Lidar QA/QC, artifacts, issues to keep in mind

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(with content adapted from Ralph Hagerud (USGS))

2011 SCEC LiDAR Short Course:

Imaging & Analyzing Southern California's Active Faults with High-Resolution Lidar Topography

October 24-25, 2011

Overview

1. Lidar technology
2. Data collection workflow
3. Data products, formats, metadata
4. Lidar and vegetation
5. QA/QC, artifacts, issues to keep in mind
6. DEM generation from lidar point cloud data

Lidar Data Quality

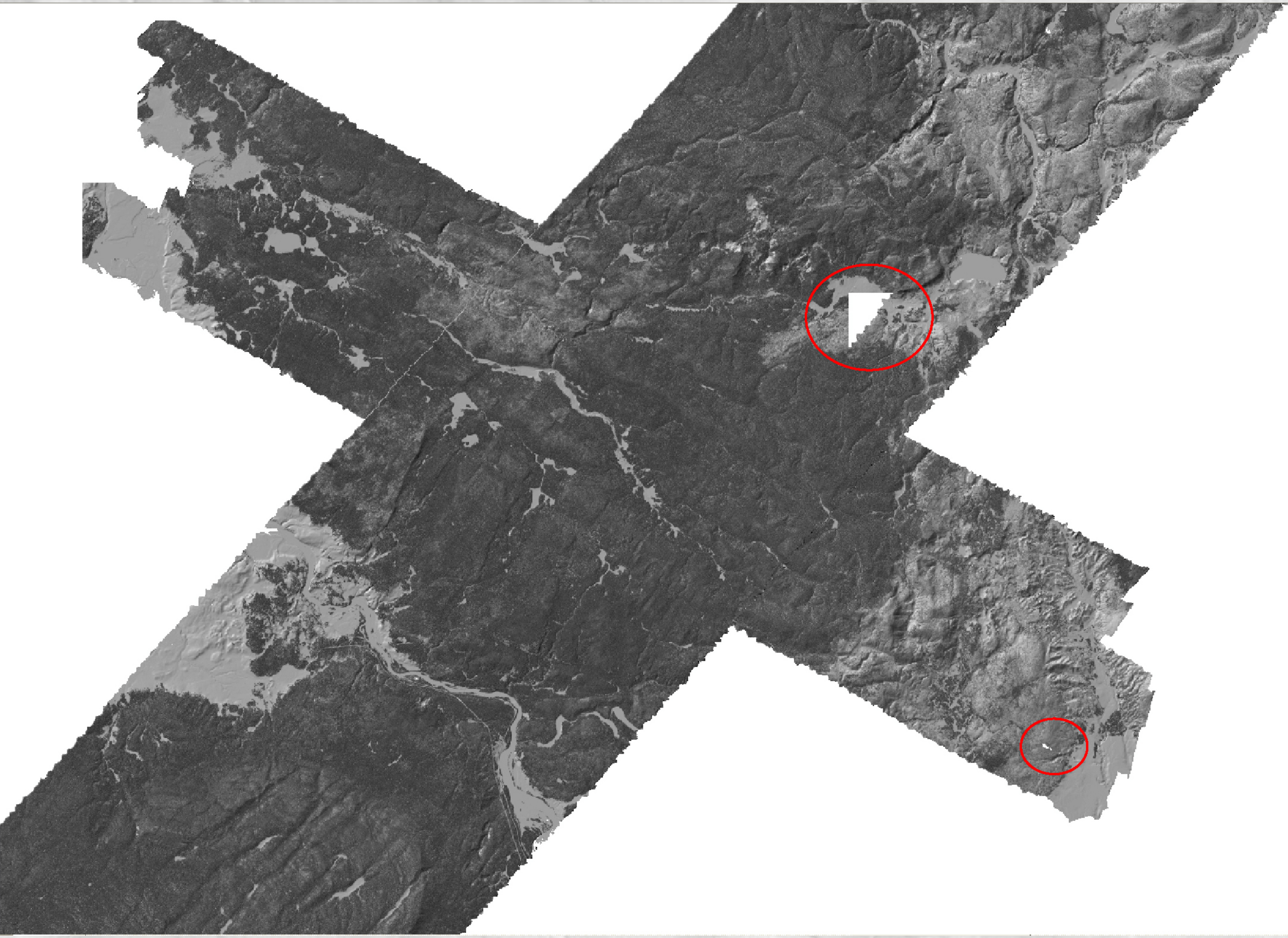
Typical metric is shot density / shot ("post") spacing:

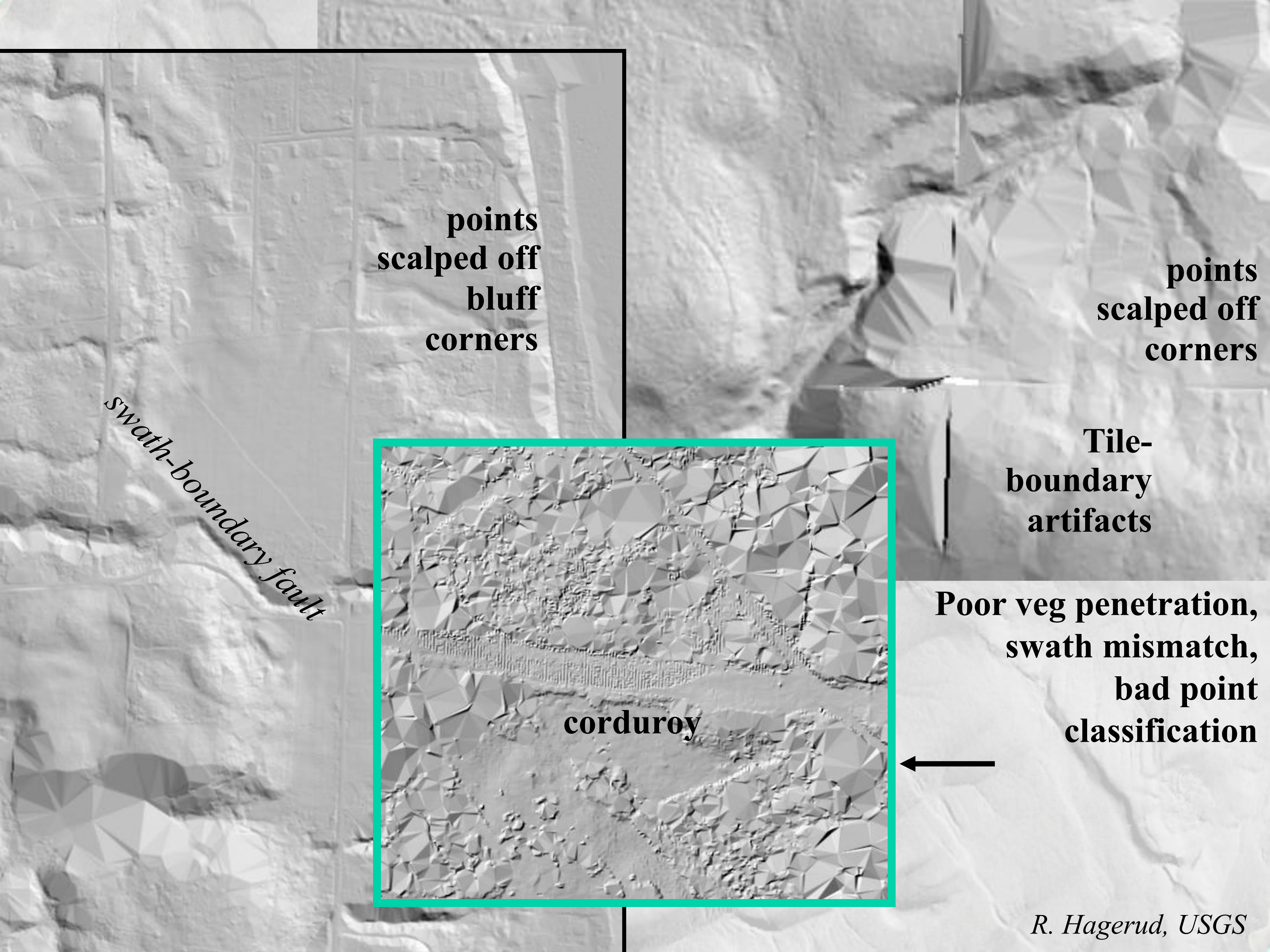
- Describes density of data and potential grid resolution.
- Shot density highly heterogeneous.
- Not all lidar data are created equal.

Evaluate lidar data quality by:

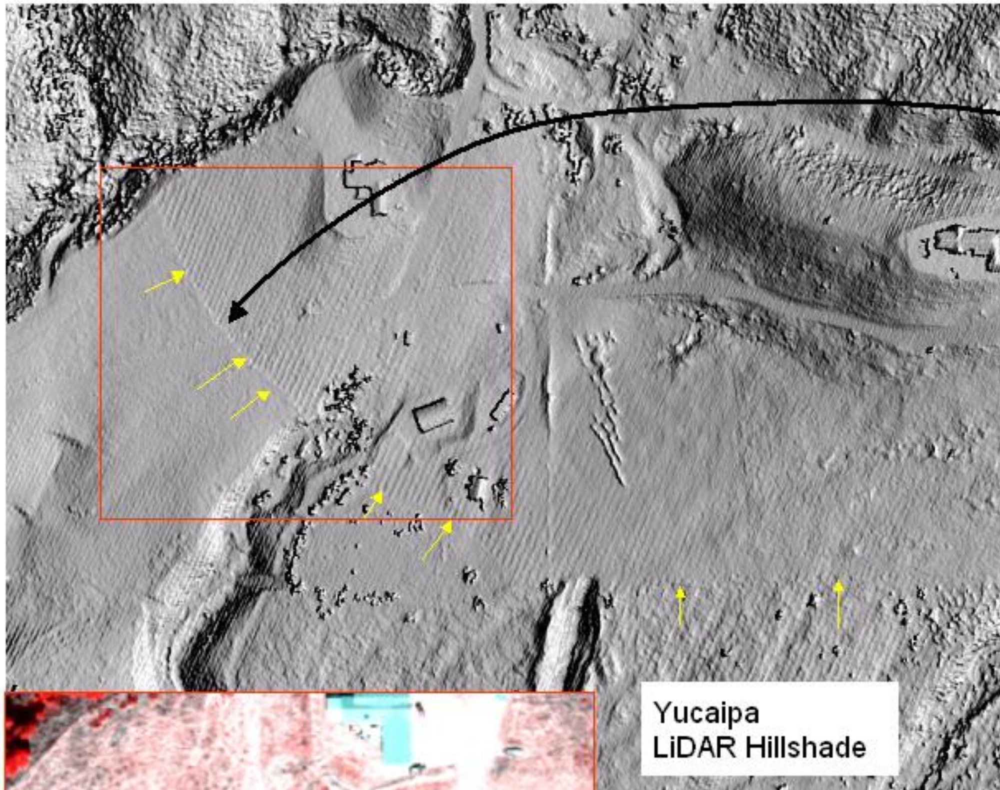
- Testing against ground control
- Looking at big images
- Quantifying swath to swath reproducibility and completeness

