- VICE PRESIDENT AND CHIEF SCIENTIST, SANBORN
- “FROM DATA DISCOVERY TO DATA VISUALIZATION AND DATA DISSEMINATION: HANDLING LARGE LIDAR DATASETS FOR A STATEWIDE CUSTOMER”

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Light Detection and Ranging (Lid
Data Storage and Dissemination
Solutions

Presented by:

Srini Dharmapuri PhD, CP, PMP

Vice President / Chief Scientist

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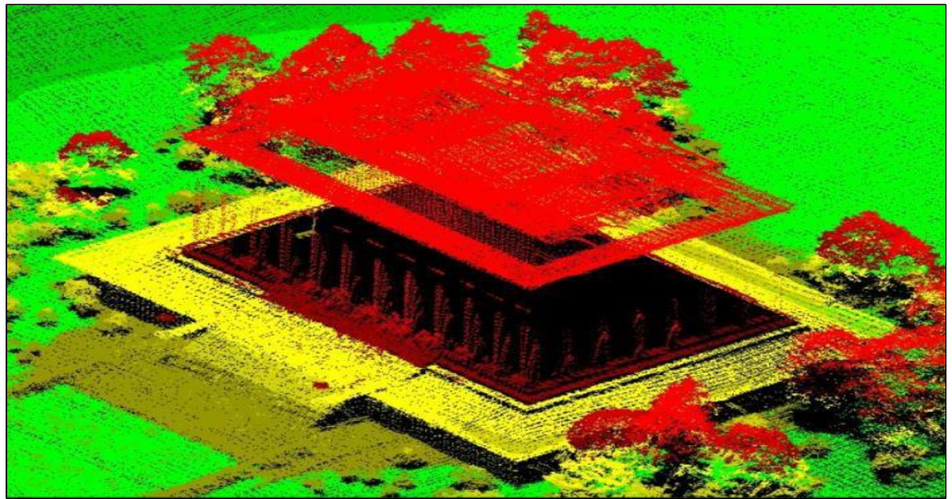
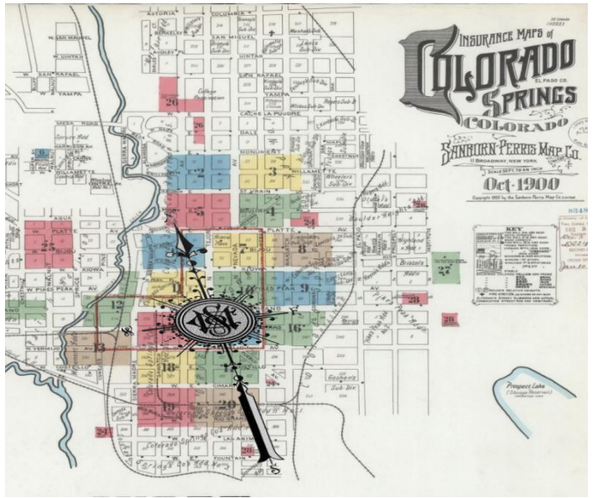
Sanborn – Mapping Leader Since 1866

- Ground control survey 1866
- Aerial mapping since 1966
- Pioneered Digital orthophotography 1988
- Aerial Lidar Mapping since 1999
- Digital Imagery Sensors since 2004
- Oblique Imagery Mapping since 2012

