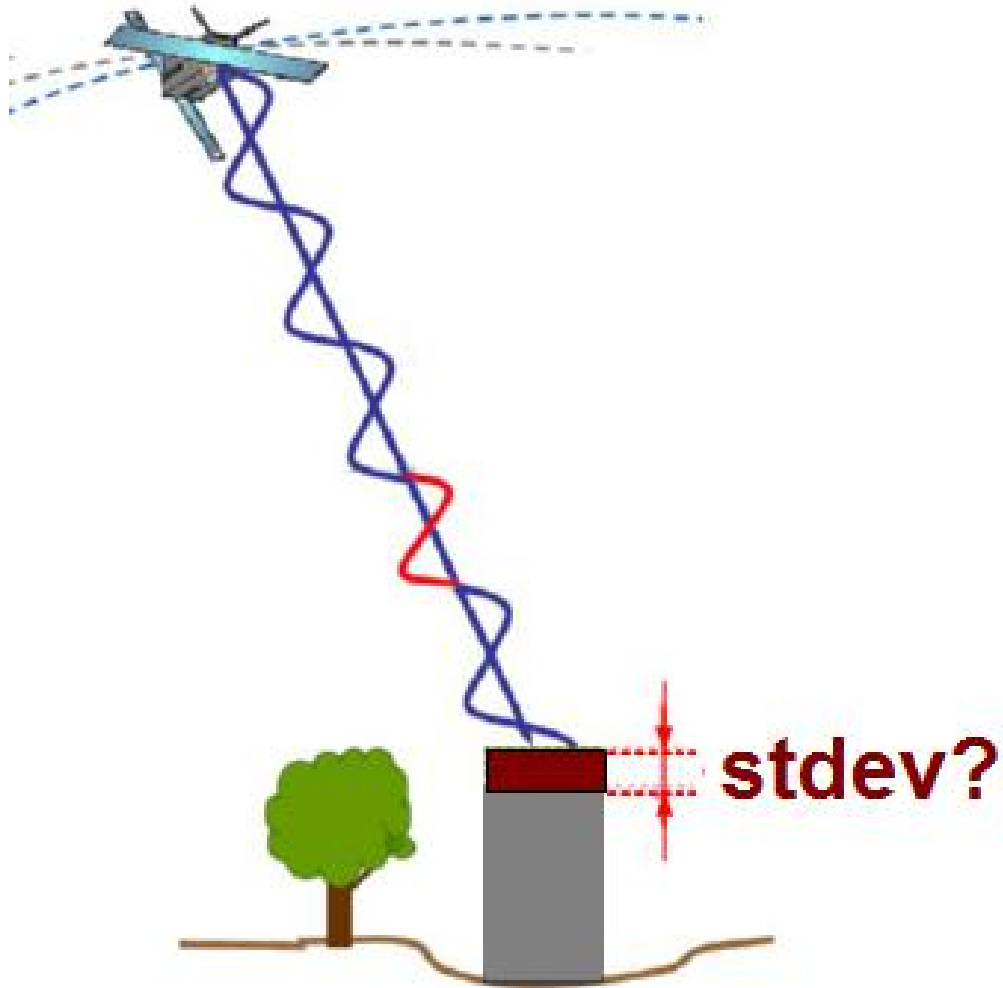


Sentinel-1 Quality Control: Poland Test Sites

Motivation



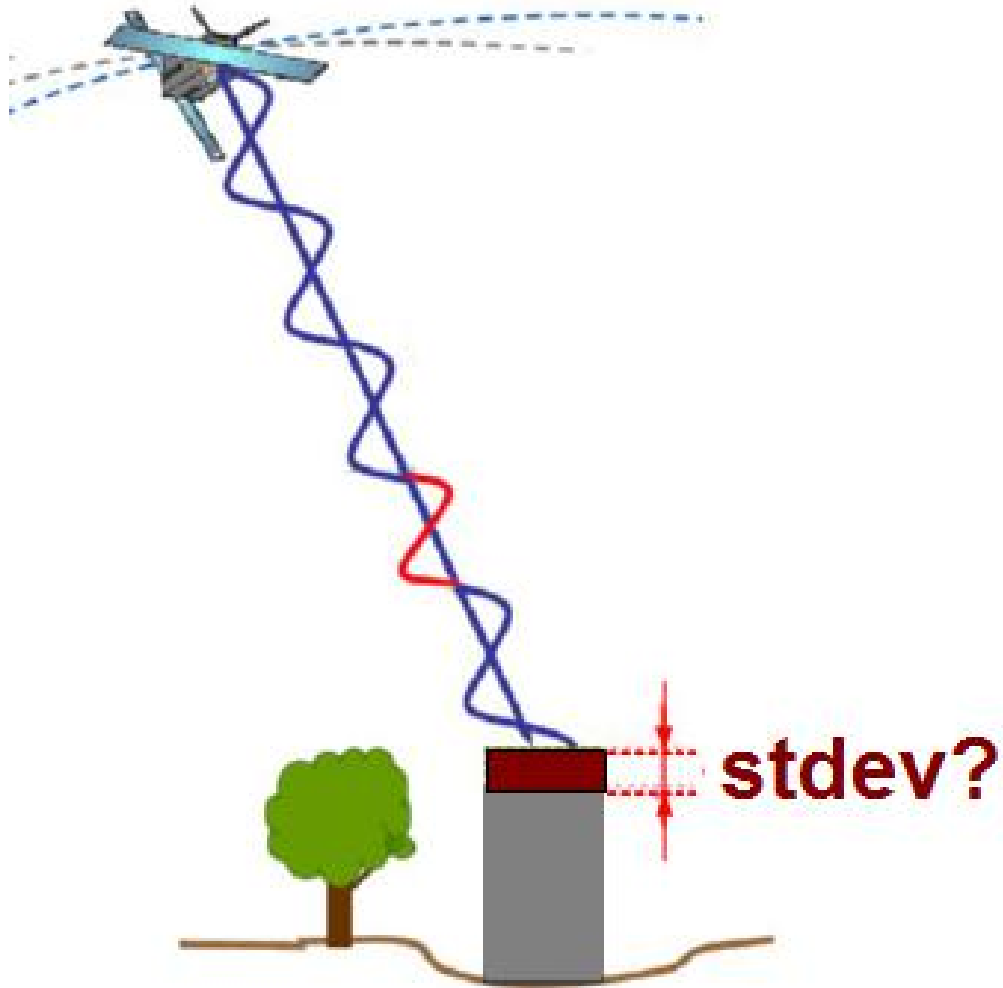
Main research question:

