TSX/PAZ Satellite Update
InSAR Subsidence
November 17, 2023

<u>Lonquist comment:</u>

The TSX satellite from the TSX/PAZ constellation (4 & 7-day revisit) passed by Sulphur on Friday November 17. We received the dataset Sunday and verified that none of the datapoint areas around the dome and caverns near the western flank are showing deviation from their respective trends. The attached time series plots have been prepared for reference.

Submitted by: Nathaniel Byars (Lonquist)

TSX/PAZ Satellite Update

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

Sulphur Mines Salt Dome

Prepared for:
Westlake Chemical

Prepared by:
Lonquist & Co., LLC
8591 United Plaza Blvd.
Suite 280
Baton Rouge, LA 70809

Date Signed: November 23, 2023
Austin, Texas

Nathaniel L. Byars, P.E.
Principal Engineer
Louisiana License No. 40697

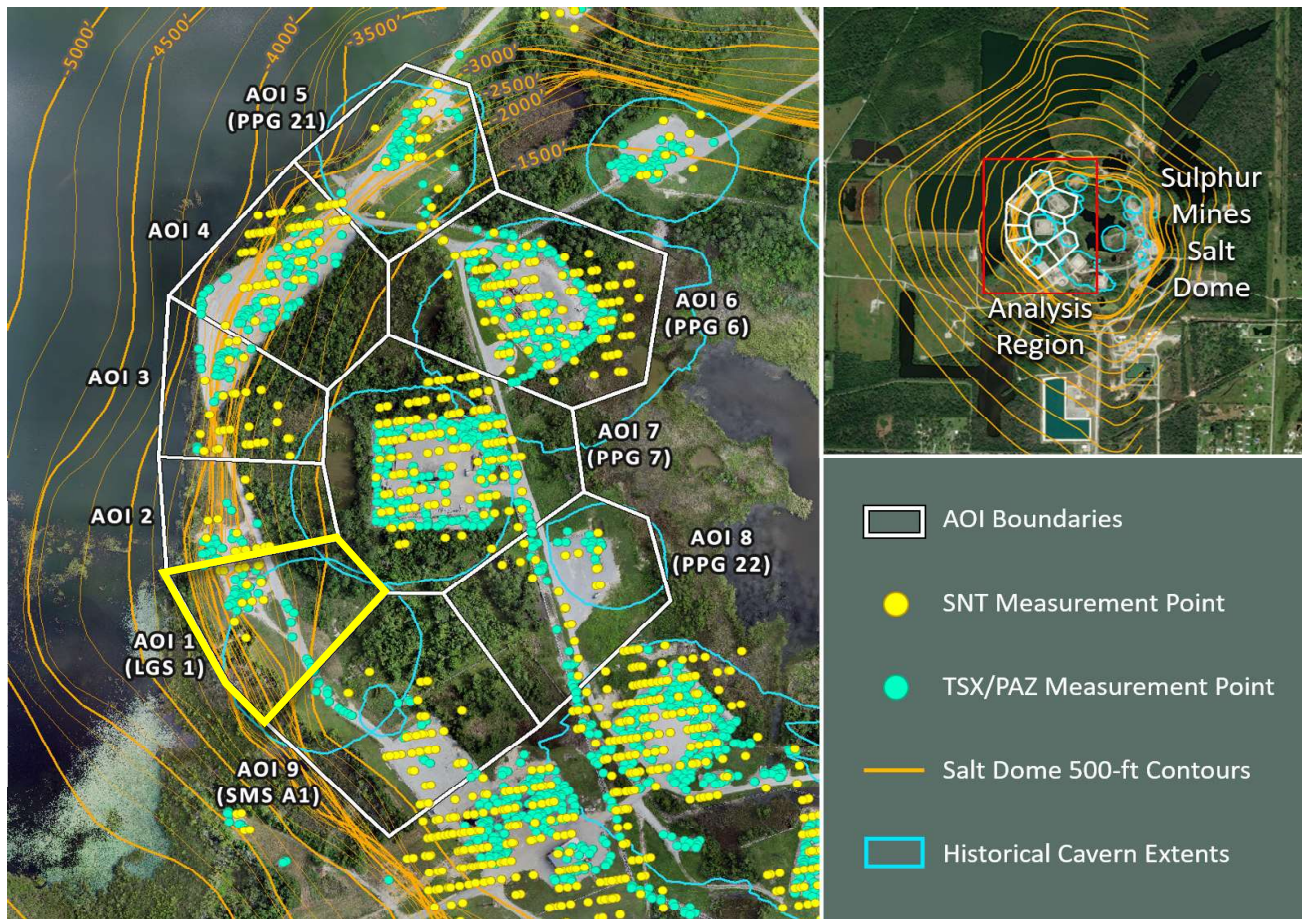| Dataset |
| --- |
| Satellite Source |
| **TerraSAR-X - PAZ Constellation** |
| Most Recent Image Date |
| **Friday, November 17, 2023** |

Analysis Report Date:

November 23, 2023

AOI 1 *(LGS 1)* - Location Map

Legend:
- **AOI Boundaries**
- **SNT Measurement Point**
- **TSX/PAZ Measurement Point**
- **Salt Dome 500-ft Contours**
- **Historical Cavern Extents**

AOI 1 *(LGS 1)* - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **38**

R² = 0.3979
R² = 0.0000
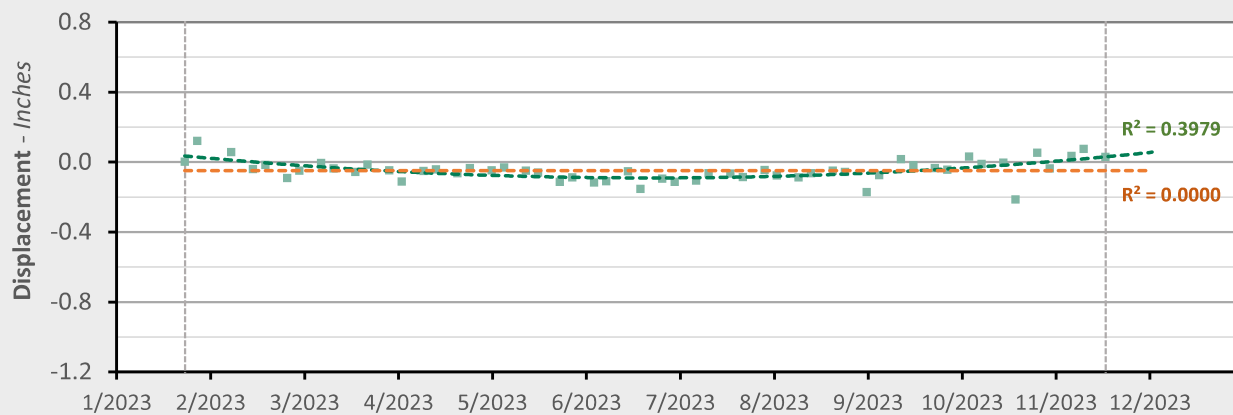
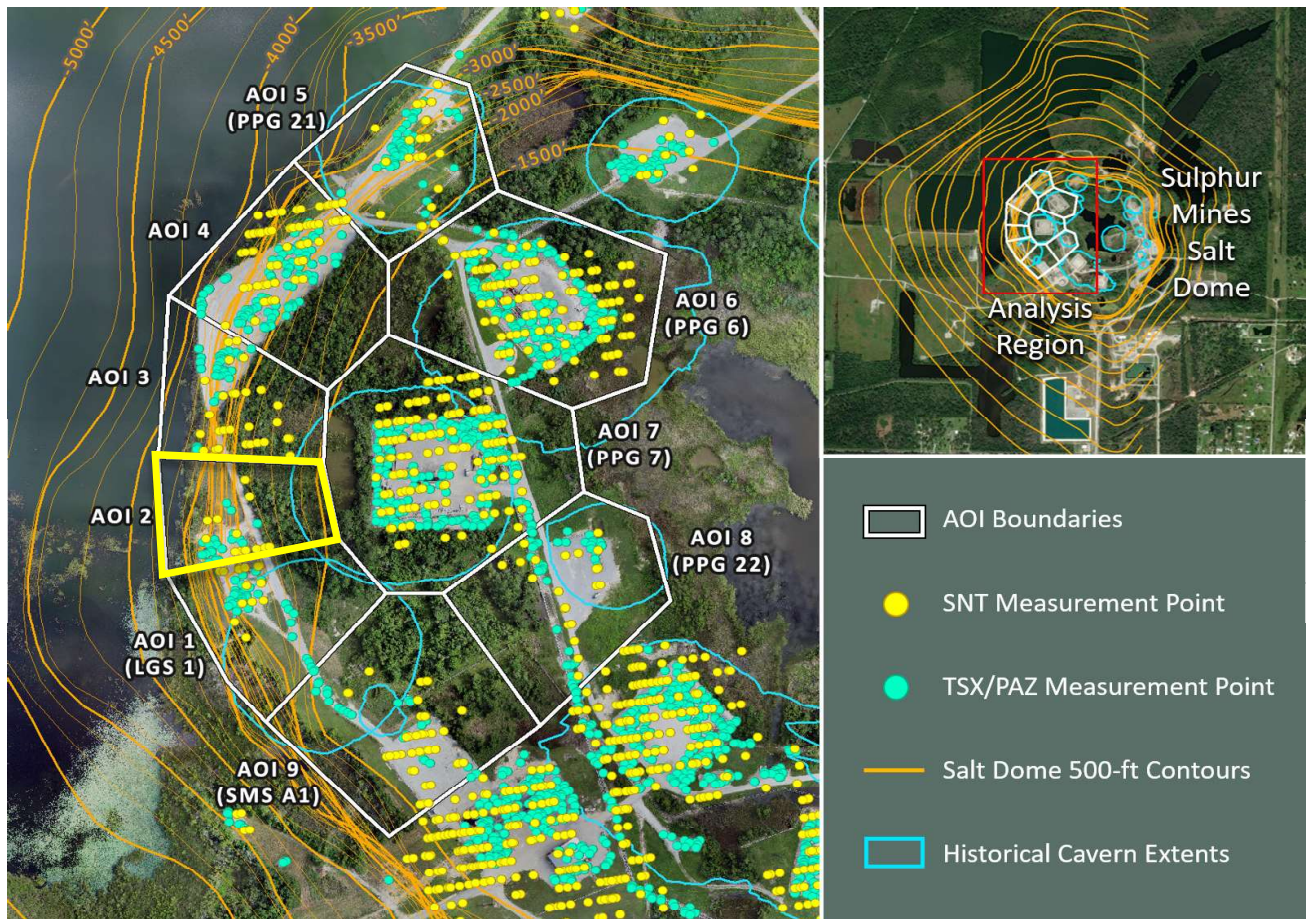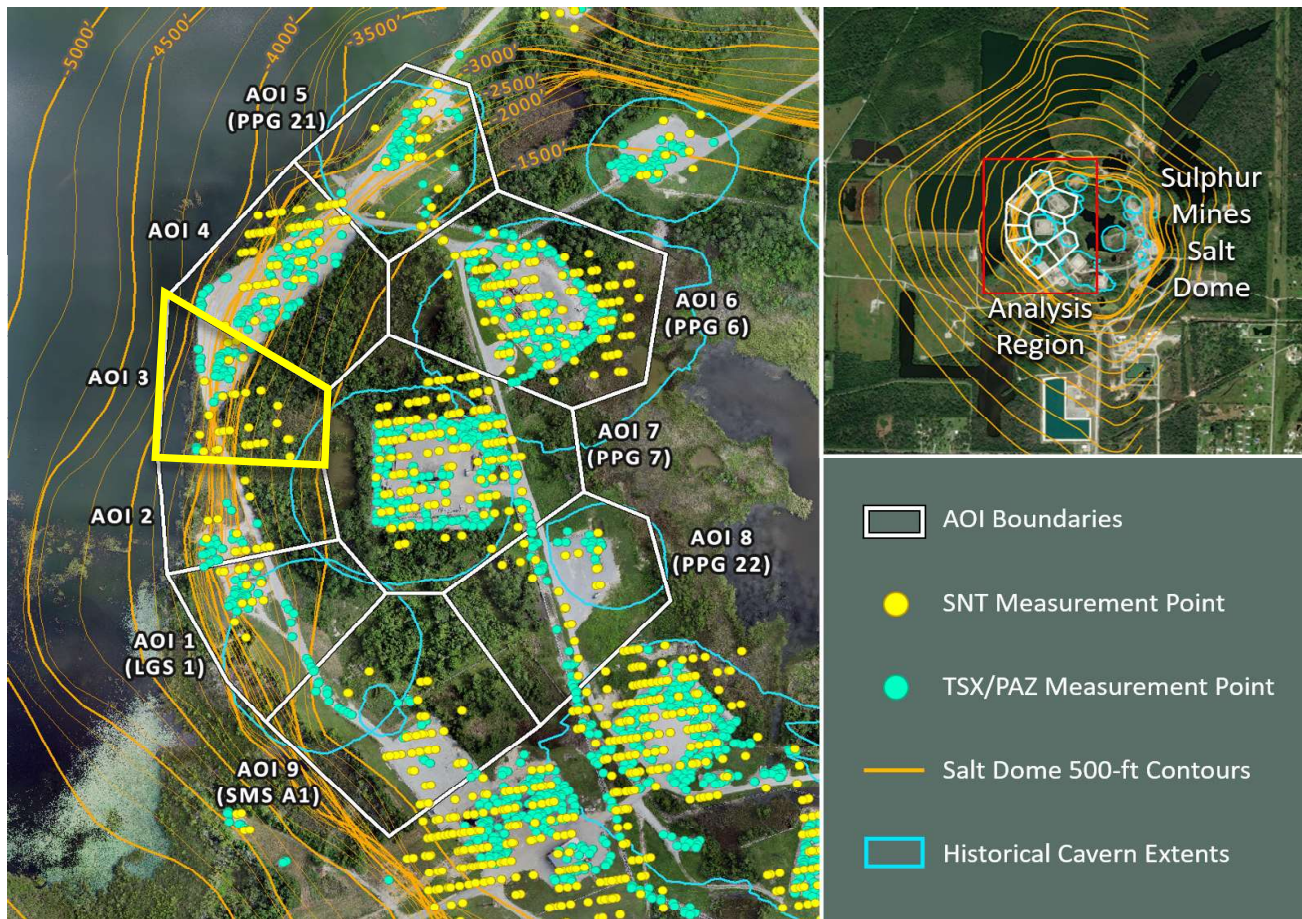|	Nonlinear Trend	Linear Trend
Velocity:	+0.60 in/yr	-0.00 in/yr
Acceleration:	+1.49 in/yr²	0.00 in/yr²