CERTIFIED ISO 9001:2015 COMPANY





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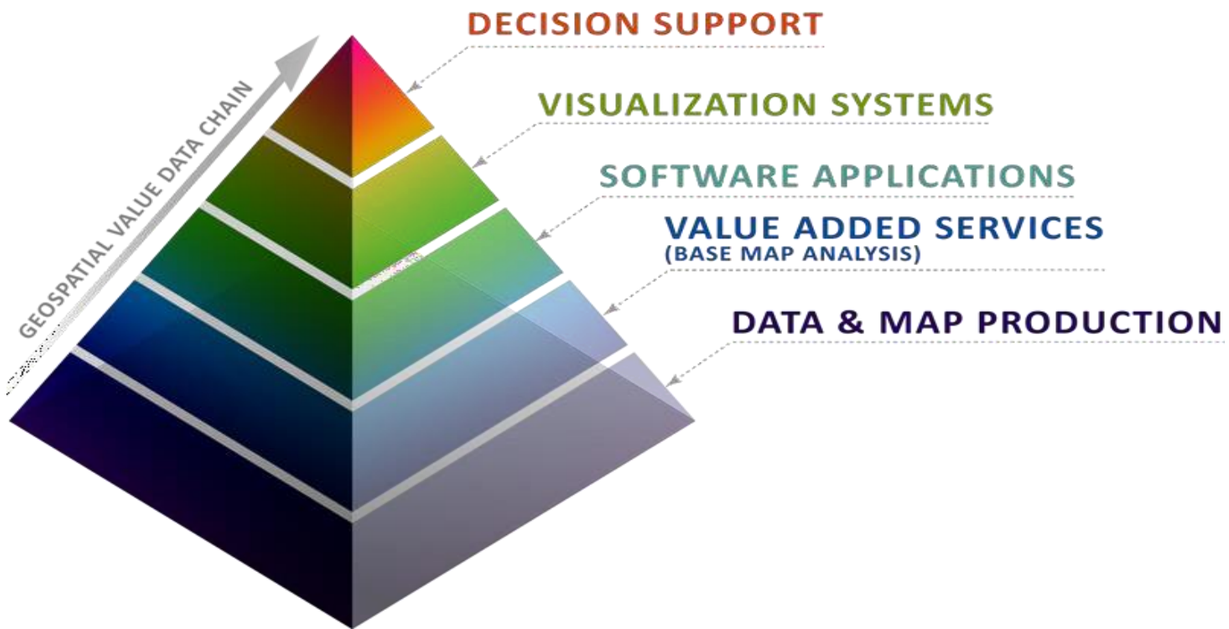
Company Overview

- **Data Map Production**
  - Lidar, Digital Oblique & Orthophotography, Photogrammetric, Topographical Maps
- **Value-Added Services**
  - Master Addressing Repository
  - Change detection
  - Other imagery analysis services/viewers
  - Land use and land cover analyses



- **Decision Support Systems**
  - Wildfire Management
  - Forestry and Ecosystem Management
  - Emergency Response
- **Visualization Systems**
  - 2D
  - 3D
  - Prism 4D
  - Common Operating Picture
- **Software Applications**
  - GIS Software Development (Enterprise/Desktop/Web)
  - Cloud Services
  - Portals and Distribution Tools

Background Information

- Increasing use of Lidar in multiple applications over a period of time.
- Periodic Lidar data collection in the past 2 decades.
- Multitude of lidar with in an organization (State clearing house).
- Logistical challenge of Storing, Managing and Retrieving data for distributed end users.
- The problem becomes more acute, in an emergency situation.

Current Challenges

- 40% of engineering time is spent locating and validating information.[1]

- Significant challenges exist when managing data discovery and dissemination for Lidar data sources:
  - Data storage
  - Data discovery
  - Data analysis
  - Data visualization

- This is a complex problem involving
  - ✓Mapping
  - ✓Data Management
  - ✓Software Development

