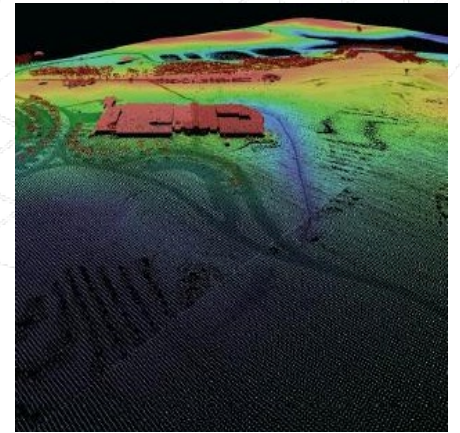
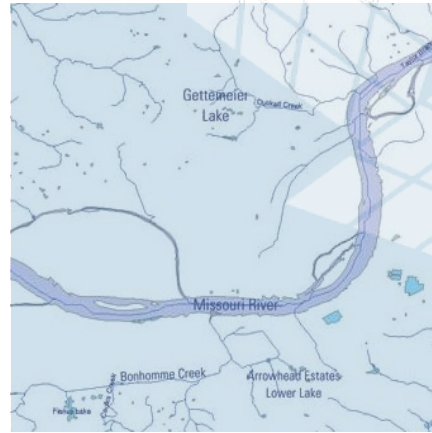
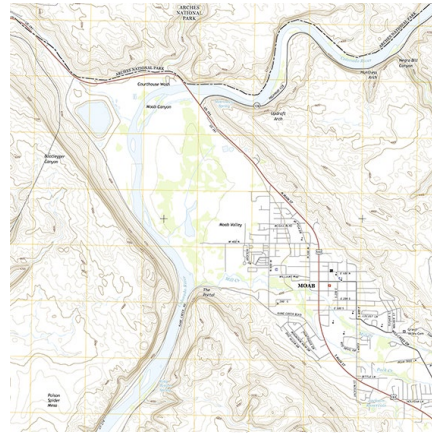


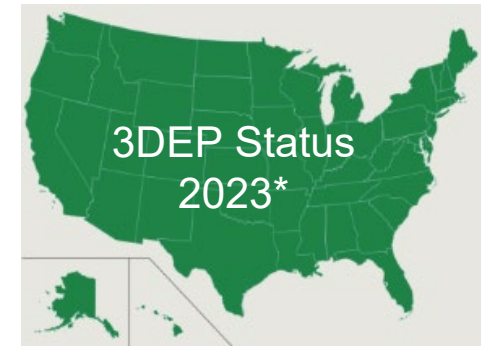
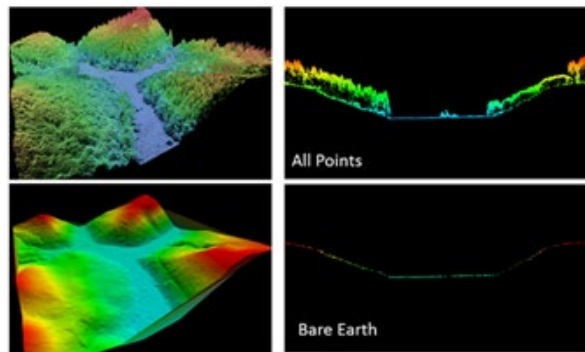
# What's new with the USGS National Geospatial Program



Claire DeVaughan  
NCTCOG Regional GIS Meeting  
December 10, 2019

# + 3D Elevation Program (3DEP)

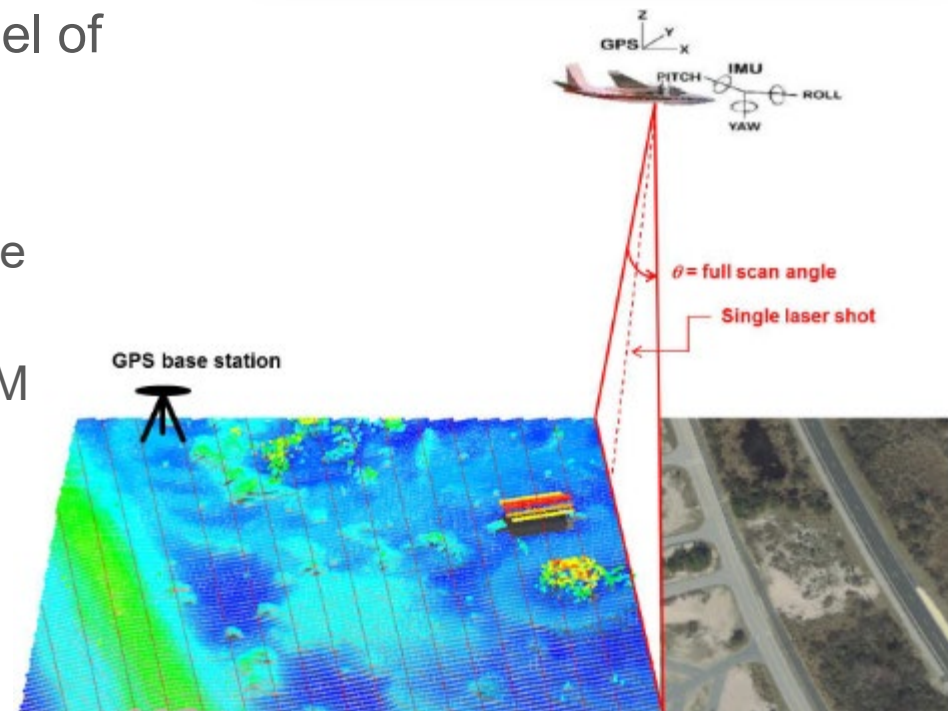
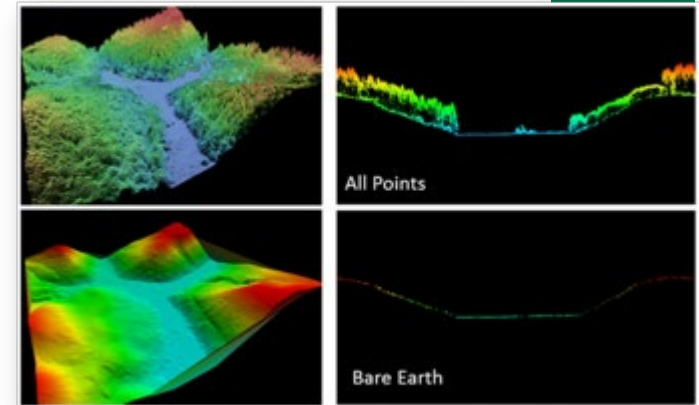
- Goal to complete acquisition of nationwide lidar (IfSAR in AK) by 2023 to provide **the first-ever national baseline of consistent high-resolution elevation data – both bare earth and 3D point clouds** – collected in a timeframe of less than a decade
- Address the mission-critical requirements of 34 Federal agencies, 50 states, and other organizations documented in the National Enhanced Elevation Assessment
- ROI 5:1, conservative benefits of \$690 million/year with potential to generate \$13 billion/year
- Leverage the capability and capacity of private industry mapping firms
- Achieve a 25% cost efficiency gain by collecting data in larger projects
- Completely refresh national elevation data holdings with new products and services