- ■ LOS Displacement Measurement
- - - Nonlinear Trend Line (Quadratic Regression)
- - - Linear Trend Line (Linear Regression)

AOI 2 - Location Map

Legend:
- AOI Boundaries
- SNT Measurement Point
- TSX/PAZ Measurement Point
- Salt Dome 500-ft Contours
- Historical Cavern Extents

Map labels: AOI 5 (PPG 21), AOI 4, AOI 3, AOI 2, AOI 6 (PPG 6), AOI 7 (PPG 7), AOI 8 (PPG 22), AOI 1 (LGS 1), AOI 9 (SMS A1), Sulphur Mines Salt Dome, Analysis Region

AOI 2 - Displacement Time Series

TSX/PAZ (11/17/2023) Point Count: **23**
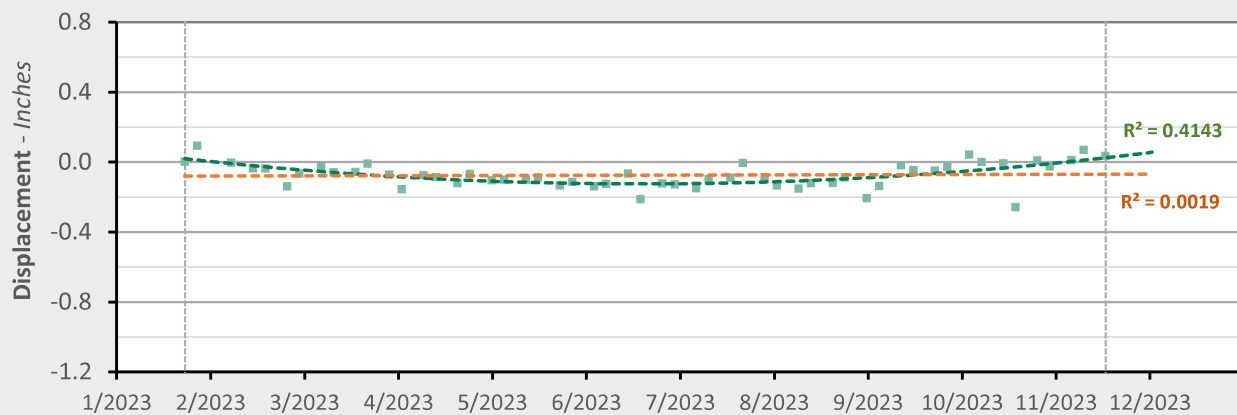
	Nonlinear Trend	Linear Trend
Velocity:	+0.73 in/yr	+0.01 in/yr
Acceleration:	+1.77 in/yr^2	0.00 in/yr^2

Legend: LOS Displacement Measurement · Nonlinear Trend Line (Quadratic Regression) · Linear Trend Line (Linear Regression)

Chart annotations: $R^2 = 0.4143$, $R^2 = 0.0019$

AOI 3 - Location Map

Legend:
- AOI Boundaries
- SNT Measurement Point
- TSX/PAZ Measurement Point
- Salt Dome 500-ft Contours
- Historical Cavern Extents

AOI 3 - Displacement Time Series

TSX/PAZ (11/17/2023) Point Count: **39**

$R^2 = 0.5762$

$R^2 = 0.2883$
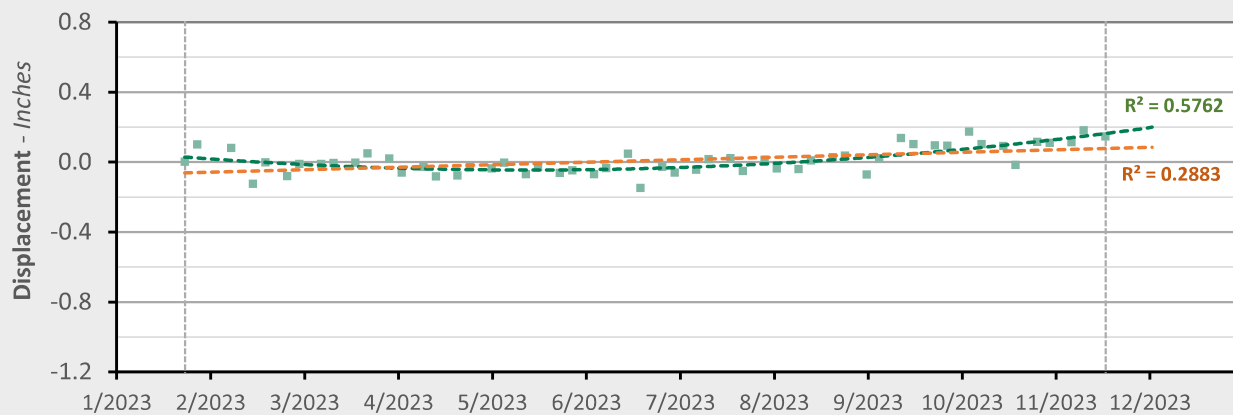
	Nonlinear Trend	Linear Trend
Velocity:	+0.82 in/yr	+0.17 in/yr
Acceleration:	+1.61 in/yr^2	0.00 in/yr^2

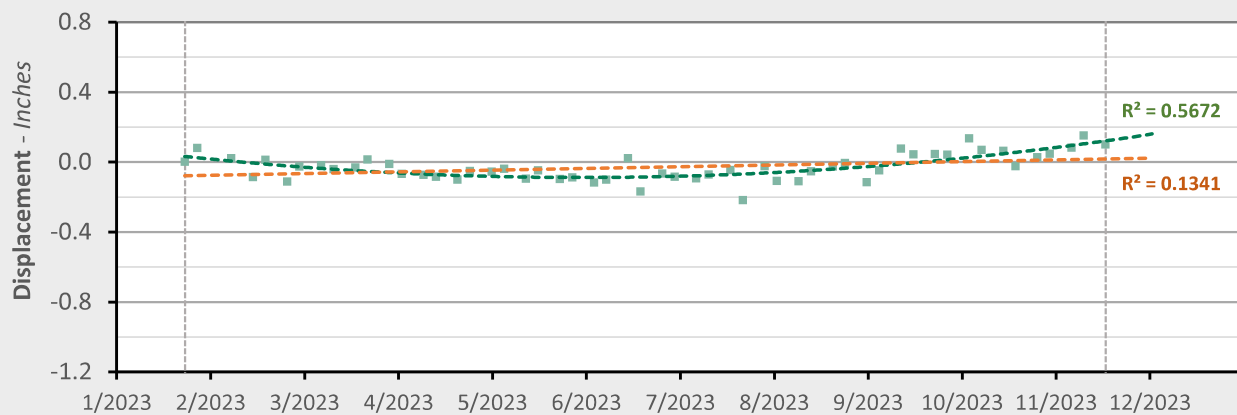- ■ LOS Displacement Measurement
- - - Nonlinear Trend Line (Quadratic Regression)
- - - Linear Trend Line (Linear Regression)
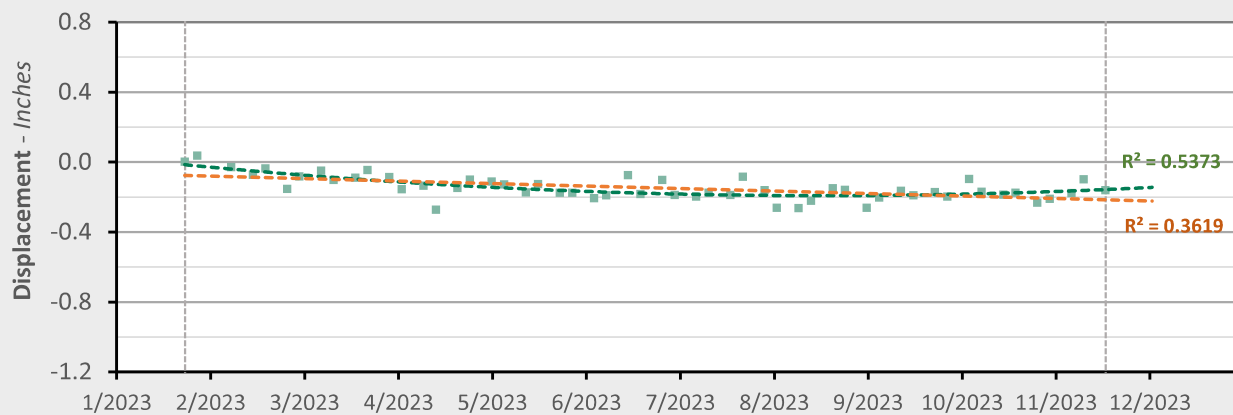
AOI 4 - Location Map
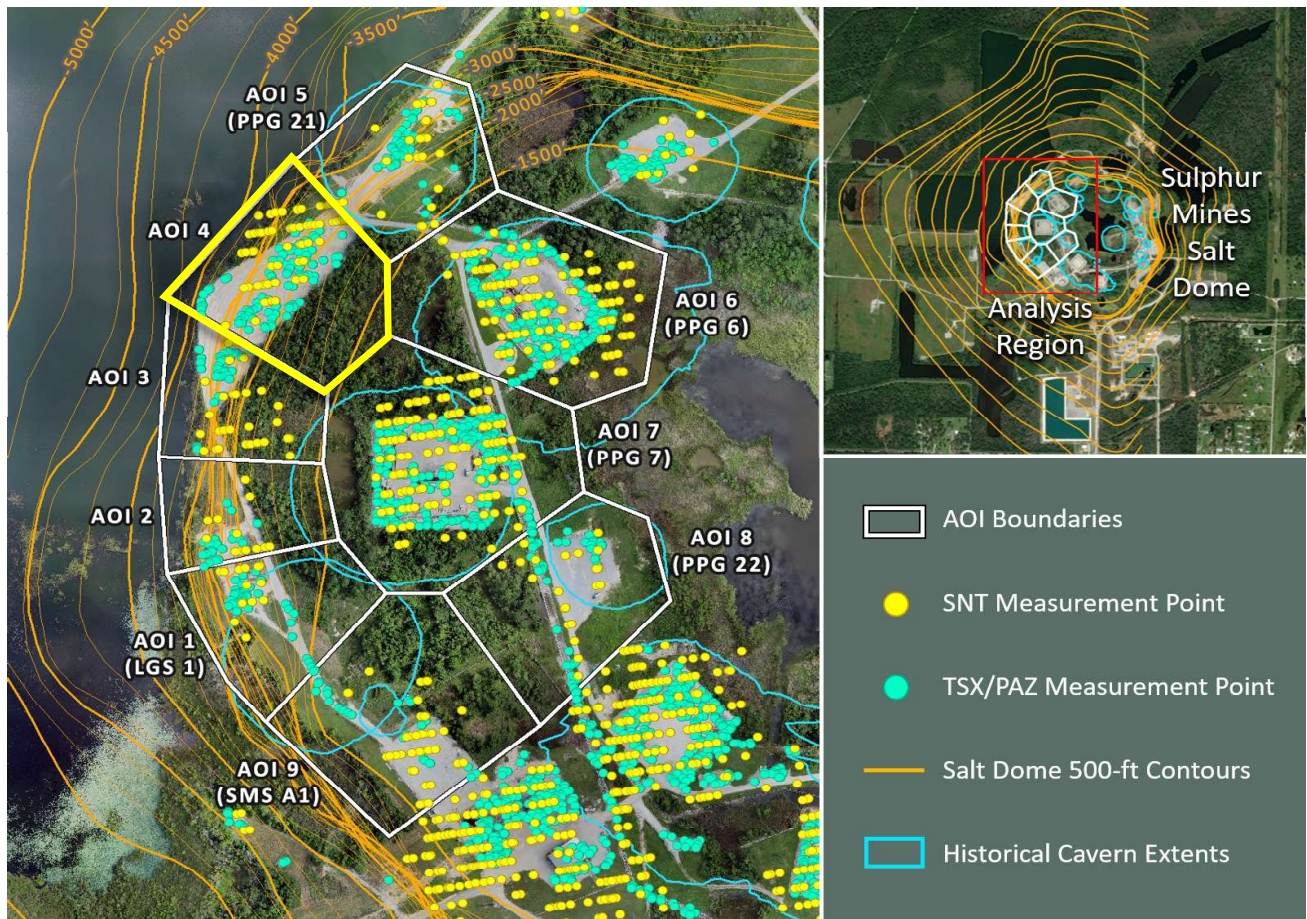
AOI 5 (PPG 21)

AOI 4

AOI 3

AOI 2

AOI 1 (LGS 1)

AOI 9 (SMS A1)

AOI 6 (PPG 6)

AOI 7 (PPG 7)

AOI 8 (PPG 22)

Sulphur Mines Salt Dome

Analysis Region

Legend:
- ▭ AOI Boundaries
- 🟡 SNT Measurement Point
- 🟢 TSX/PAZ Measurement Point
- — Salt Dome 500-ft Contours
- ▭ Historical Cavern Extents

