



# InSAR for Hazard Screening and Decision Support

Presented by

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PERMIAN BASIN WATER  
IN ENERGY CONFERENCE



# What InSAR measure?

InSAR: Interferometric Synthetic Aperture Radar

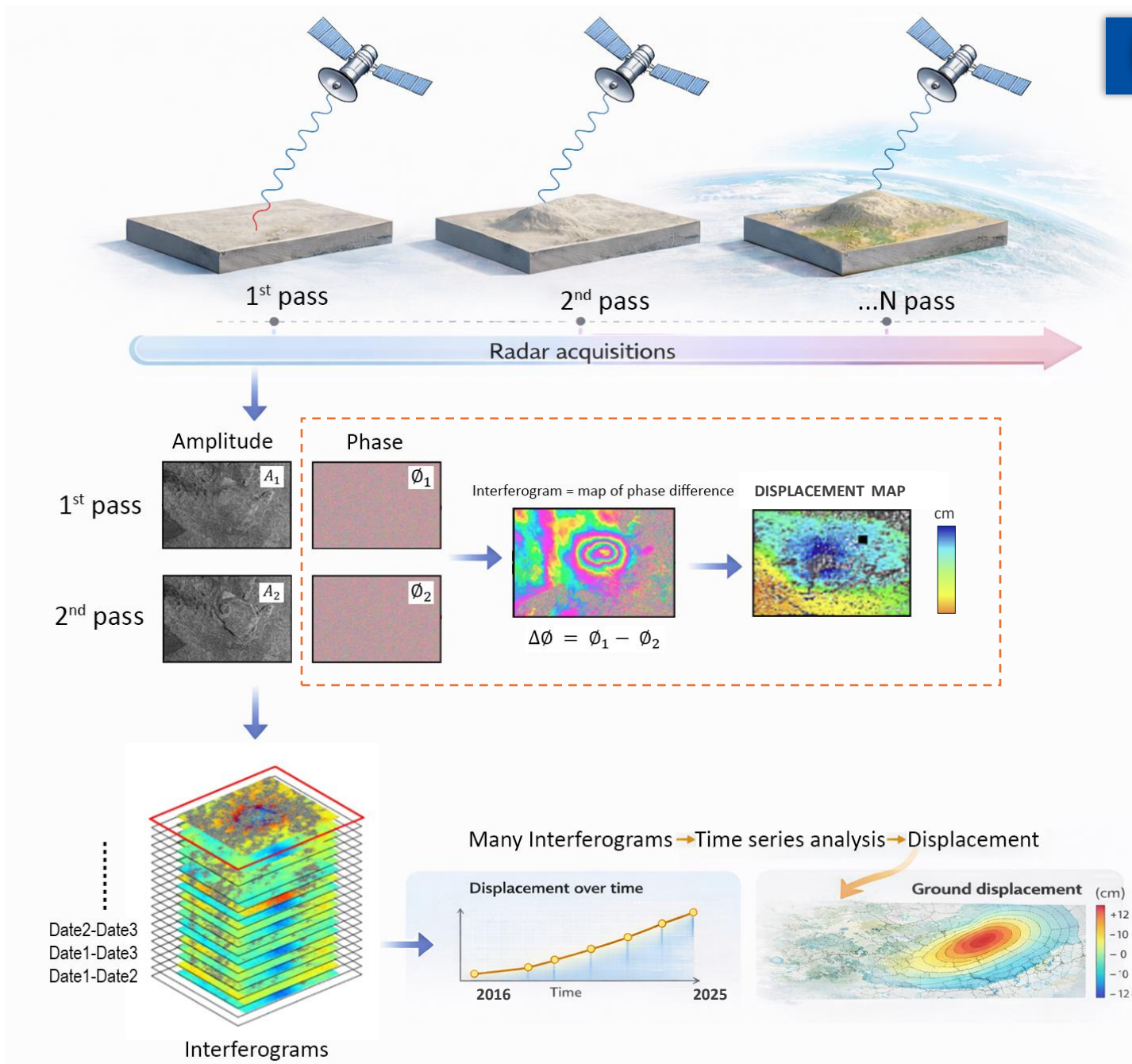
- Uses repeated radar images to measure ground motion over time

## Main Outputs:

- Displacement maps (where motion is occurring)
- Time series at points or areas (how motions evolves)

## Typical use:

- Detect subsidence or uplift related to subsurface processes (e.g. reservoir or formation response)