“How good is what we measure/estimate?”

Context:

“Full scale error propagation for InSAR not straightforward....”

Motivation



Main research question:

“How good is what we measure/estimate?”

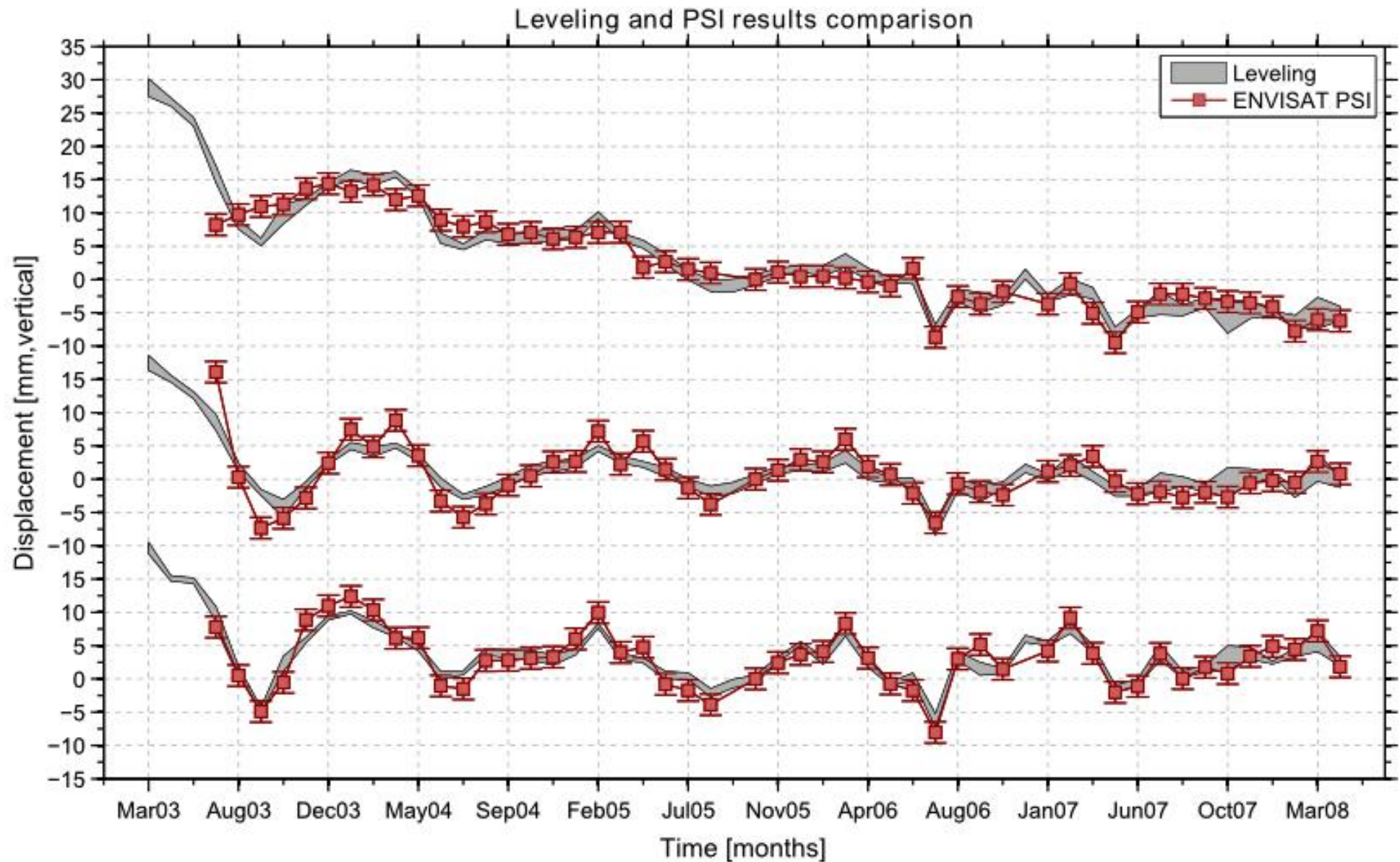
Context:

“Full scale error propagation for InSAR not straightforward....”