AOI 4 - Displacement Time Series

TSX/PAZ (11/17/2023) Point Count: **103**

Displacement - *Inches*

$R^2 = 0.5672$

$R^2 = 0.1341$

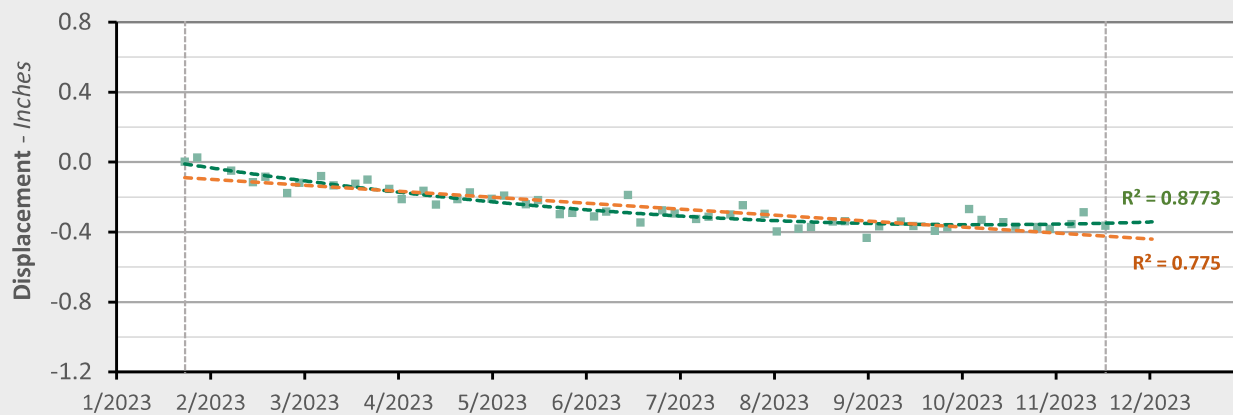|	Nonlinear Trend	Linear Trend
Velocity:	+0.91 in/yr	+0.12 in/yr
Acceleration:	+1.96 in/yr^2	0.00 in/yr^2

- ■ LOS Displacement Measurement
- – – Nonlinear Trend Line (Quadratic Regression)
- – – Linear Trend Line (Linear Regression)

AOI 5 *(PPG 21)* - Location Map

Legend:
- ▭ AOI Boundaries
- ● SNT Measurement Point
- ● TSX/PAZ Measurement Point
- — Salt Dome 500-ft Contours
- — Historical Cavern Extents
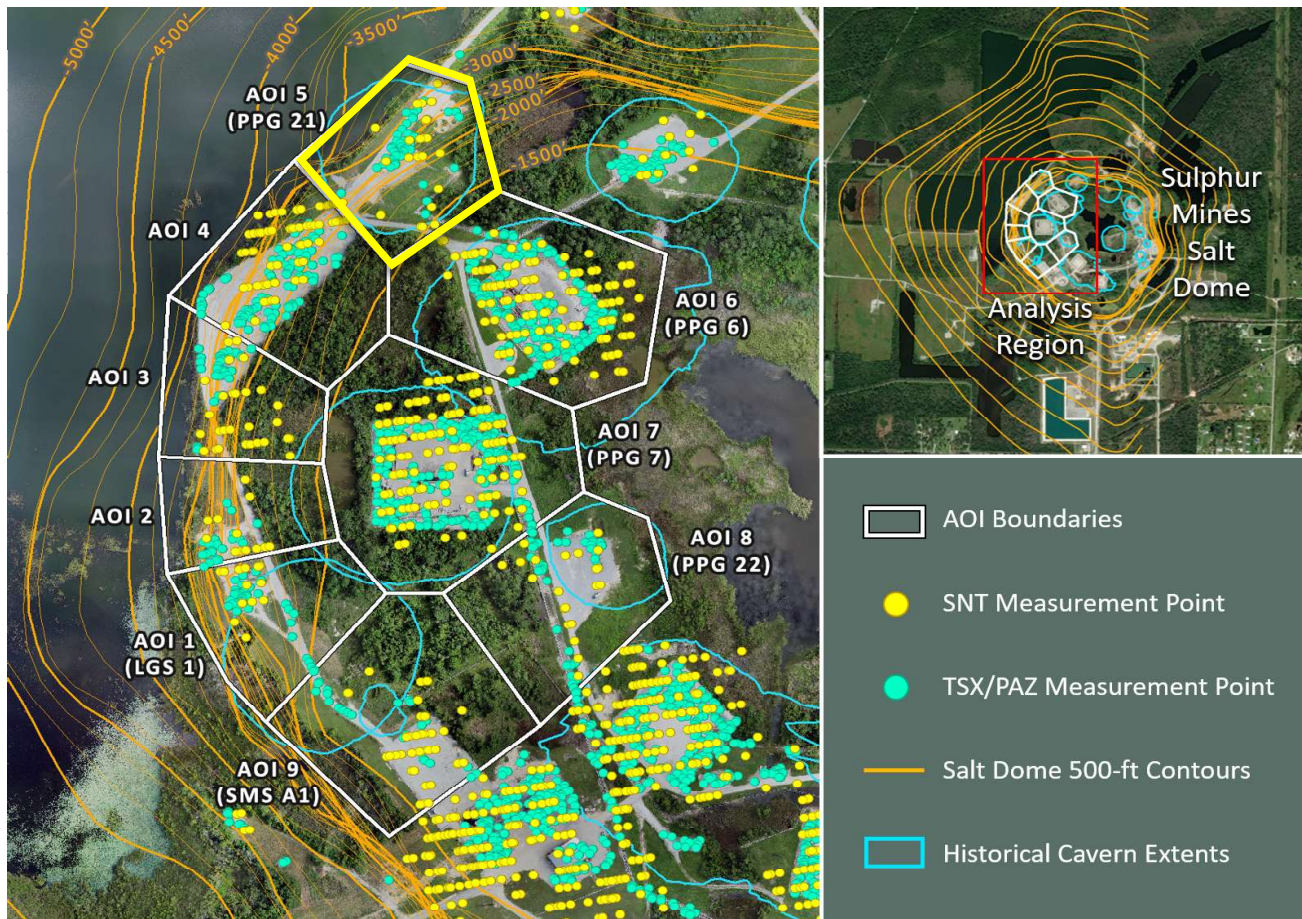
AOI 5 *(PPG 21)* - Displacement Time Series TSX/PAZ (11/17/2023) Point Count: **46**

$R^2 = 0.5373$

$R^2 = 0.3619$

	Nonlinear Trend	Linear Trend
Velocity:	+0.28 in/yr	-0.17 in/yr
Acceleration:	+1.12 in/yr²	0.00 in/yr²

Legend:
- ■ LOS Displacement Measurement
- --- Nonlinear Trend Line (Quadratic Regression)
- --- Linear Trend Line (Linear Regression)

AOI 6 *(PPG 6)* - Location Map
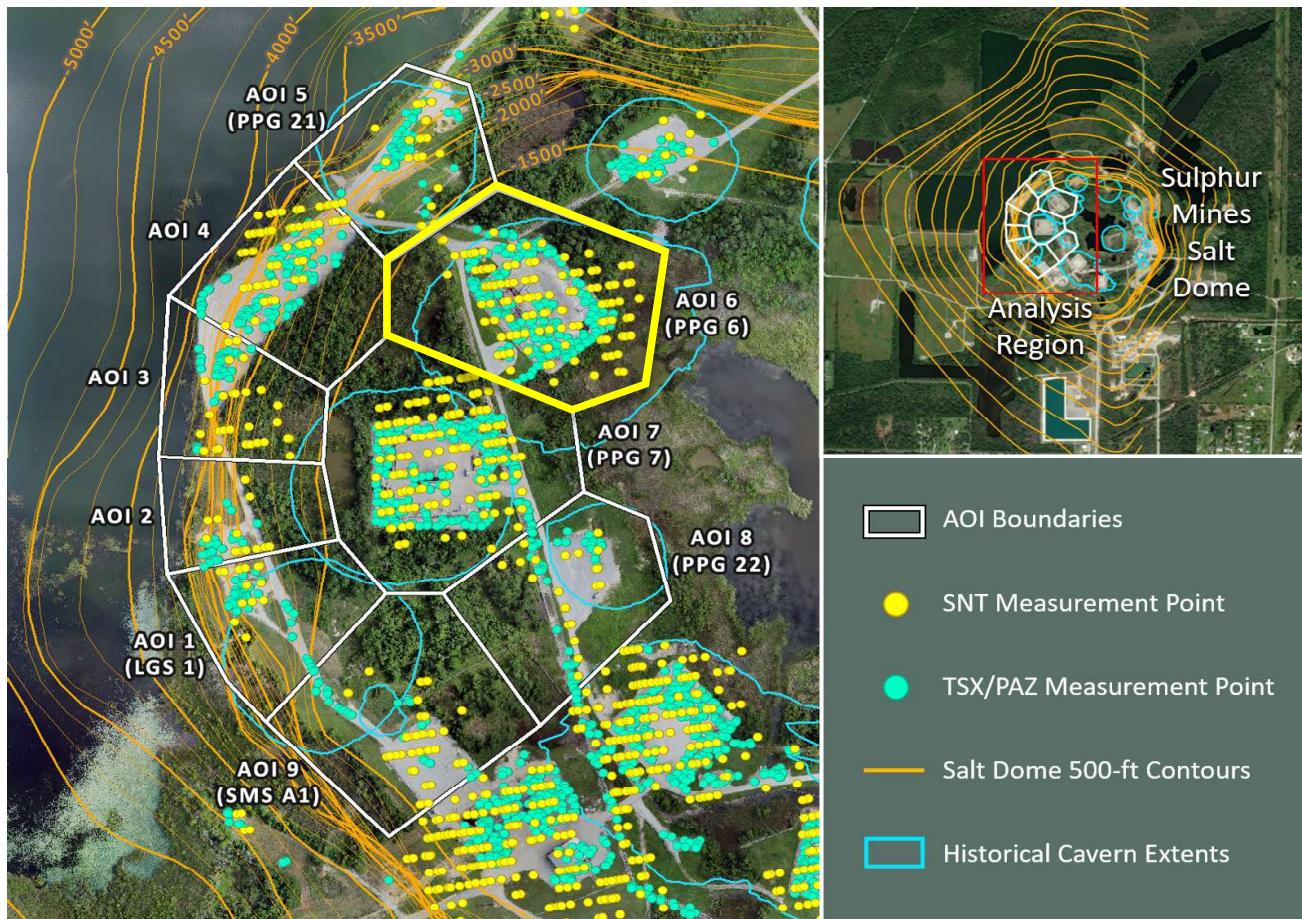
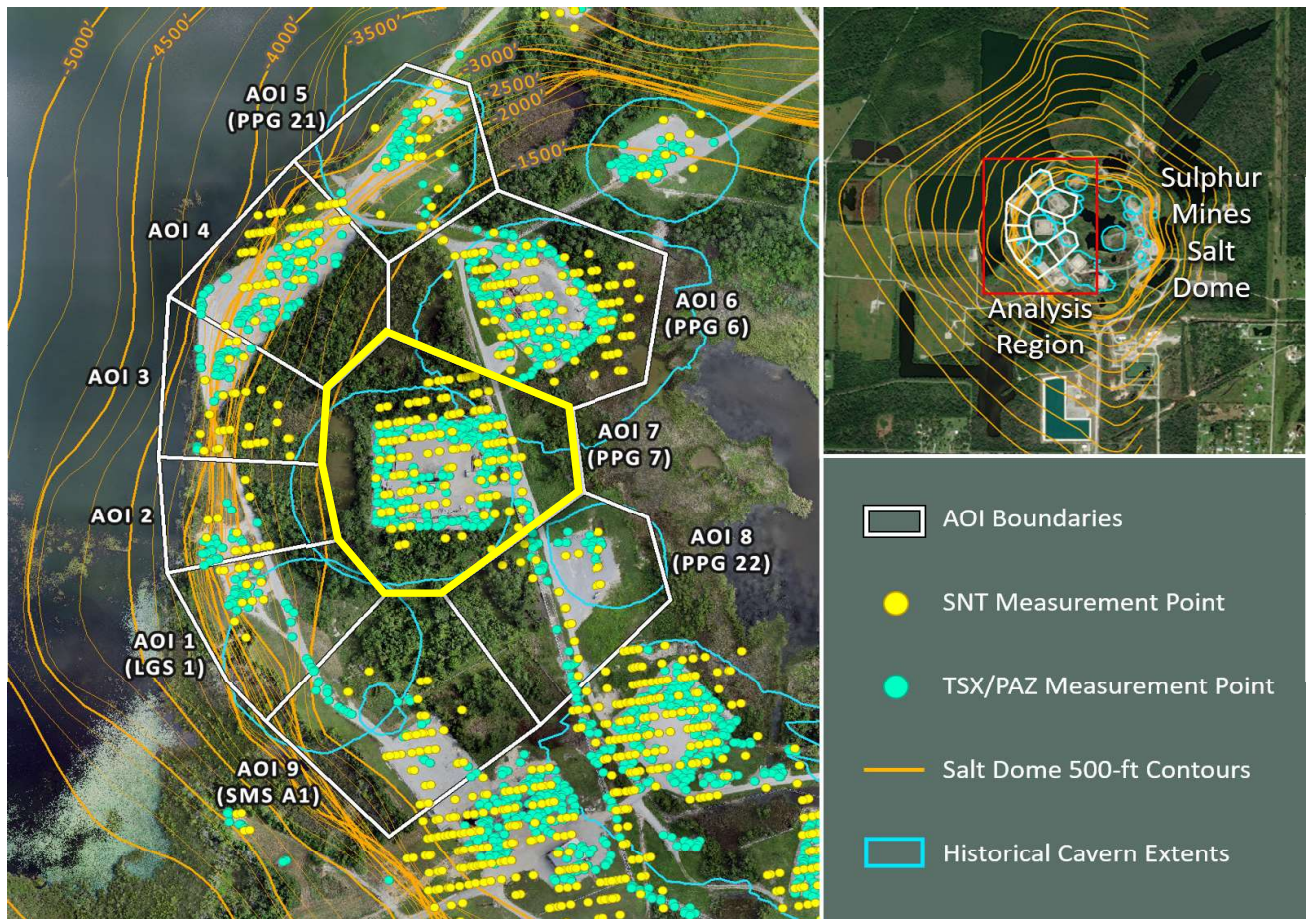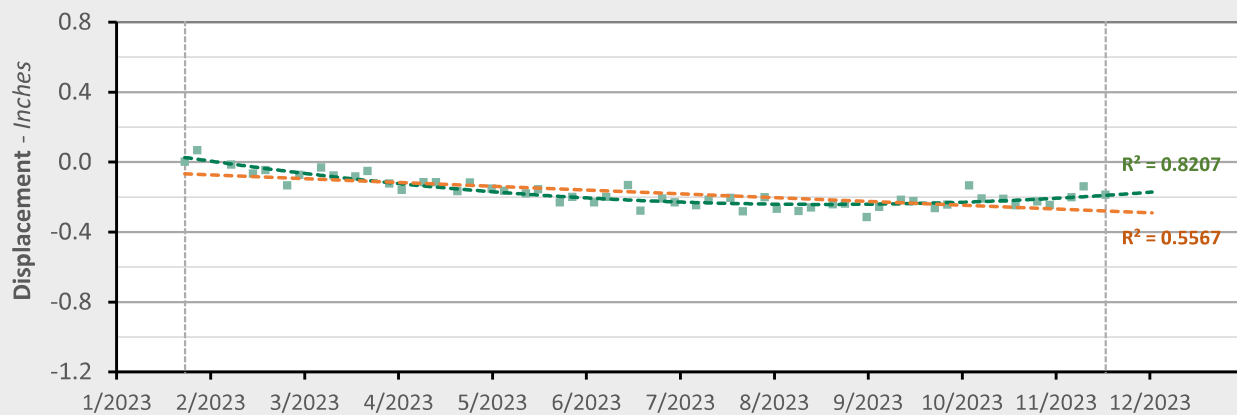## AOI 6 *(PPG 6)* - Displacement Time Series TSX/PAZ (11/17/2023) Point Count: **212**

