Westlake US 2
Received 8/31/2023

TSX/PAZ Satellite Update
InSAR Subsidence
August 25, 2023

Longuist comment:

This is a follow-up to the update that was sent regarding the 8/25/2023 TSX/PAZ dataset. We have taken a closer look at the data and present some additional observations in the attached slides. This review has been supplemented by the latest SNT dataset that was received this afternoon in which no material trend deviation was observed. We anticipate that we will receive the next TSX/PAZ dataset (9/1/2023) this Sunday or Monday to further this evaluation.

Submitted by: Nathaniel Byars (Longuist)

TSX/PAZ Constellation

Supplementary August 25, 2023 Dataset Update

Continuous InSAR Monitoring of
Ground Displacement
Near Western Caverns and Dome Flank

Sulphur Dome
Westlake Chemicals

August 25, 2023 Update

Date Signed: August 31, 2023
Austin, TX

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Principal Engineer Louisiana
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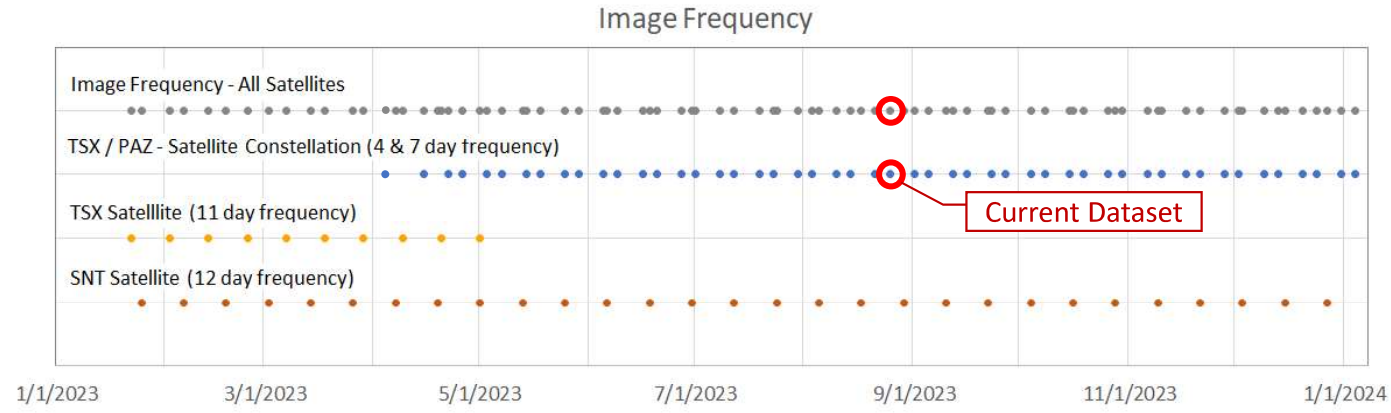
LONQUIST & CO. LLC
PETROLEUM ENGINEERS | ENERGY ADVISORS

Parameters of InSAR Dataset and Collection Frequency

- Satellite Data Delivery Frequency as of April 2023:
  - Sentinel 1 (SNT) 12 days
  - TSX / PAZ Constellation 4 & 7 days
  - 3.96-day avg. frequency

			TSX/PAZ Constellation	
	Sentinel-1	TerraSAR-X	TerraSAR-X	PAZ
Mode / Resolution	16 x 65 ft	Spotlight (3 x 3 ft)	Spotlight (3 x 3 ft)	Spotlight (3 x 3 ft)
Track	T136	T29	T67	T120
Band (wavelength)	C-Band (2.32 in)	X-Band (1.22 in)	X-Band (1.22 in)	X-Band (1.22 in)
Nominal frequency	12- day	11- day	11- day	11- day
Orbit (LOS angle)	Ascending 43°	Descending 17°	Descending 37°	Descending 37°
Date range	04 Oct 2016 – 20 Jan 2024	16 Jun 2022 – 01 May 2023	24 Jan 2023 – 11 Jan 2024	28 Jan 2023 – 15 Jan 2024
Number of images	199	30	34	33

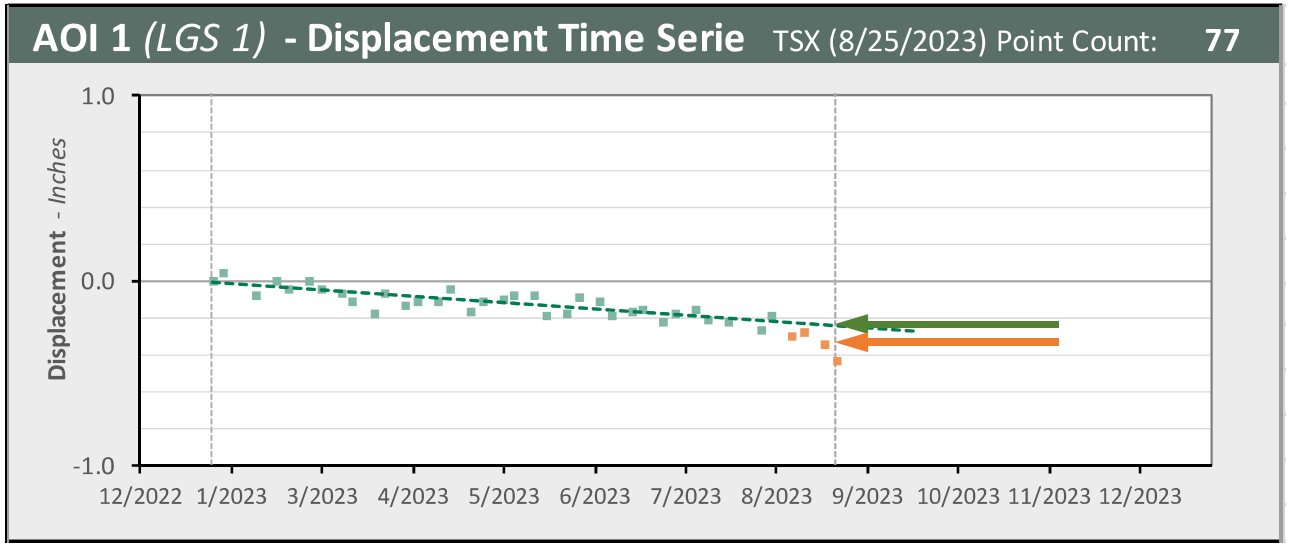


Supplementary Update

- In the latest dataset (8/25/2023) received from the TSX/PAZ constellation, multiple consecutive displacement measurements ("August data") were noted to have fallen below trend in a few of the review areas
- The following supplementary investigation was performed to review the trends in more detail and to map the degree of deviation from trends observed throughout the full dataset
- In order to compare and quantify the difference observed in the recent data, the last 4 updates were evaluated separately from the preceding historical data
  - The preceding historical data was found to be best represented by a linear trend line (no improvement in R^2 value using non-linear quadratic fit)
  - The last 4 update measurements are too few to derive a trend due to data fluctuation (noise) that is known to be present. Instead the average displacement in the last 4 measurements was considered

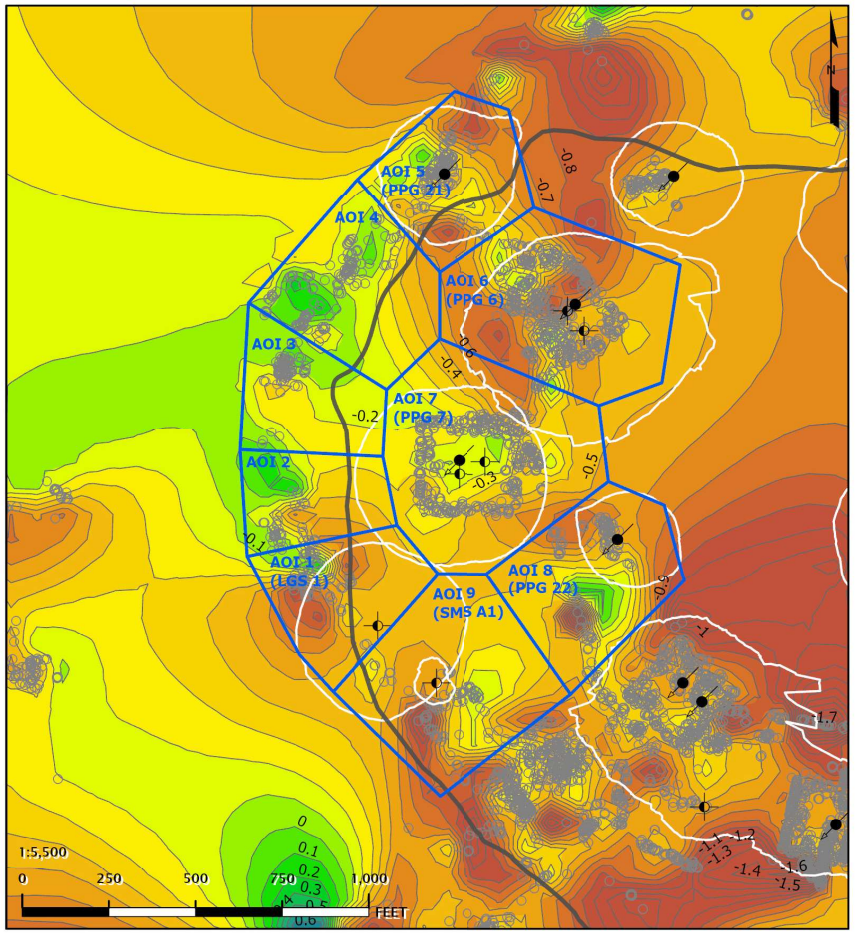
Supplementary Update

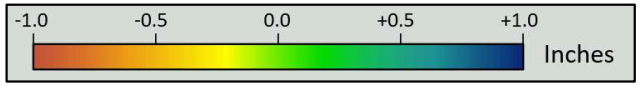
- The below chart provides an example of the evaluation performed
- For each measurement point in the dataset two displacement values were calculated
  - The displacement predicted for 8/25/2023 by the historical linear trend (Green Arrow)
  - The displacement averaged between the last 4 measurements (Orange Arrow)