# + What is Lidar?

## Light Detection and Ranging (lidar)

- Collected by high-altitude aircraft
- Onboard sensor records reflections of a pulsed laser beam as billions of individual points (a “point cloud”)
- Point cloud represents 3D model of the earth
- Lidar products include:
  - Lidar point cloud (earth surface and objects on it)
  - Digital Elevation Model or DEM (bare earth surface)

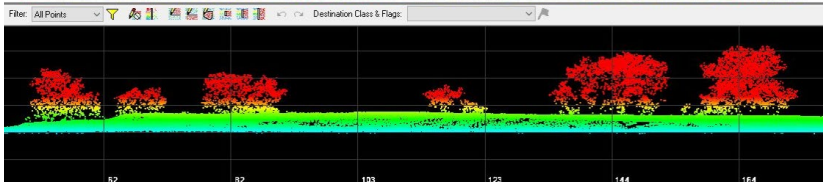
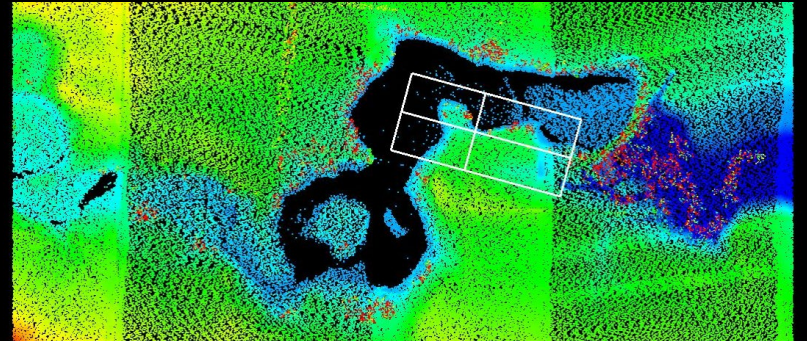
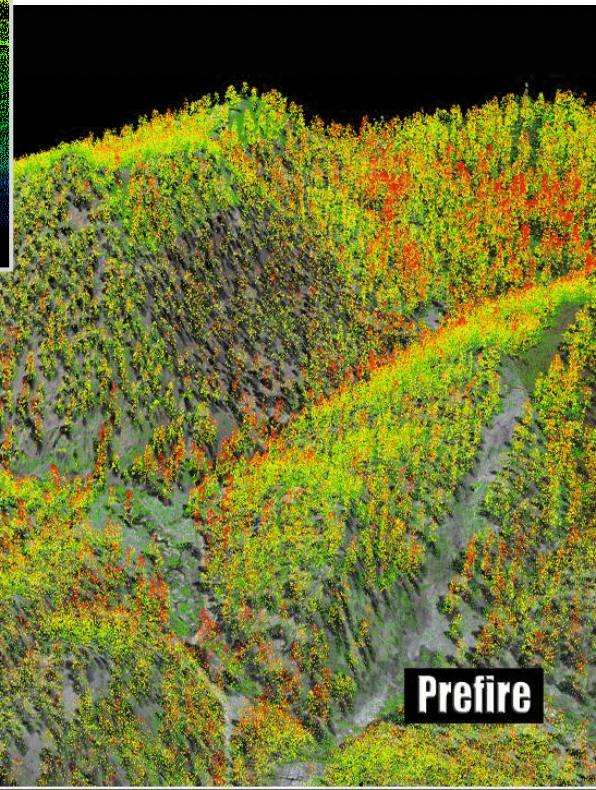
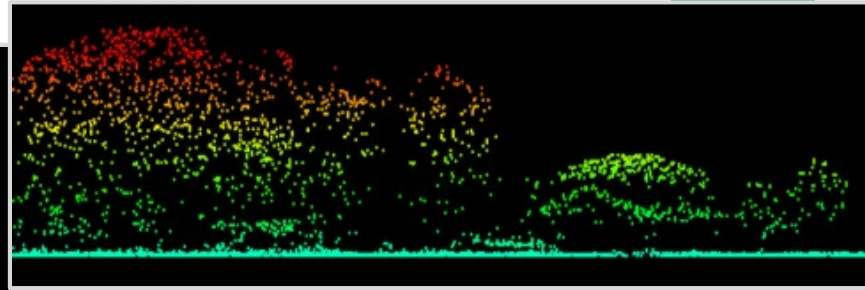
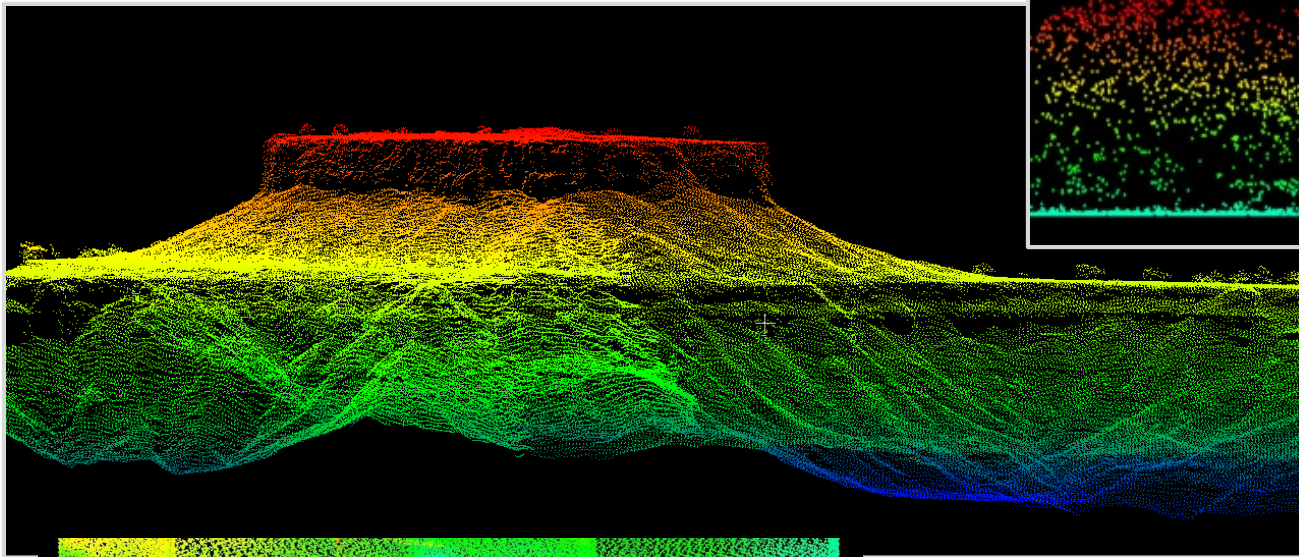