Sanborn's Solution

- **Our solution is …..**

Sanborn Geo-Data Explorer™ with Sanborn Lidar Analyst™

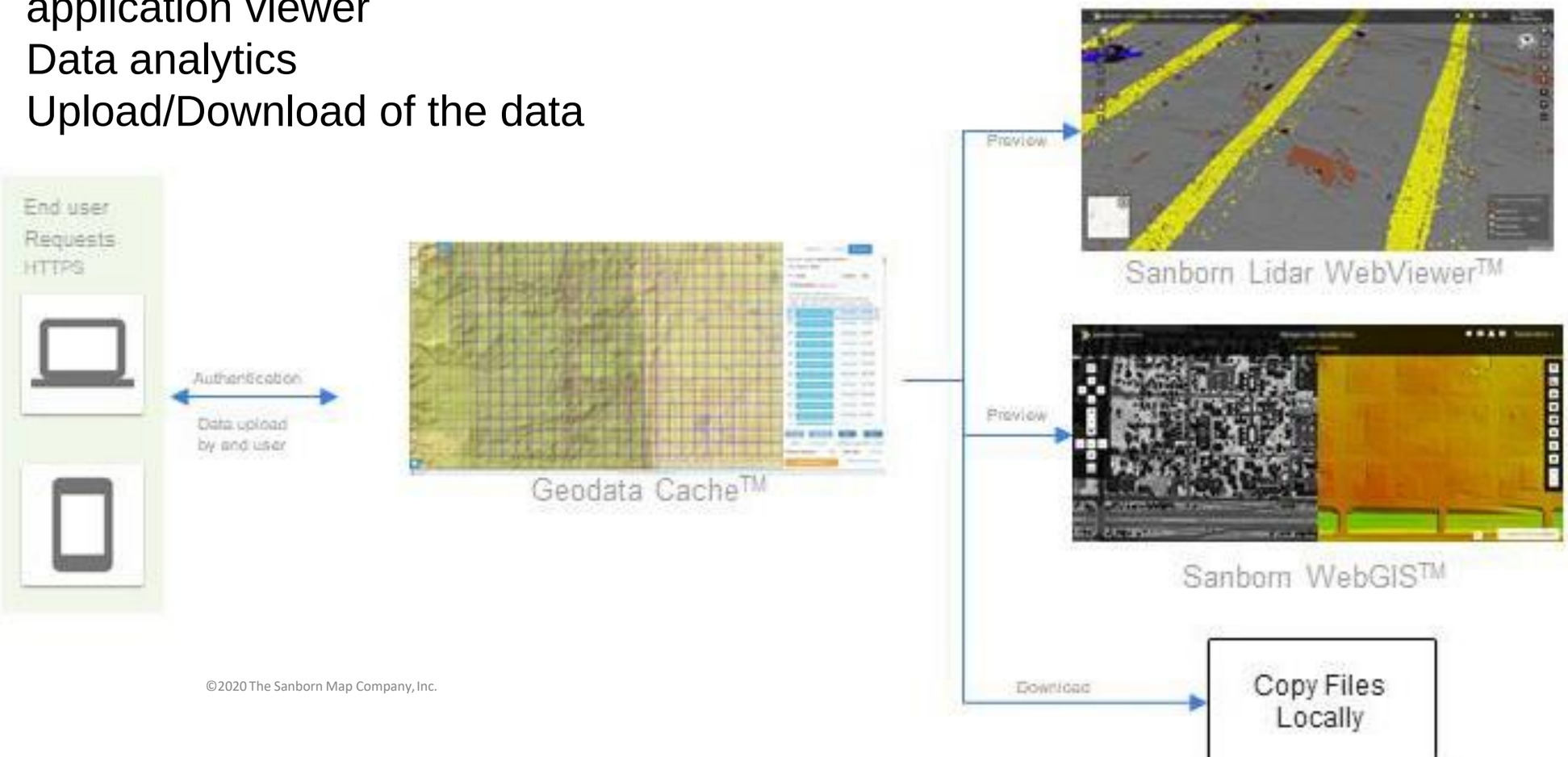
Scenario

- An end user needs Lidar data for a given AOI and would like to review all the Lidar data available and select a particular year/years dataset.
- Log into GeoData Explorer™ website and can see the different datasets available.
- Narrow down the search of the AOI, based on geographic and attribute filters.
- In order to see the data quality, preview option is possible in the Lidar Web-viewer™
- Tasks like elevation profiling, measurements, vector overlays, or change the point cloud display method is possible in Lidar Web-viewer™
- Once satisfied, data can be clipped and downloaded for immediate offline consumption.
- After removing noise from the data, able to submit it back to the data repository for future use.

End User Workflow

Managed through a spatial database framework hosted in the public cloud/Server - involves five distinct sections:

a) Populating the database
b) Building a spatial hierarchy that supports lookup of the available data sources
c) Generating a visualization of Lidar data (or its subset) in a WebGL enabled web-application viewer
d) Data analytics
e) Upload/Download of the data