Supplementary Update – Mapped Data

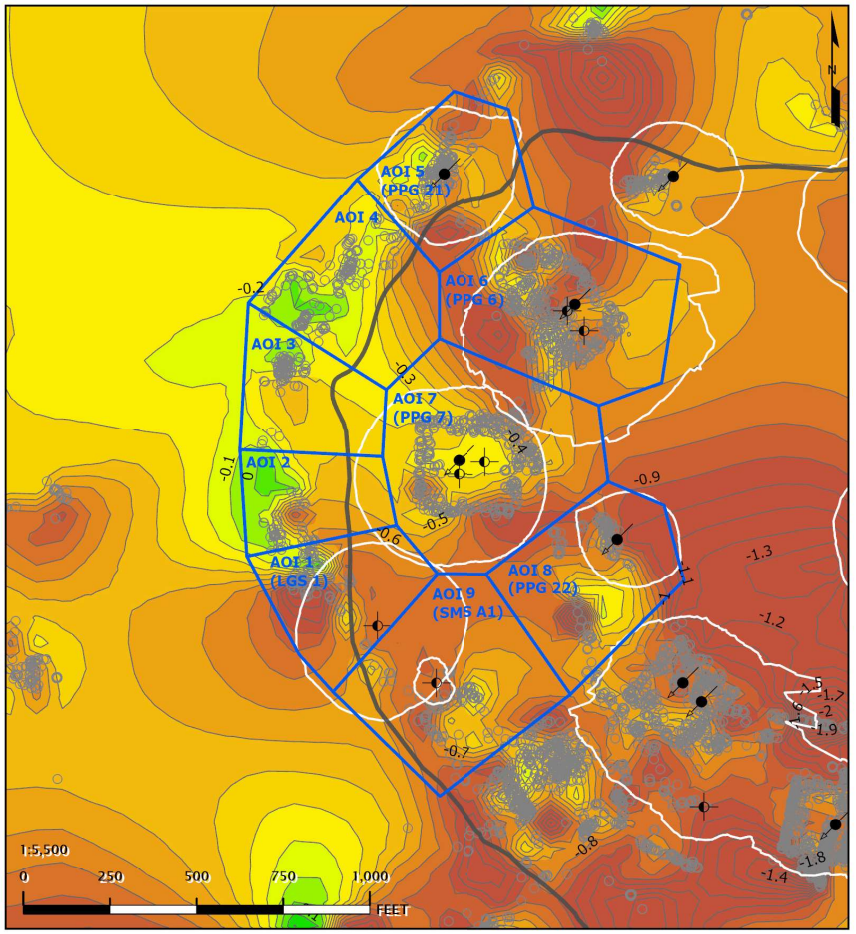
- The map to the right shows:
  - The displacement predicted for 8/25/2023 by the historical linear trend for each data point (Green Arrow from chart example)

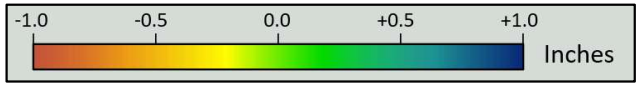




Supplementary Update – Mapped Data

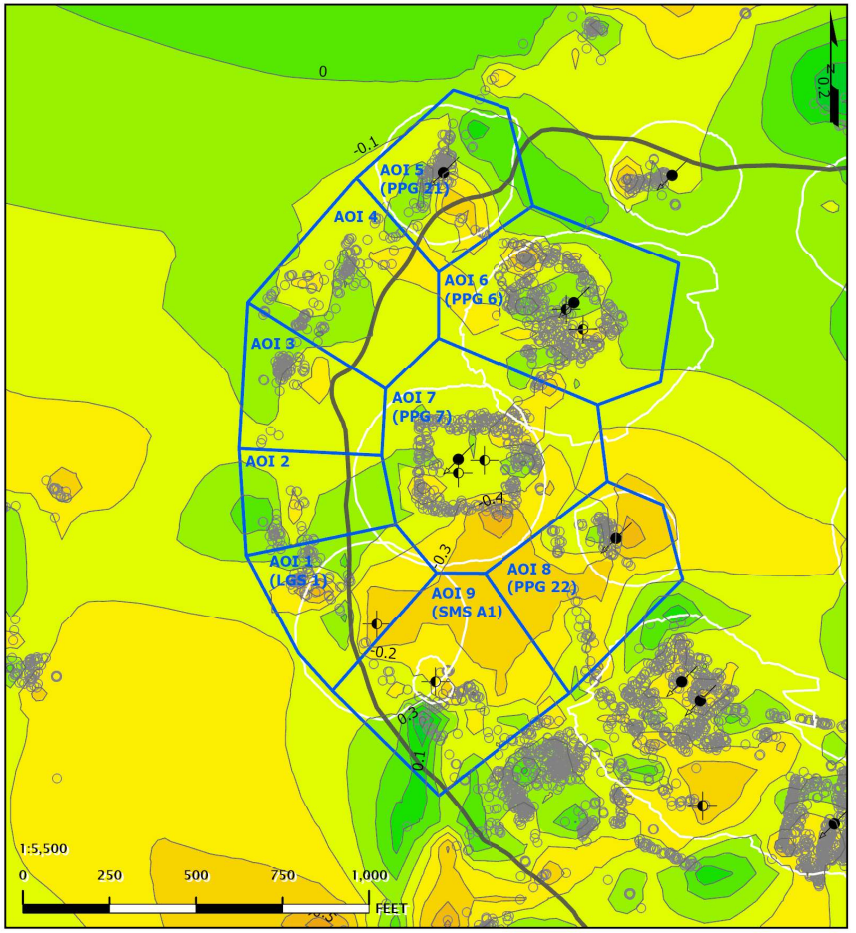
- The map to the right shows:
  - The displacement averaged between the last 4 measurements for each data point (Orange Arrow from chart example)
- The change in displacement relative to the historical trend map appears to have occurred broadly across the larger data area to varying degrees
  - This implies that at least part of what we are seeing in the trend deviation may not be related to a specific cavern location, i.e. something affecting measurement accuracy or seasonal ground movement from dry conditions

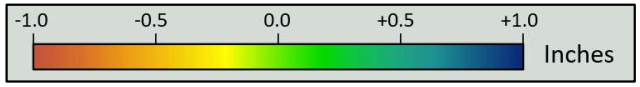




Supplementary Update – Mapped Data

- The map to the right shows:
  - The difference between the displacement predicted by the historical linear trends and the average actual displacement in the last 4 measurements
- Most values are negative indicating a general downward movement in the last 4 measurement points relative to the historical trends
- There is a slight increase in the difference south of PPG 7 corroborating what was seen in the charts for those AOIs