+

# Lidar Products

## Lidar Point Clouds



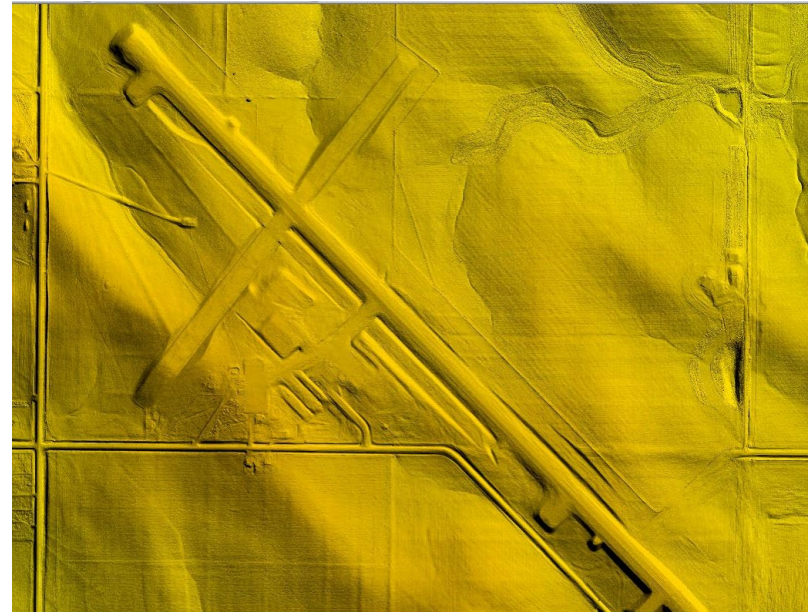
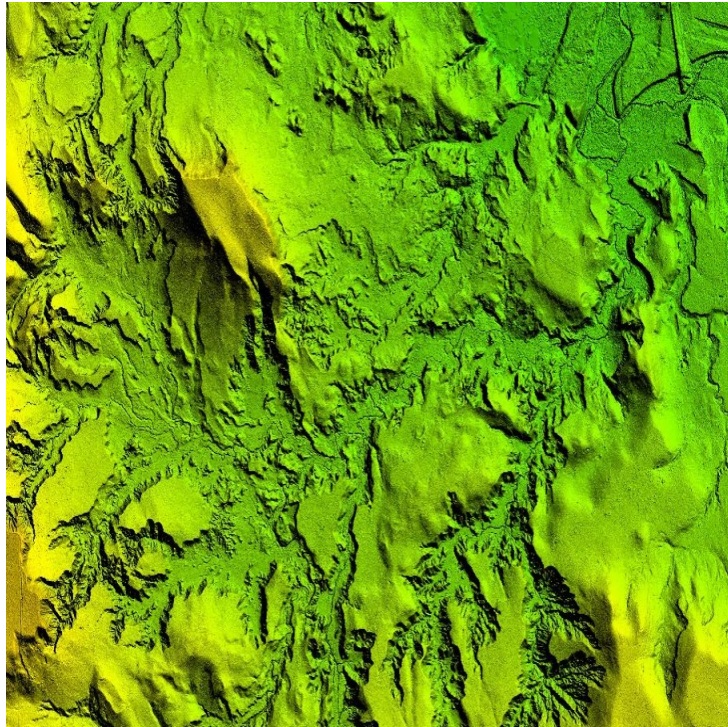
**Prefire**



+

# Lidar Products

## Digital Elevation Models (DEMs)



# + Lidar Benefits

Supports a broad range of applications and decisions that depend on elevation data

- Flood risk management
- Infrastructure and construction management
- Natural resources conservation
- Agriculture and precision farming
- Water supply and quality
- Wildfire management, planning and response
- Geologic mapping
- Forest, river and stream management
- Aviation safety
- Archaeological studies

# + USGS Leads 3DEP

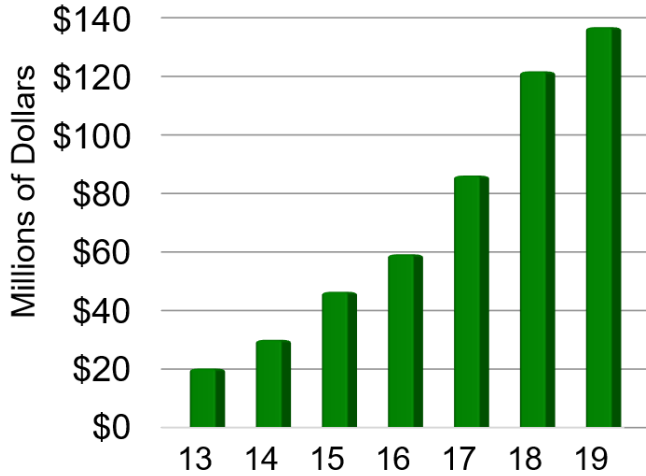
- USGS manages 3DEP on behalf of a broad partner community that includes Federal, state, local and tribal governments, private sector, and non-profit groups
  - Over 200 partners have contributed funding since 2015
  - From 2015-2018, USGS funded 33% of costs for data acquisition, processing, and management, while partners funded 67% of data acquisition
- USGS manages the overall program and data lifecycle
  - Leads governance and partnerships
  - Manages projects
  - Conducts quality checks
  - Produces standard data products
  - Delivers copy of data to funding partners
  - Publishes data in The National Map
  - Designs future generations of 3DEP based on user needs