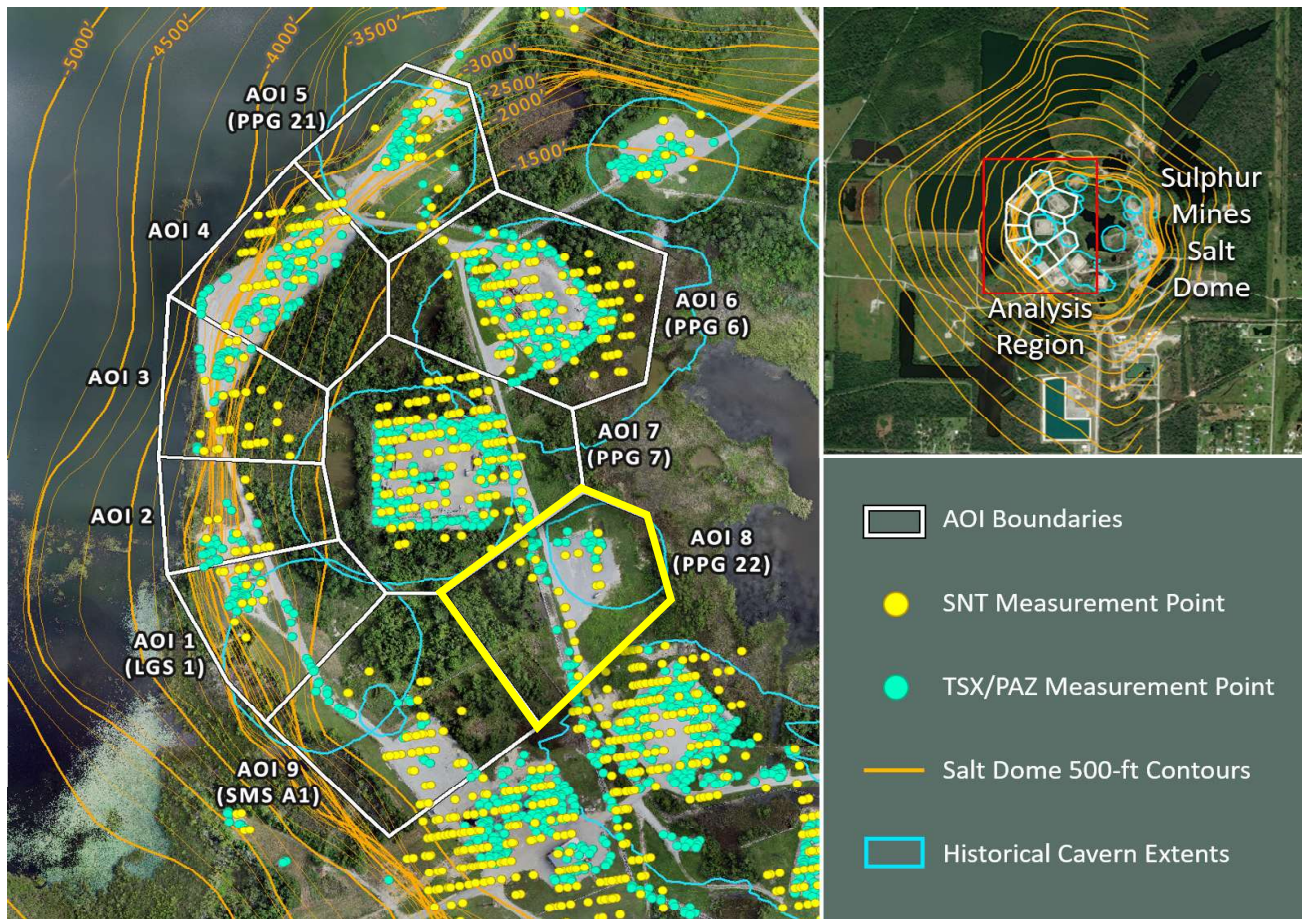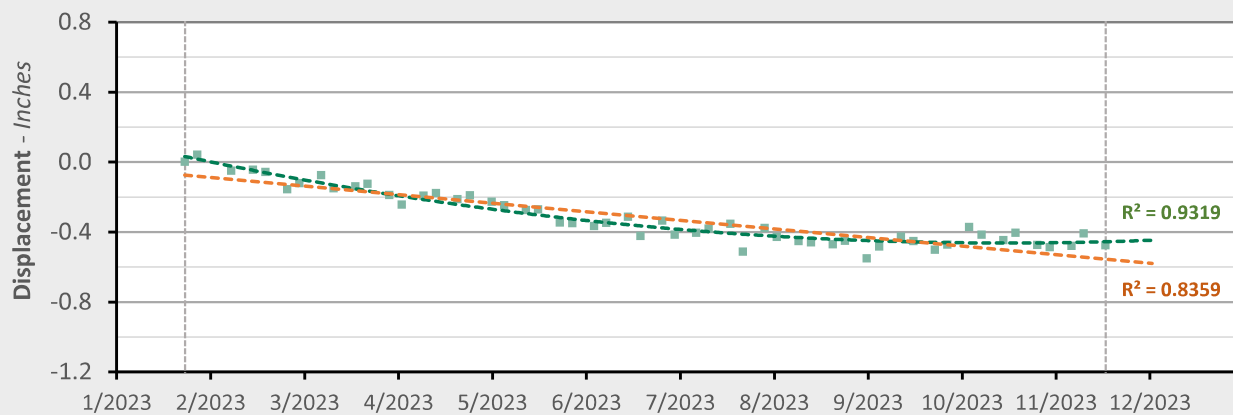|	Nonlinear Trend	Linear Trend
Velocity:	+0.15 in/yr	-0.41 in/yr
Acceleration:	+1.40 in/yr^2	0.00 in/yr^2

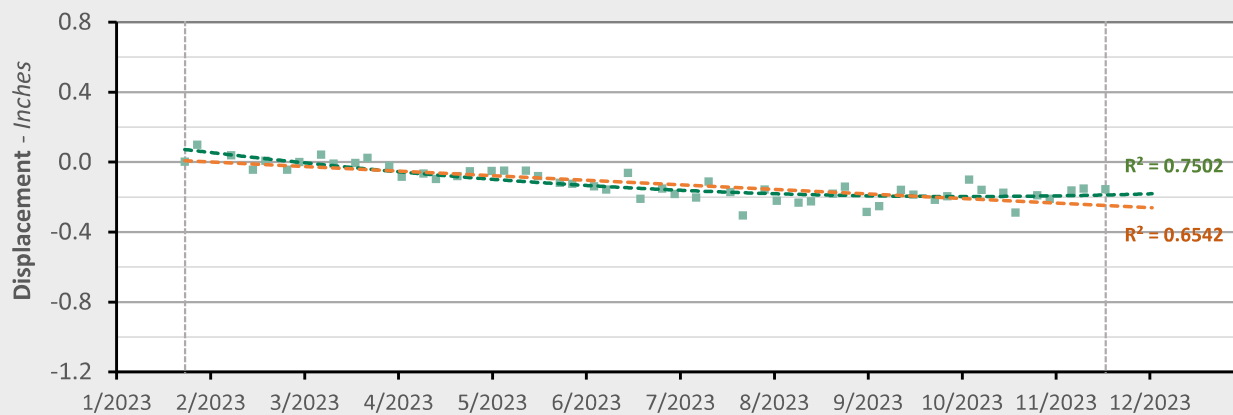LOS Displacement Measurement   Nonlinear Trend Line (Quadratic Regression)   Linear Trend Line (Linear Regression)

AOI 7 *(PPG 7)* - Location Map

Legend:
- AOI Boundaries
- SNT Measurement Point
- TSX/PAZ Measurement Point
- Salt Dome 500-ft Contours
- Historical Cavern Extents

Map labels: AOI 5 (PPG 21), AOI 4, AOI 3, AOI 2, AOI 1 (LGS 1), AOI 9 (SMS A1), AOI 6 (PPG 6), AOI 7 (PPG 7), AOI 8 (PPG 22), Sulphur Mines Salt Dome, Analysis Region

AOI 7 *(PPG 7)* - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **214**

$R^2 = 0.8207$

$R^2 = 0.5567$

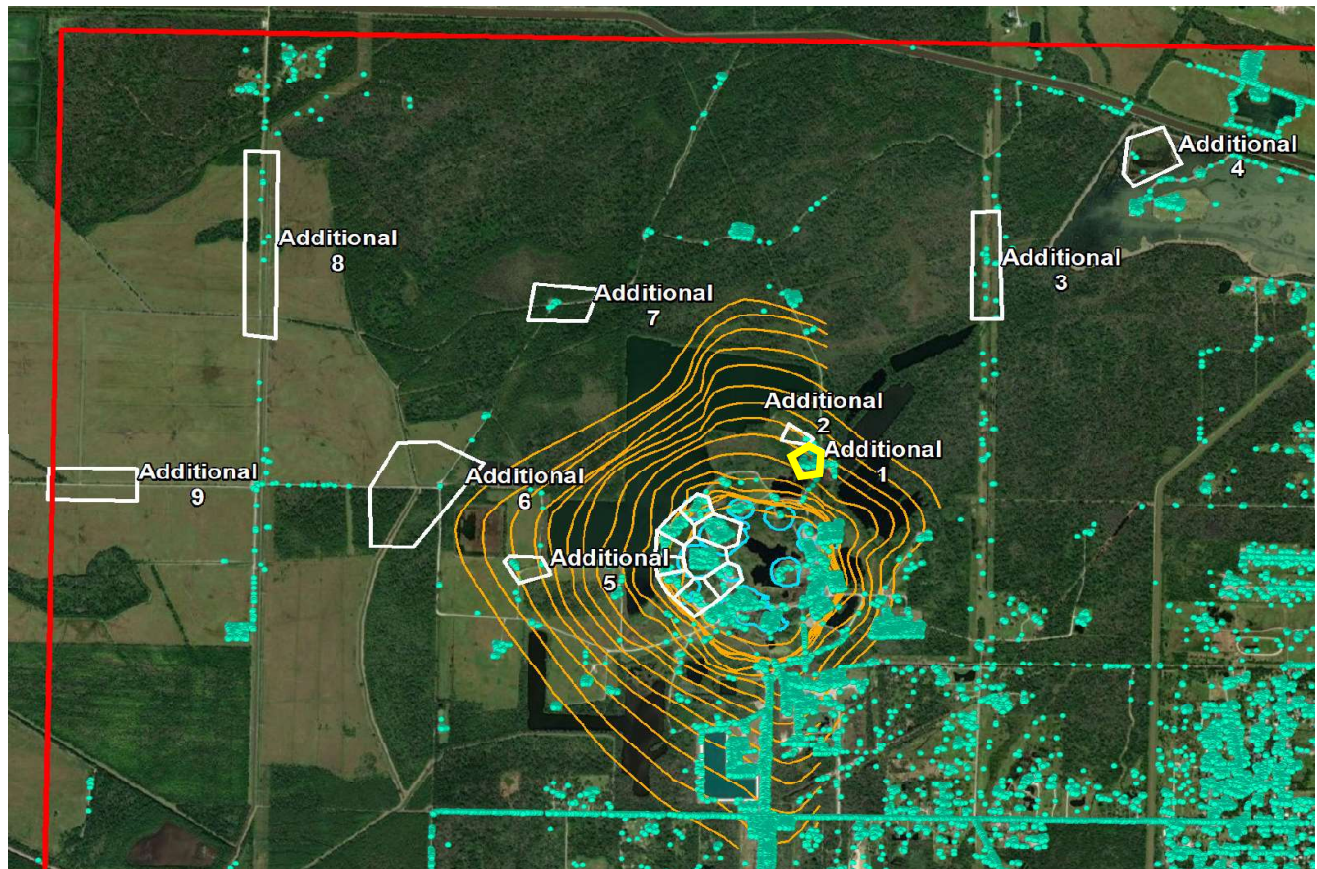|	Nonlinear Trend	Linear Trend
Velocity:	+0.42 in/yr	-0.26 in/yr
Acceleration:	+1.68 in/yr^2	0.00 in/yr^2