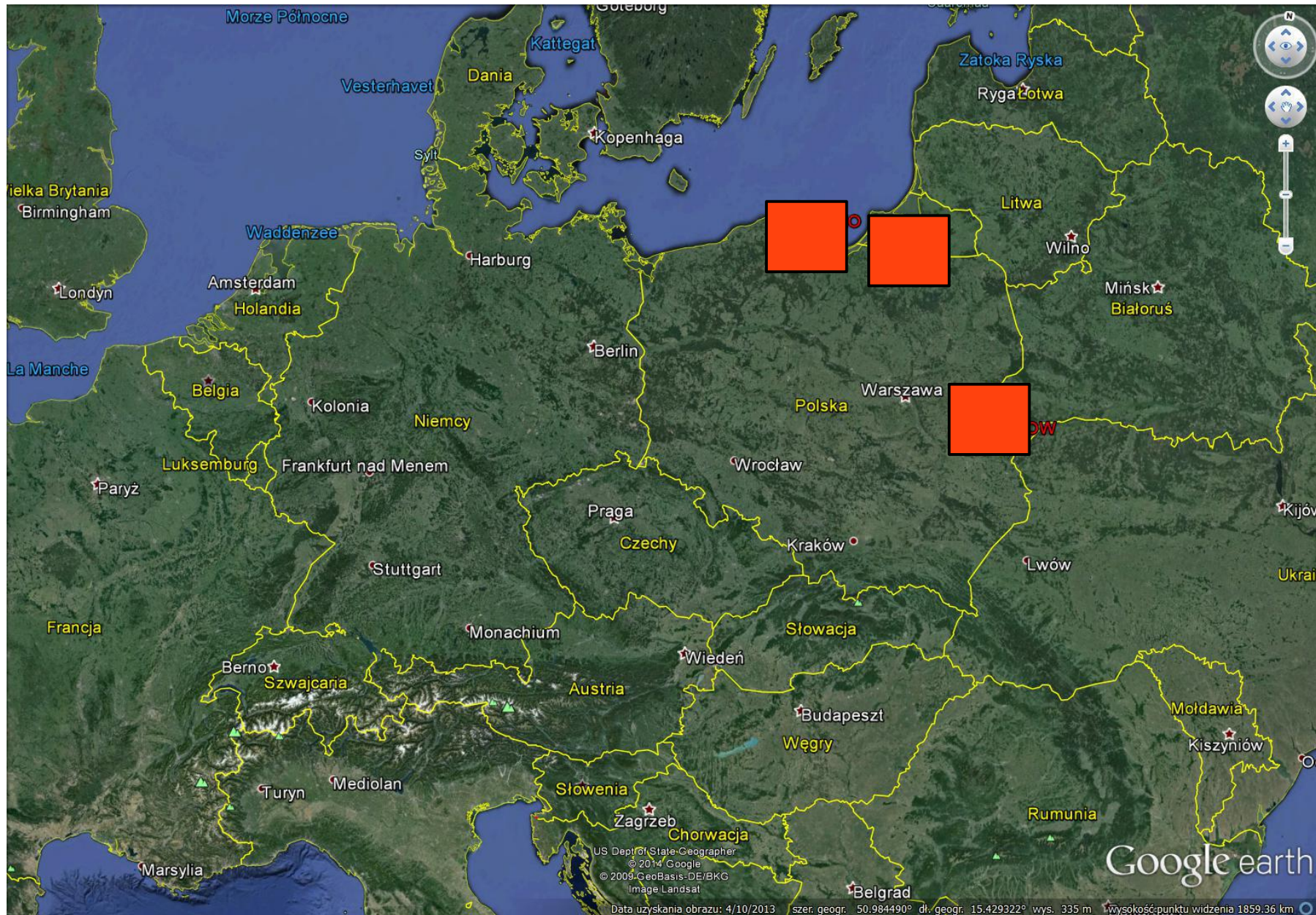
Empirical Validation

Previous Study: Delft CR Site



Credit: TU Delft, Delft CR experiment, Marinkovic et al. 2009

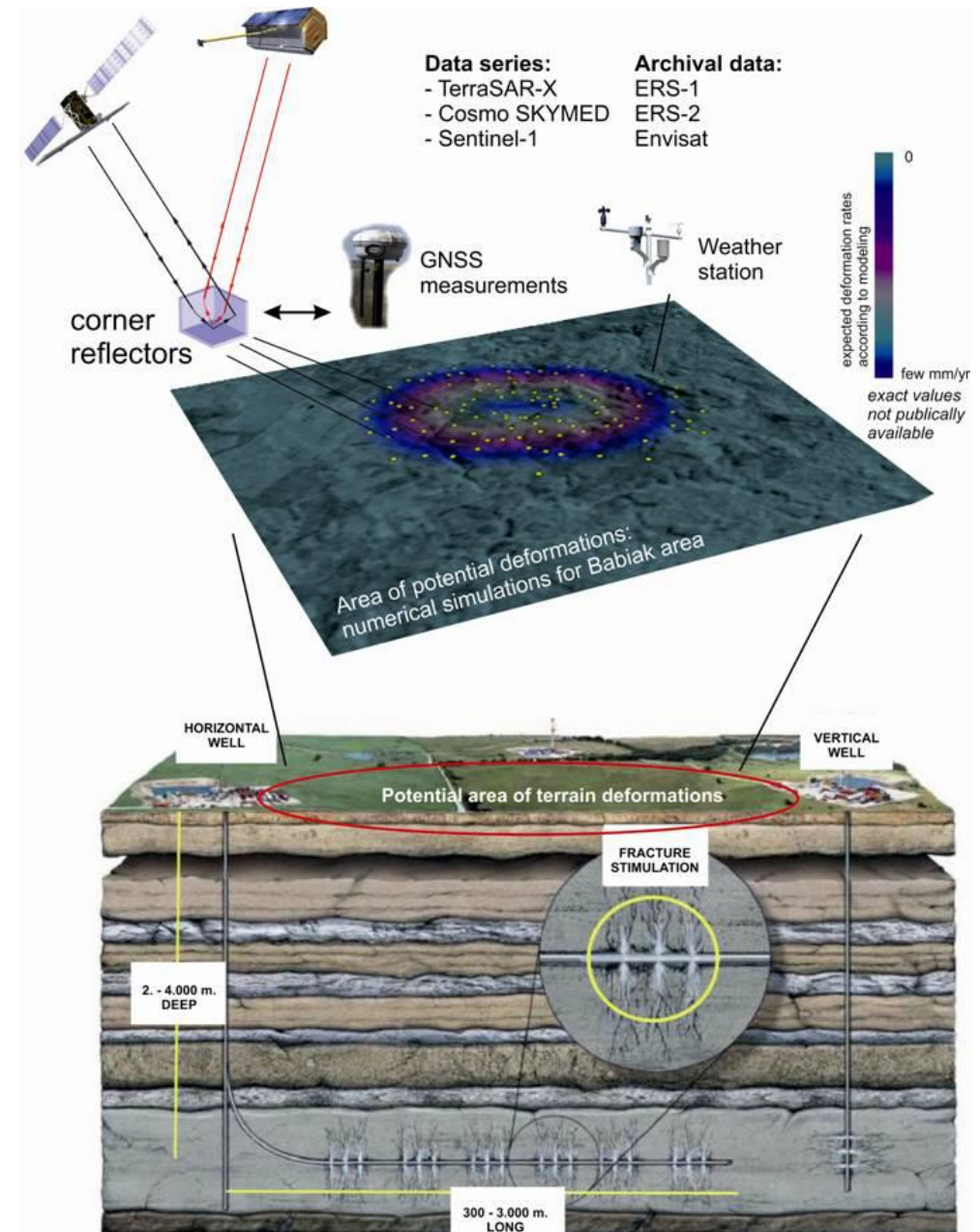
Poland S-1 Test Sites



Wider context: 'The ShaleGas Project'



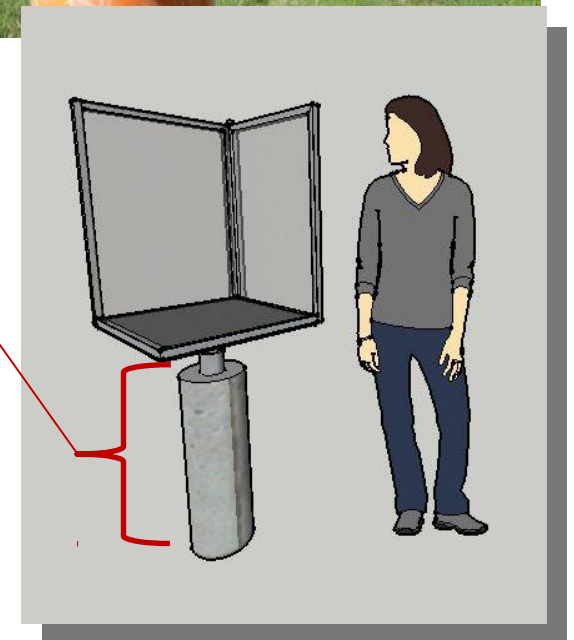
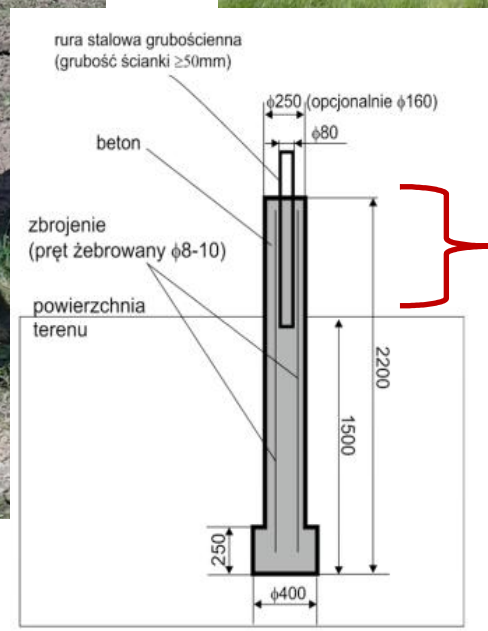
A pilot study that aimed to monitor potential terrain surface deformation associated with hydraulic fracturing in Poland.



The project in figures:

- duration: 3 years (from 2013)
- 3 test sites
- 3 automatic weather stations
- **3 x 15 CRs + 3 x 5 CRs S1**
- 3 x 34 GNSS benchmarks
- 3 x 60 new TSX acquisitions
- 3 x ?? RSAT2 data
- 3 x ?? Sentinel-1 data

CRs - Design Details



CRs - Design Details



Type: trihedral

Material: steel frame + aluminium plates (perforated)

Two sizes:

TSX-ready

S1-ready

Orientation: descending

Tilt: 10 deg

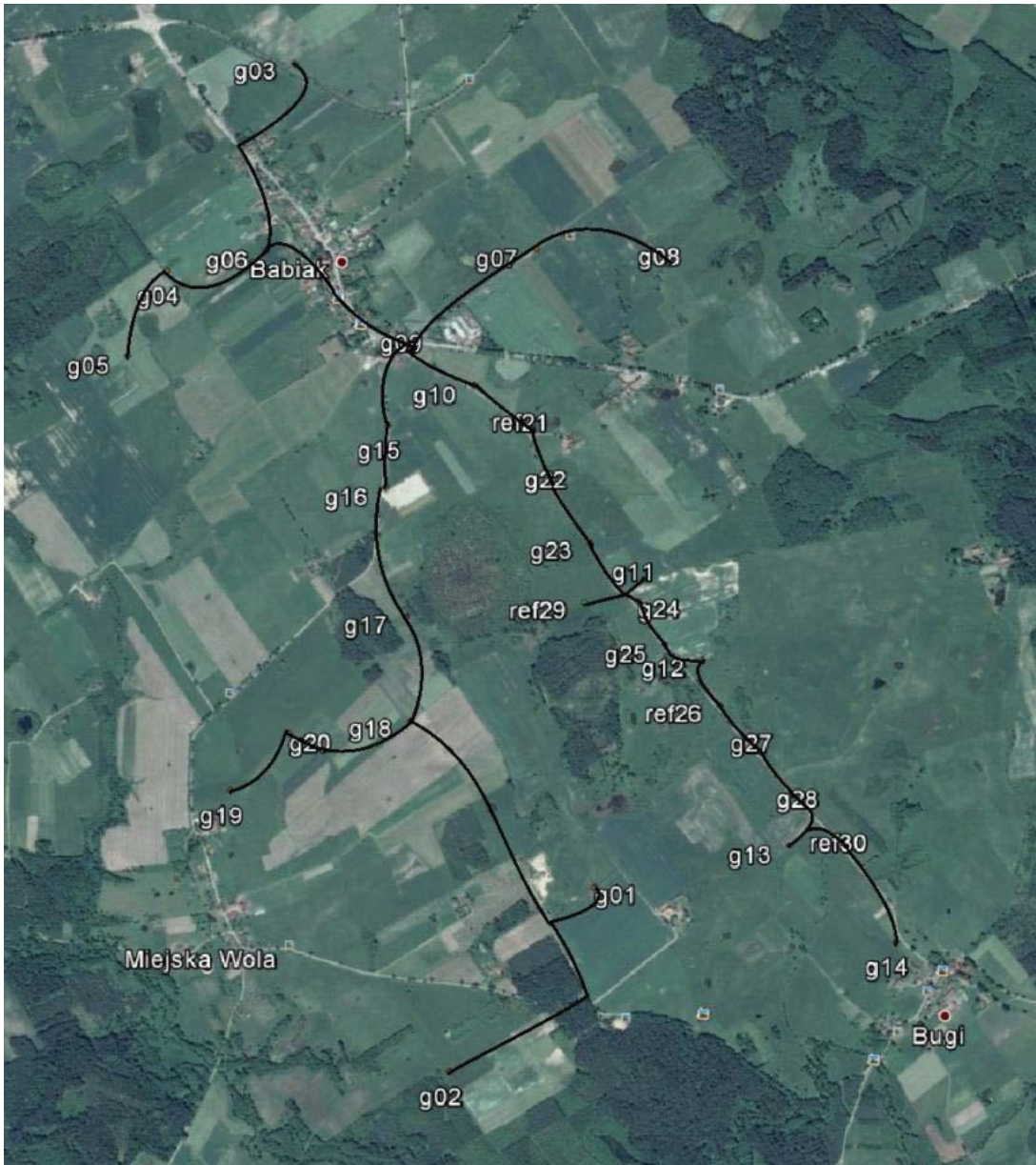
Mount: adjustable

Base: concrete 1,5 m deep

Levelling of S1 CRs (Babiak area)