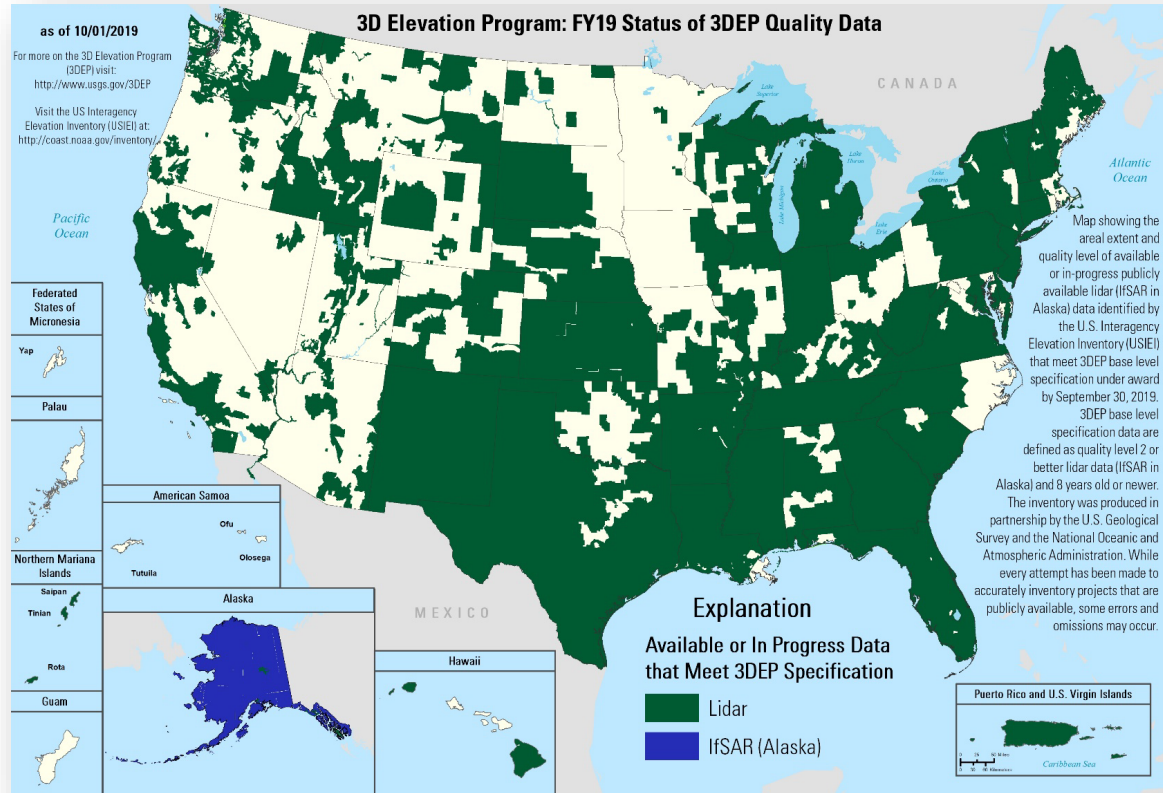
# 3DEP Status – End of Fiscal Year 2019

## Data are available or in progress for 67% of the Nation

\*includes lidar and AK IfSAR



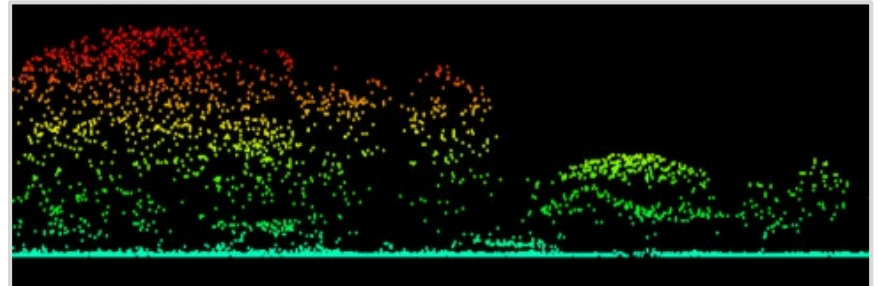
Data acquisition investments by all partners, by fiscal year



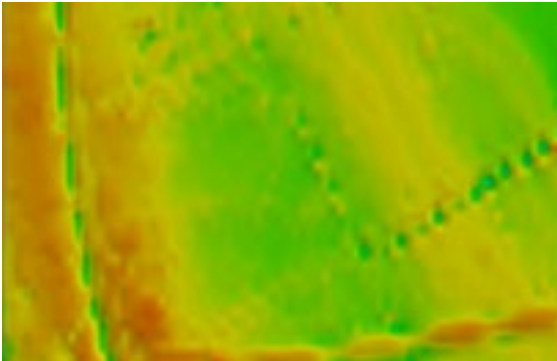


# + 3DEP Products

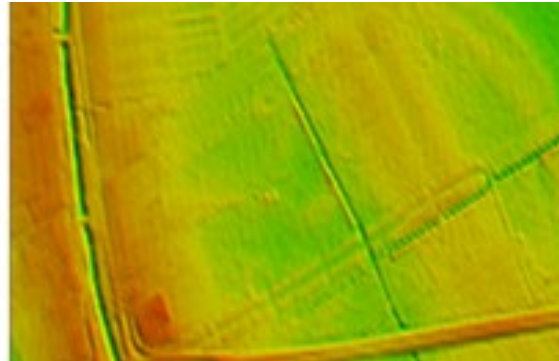
- Lidar point cloud
- 1-meter DEM
- 10-meter seamless national DEM
- 30-meter seamless national DEM



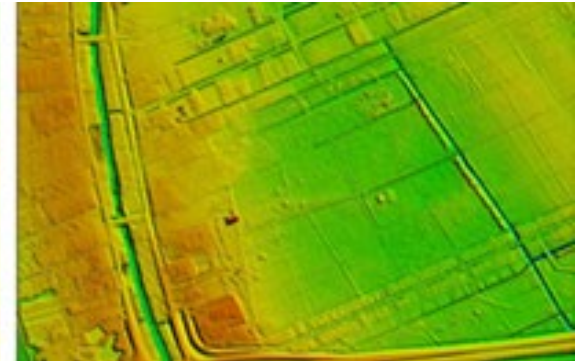
*Lidar Point Cloud*



*30-meter DEM*



*10-meter DEM*



*1-meter DEM*





# Accessing and Using 3DEP Products

<https://nationalmap.gov/3dep/>

HOME

WHAT IS 3DEP?