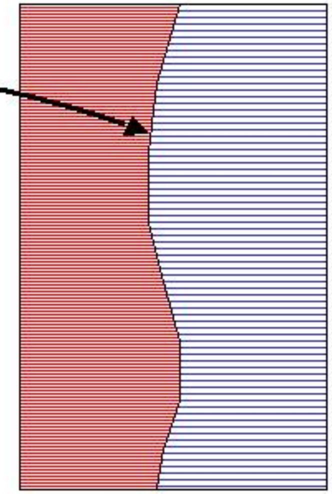
Modified from R. Hagerud, USGS



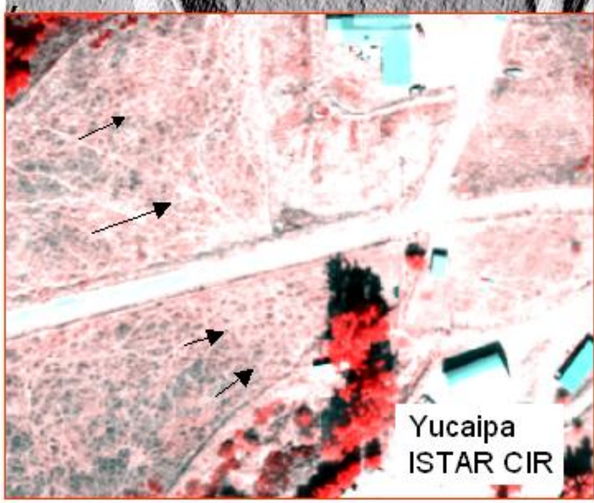

points scalped off bluff corners
swath-boundary fault
points scalped off corners
Tile-boundary artifacts
corduroy
Poor veg penetration, swath mismatch, bad point classification
R. Hagerud, USGS