Precise Leveling & GNSS



Accuracy: ~2mm

One step closer to satellite: UAV



CRs of 'Babiak' test site as seen by UAV

S-1 Acquisition

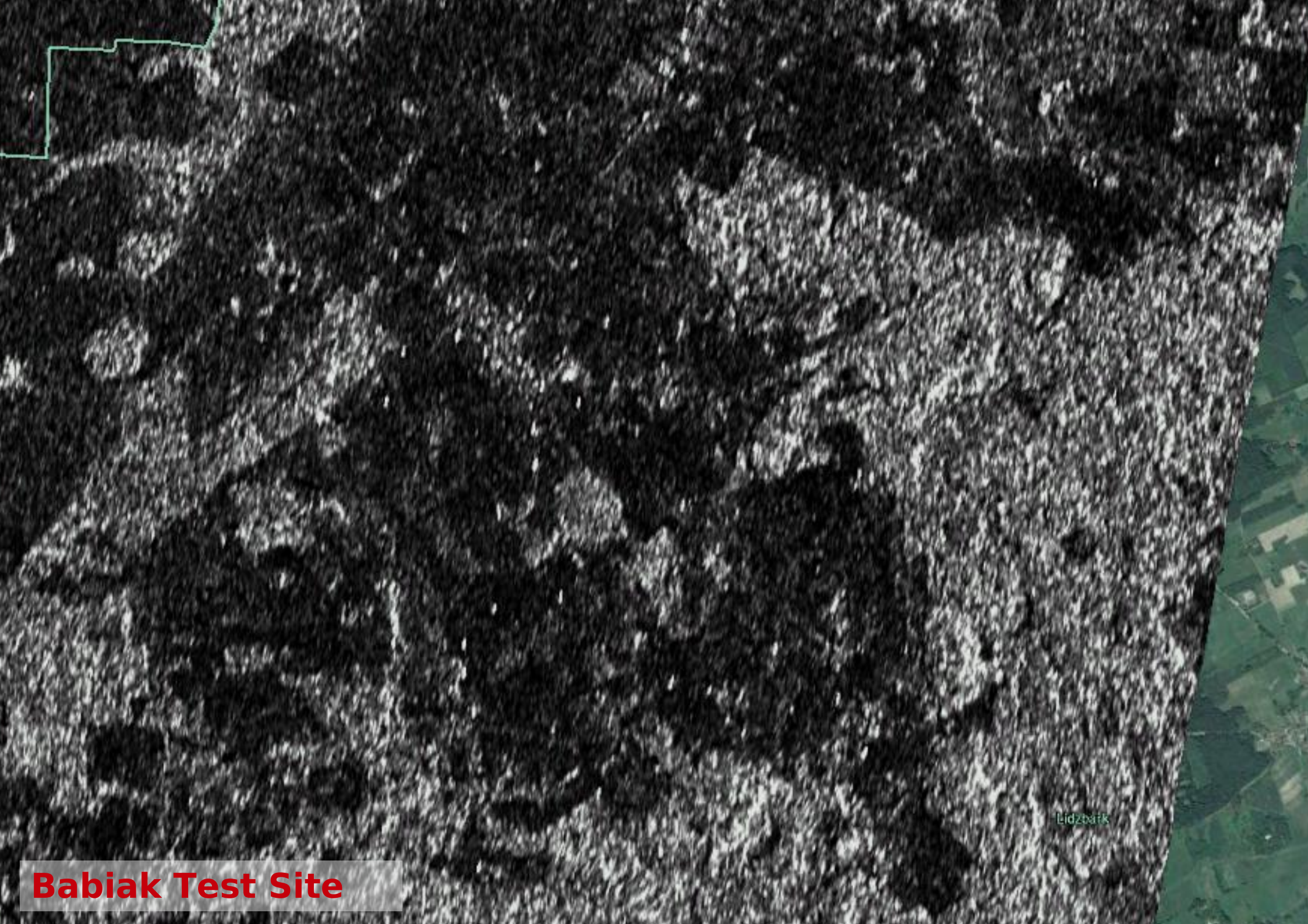


US Dept of State Geographer
©2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

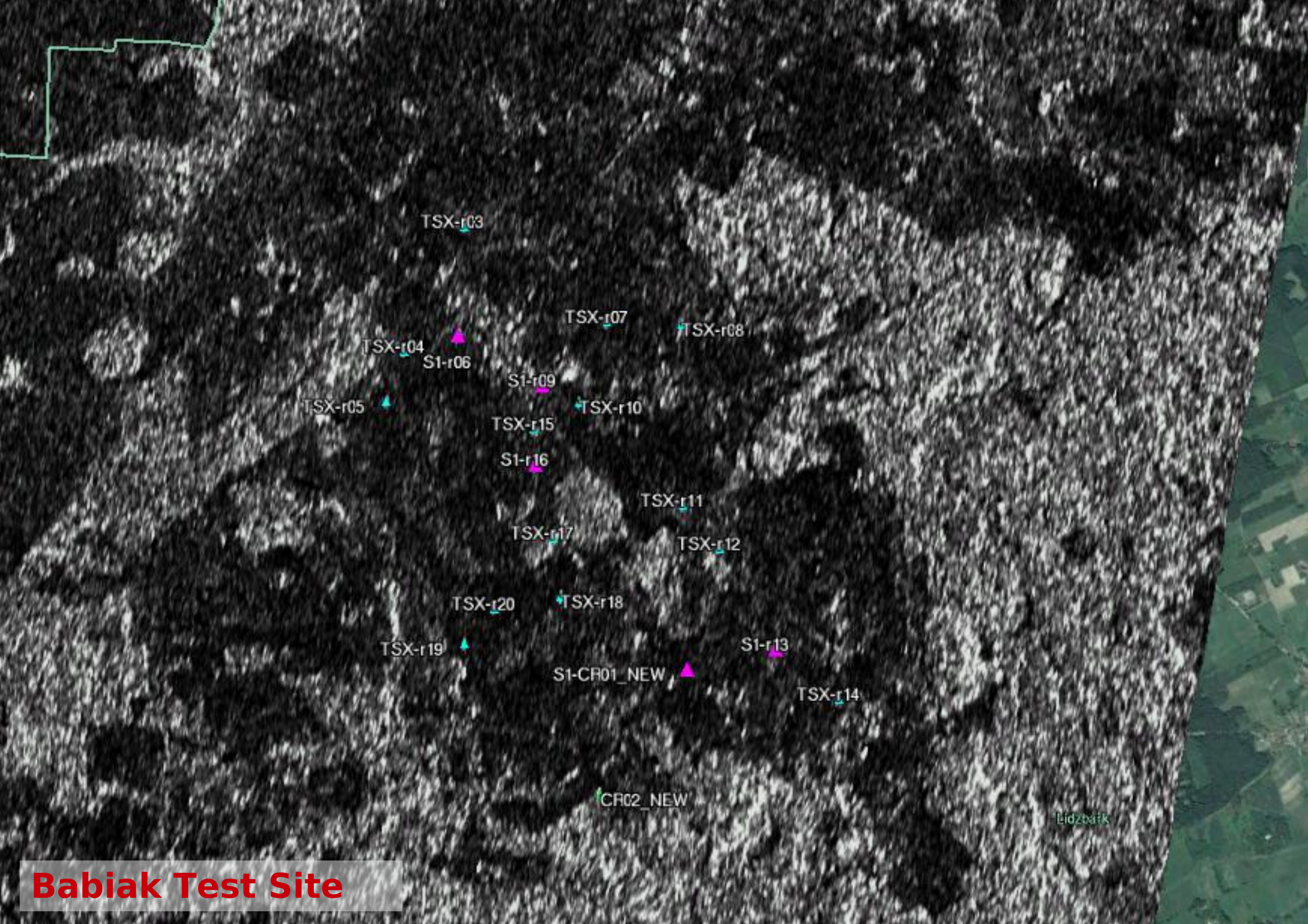
S-1 Acquisition: Babiak Site





Lidzbark

Babiak Test Site



Babiak Test Site

Lidzbark

Two for the price of one...