GOVERNANCE

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PARTNERSHIPS

PROGRAM  
BENEFITS AND  
USES

STANDARDS AND  
SPECIFICATIONS

**DATA & TOOLS**

3DEP Product News

3DEP National  
Indexing Scheme

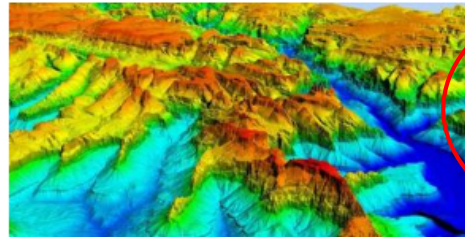
## Data and Tools

Access to 3DEP Products and Services



All 3DEP products are available, free of charge and without use restrictions. To download 3DEP products, please visit The National Map Viewer at the link below

[Download Data Link](#)



The National Map includes several data download and visualization services, as well as "how to" videos, a Metadata Lineage Reporter map application designed to help users find lidar source data for all 3DEP lidar-derived products, and other tools.

[Learn More](#)

[About 3DEP Products and Services](#)

[National Map- Service Endpoints](#)

[National Map Products and Services Training Videos](#)

[3DEP Demonstration Elevation Viewer](#)

[USIEI \(U.S. Interagency Elevation Inventory\)](#)

[NOAA Digital Coast Data](#)

[Seasketch \(U.S. Federal Mapping Coordination Site\)](#)

# + USGS LidarExplorer

<https://prd-tnm.s3.amazonaws.com/LidarExplorer/index.html>

USGS LidarExplorer interface showing a map of Texas and surrounding regions. The interface includes a sidebar with filters for product type (LIDAR, DEM, OTHER) and resolution (1 meter, 1/9 arc-second, 1/3 arc-second, 5 meter (Alaska only), 1 arc-second, 2 arc-second, Original Product Resolution). The map displays a grid overlay representing DEM data.

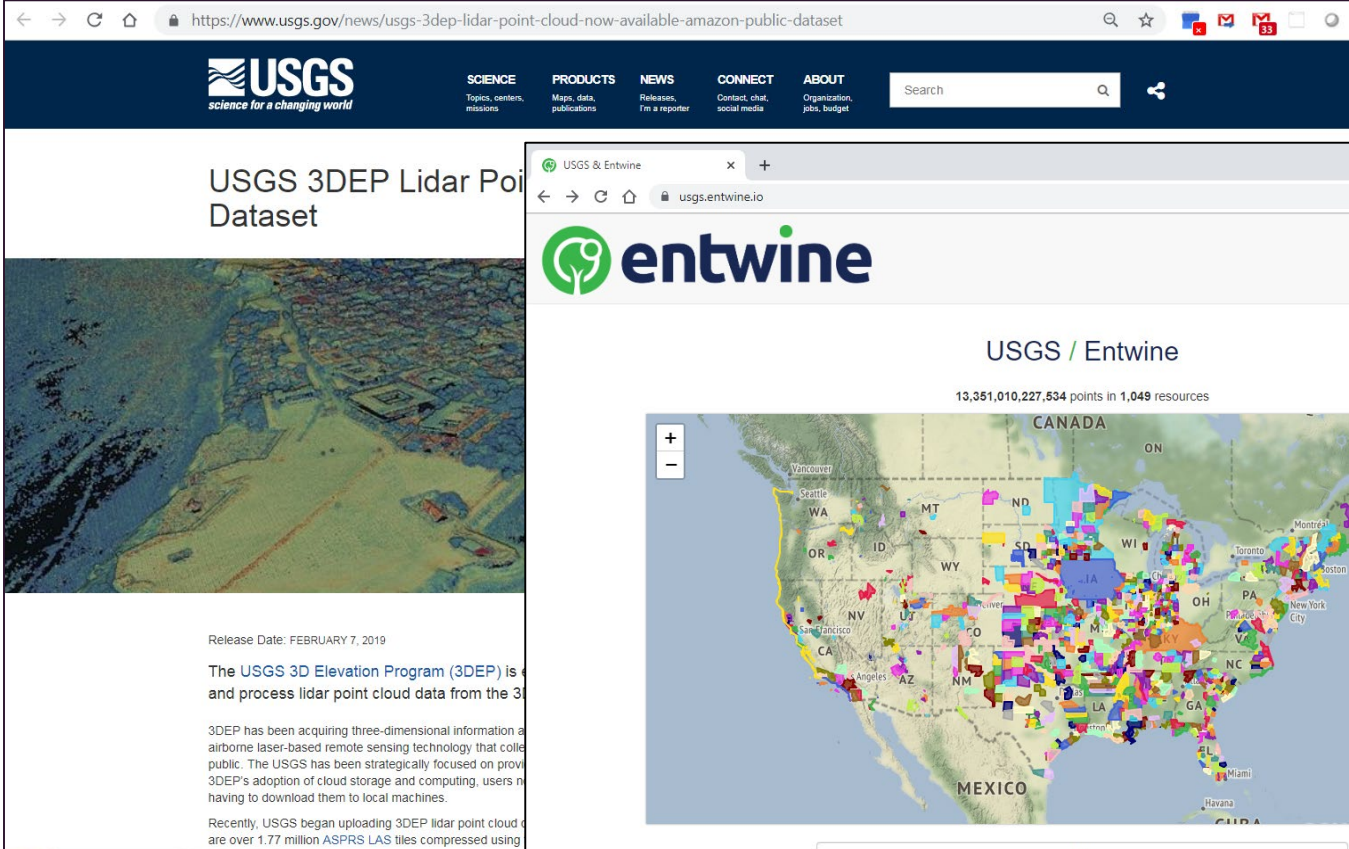
# + 3DEP Point Cloud as Amazon Public Dataset

