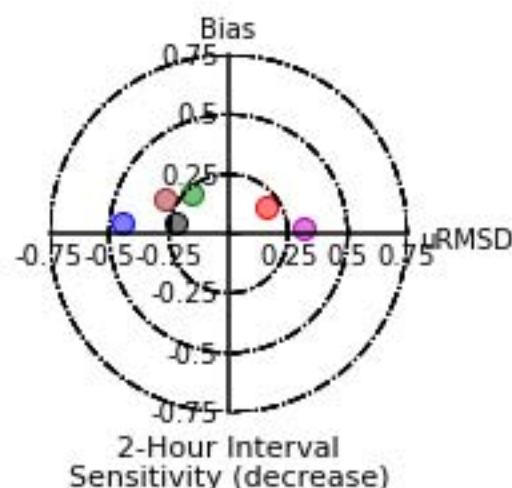
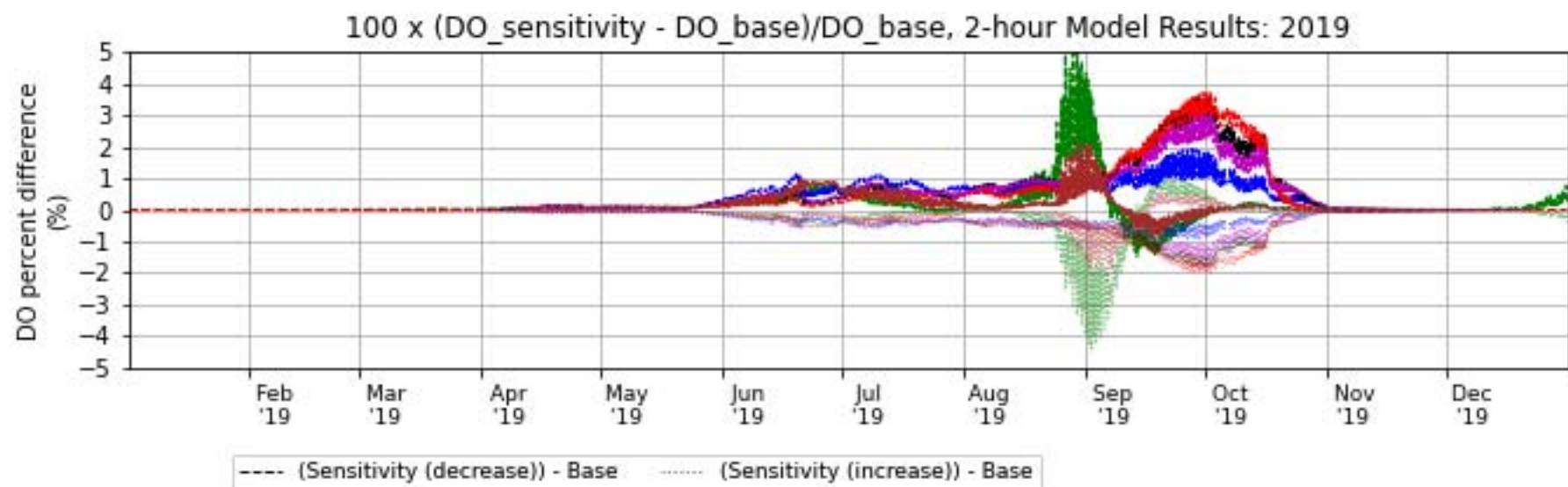
Normalized Bias and Unbiased RMSD (ubRMSD) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 1, 2, 3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01



Normalized Bias and Unbiased RMSE (ubRMSE) are shown.
Normalization was based on the standard deviation of the data

● Reedy Island ● Chester ● Ben Franklin Bridge ● Pennypack Woods ● PWD Buoy B ● PWD Buoy P

Sensitivity Test: Phytoplankton Optimal Light Saturation (chl_a 1, 2, 3)

WASP 2-hour model results were used in this analysis.

Run ID: WASP_G7pt2_2D_202205-01