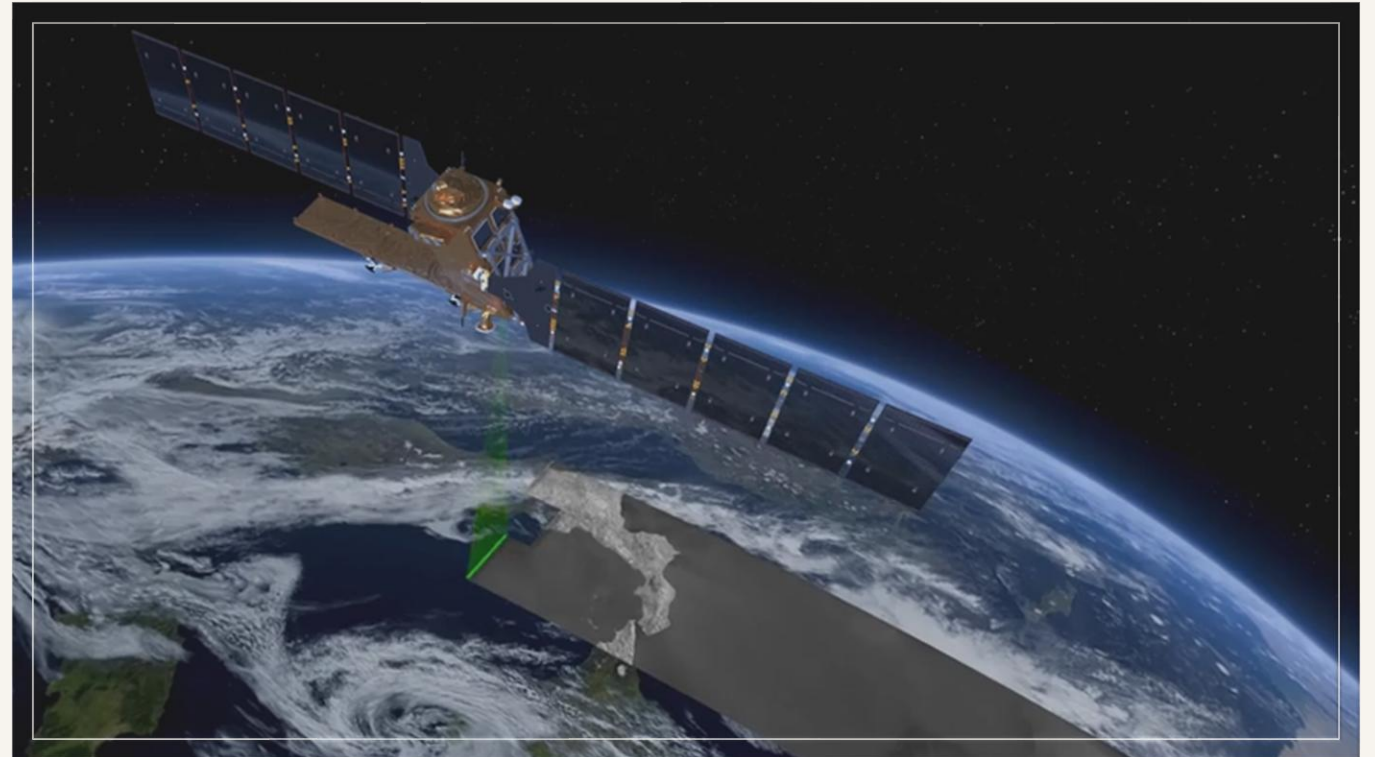
# The public-data advantage

free • repeatable • scalable

## Public radar satellite imagery

- day/night, through clouds
- Repeat coverage through time

**Scalable** from site-specific review to basin screening



Public satellite missions make regional monitoring practical

# What InSAR Adds to the Monitoring Toolkit

A **surface-response layer** that complements subsurface, operational, and field-based monitoring.