## “Point cloud via the cloud”

- Users now have the option to work with massive lidar point cloud datasets without having to download them to local machines
- The data are now part of the Open Data registry provided by AWS, similar to the Landsat archive (in a 2-year period initially)
- Hobu, Inc. and USACE collaborated with the Amazon Web Services (AWS) Public Datasets team to organize these data as Entwine Point Tile (EPT) resources:
  - EPT enables 3D Visualization as well as optimized processing direct from the cloud
- Registry info: <https://registry.opendata.aws/usgs-lidar/>
- USGS is now uploading 3DEP lidar point cloud data into an Amazon s3://usgs-lidar “Requester Pays” bucket

# + 3DEP Point Cloud as Amazon Public Dataset

Visualization of USGS 3DEP Lidar Point Clouds as EPT with Potree and Plasio: <https://usgs.entwine.io/>



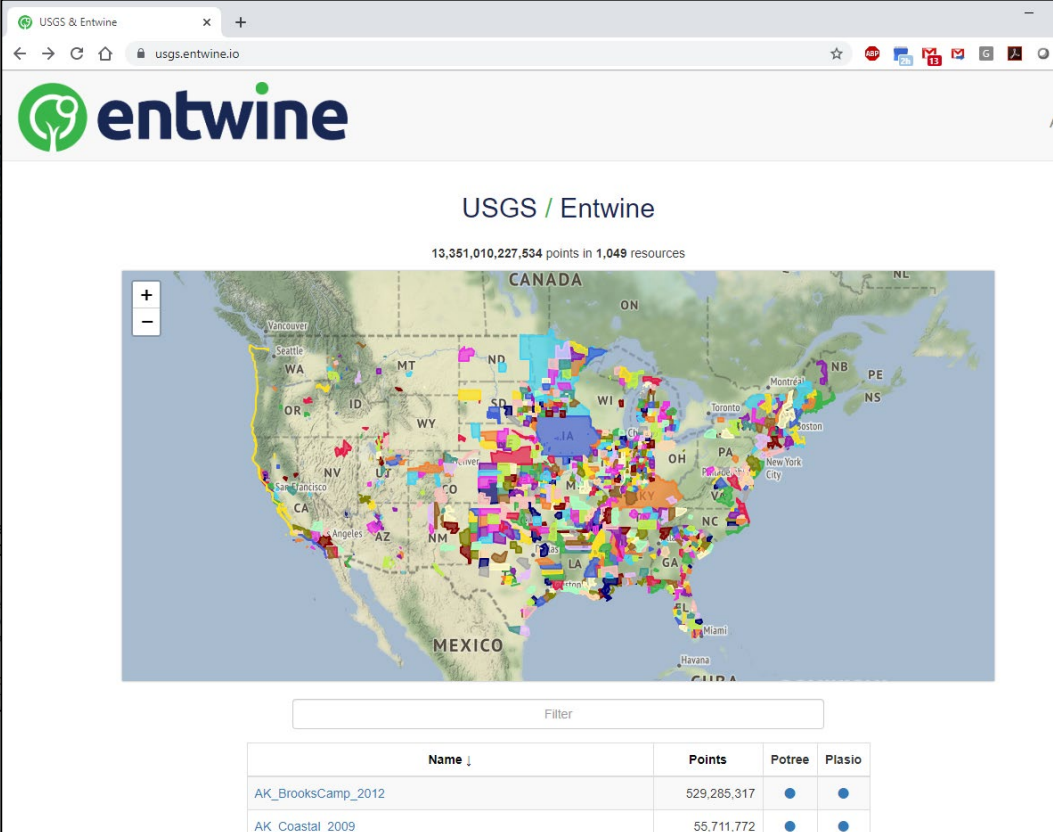
USGS 3DEP Lidar Point Cloud Dataset

Release Date: FEBRUARY 7, 2019

The USGS 3D Elevation Program (3DEP) is... and process lidar point cloud data from the 3...

3DEP has been acquiring three-dimensional information a... airborne laser-based remote sensing technology that colle... public. The USGS has been strategically focused on provi... 3DEP's adoption of cloud storage and computing, users n... having to download them to local machines.

Recently, USGS began uploading 3DEP lidar point cloud... are over 1.77 million ASPRS LAS tiles compressed using...