0
60
120
240 Meters



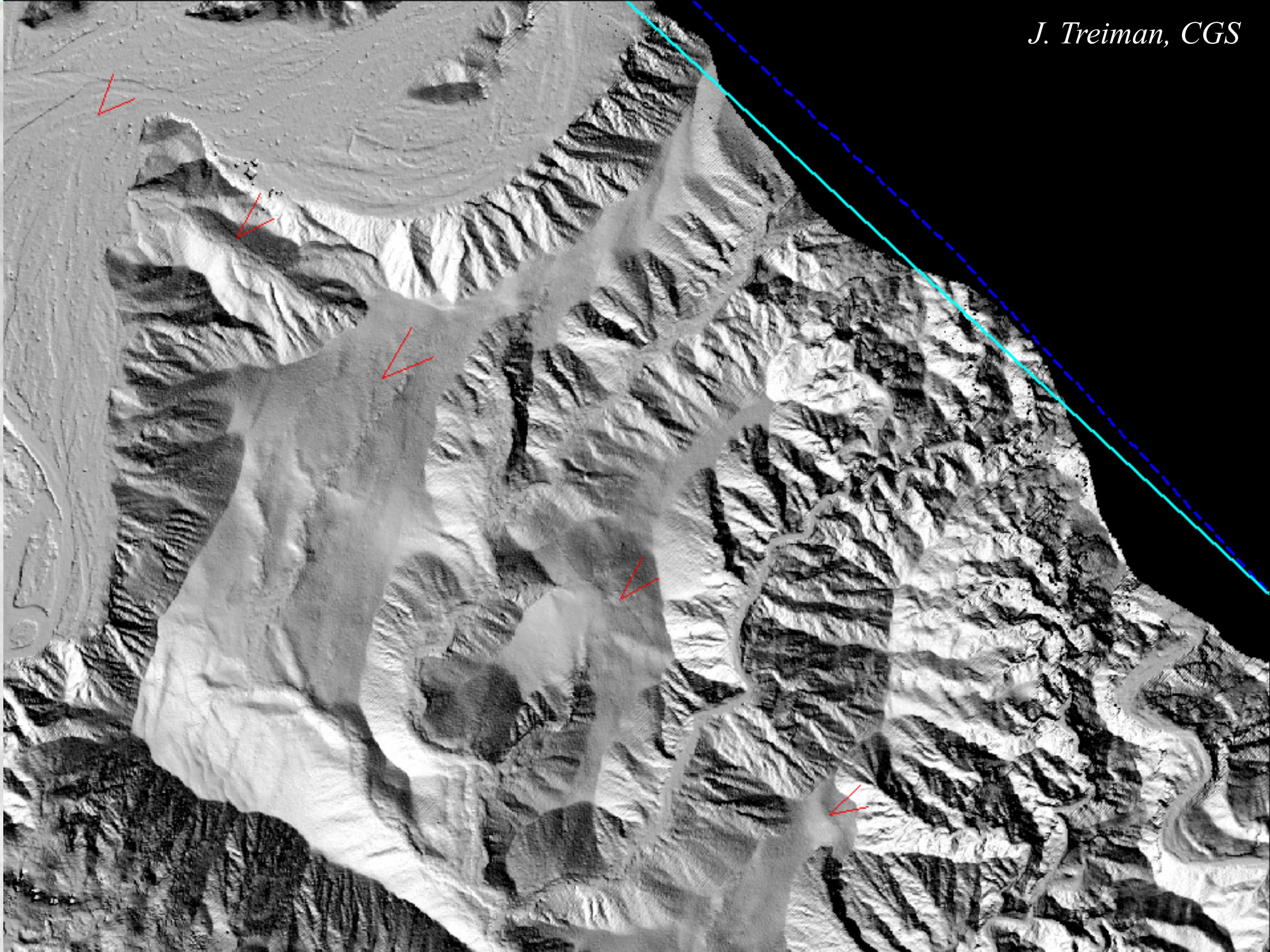


"Seam line" between swaths where the corduroy artifacts will not line up due to Vertical Swath Offset.



Red Arrows – features *attributed* to artifacts   Green Arrows – "natural" features (aligned drainages, scarplets)

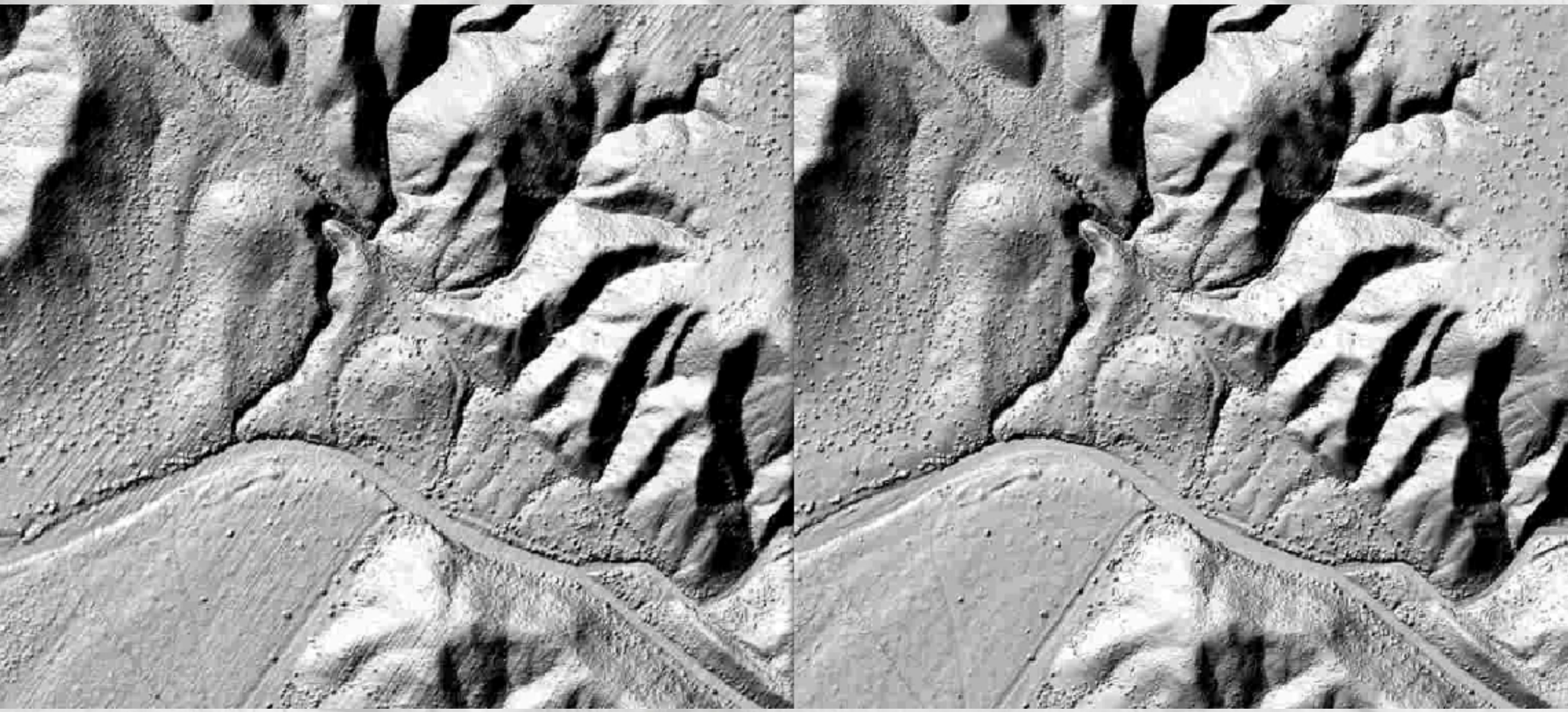
Ante Perez, CGS


J. Treiman, CGS

K. Hudnut, USGS

Corduroy

The B4 survey was supported by the loan of a 5100 unit from Optech to NCALM.