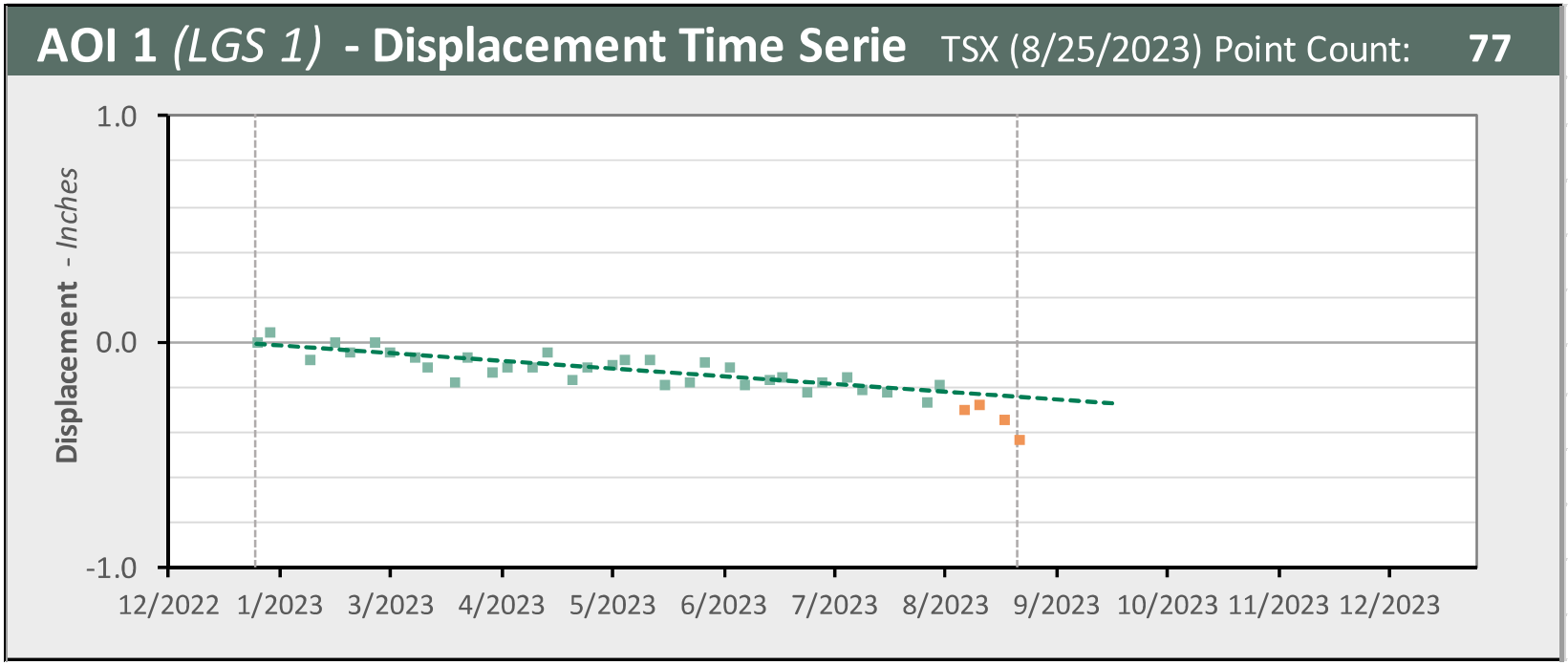




TSX/PAZ - 8/25/2023

Supplementary Update – AOI Displacement Time Series

- Averaged data from the AOI regions pictured on the prior maps are shown below for reference



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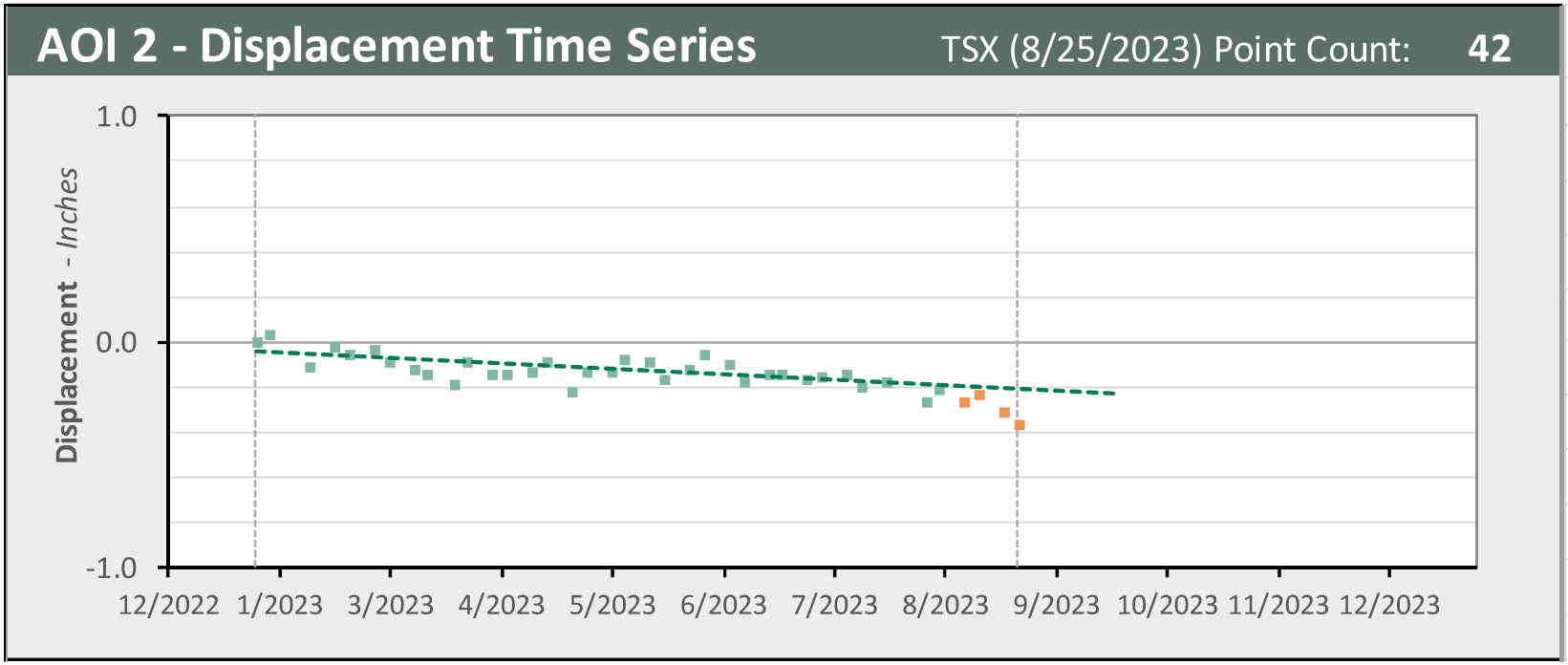

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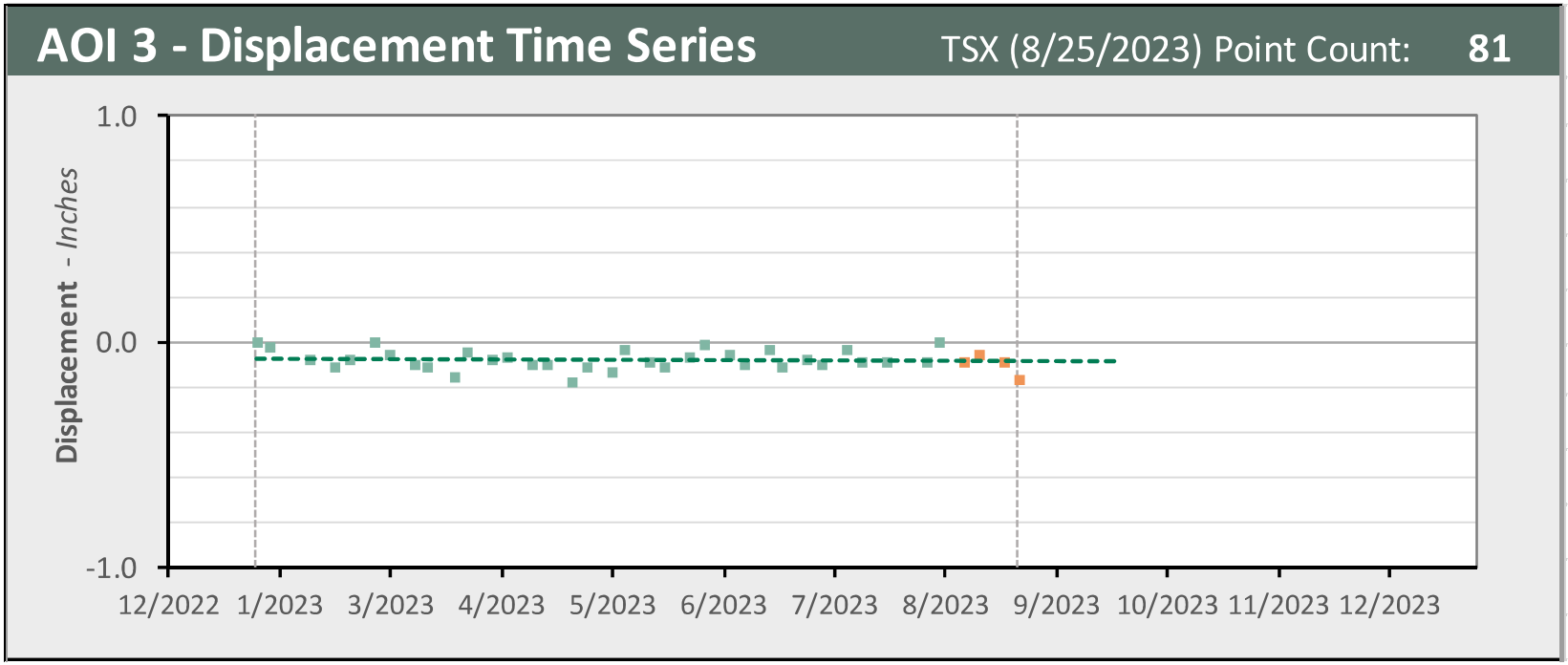