Legend:
- LOS Displacement Measurement
- Nonlinear Trend Line (Quadratic Regression)
- Linear Trend Line (Linear Regression)

AOI 8 *(PPG 22)* - Location Map

Legend:
- **AOI Boundaries**
- 🟡 **SNT Measurement Point**
- 🟢 **TSX/PAZ Measurement Point**
- **Salt Dome 500-ft Contours**
- **Historical Cavern Extents**

Map labels: AOI 5 (PPG 21), AOI 4, AOI 3, AOI 2, AOI 1 (LGS 1), AOI 6 (PPG 6), AOI 7 (PPG 7), AOI 8 (PPG 22), AOI 9 (SMS A1), Sulphur Mines Salt Dome, Analysis Region

AOI 8 *(PPG 22)* - Displacement Time Series TSX/PAZ (11/17/2023) Point Count: **40**

$R^2 = 0.9319$

$R^2 = 0.8359$

Y-axis: Displacement - Inches

	Nonlinear Trend	Linear Trend
Velocity:	+0.17 in/yr	-0.59 in/yr
Acceleration:	+1.88 in/yr^2	0.00 in/yr^2

Legend:
- ■ LOS Displacement Measurement
- - - Nonlinear Trend Line (Quadratic Regression)
- - - Linear Trend Line (Linear Regression)

AOI 9 *(PPG A1)* - Location Map

Sulphur Mines Salt Dome

Analysis Region

Legend:
- AOI Boundaries
- ● SNT Measurement Point
- ● TSX/PAZ Measurement Point
- Salt Dome 500-ft Contours
- Historical Cavern Extents

Map labels: AOI 5 (PPG 21), AOI 4, AOI 3, AOI 2, AOI 1 (LGS 1), AOI 9 (SMS A1), AOI 6 (PPG 6), AOI 7 (PPG 7), AOI 8 (PPG 22)
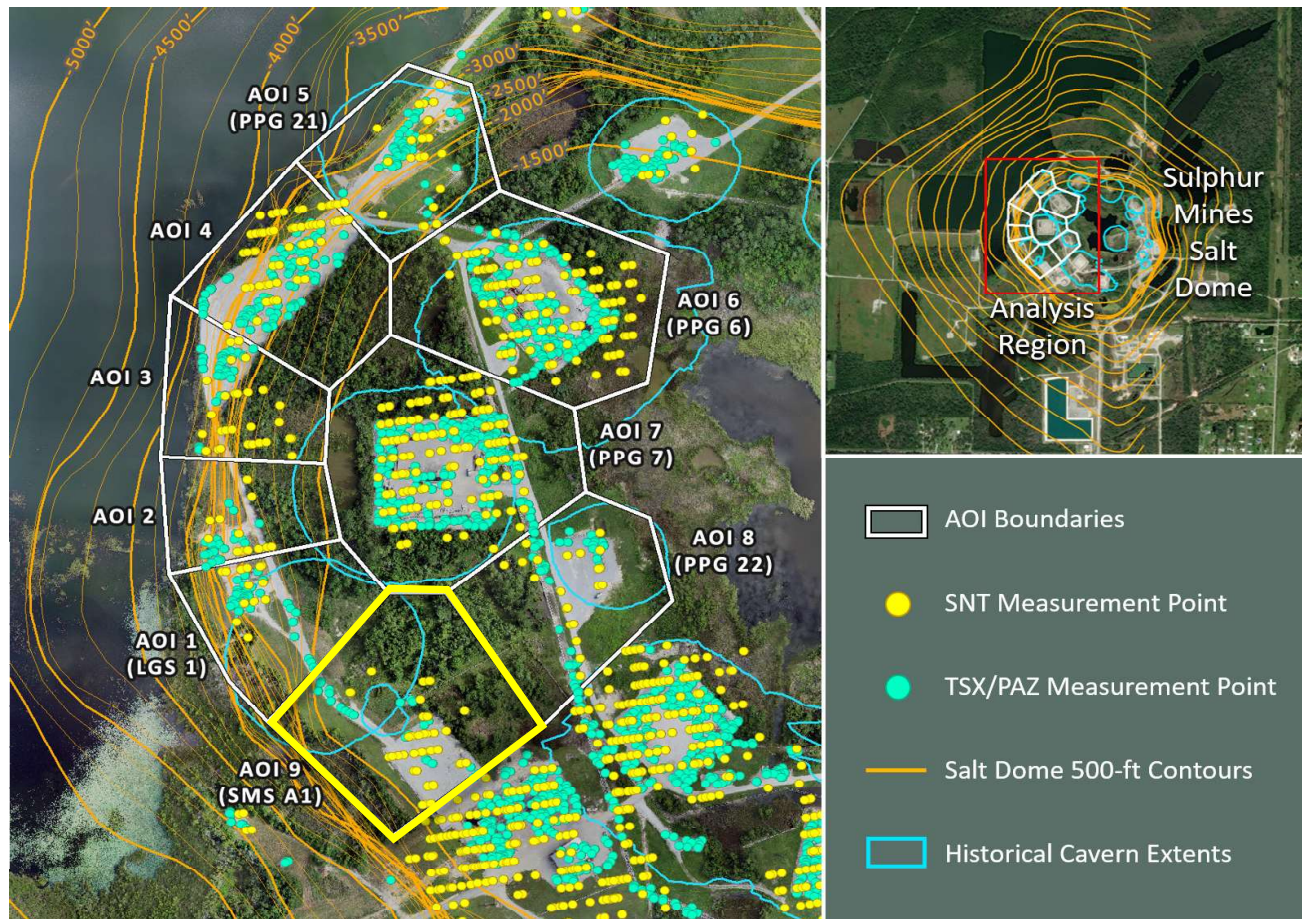
AOI 9 *(SMS A1)* - Displacement Time Series TSX/PAZ (11/17/2023) Point Count: **26**

$R^2 = 0.7502$

$R^2 = 0.6542$

	Nonlinear Trend	Linear Trend
Velocity:	+0.14 in/yr	-0.32 in/yr
Acceleration:	+1.14 in/yr^2	0.00 in/yr^2

Legend:
- ■ LOS Displacement Measurement
- Nonlinear Trend Line (Quadratic Regression)
- Linear Trend Line (Linear Regression)

Additional 1 - Location Map

Additional 1 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **63**

R² = 0.5856

R² = 0.3231
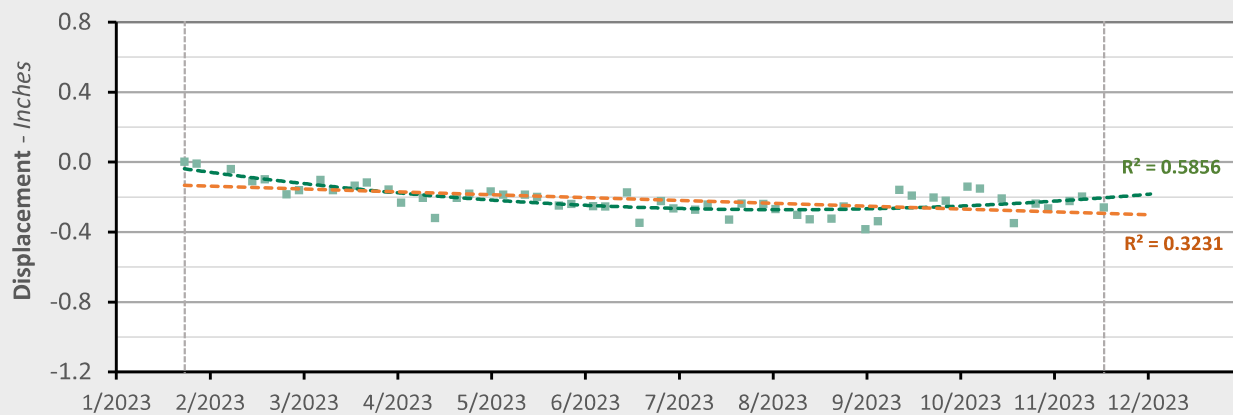
	Nonlinear Trend	Linear Trend
Velocity:	+0.48 in/yr	-0.20 in/yr
Acceleration:	+1.67 in/yr²	0.00 in/yr²