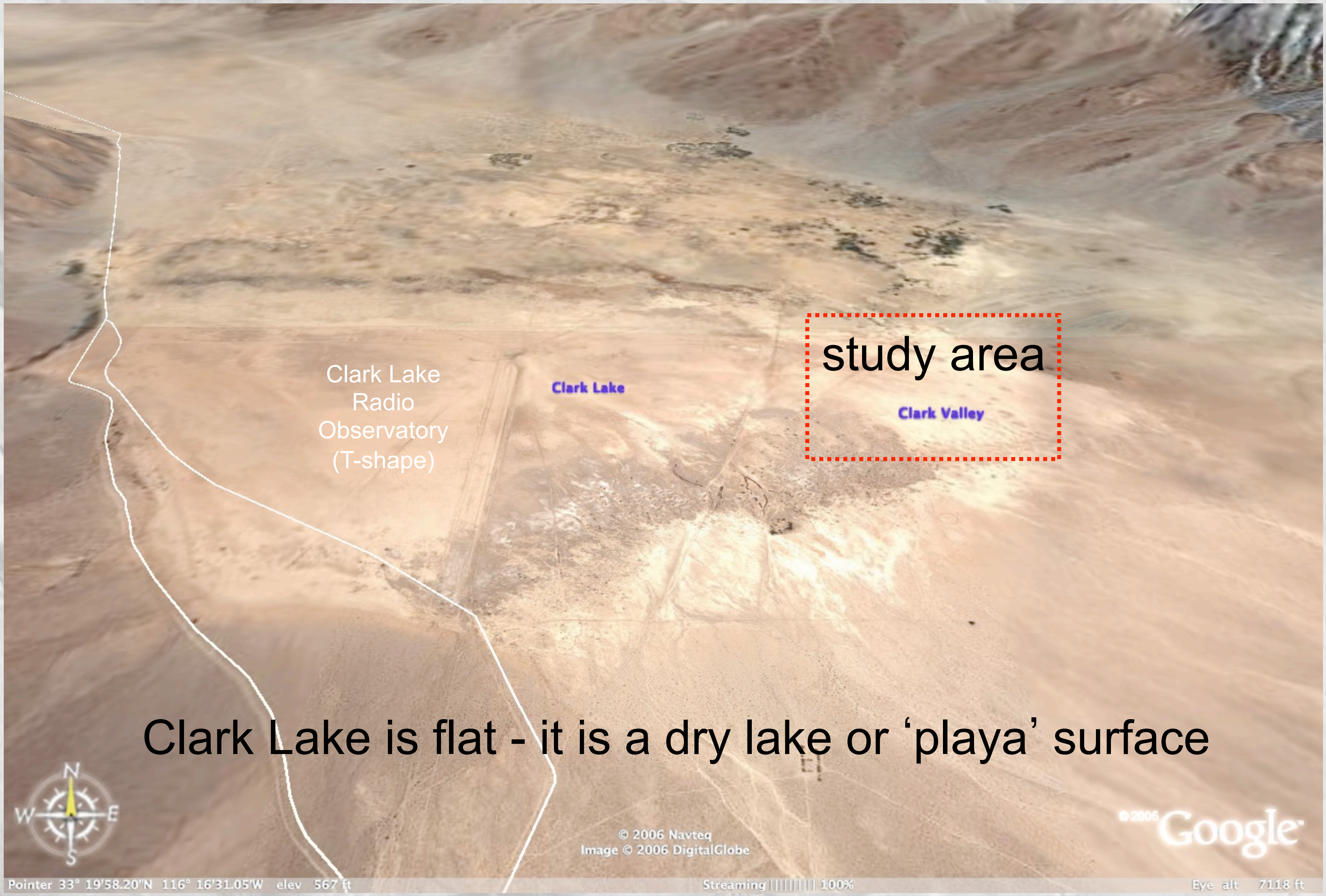
1233 5100

Carizzo Plain

Both models were used over the first few days of the May campaign. In general corduroy, though still present, is more subdued in the 5100 data, as illustrated in these DEM patches.