## 1 Regional Context

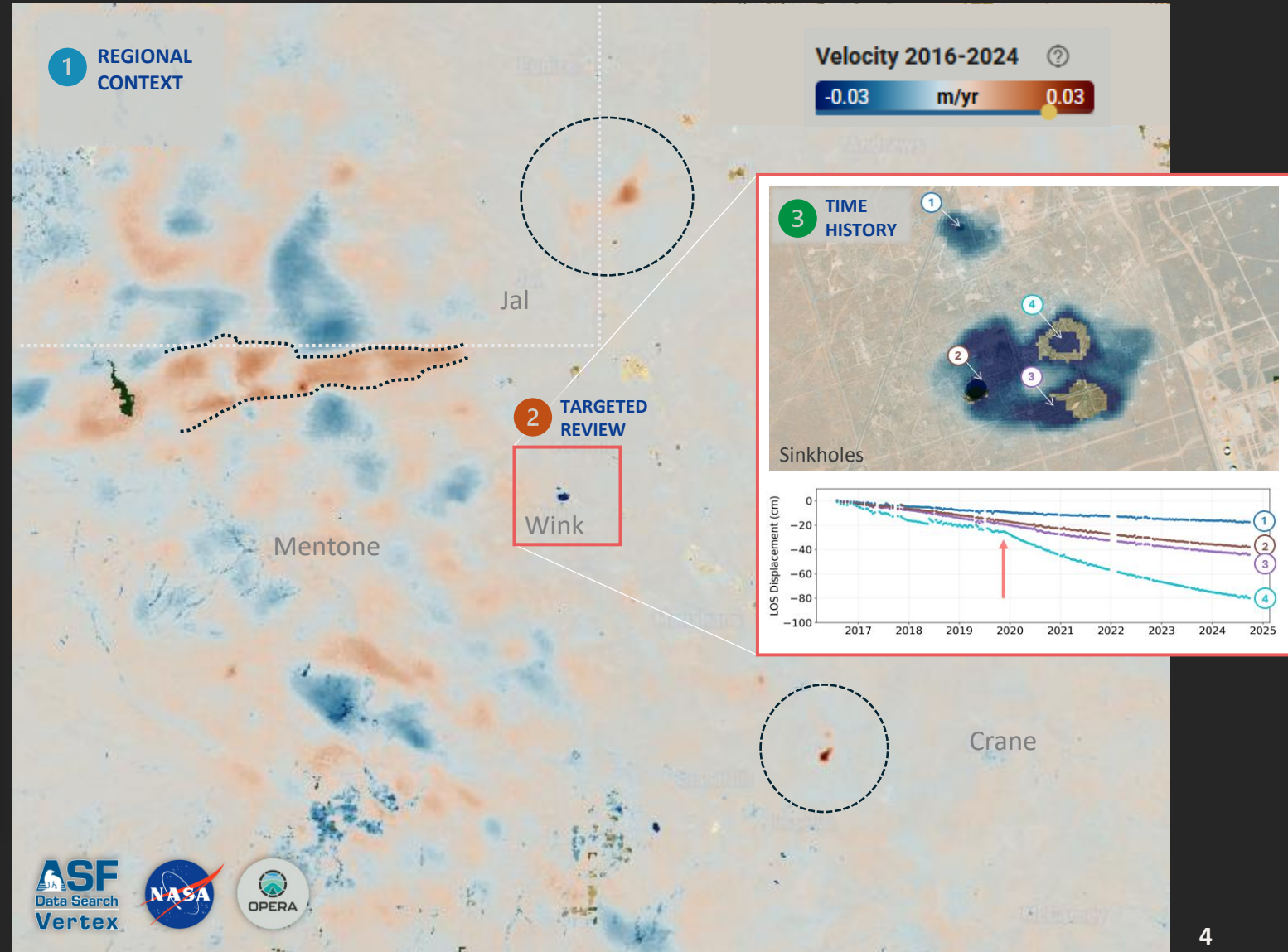
Broad-area view of uplift and subsidence across fields and basins.

## 2 Targeted review

Supports screening, prioritization, and closer technical follow-up.

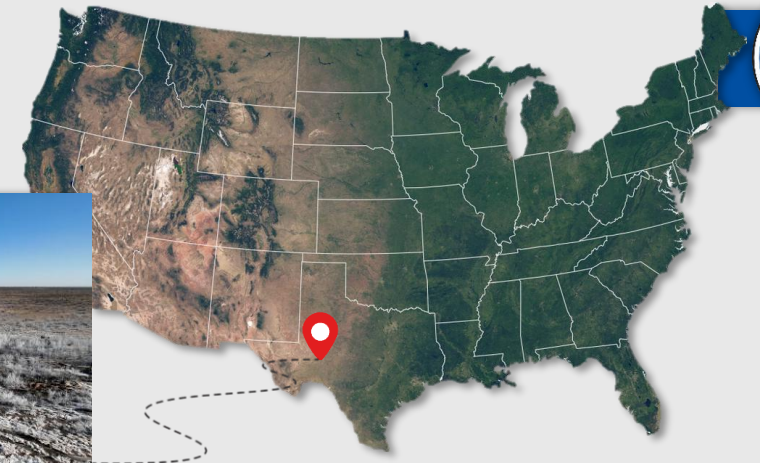
## 3 Time history

Maps and time series show whether motion is gradual, persistent, accelerating, or abrupt.