- ■ LOS Displacement Measurement
- --- Nonlinear Trend Line (Quadratic Regression)
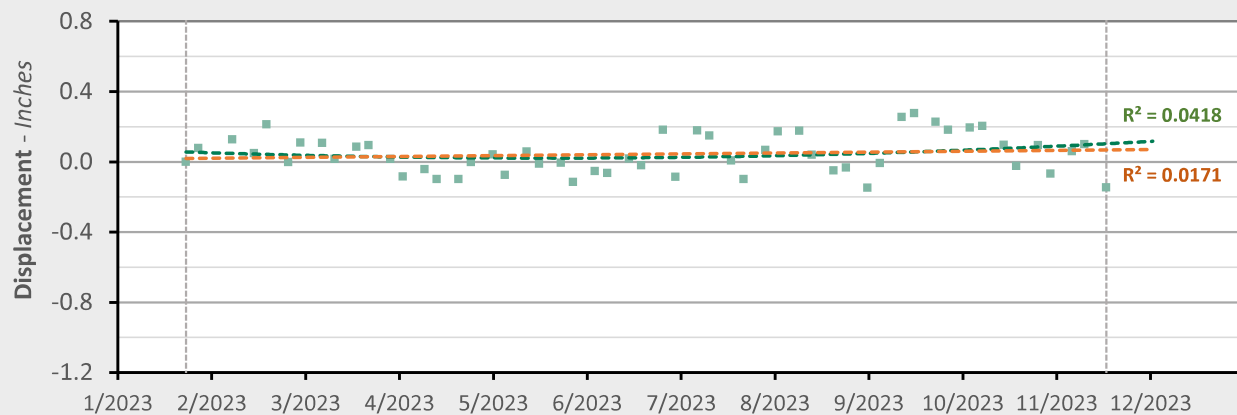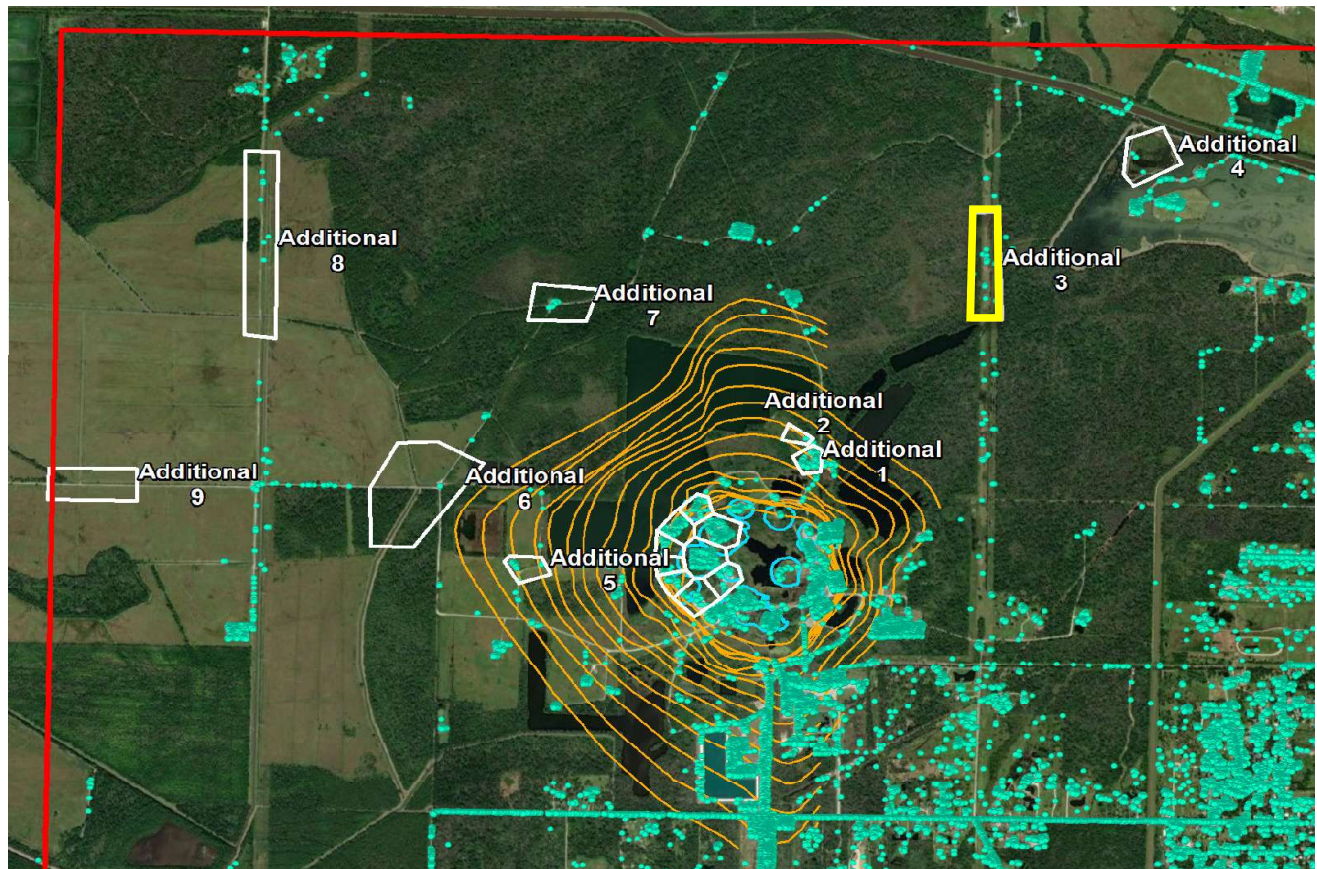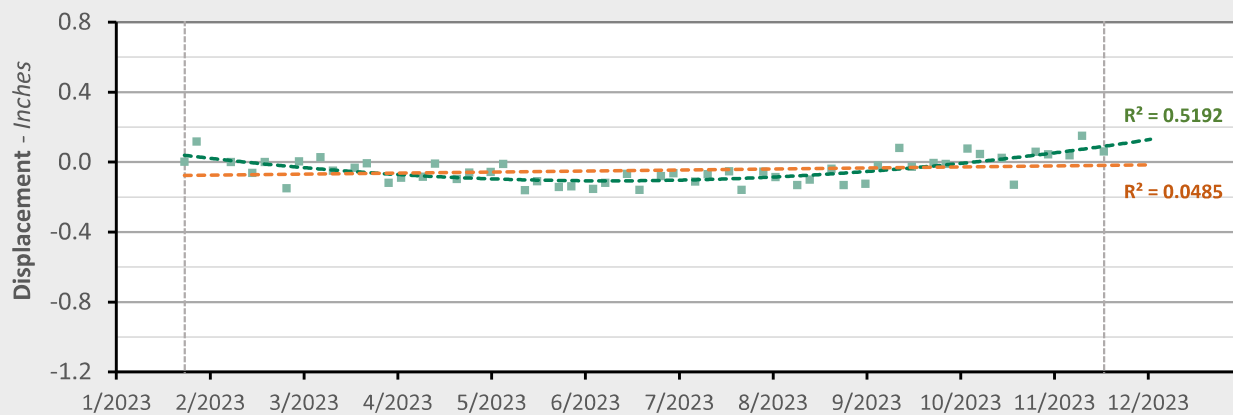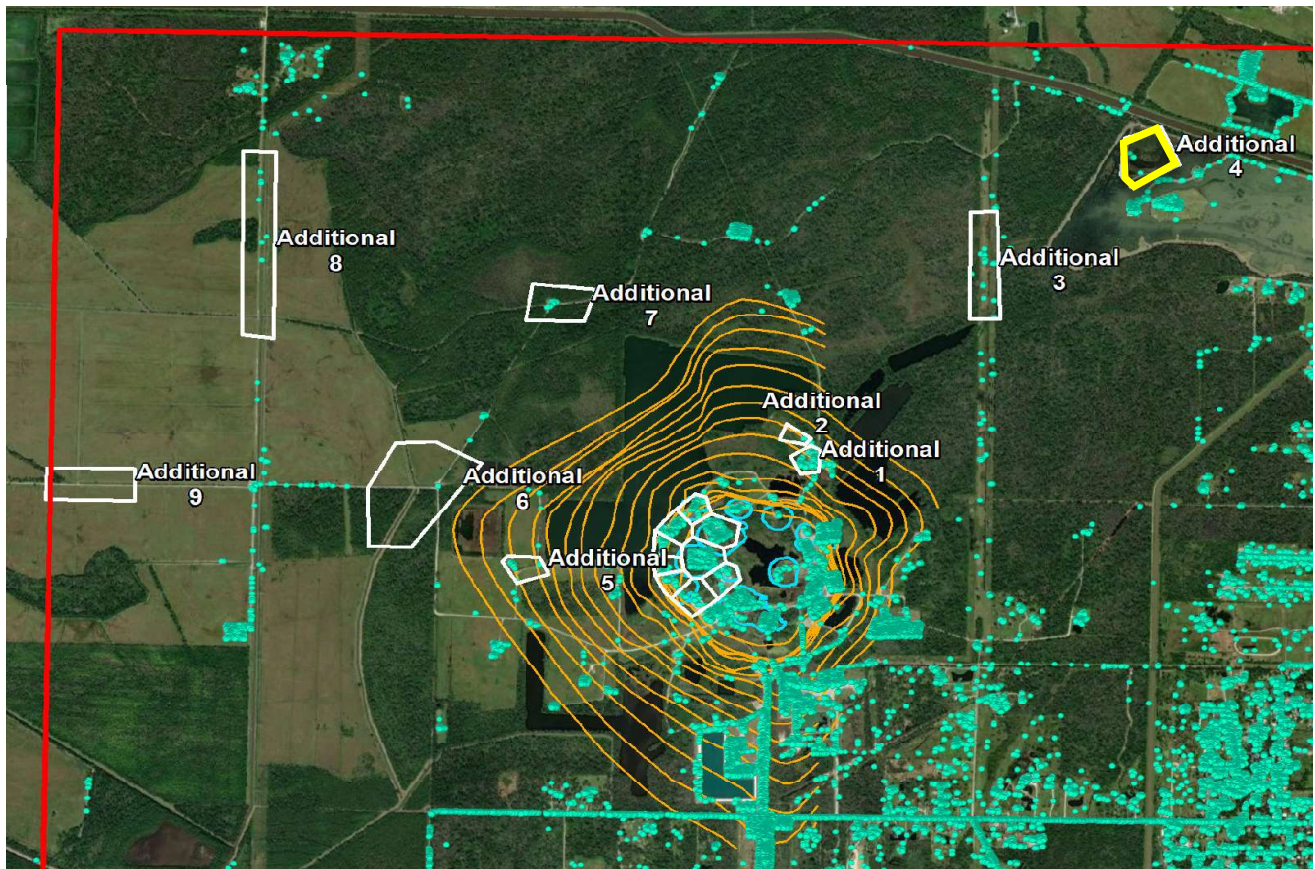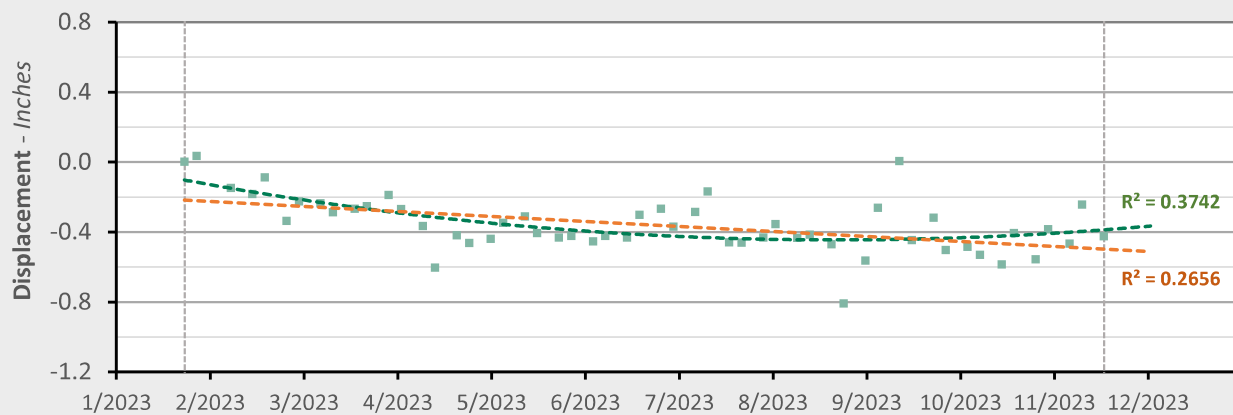- --- Linear Trend Line (Linear Regression)

LONQUIST & CO. LLC

Additional 2 - Location Map
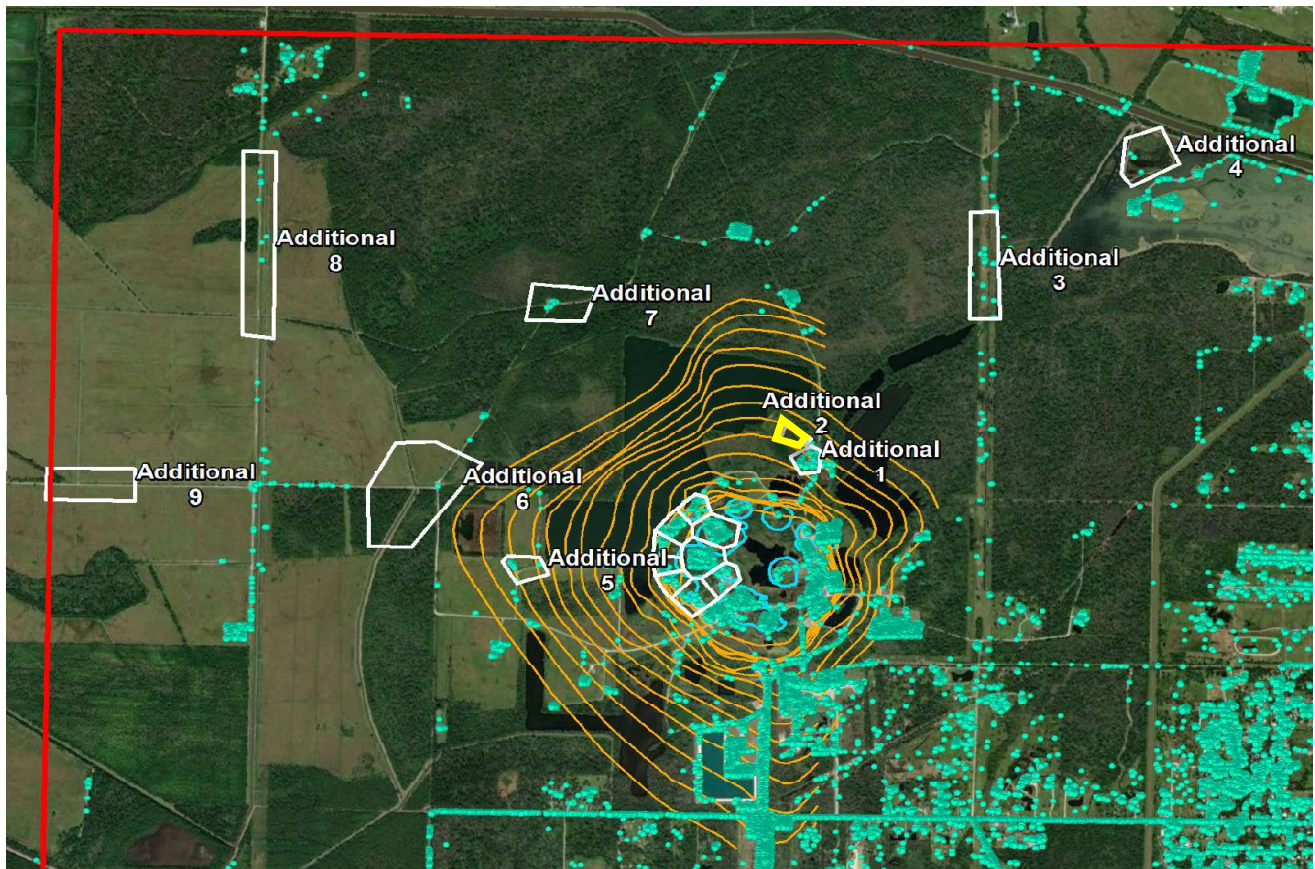
Additional 2 - Displacement Time Series

TSX/PAZ (11/17/2023) Point Count: **2**

$R^2 = 0.0418$

$R^2 = 0.0171$

	Nonlinear Trend	Linear Trend
Velocity:	+0.33 in/yr	+0.06 in/yr
Acceleration:	+0.67 in/yr^2	0.00 in/yr^2

■ LOS Displacement Measurement　　　- - - Nonlinear Trend Line (Quadratic Regression)　　　- - - Linear Trend Line (Linear Regression)

Additional 3 - Location Map

Additional 3 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **26**
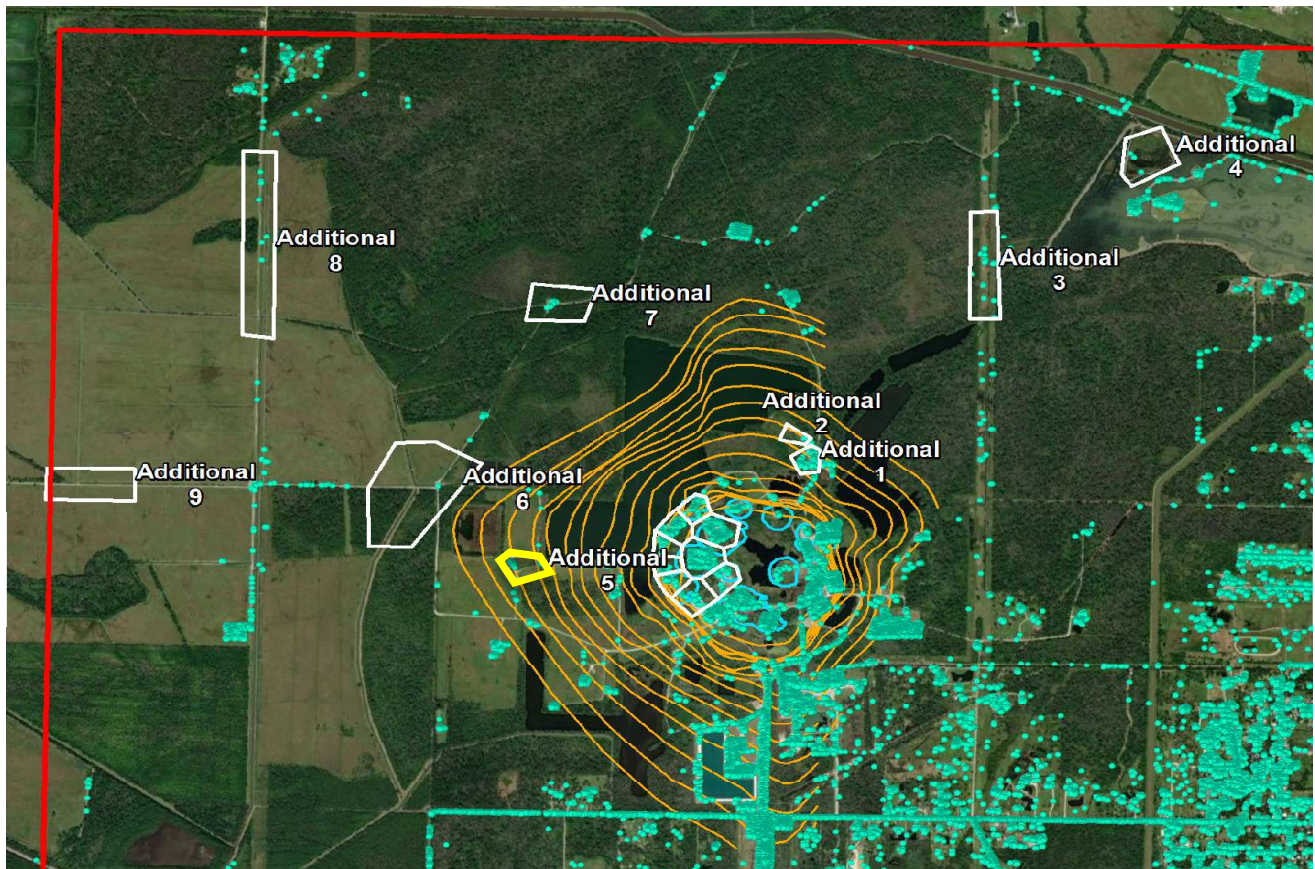