US Dept of State Geographer
©2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

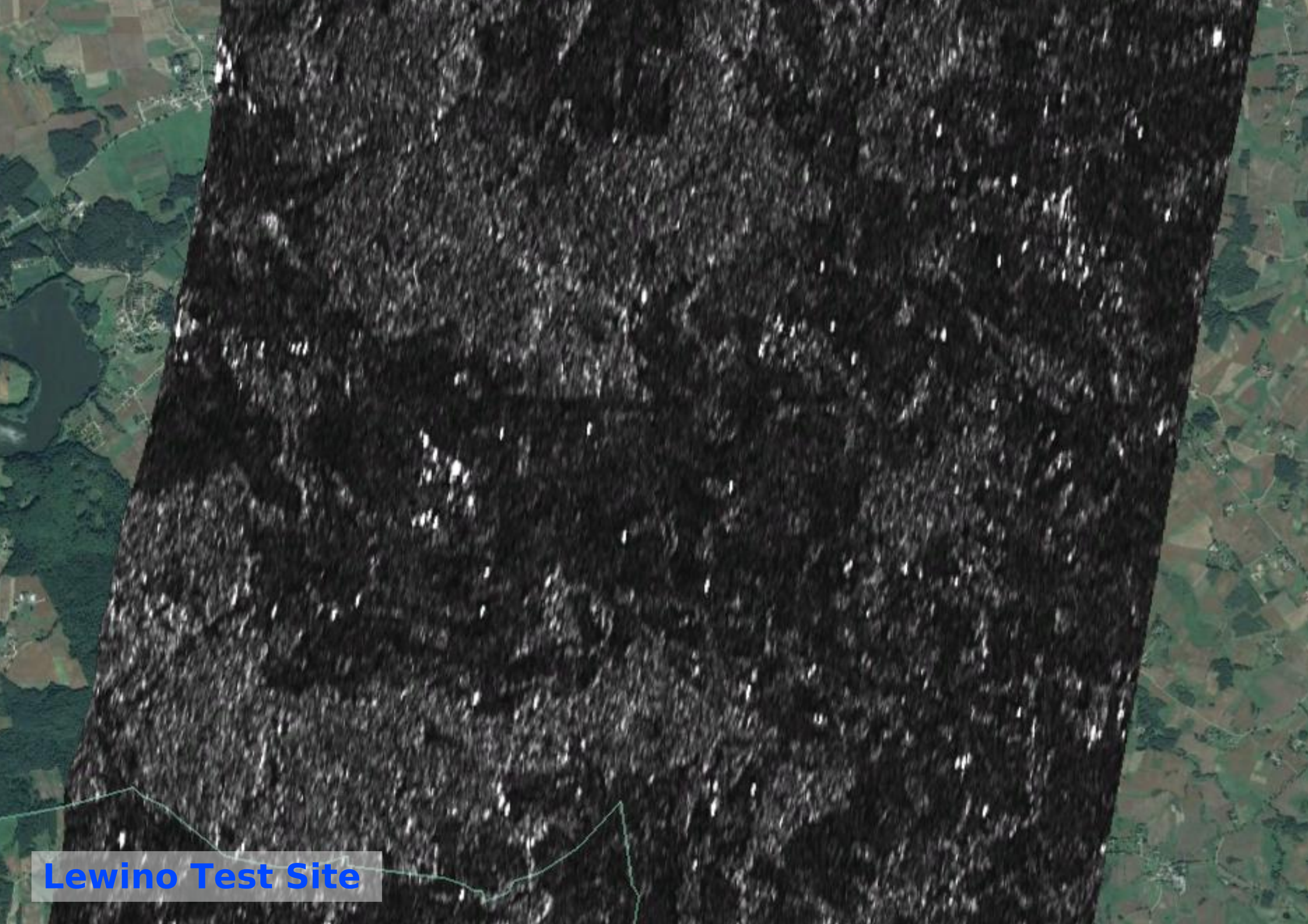
Google earth

Imagery Date: 4/10/2013 54°14'34.55" N 18°59'51.75" E elev -1 m eye alt 371.81 km



Two for the price of one...