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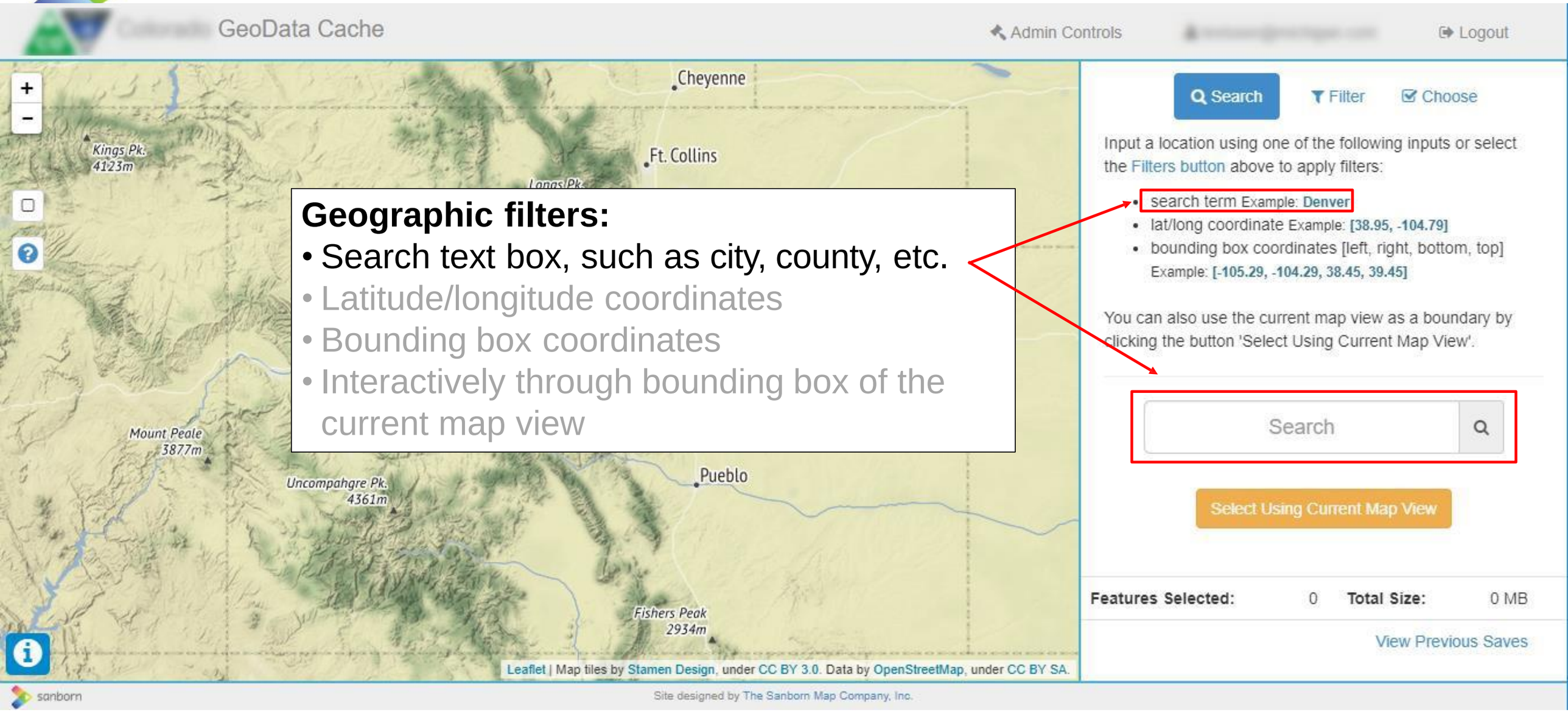
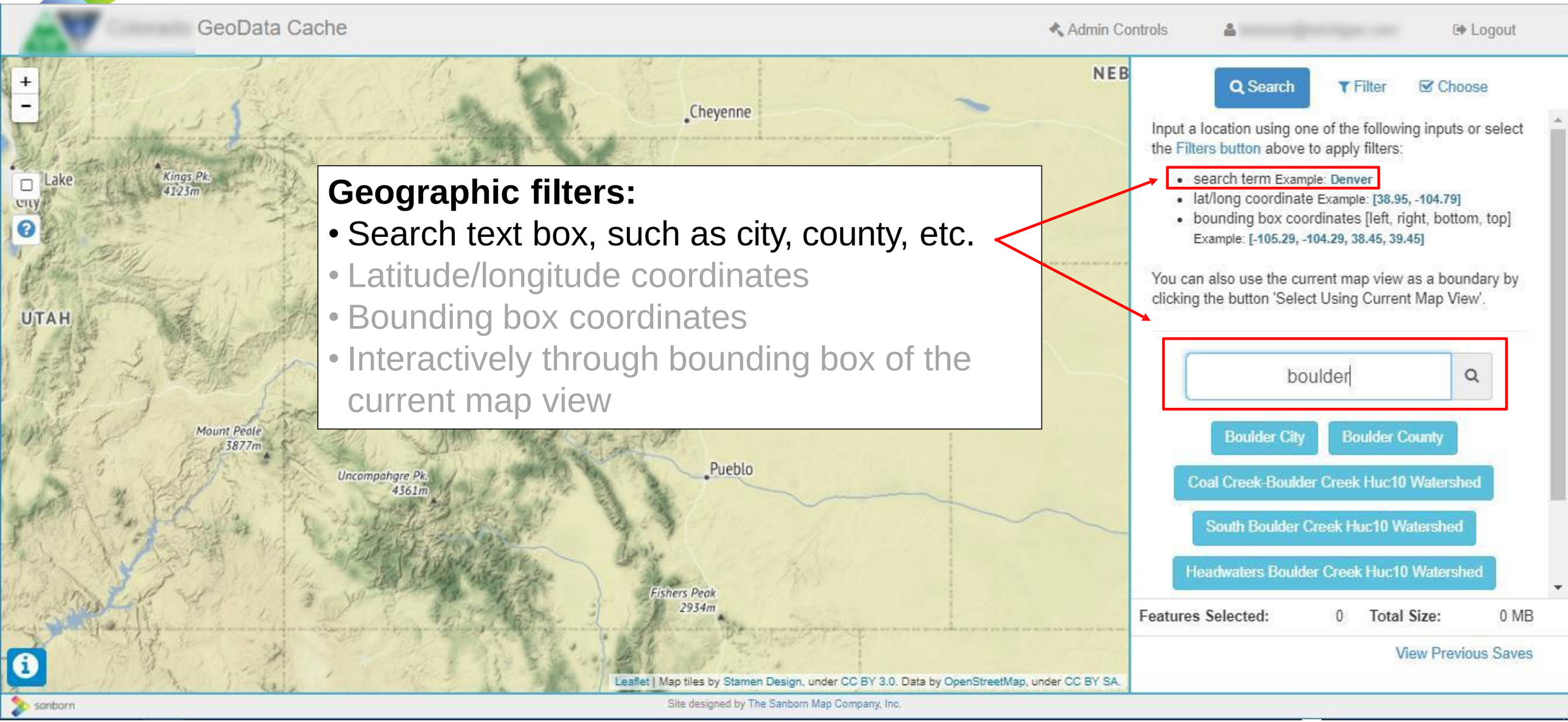
Data Discovery: Search Options