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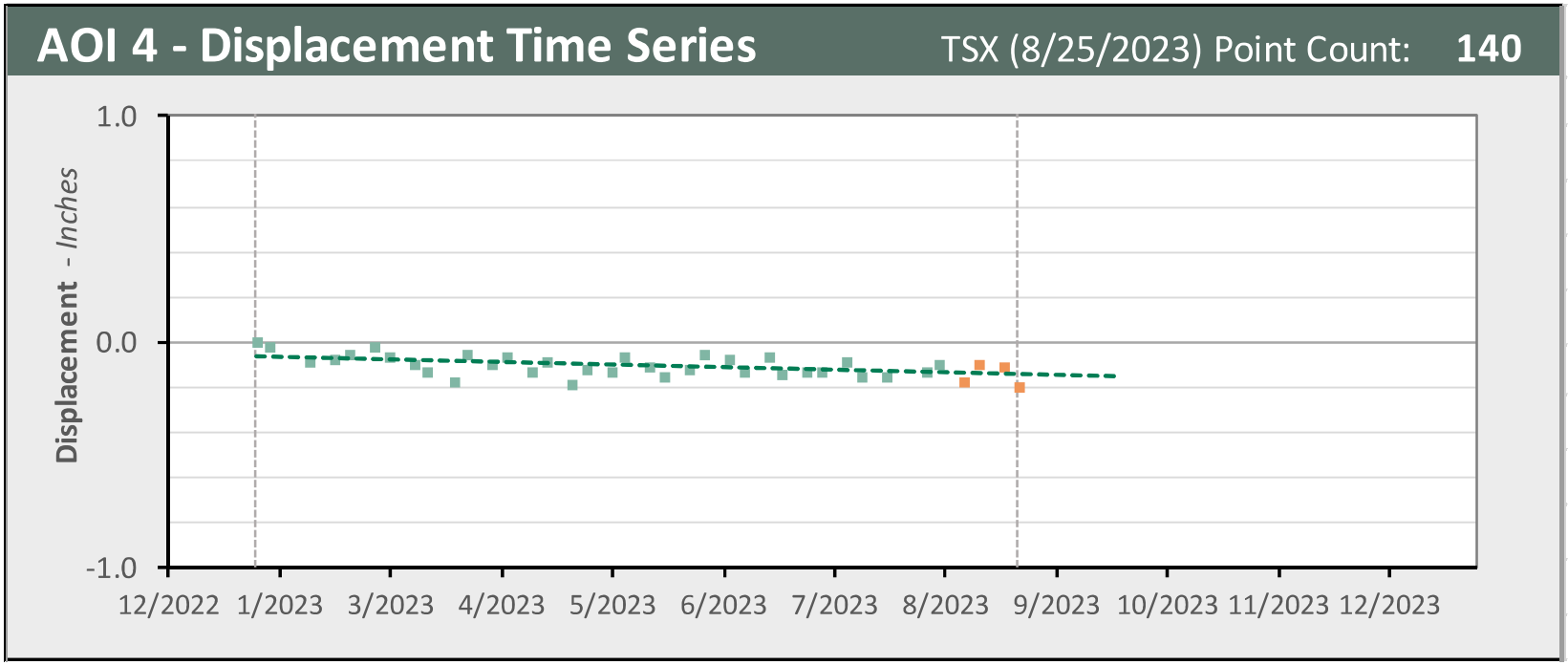

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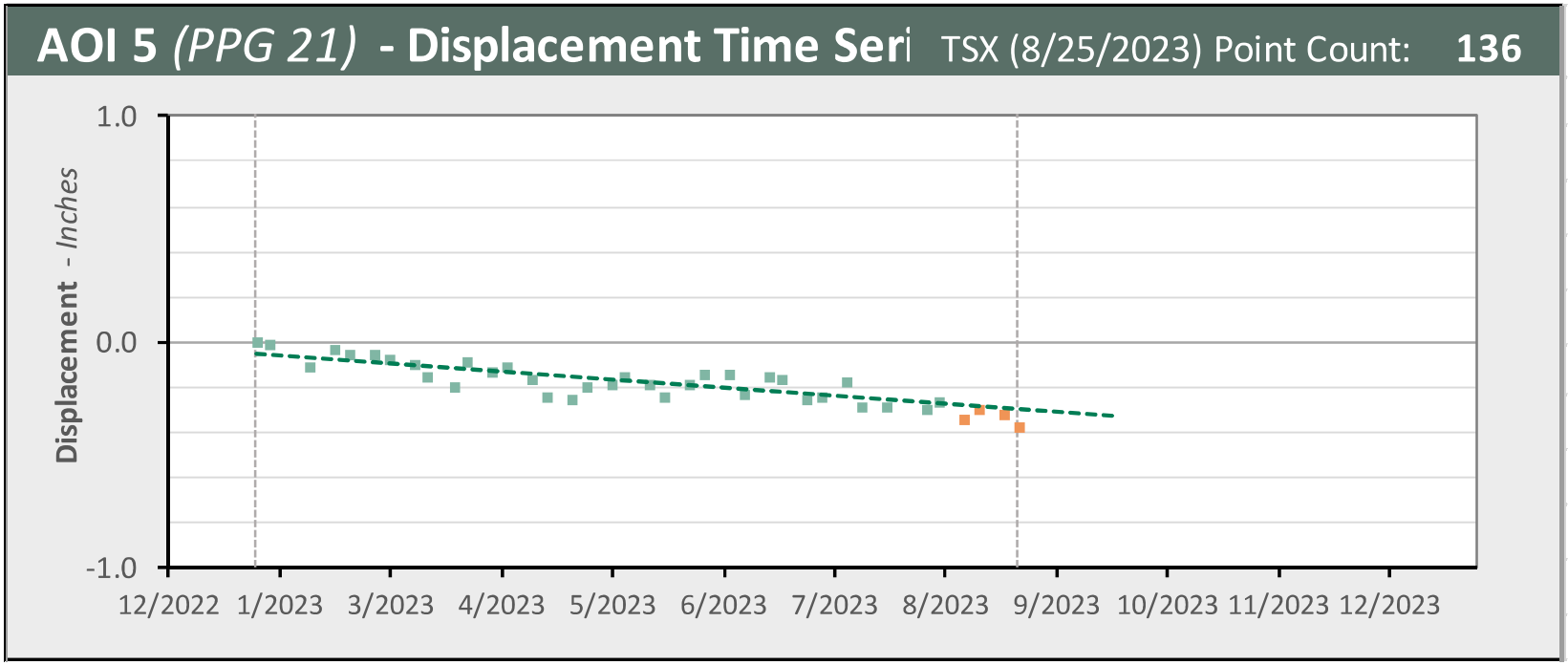

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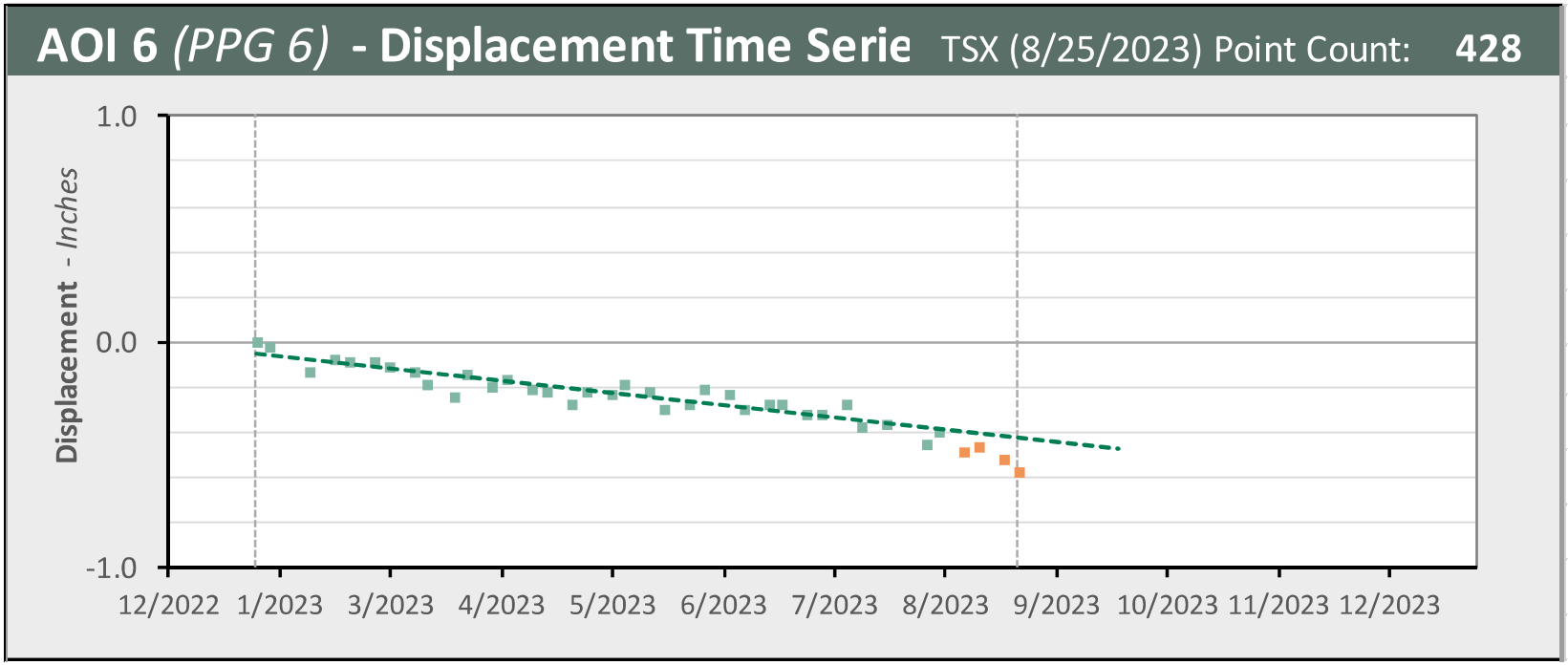