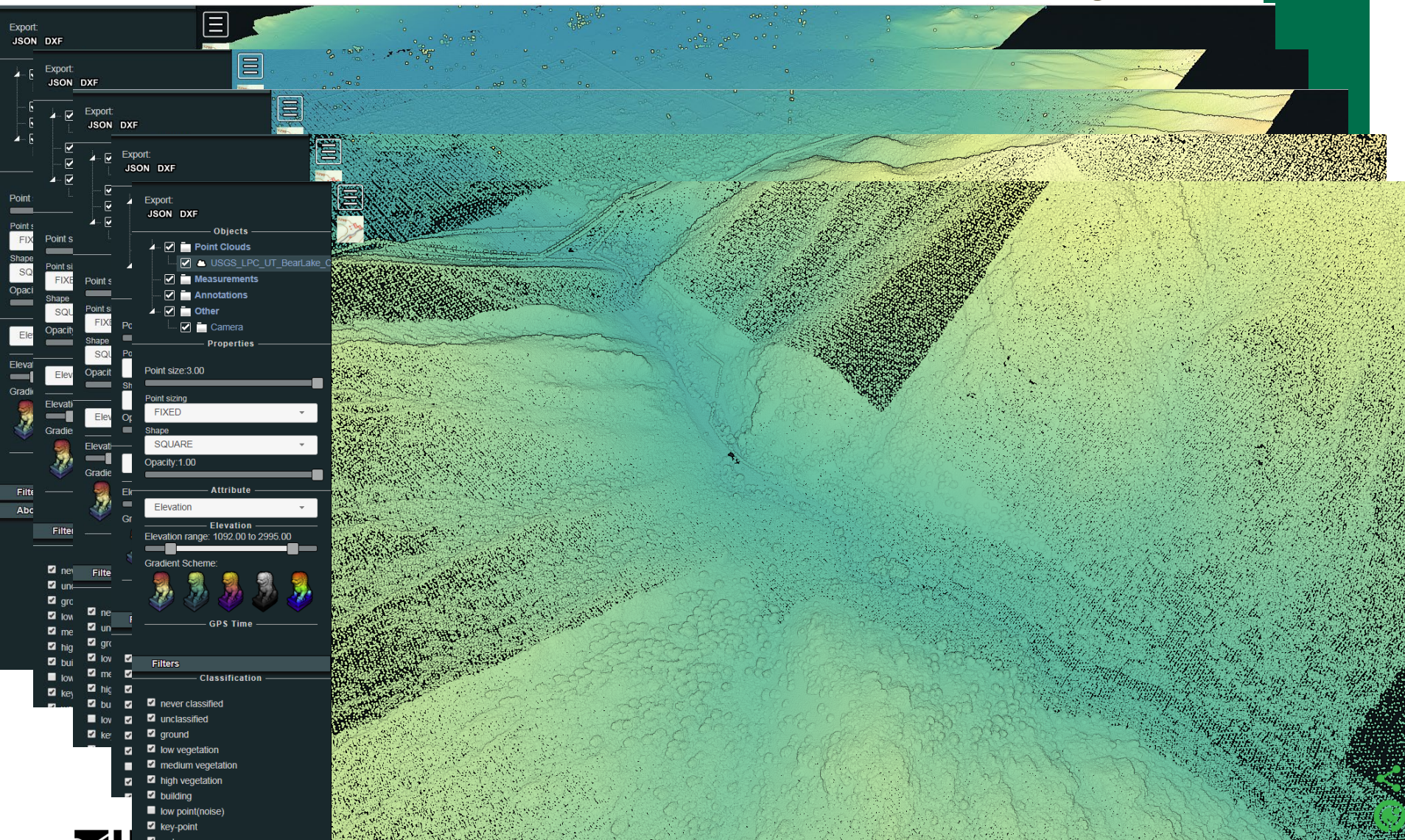
USGS / Entwine

13,351,010,227,534 points in 1,049 resources

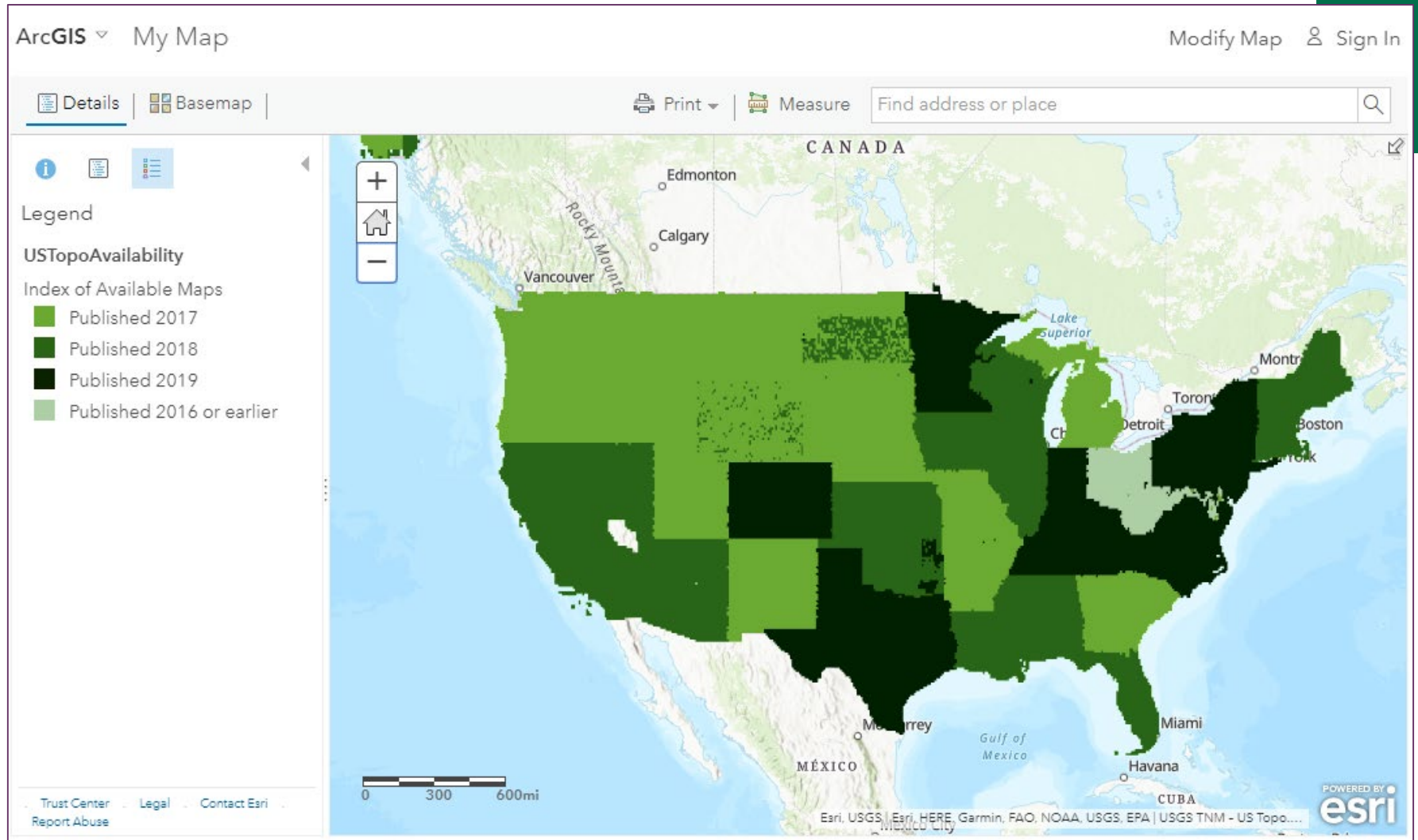
Name ↓	Points	Potree	Plasio
AK_BrooksCamp_2012	529,285,317	●	●
AK_Coastal_2009	55,711,772	●	●

# + Example of EPT in Potree Viewer

2016 Bear Lake-Cache project – data shows an area near Logan, UT



# + US Topo Status – 12/3/19





# + US Topo Access

- Both the US Topo series and HTMC maps are offered as GeoPDFs through The National Map and the USGS Store. However, additional formats are now offered through topoView: <https://ngmdb.usgs.gov/topoview/>
- GeoTIFF – compressed, 300 dpi TIFF image format, with embedded georeferencing information so that the map can be used directly in a GIS. The GeoTIFFs are generated at true scale, allowing users to plot the map at the intended map scale in cases where a hard copy is needed.
- JPEG – The high-resolution JPEGs, or 'Browse JPEG' format are useful for getting a quick view of the map in order to find place names or simply explore the map area without the need for downloading a large file.
- KMZ – The KMZ format is a compressed form of the KML format which is used for displaying the maps in Google Earth.