Geographic filters:

- Search text box, such as city, county, etc.
- Latitude/longitude coordinates
- Bounding box coordinates
- Interactively through bounding box of the current map view

Data Discovery: Search Options



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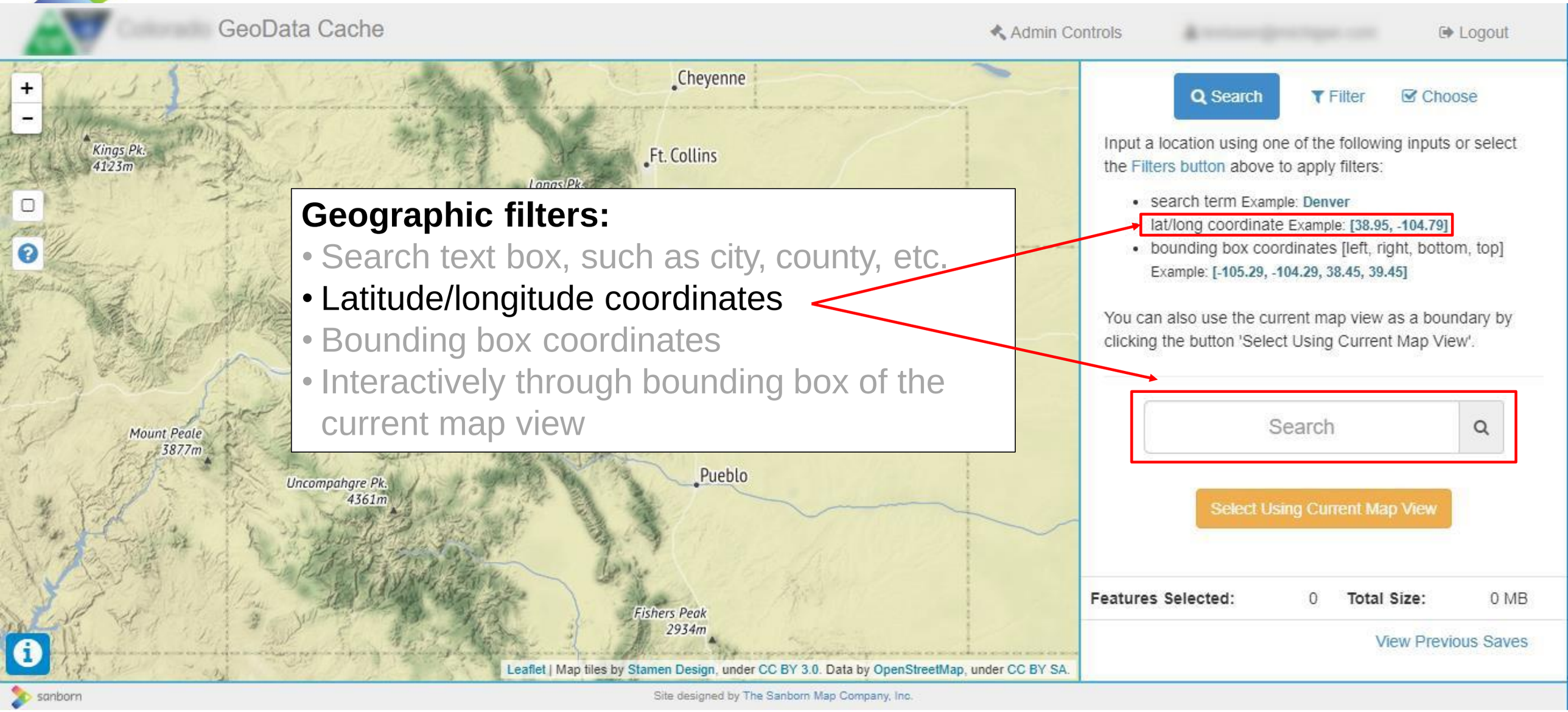