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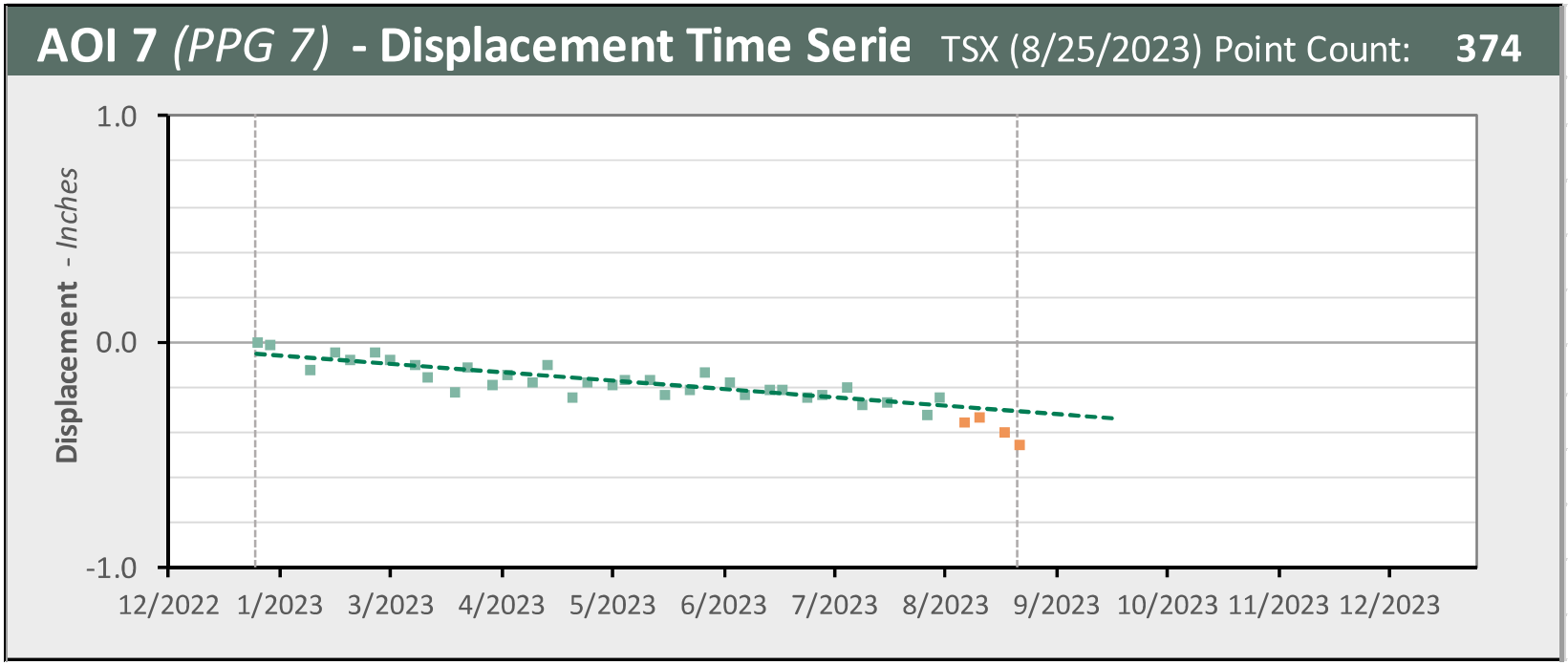

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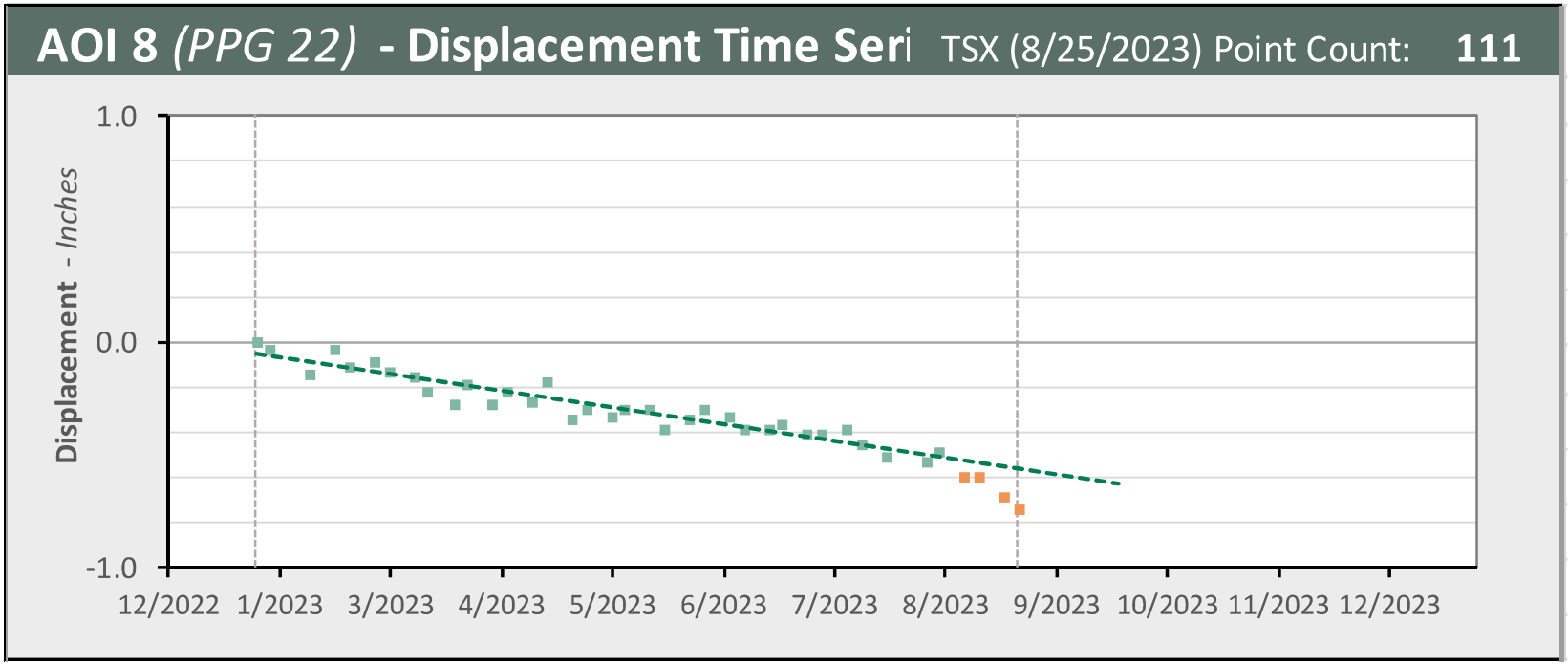

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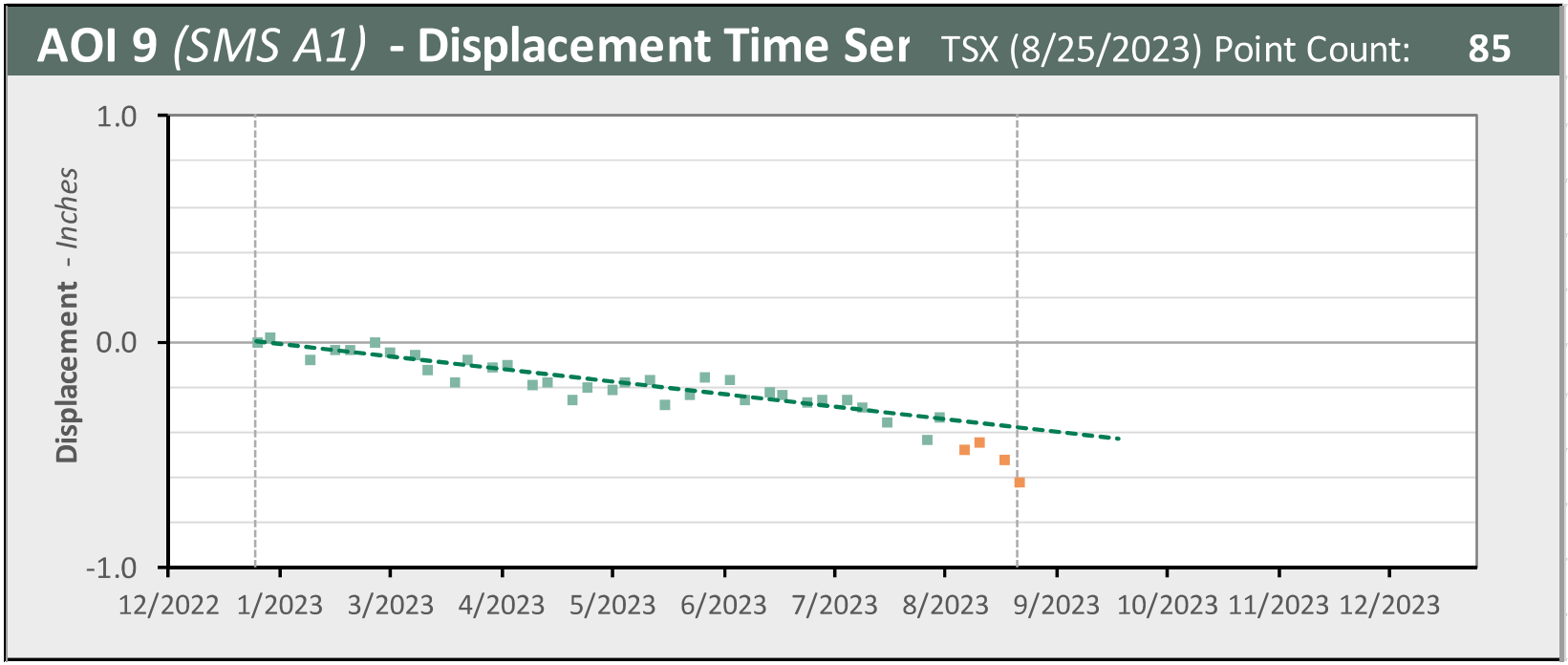