# + US Topo in GeoTIFF

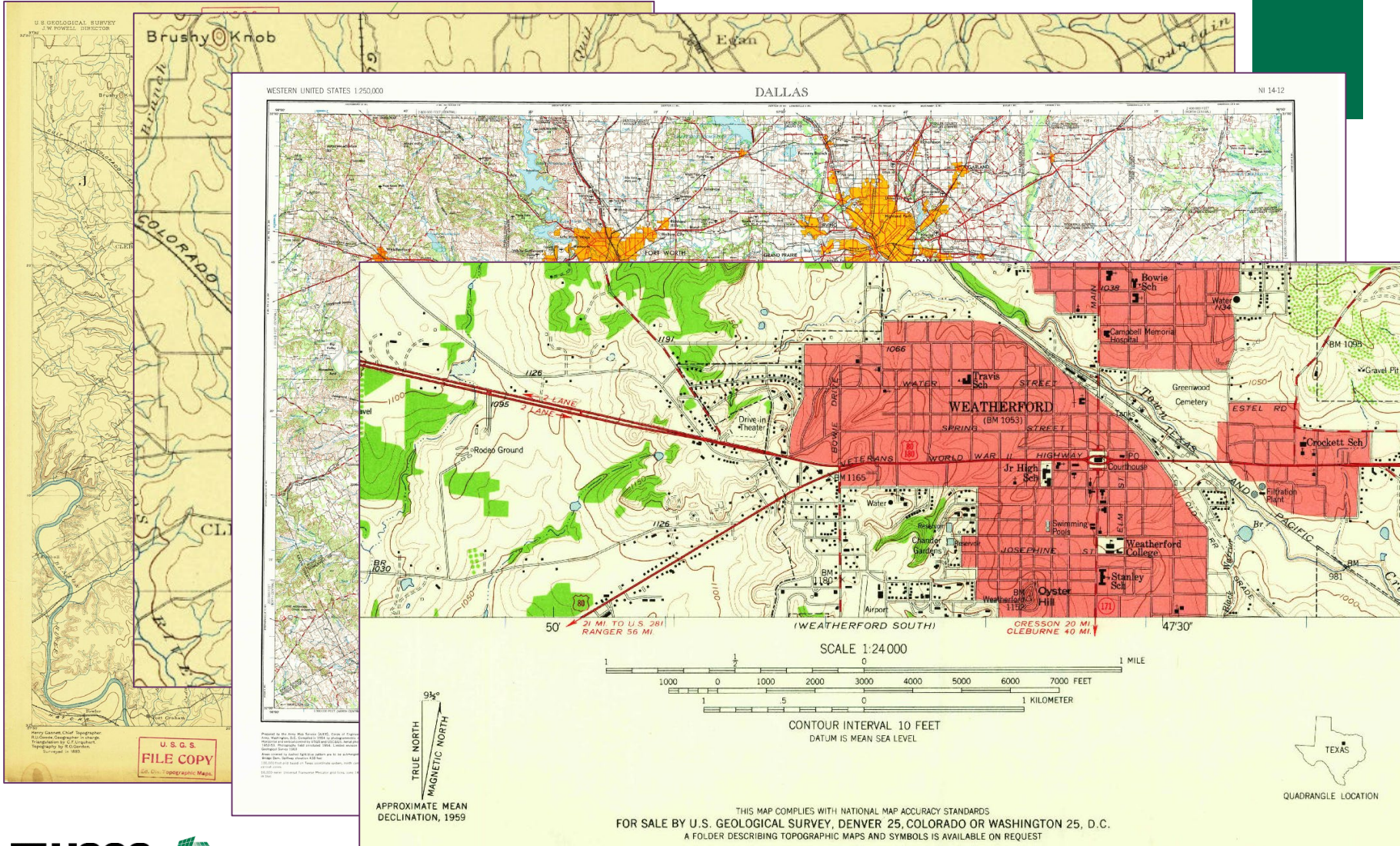
The image displays two instances of the QGIS desktop environment. The left window shows a map with a scale of 1:100,000. The legend in this window lists two layers: 'OK\_Mount\_Scott\_20181210\_TM\_geo.tif' (RGB) and 'OK\_Mount\_Scott\_20181210\_TMorth\_geo.tif' (RGB). The right window shows a similar map with a legend and a scale bar. The legend in this window lists three bands: 'Red: Band\_1', 'Green: Band\_2', and 'Blue: Band\_3'. The map shows a topographic view of a mountainous region with a river and a lake. The USGS logo is visible in the top left corner of the map area. The status bar at the bottom right of the right window displays the coordinates '506205.266 3829286.814 Meters'.



# Historical Topographic Maps (HTMC)

## Preserving the Past

<https://ngmdb.usgs.gov/topoview/>



# + National Map Training Videos

<https://www.usgs.gov/NGPvideos>

**3D Elevation Program: Mission Critical Applications**

**Natural Hazards:** Identifying features in heavily forested and snow covered Glacier Peak

**Water:** Modeling flood inundation along the Upper Mississippi

**Core Science:** Assessing the on forest structure wildlife habitat Smoky Mountain

**Lesson 11F: New elevation products and services**

2,065 views

**USGS** Published on Jun 6, 2017

This is lesson 11f. In this lesson, you will learn about the 3D Elevation Program

**Hydro-Flattened (Smokey Mountain) (Topographic Surface)**

**Stream Waterbody**

**Digital Elevation Models, Hydro-Flattening, and Hydro-Flattening**

1,640 views

**USGS** Published on Jan 31, 2017

Lesson 10A - 3DEP Topic Lesson: Digital Elevation Models, Hydro-Flattening, and Breaklines in this 3DEP Topic lesson, we will provide information on how to create Digital Elevation Models, or DEMs. We will discuss the difference between Digital Elevation Models, or DEMs, and Digital Surface Models, or DSMs.

**Lesson 10b1: Intro to LAS Files in ArcGIS Pro**

200 views

**USGS** Published on Oct 1, 2018

The following series of lessons will cover how to use LIDAR data in the ArcGIS Pro environment. In this lesson, we will provide the user with an overview of how to load and view lidar files in the ArcGIS Pro environment.



# Thank you!

Claire DeVaughan

National Map Liaison for Texas, Oklahoma, and Utah

512-927-3583

[cdevaugh@usgs.gov](mailto:cdevaugh@usgs.gov)