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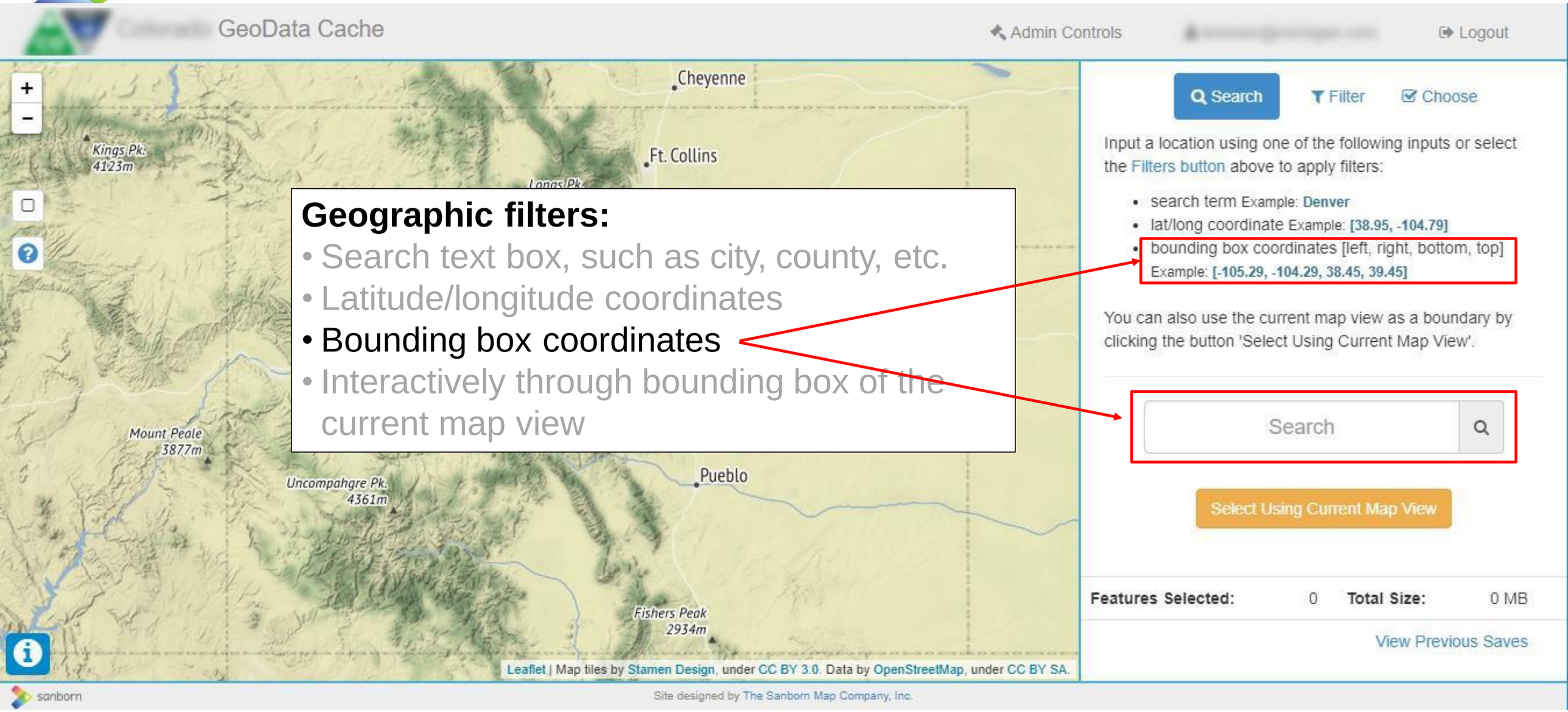

