Westlake US 2
Received 9/8/2023

TSX/PAZ Satellite Update
InSAR Subsidence
September 5, 2023

Longuist comment:

The PAZ satellite from the TSX/PAZ constellation (4 & 7-day revisit) passed by Sulphur on Tuesday September 5. We received the dataset yesterday and noted that the new data point generally continues the reversal of the below-trend readings that were noted in the 8/21 and 8/25 updates. The attached time series plots have been prepared for reference.

With each of the two most recent updates we have seen the severity of the 8/21 and 8/25 below-trend readings recede closer to the trend lines. This is due to the below explanation provided last month by TREA on the retroactive reprocessing of measurements that they employ on recently collected data. As the clarity of the below-trend behavior has diminished there is no additional evaluation planned at this time for the TSX/PAZ data. Additional evaluation will be performed if:

1) Over the next few weeks or months we see evidence of gradual downward acceleration that is distinct from the prior linear trend
2) We encounter another series of distinctly below trend readings

Submitted by: Nathaniel Byars (Lonquist)

TSX/PAZ Constellation Update

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

Sulphur Dome
Westlake Chemicals

September 5, 2023 Update

Date Signed: September 8, 2023
Austin, TX

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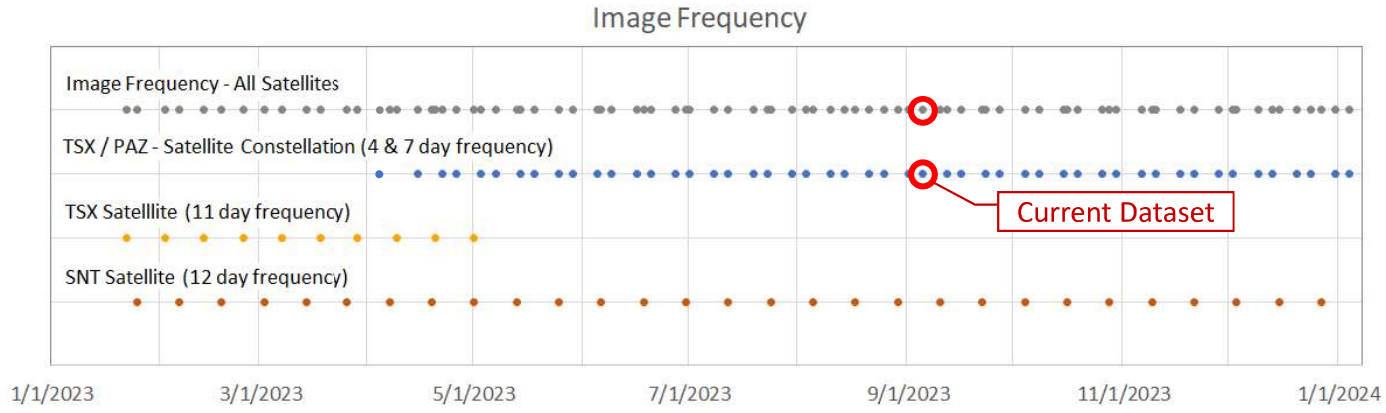
Louisiana License No. 40697

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



Overview and Monitoring History

- Beginning in late January, ground displacement over the western portion of the Sulphur Mines Salt Dome has been evaluated following the delivery of each dataset update from TRE-Altamira
- An automated process and set of deliverables to convey the results of the datasets is being considered that will evaluate multiple factors including trend consistency and mapped acceleration of ground displacement
- Current updates are focused on the review of time series charts of averaged data for selections of points around the dome and caverns on the western flank
- The TSX/PAZ satellite constellation (4 & 7-day revisit) passed by Sulphur on Tuesday September 5, 2023
- The following slides present the time series and associated linear trends for each location evaluated from this dataset
- The prior recent updates from the TSX/PAZ satellite constellation began to show a slight increase in downward displacement rates in most of the review areas, but the most recent two updates and have shown a reversal of that trend and the prior data points of concern have also risen slightly as a result of the retroactive reprocessing that TREA employs on recently collected data