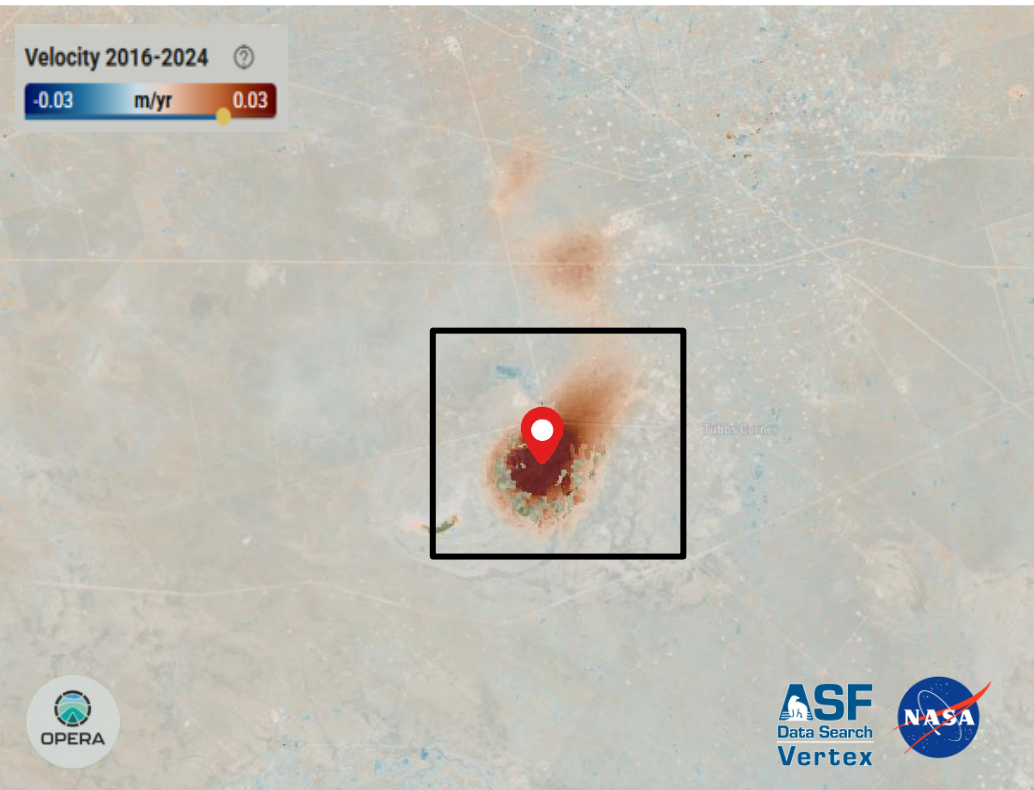


# Case Example: Tubbs Corner Blowout

- **Public** analysis-ready deformation product
- **Rapid screening** plus time-series review
- **Surface response** consistent with event history



Oil Well Blowouts  
Crane County, TX



## VERTICAL DISPLACEMENT



# What Makes a Signal Worth Closer Review?

Displacement Rate Thresholds for Vertical Displacement	
Rate, cm/year	
<span style="color: red;">●</span> > 20 ± 5	<b>Critical</b> – Rapid vertical movement
<span style="color: red;">●</span> 10 ± 5	<b>Significant deformation</b> – Immediate attention
<span style="color: orange;">●</span> 5	<b>Noticeable movement</b> – May need investigation
<span style="color: yellow;">●</span> 1.5 – 2.5	<b>Minor deformation</b> – Monitor occasionally
<span style="color: green;">●</span> 0 ± 1	<b>Stable</b> – negligible change

\*\*Example rates shown for illustrative purposes only

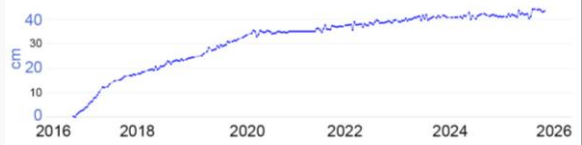
≥ 5 cm/yr is "fast" and worth a closer look



# FROM DETECTION TO DECISION SUPPORT

*InSAR tells us where to look* >>> *Regulation decides what to do next.*

## 01 Detection



**Signal identified**



## 02 Technical Review



**Integrated with context**



## 03 Decision Support



**Supports next-step review**

# Key Takeaways



**Public satellite data** make regional monitoring practical and repeatable.



**InSAR supports** hazard screening and situational awareness.



**Its value is greatest** when integrated with other datasets and workflows



*The world is a dynamic place*



# Thank You

*for your attention*

Laura Ortiz-Huerta

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