Lewino Test Site



lewino_r18

lewino_r16

lewino_r17

lewino_r20

lewino_r11

lewino_r19

lewino_r10

lewino_r09

lewino_r01

lewino_r02

lewino_r12

lewino_r08

lewino_r07

lewino_r14

lewino_r04

lewino_r03

lewino_r05

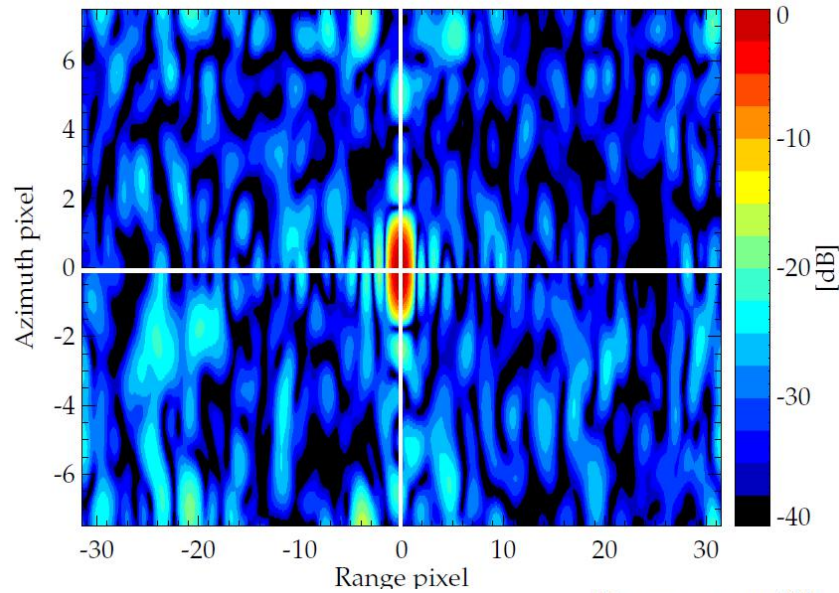
lewino_r13

lewino_r06

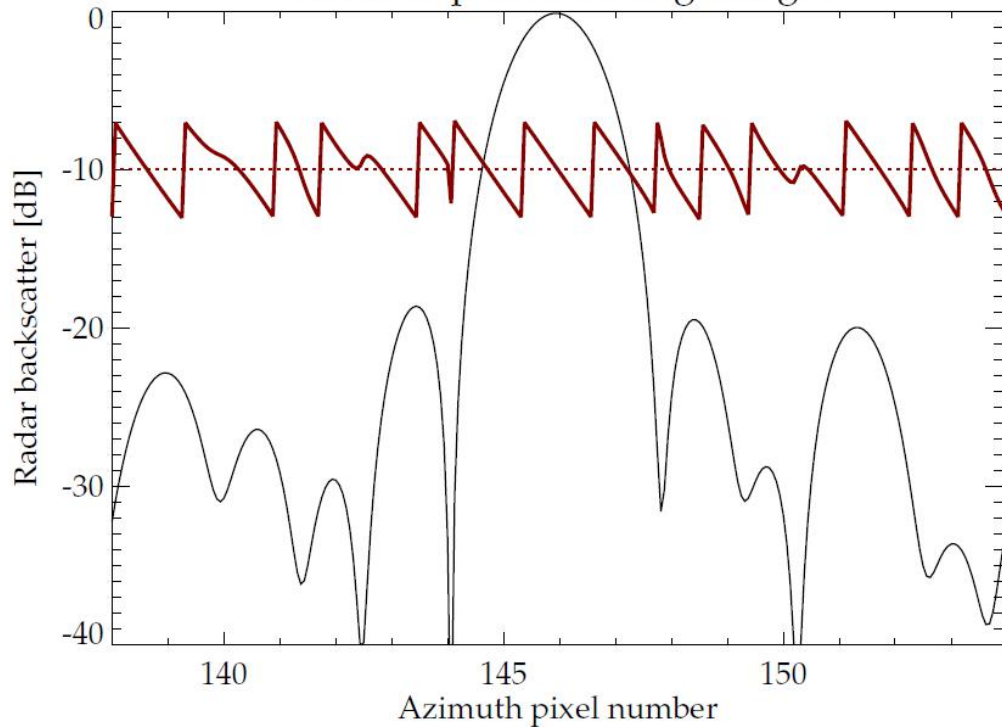
lewino_r15

Lewino Test Site

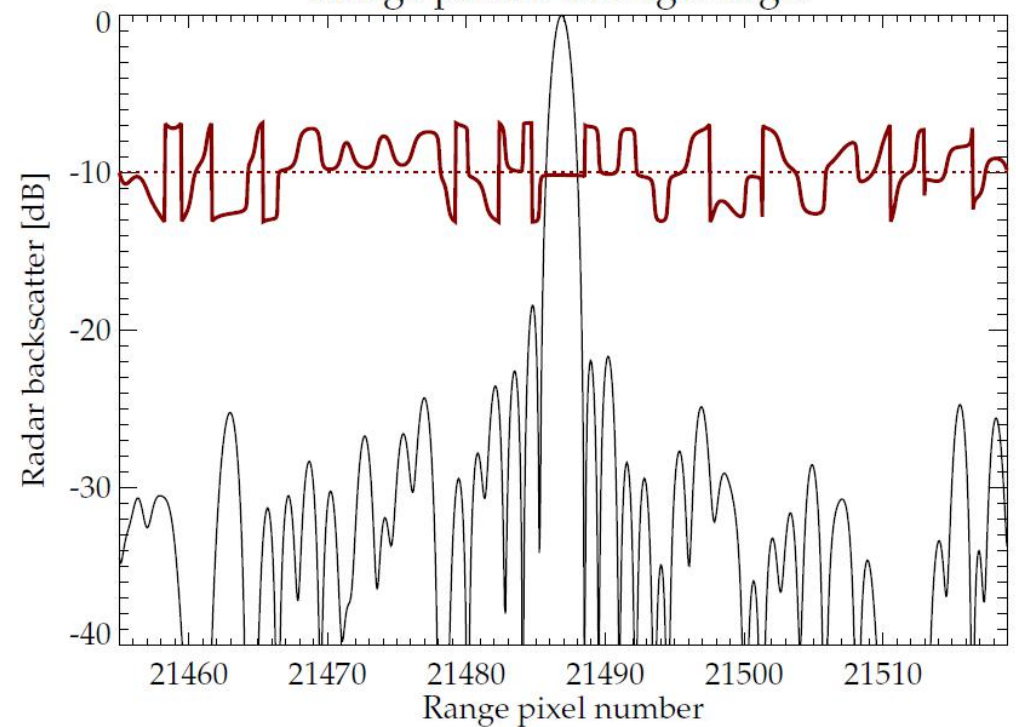
PTA of S-1 CR



Azimuth profile through target



Range profile through target



Summary and remarks



- **A number CR test sites for S-1 validation deployed and operational**
- **Qualitative and quantitative validation of S-1 wrt**
 - In-situ: GNSS and leveling,
 - Other SAR sensors: TerraSAR-X and RADARSAT-2
- **Considerations:**
 - Data availability ← resolved with latest SciHub update
- **Two test sites 150 kms apart open new validation opportunities (and challenges):**
 - characterization of the long wavelength signal,
 - quantization of 'other' error sources (eg. Orbits),
 - and large distance error propagation