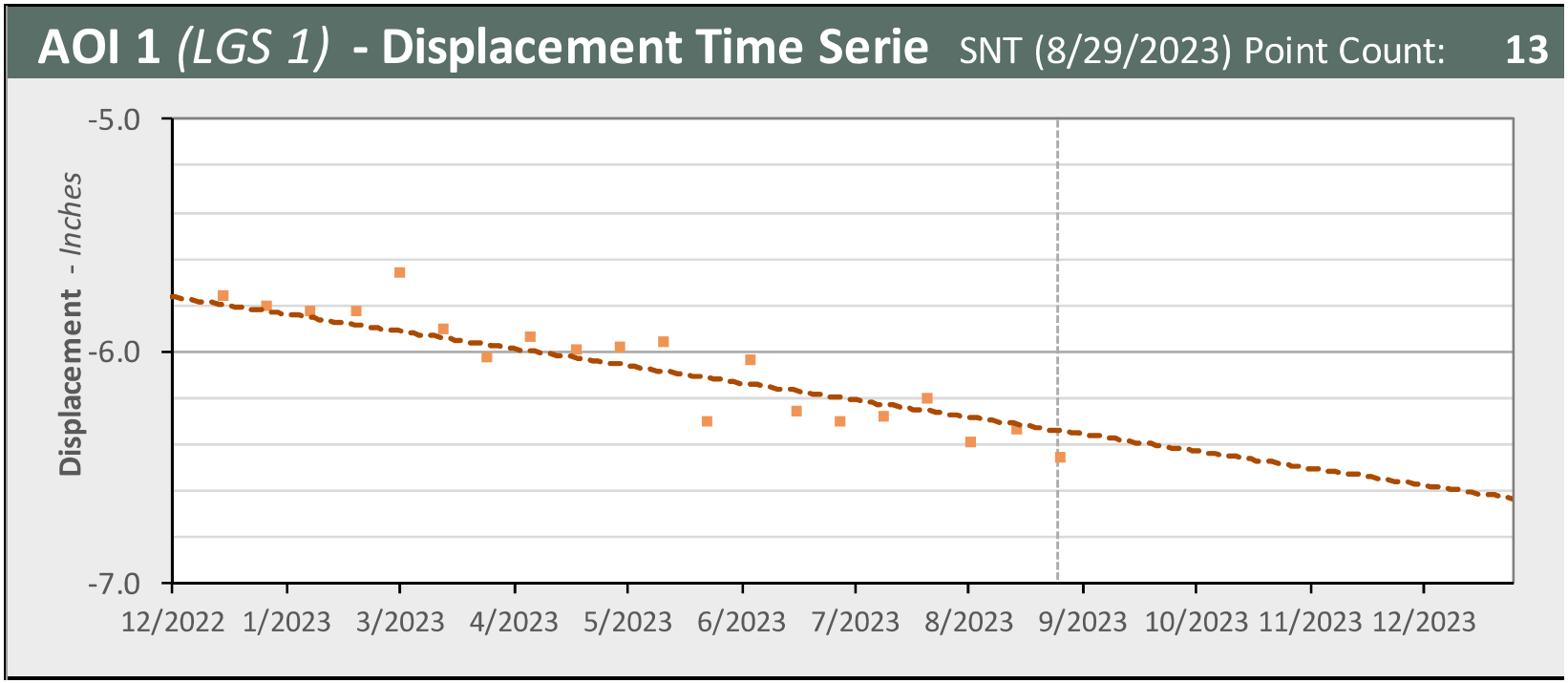
SNT – 8/29/2023

SNT Data – 8/29/2023

- New data received from the latest SNT update (8/29/2023) was reviewed
- There does not appear to be a similar difference to what was observed in the TSX/PAZ data in August
- The latest SNT datapoints generally fall on the current trends within the precision range of the data
- The following SNT charts have been prepared for the same AOI regions plotted in the prior TSX/PAZ section, along with matching X and Y-axis scales for reference

SNT – AOI Displacement Time Series

- Averaged SNT data (8/29/2023) from the AOI regions



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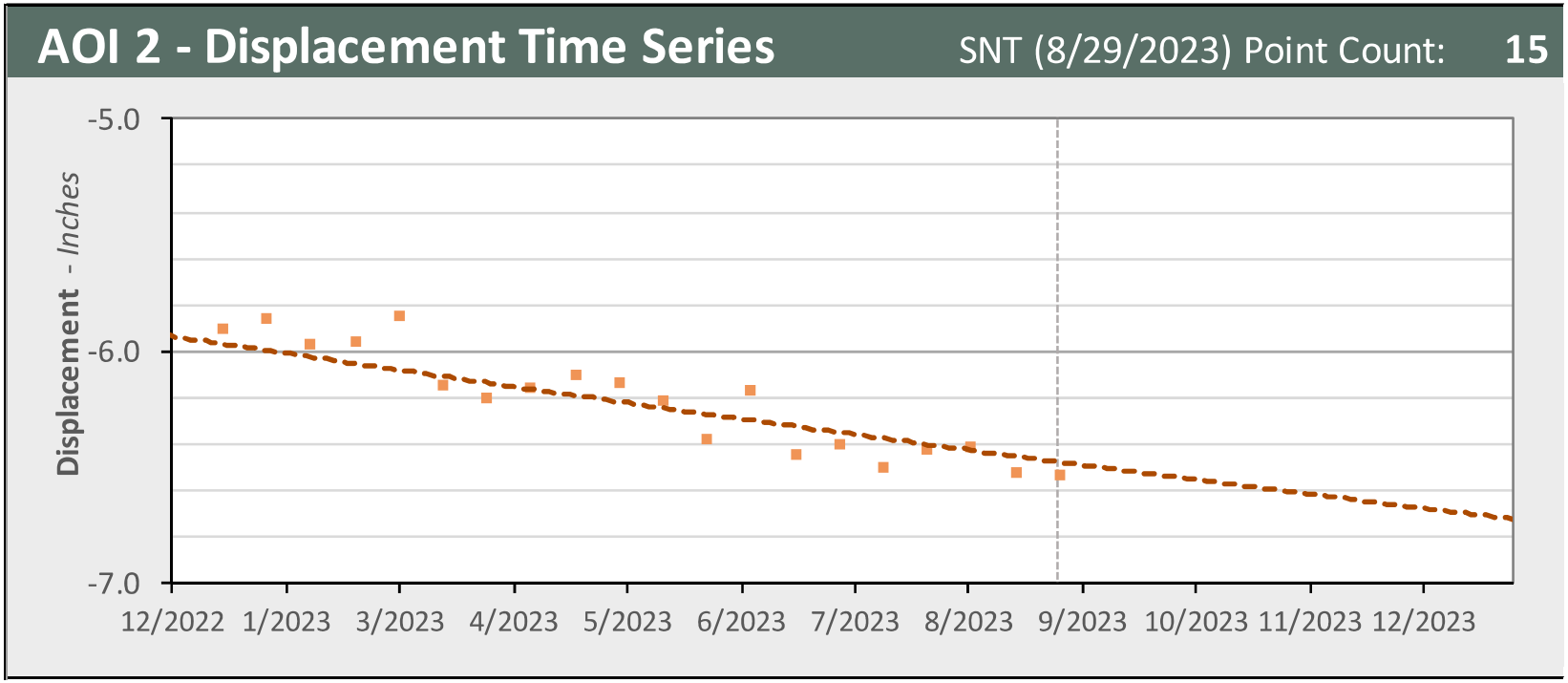

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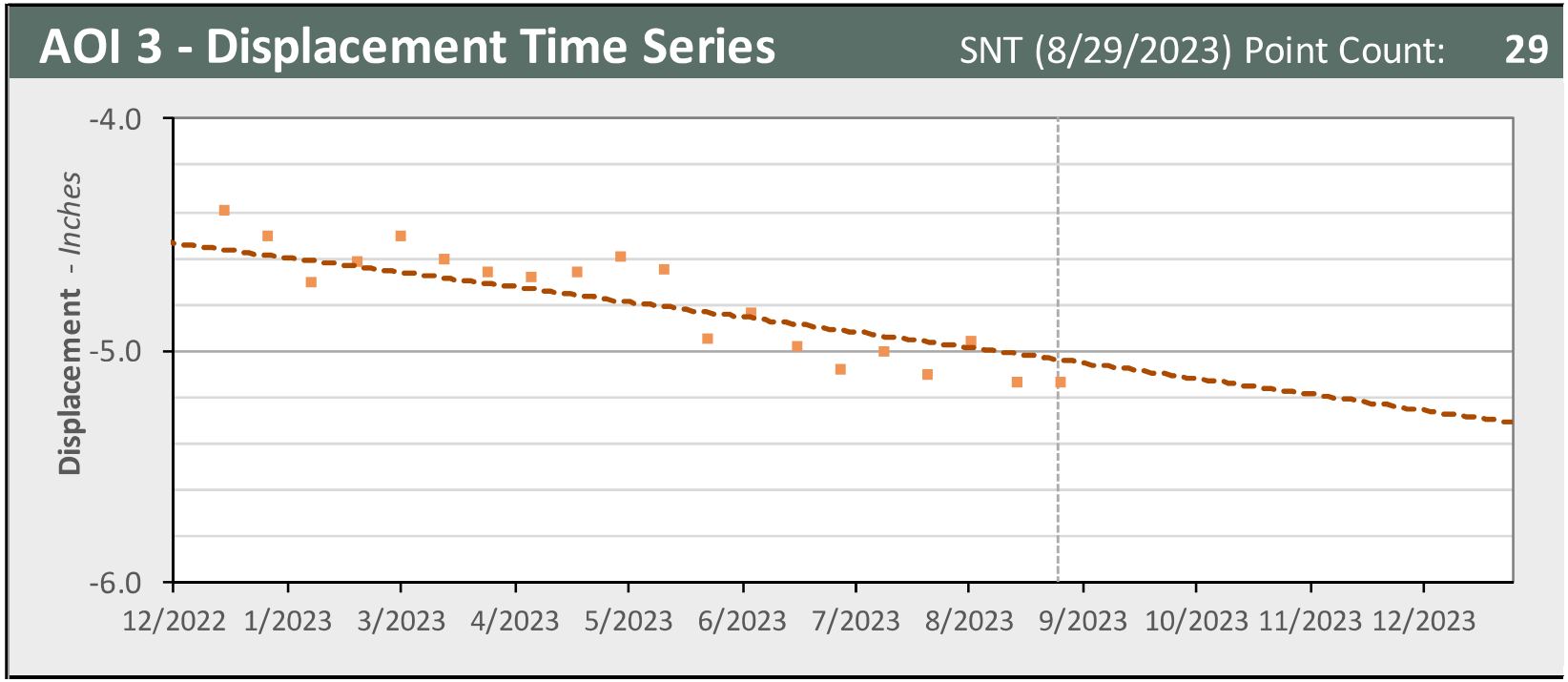