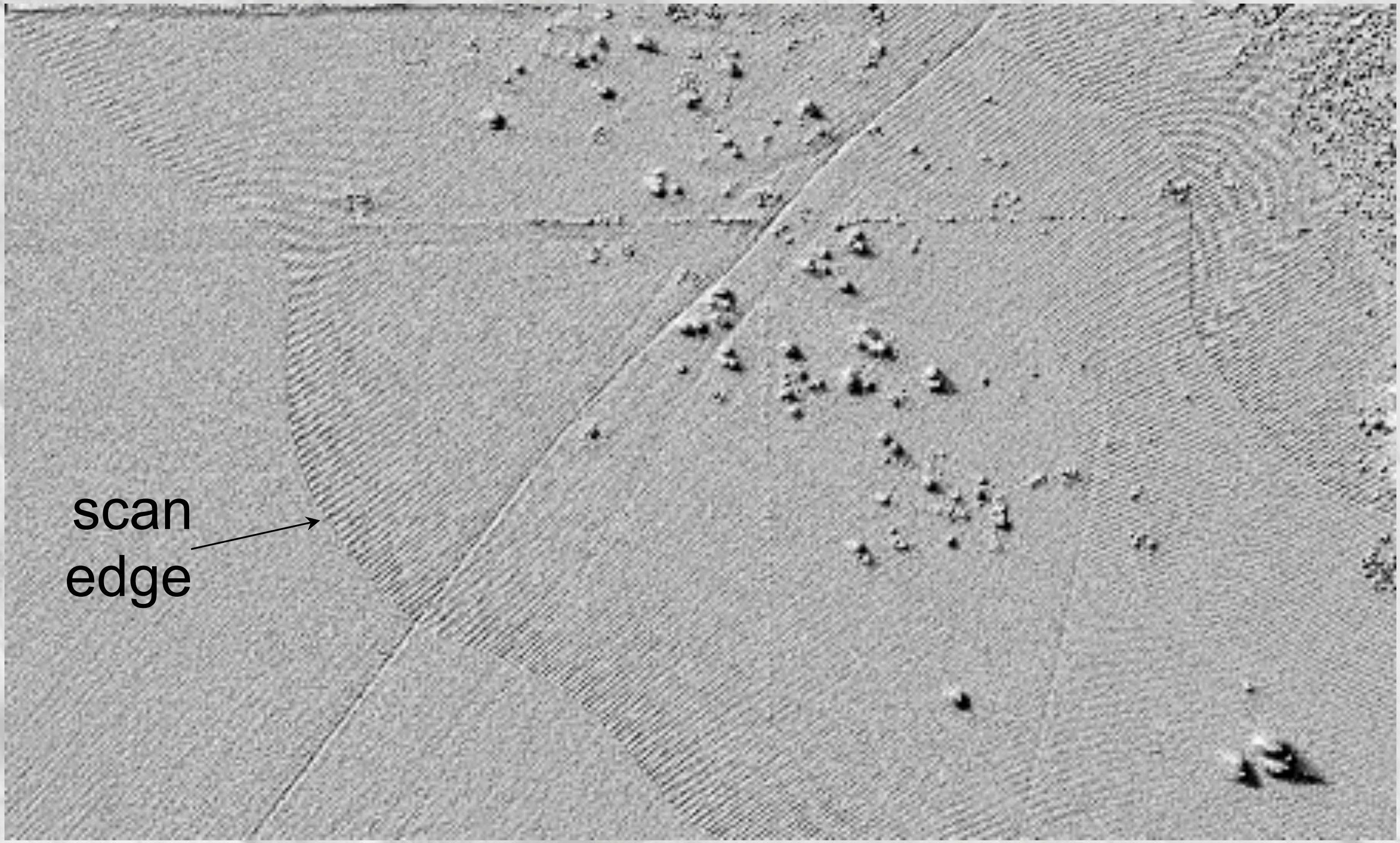
K. Hudnut, USGS

Corduroy



K. Hudnut, USGS

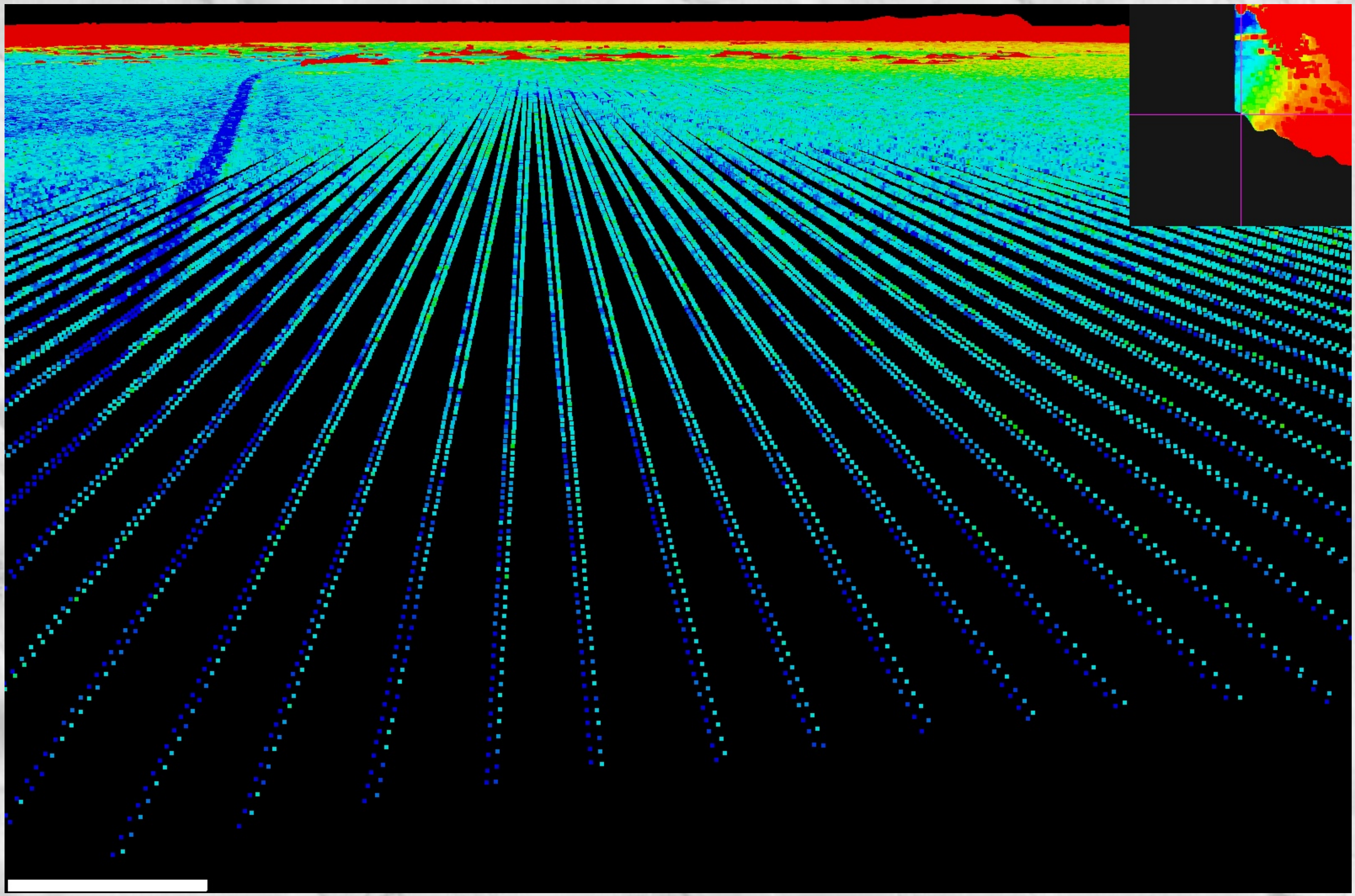
Corduroy



SURFER 0.5 m DEM from NCALM - standard product

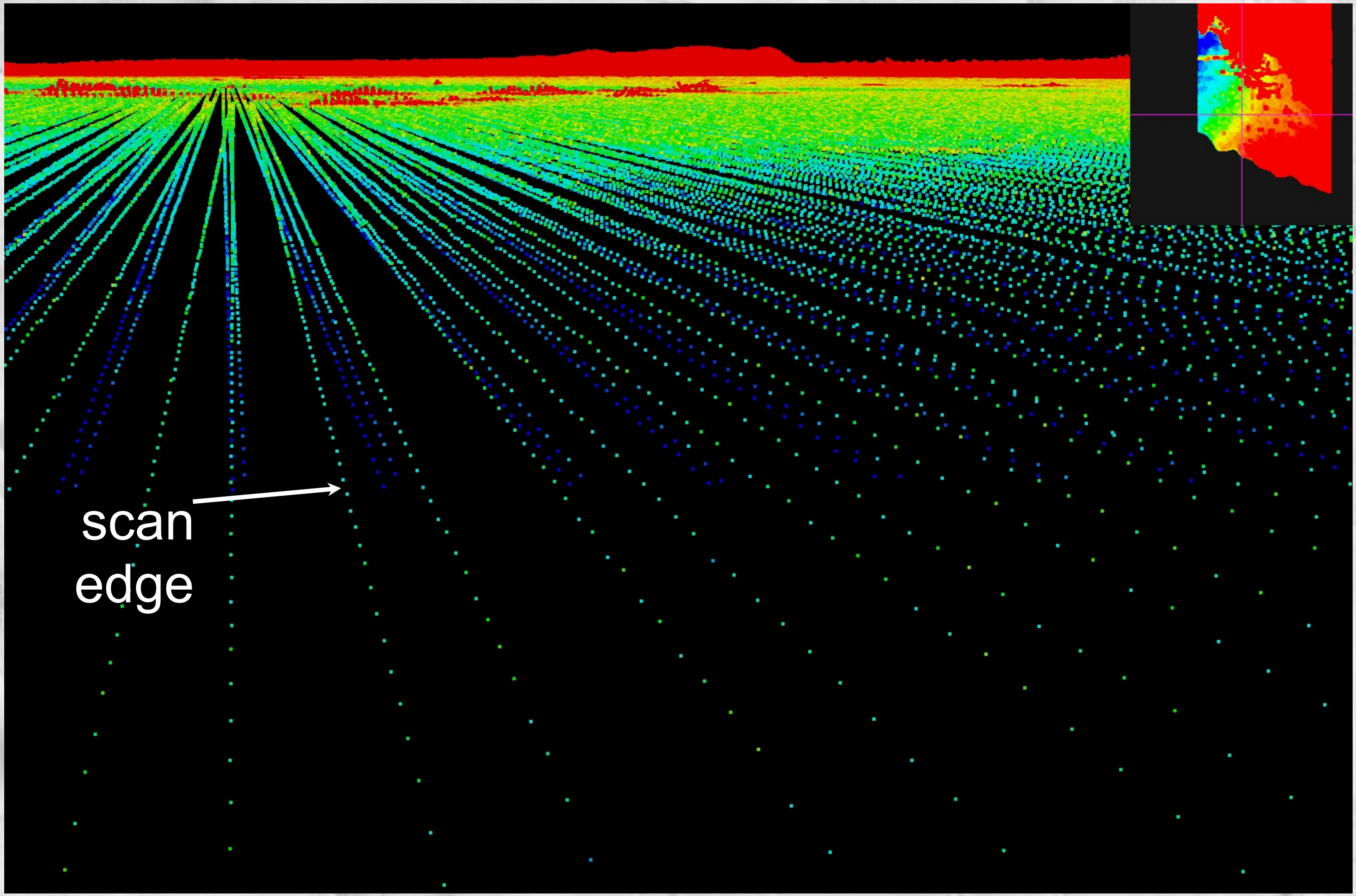
K. Hudnut, USGS

Corduroy – type 1



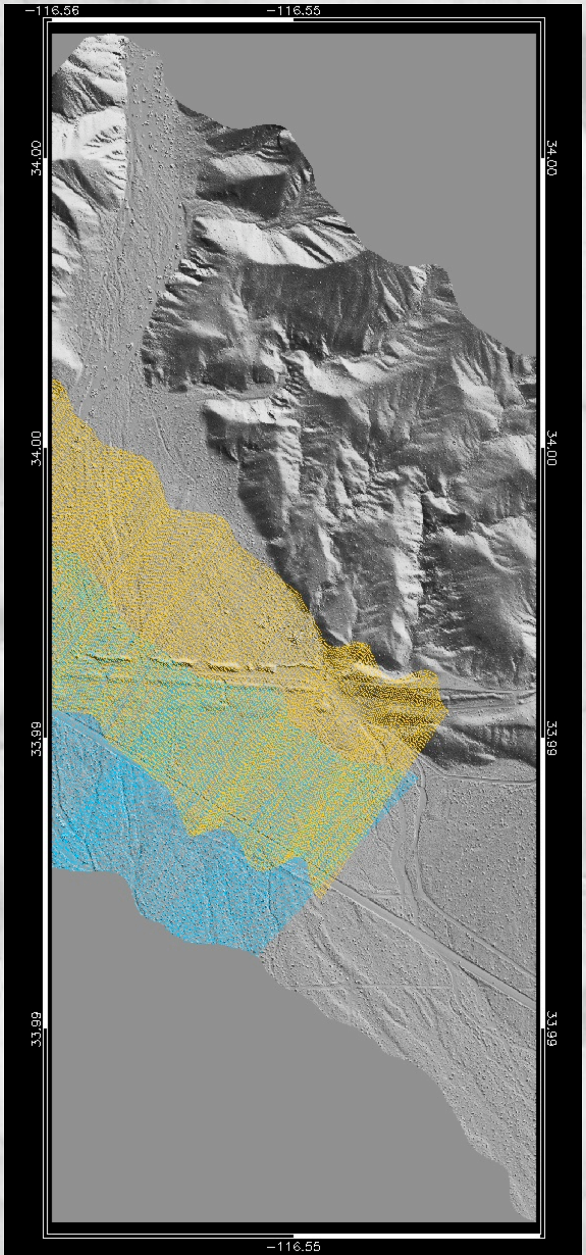