TSX/PAZ Constellation – September 5, 2023 Update

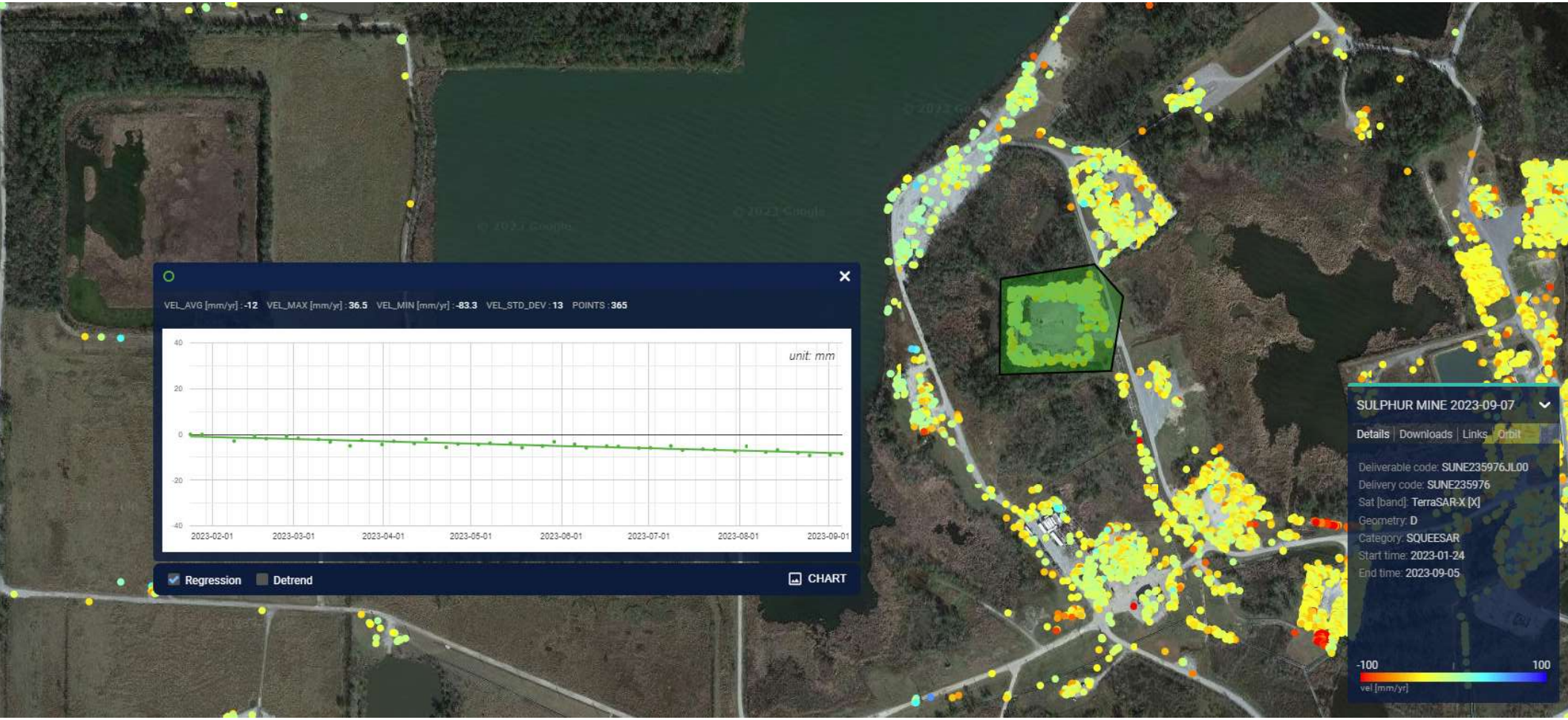
PPG 21


VEL_AVG [mm/yr] : -10.5 VEL_MAX [mm/yr] : 38.9 VEL_MIN [mm/yr] : -75.1 VEL_STD_DEV : 18.7 POINTS : 128
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