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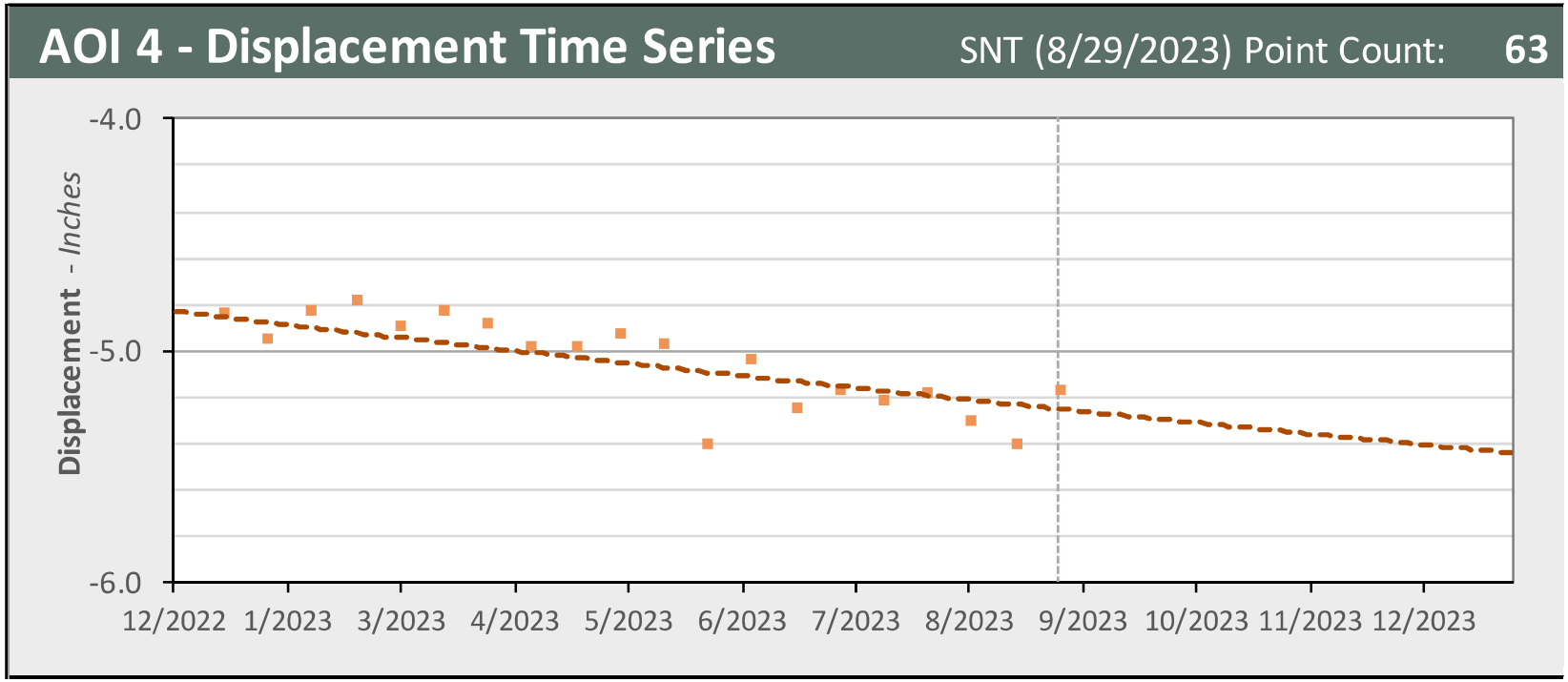

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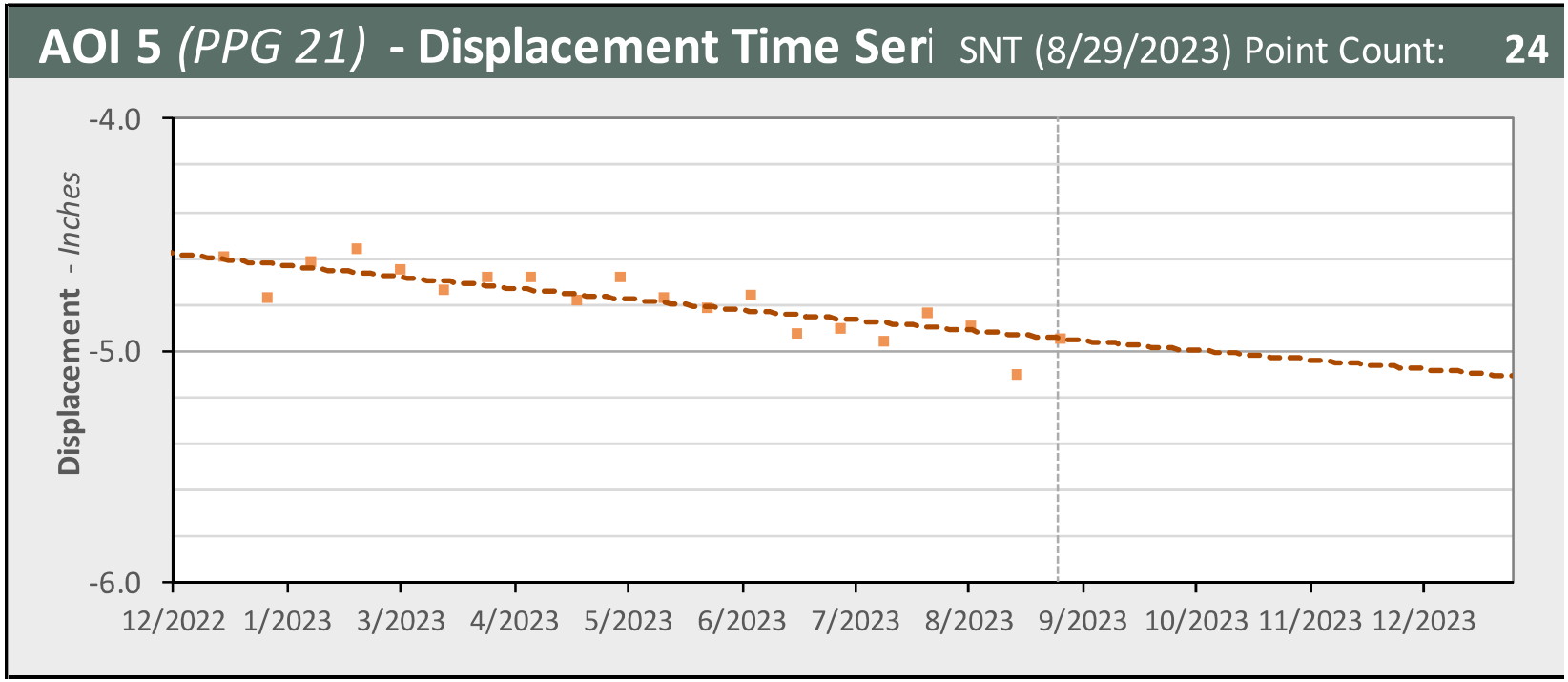