$R^2 = 0.5192$

$R^2 = 0.0485$

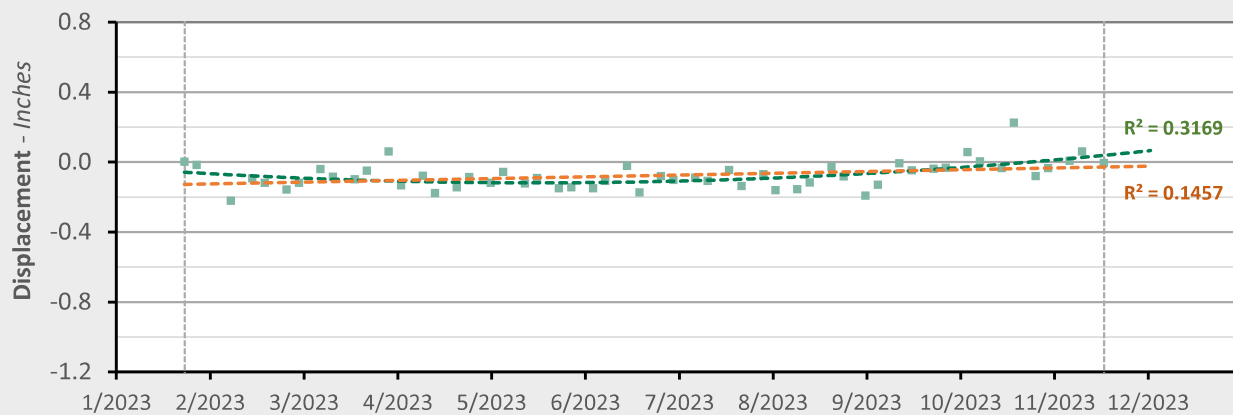|	Nonlinear Trend	Linear Trend
Velocity:	+0.90 in/yr	+0.07 in/yr
Acceleration:	+2.07 in/yr^2	0.00 in/yr^2

■ LOS Displacement Measurement ┄ Nonlinear Trend Line (Quadratic Regression)   ┄ Linear Trend Line (Linear Regression)

Additional 4 - Location Map

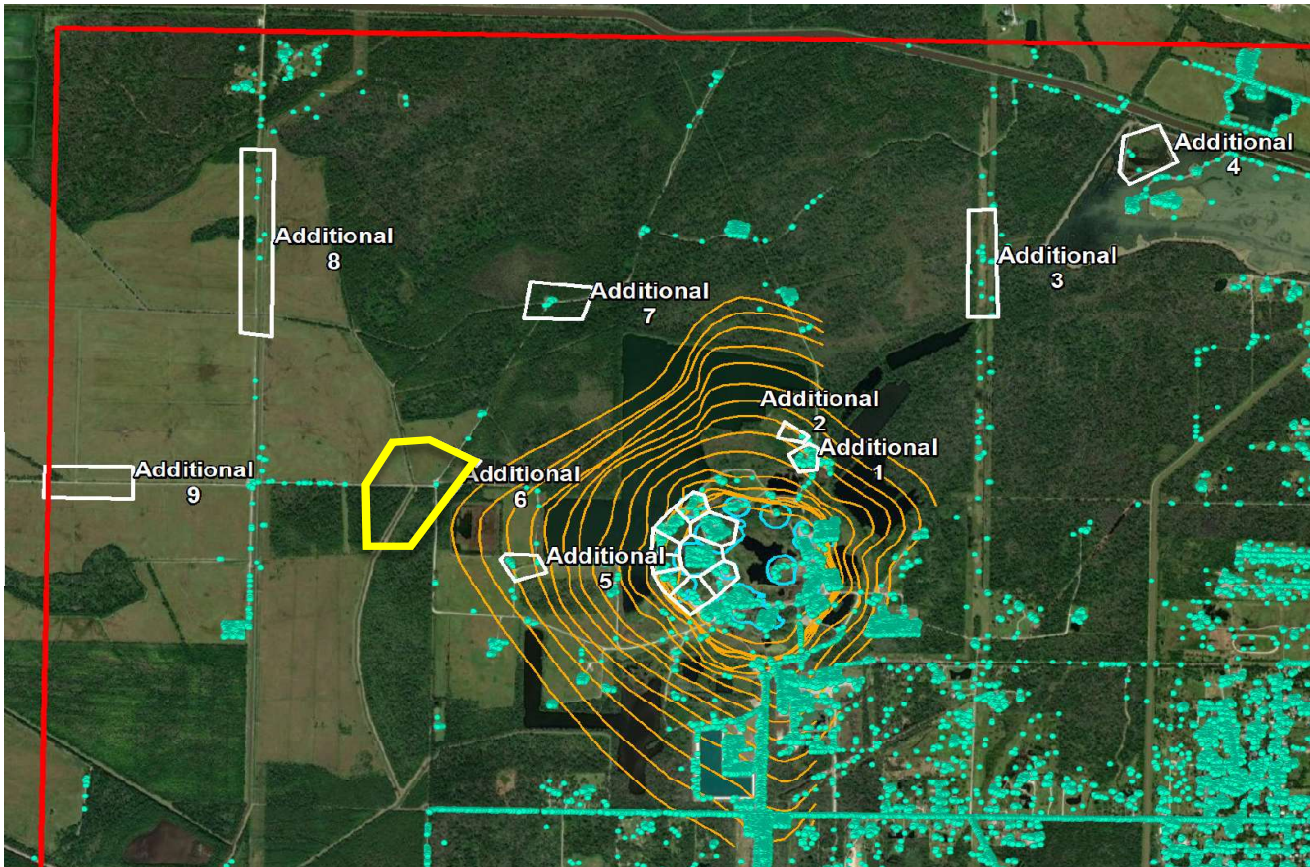## Additional 4 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **3**

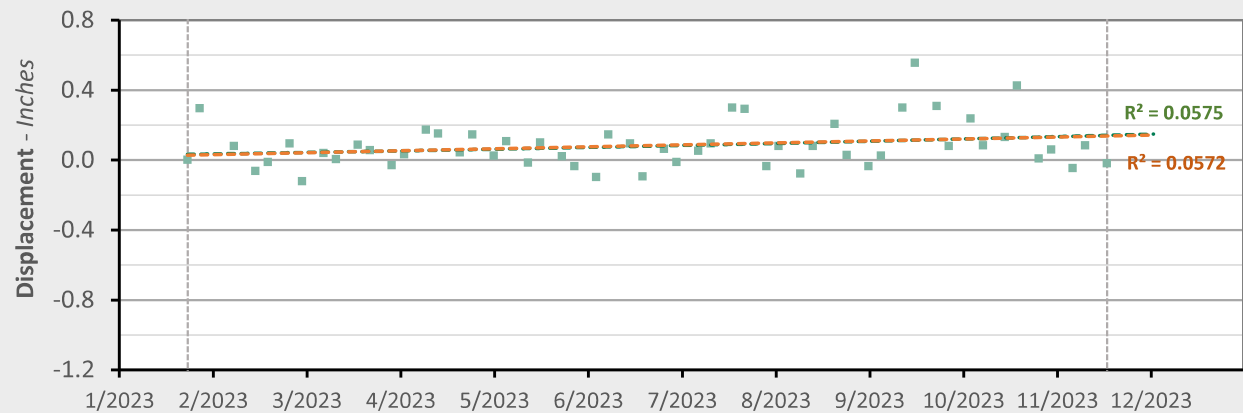|	Nonlinear Trend	Linear Trend
Velocity:	+0.49 in/yr	-0.34 in/yr
Acceleration:	+2.06 in/yr^2	0.00 in/yr^2

■ LOS Displacement Measurement   Nonlinear Trend Line (Quadratic Regression)   Linear Trend Line (Linear Regression)

Additional 5 - Location Map

Additional 5 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **14**

	Nonlinear Trend	Linear Trend
Velocity:	+0.63 in/yr	+0.12 in/yr
Acceleration:	+1.25 in/yr^2	0.00 in/yr^2

- ■ LOS Displacement Measurement
- - - - Nonlinear Trend Line (Quadratic Regression)
- - - - Linear Trend Line (Linear Regression)

Additional 6 - Location Map

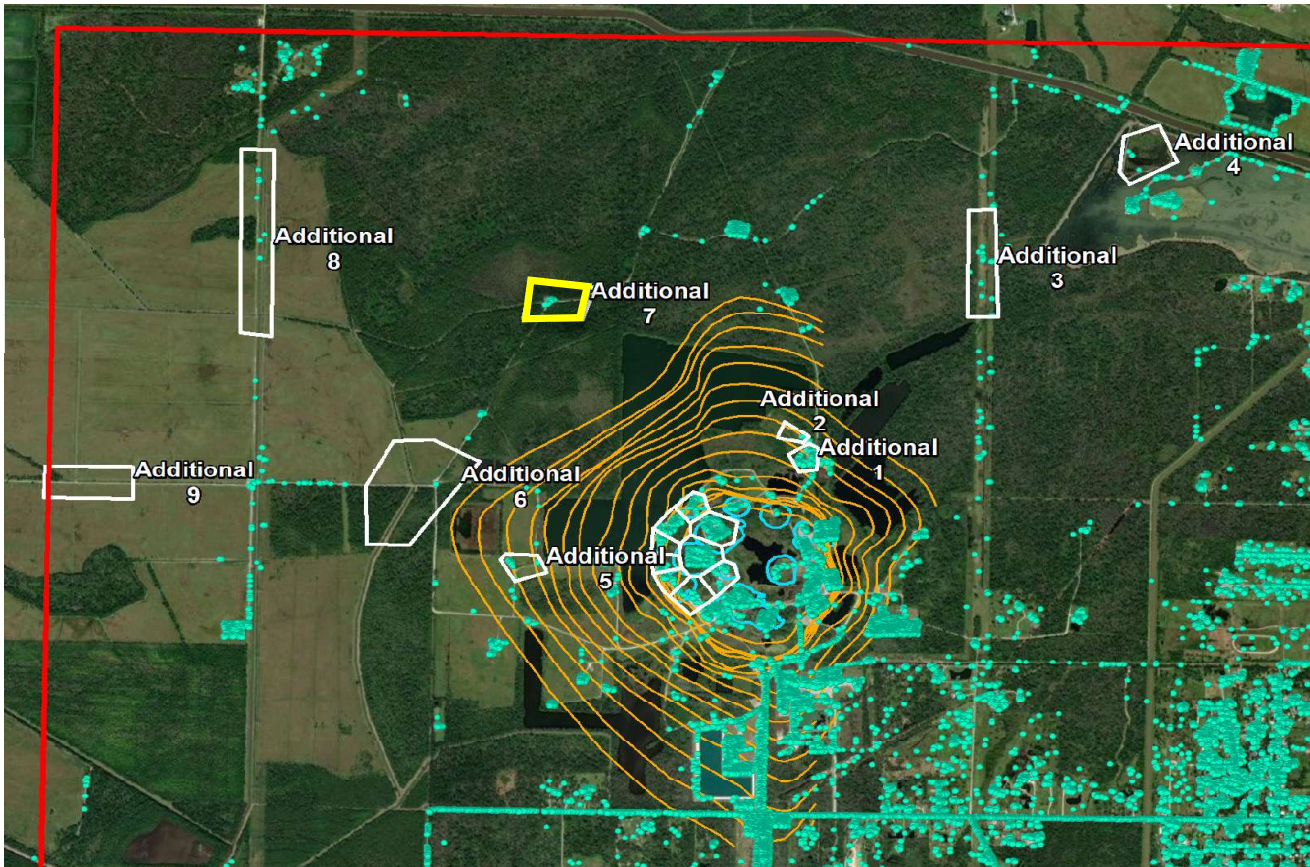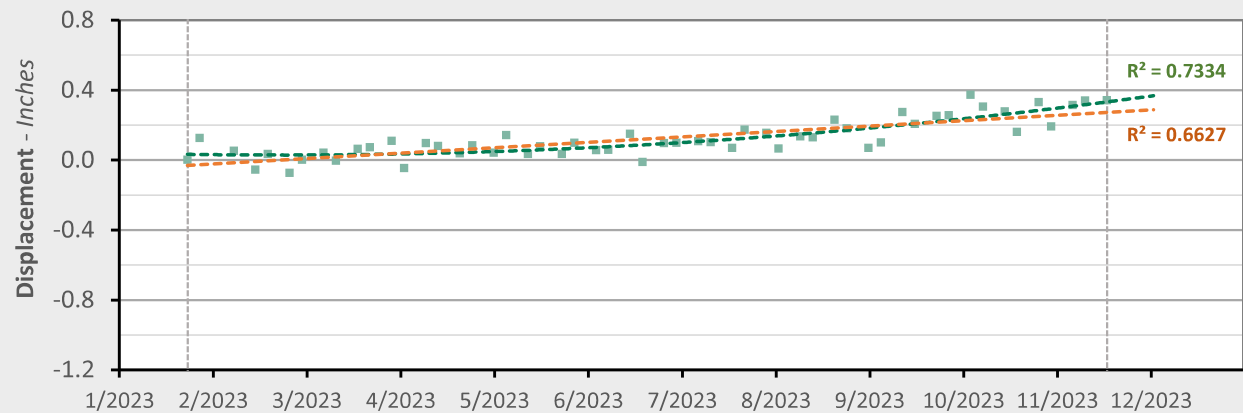

Additional 6 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: 1

	Nonlinear Trend	Linear Trend
Velocity:	+0.17 in/yr	+0.13 in/yr
Acceleration:	+0.09 in/yr^2	0.00 in/yr^2