Scan artifact - at scan edge on dry lake one sees a pattern of up-down consistently; as mirror flips, height reads differently

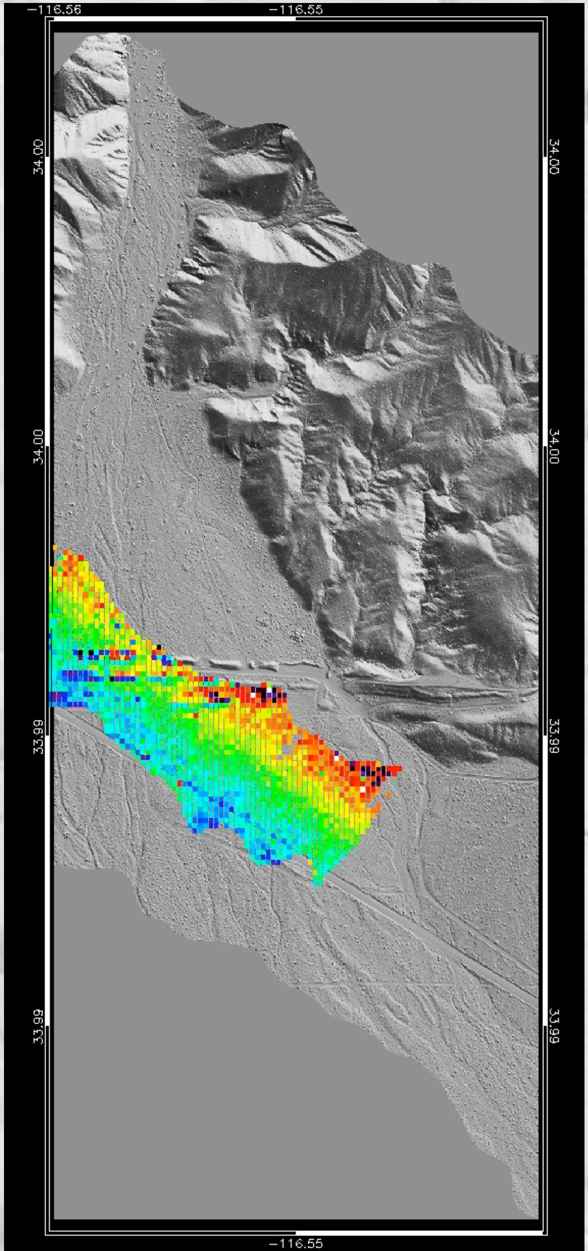
Corduroy – type 2



The inner scan is consistently lower than the outer scan; this is a different source of 'corduroy,' the second type.

Swath comparisons





Courtesy of Adrian Borsa

K. Hudnut, USGS

Corduroy

There are *two* types of ‘corduroy’ in B4 data

type 1 - ‘scan angle artifact’

scanner reads higher going one direction than it does in the other

type 2 - ‘vertical swath offset’

aircraft first pass is vertically mis-aligned with second pass within a given area

The second type, at least, can be mitigated or eliminated by increasing the accuracy of our GPS/IMU trajectories