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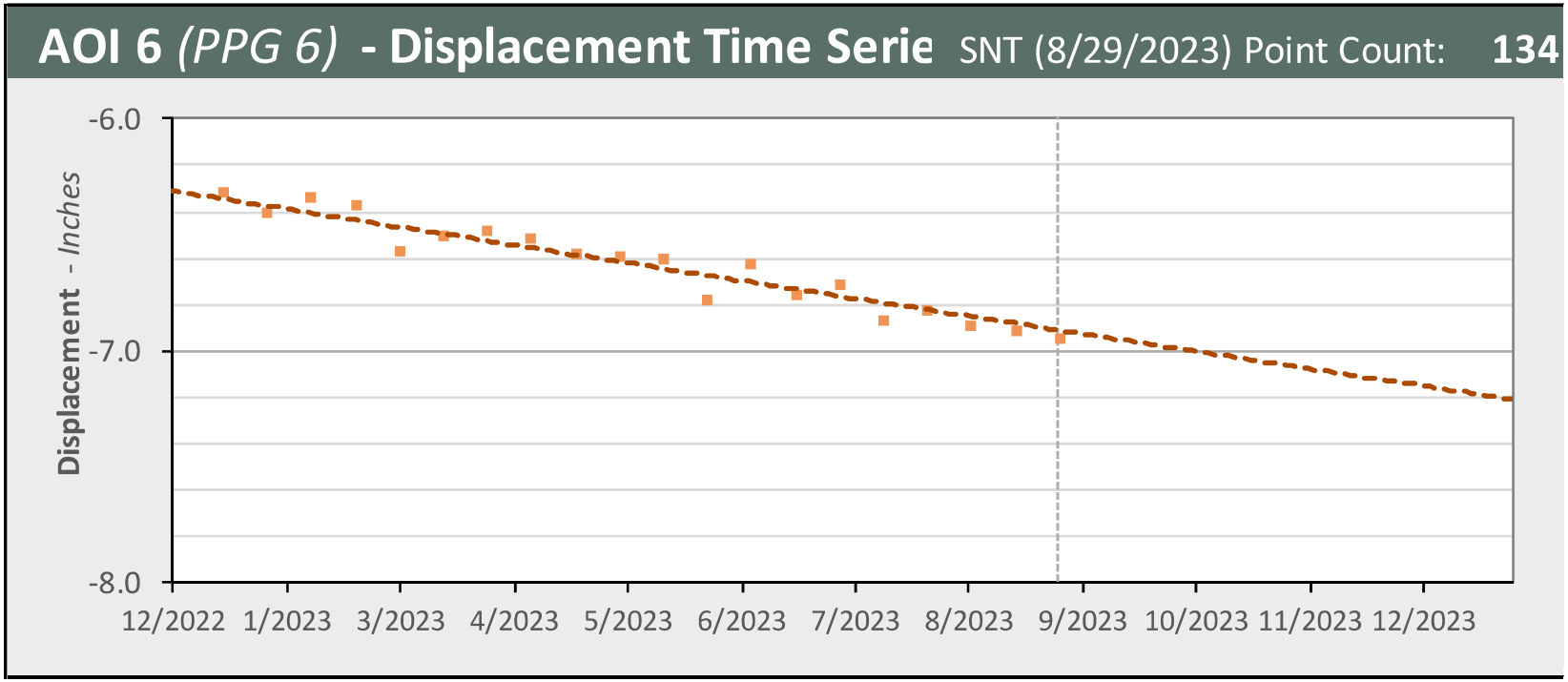

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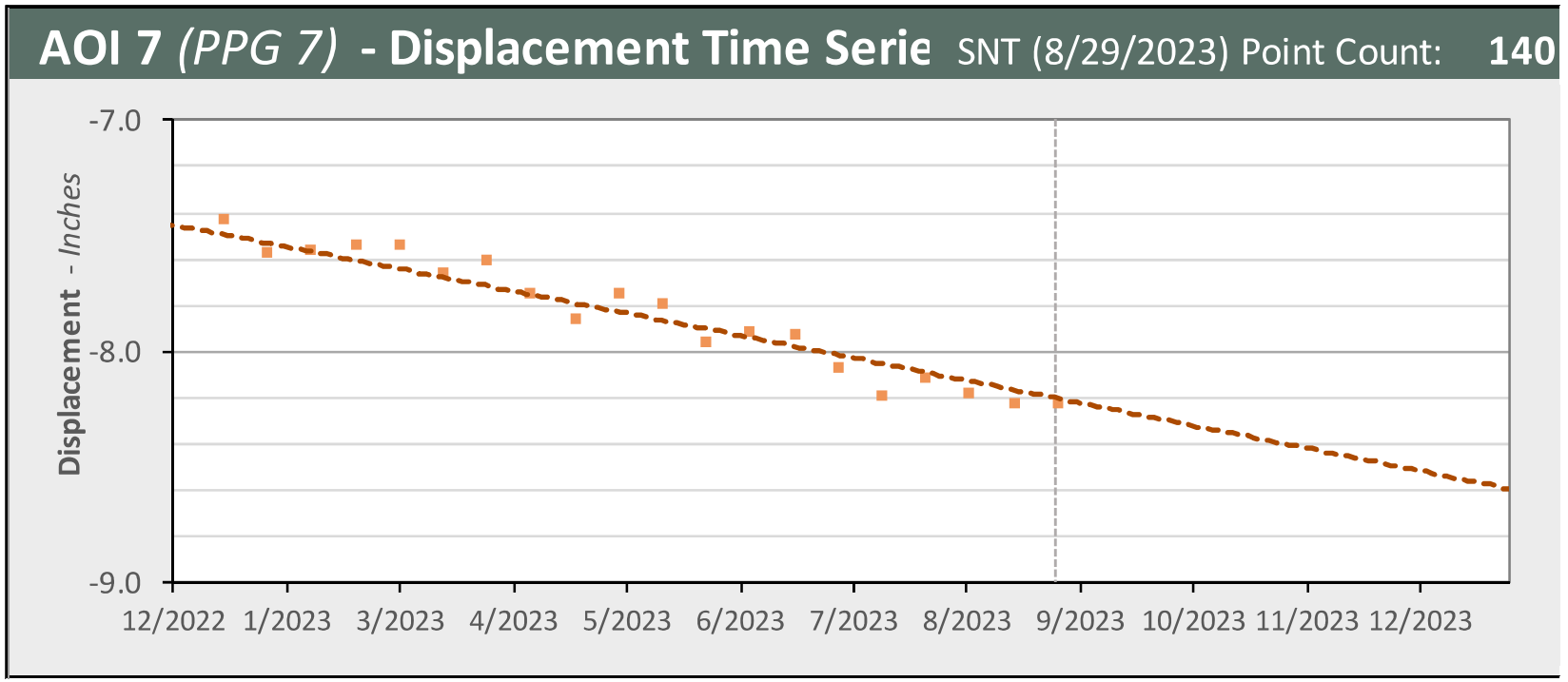

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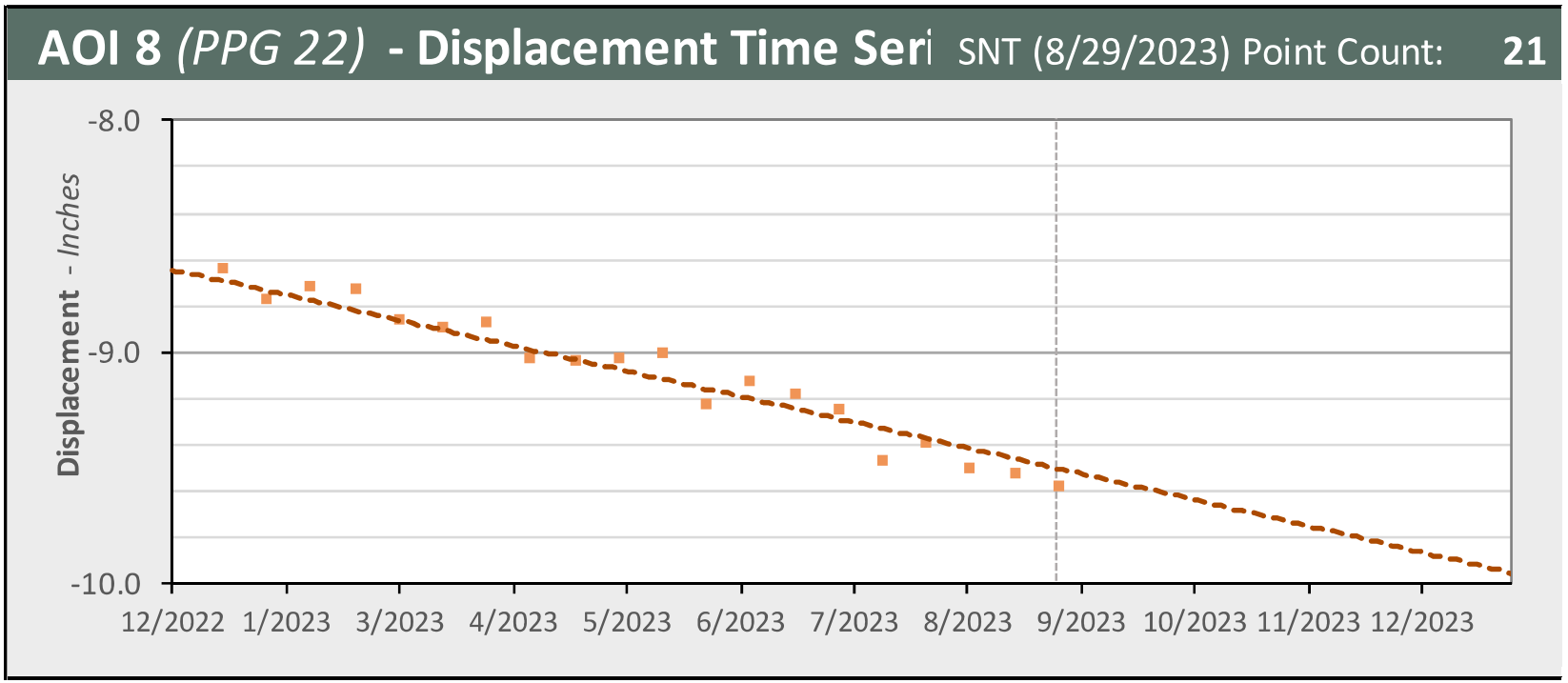

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