■ LOS Displacement Measurement   - - - Nonlinear Trend Line (Quadratic Regression)   - - - Linear Trend Line (Linear Regression)

Additional 7 - Location Map

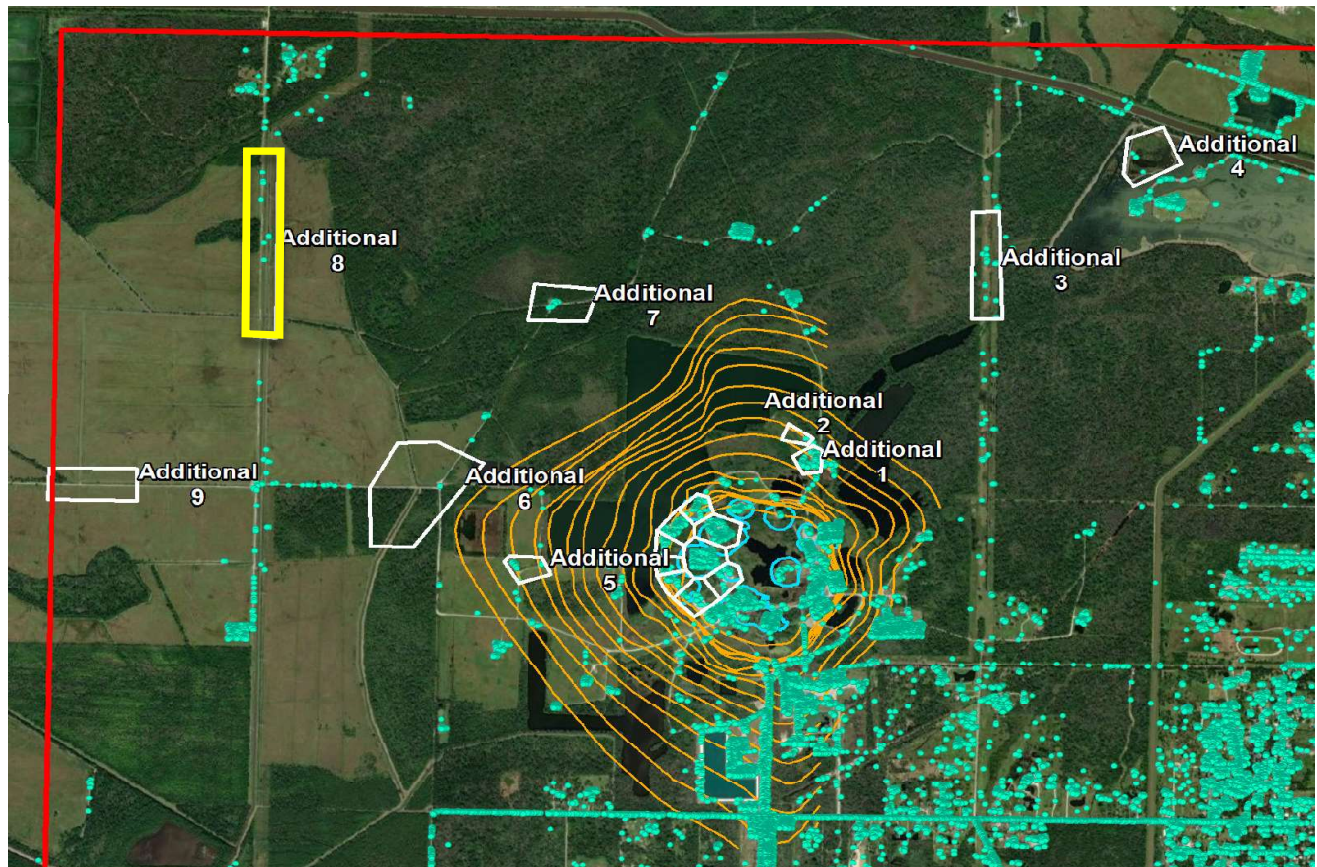## Additional 7 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: **10**

	Nonlinear Trend	Linear Trend
Velocity:	+0.83 in/yr	+0.37 in/yr
Acceleration:	+1.14 in/yr^2	0.00 in/yr^2

- LOS Displacement Measurement
- - - Nonlinear Trend Line (Quadratic Regression)
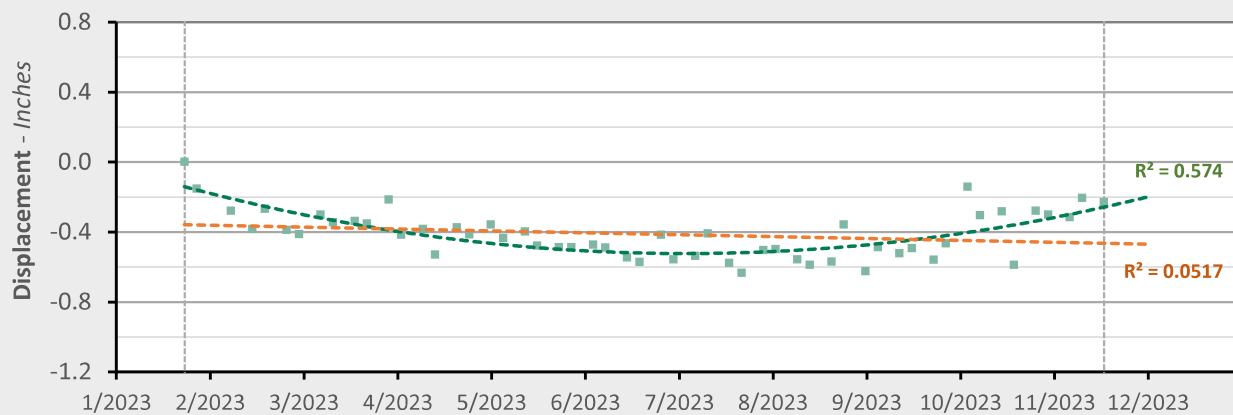- - - Linear Trend Line (Linear Regression)

Additional 8 - Location Map

Additional 8 - Displacement Time Series   TSX/PAZ (11/17/2023) Point Count: 7
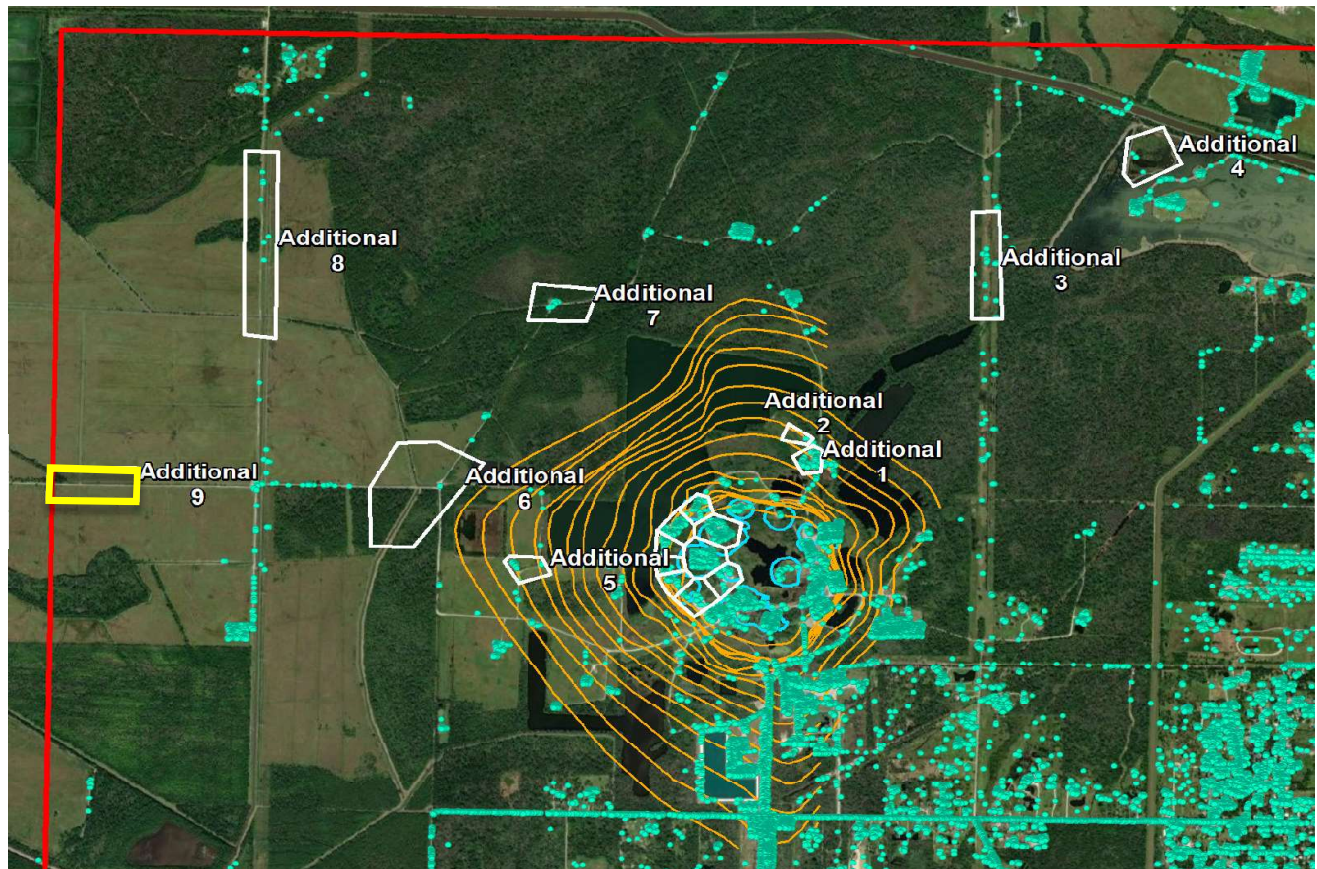

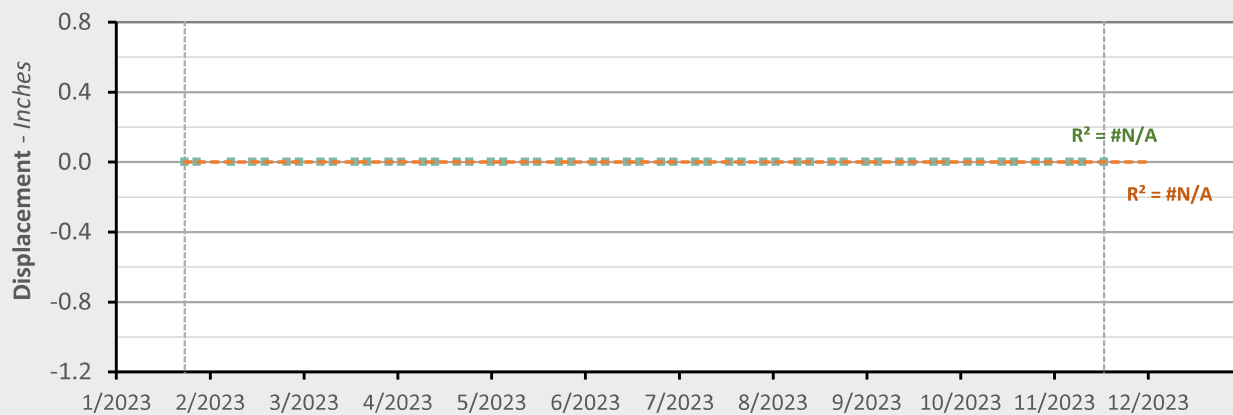|	Nonlinear Trend	Linear Trend
Velocity:	+1.44 in/yr	-0.13 in/yr
Acceleration:	+3.88 in/yr^2	0.00 in/yr^2

- ■ LOS Displacement Measurement
- – – Nonlinear Trend Line (Quadratic Regression)
- – – Linear Trend Line (Linear Regression)

Additional 9 - Location Map

Additional 9 - Displacement Time Series
TSX/PAZ (11/17/2023) Point Count: **0**

	Nonlinear Trend		Linear Trend	
Velocity:	#VALUE!	in/yr	#VALUE!	in/yr
Acceleration:	#VALUE!	in/yr^2	0.00	in/yr^2

■ LOS Displacement Measurement   - - - Nonlinear Trend Line (Quadratic Regression)   - - - Linear Trend Line (Linear Regression)