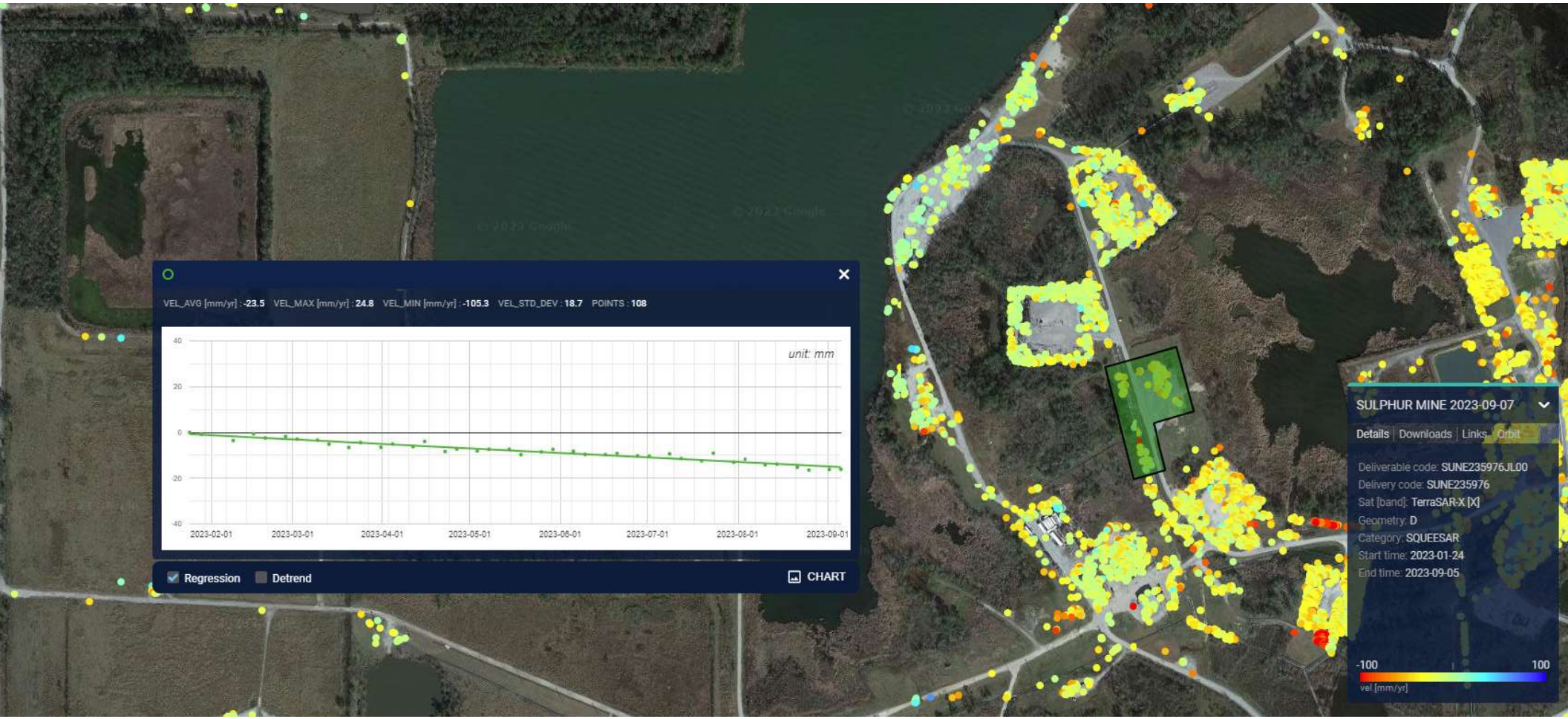
PPG 6


VEL_AVG [mm/yr] : -17.7
VEL_MAX [mm/yr] : 44.1
VEL_MIN [mm/yr] : -78.9
VEL_STD_DEV : 16.7
POINTS : 443
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976.JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

PPG 7


VEL_AVG [mm/yr] : -12 VEL_MAX [mm/yr] : 36.5 VEL_MIN [mm/yr] : -83.3 VEL_STD_DEV : 13 POINTS : 365
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976.JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

PPG 22


VEL_AVG [mm/yr] : -23.5 VEL_MAX [mm/yr] : 24.8 VEL_MIN [mm/yr] : -105.3 VEL_STD_DEV : 18.7 POINTS : 108
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

AOI #1


VEL_AVG [mm/yr] : -18.6 VEL_MAX [mm/yr] : 45.6 VEL_MIN [mm/yr] : -81.3 VEL_STD_DEV : 20.4 POINTS : 225
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

AOI #2


VEL_AVG [mm/yr] : -11 VEL_MAX [mm/yr] : 41.9 VEL_MIN [mm/yr] : -88.3 VEL_STD_DEV : 21.3 POINTS : 117
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
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Deliverable code: SUNE235976.JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

AOI #3


VEL_AVG [mm/yr] : 0.5 VEL_MAX [mm/yr] : 38.8 VEL_MIN [mm/yr] : -49.5 VEL_STD_DEV : 12.2 POINTS : 144
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
Details | Downloads | Links | Orbit
Deliverable code: SUNE235976JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]

AOI #4


VEL_AVG [mm/yr] : -4.5 VEL_MAX [mm/yr] : 26.3 VEL_MIN [mm/yr] : -41.6 VEL_STD_DEV : 13.6 POINTS : 78
unit: mm
40
20
0
-20
-40
2023-02-01
2023-03-01
2023-04-01
2023-05-01
2023-06-01
2023-07-01
2023-08-01
2023-09-01
Regression
Detrend
CHART
SULPHUR MINE 2023-09-07
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Deliverable code: SUNE235976.JL00
Delivery code: SUNE235976
Sat [band]: TerraSAR-X [X]
Geometry: D
Category: SQUEESAR
Start time: 2023-01-24
End time: 2023-09-05
-100
100
vel [mm/yr]