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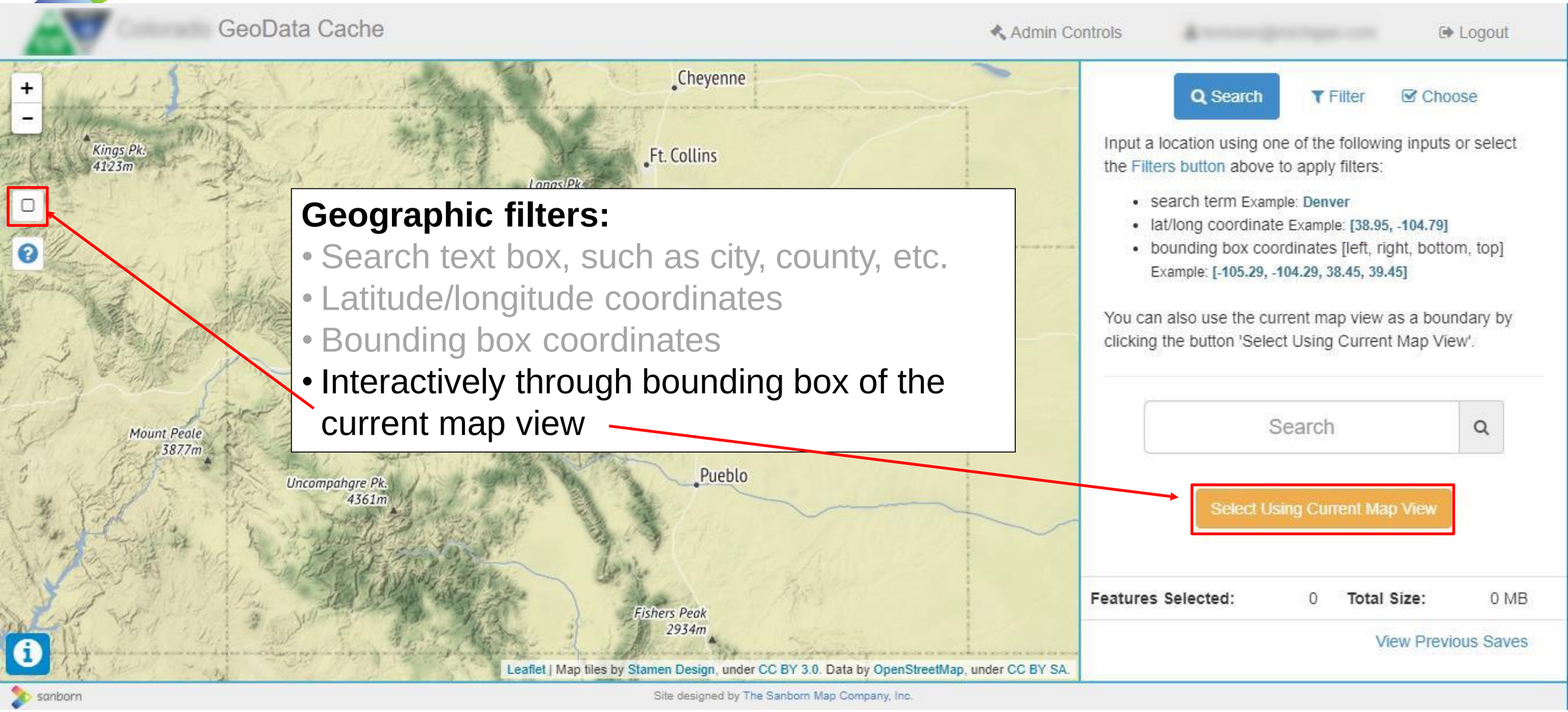

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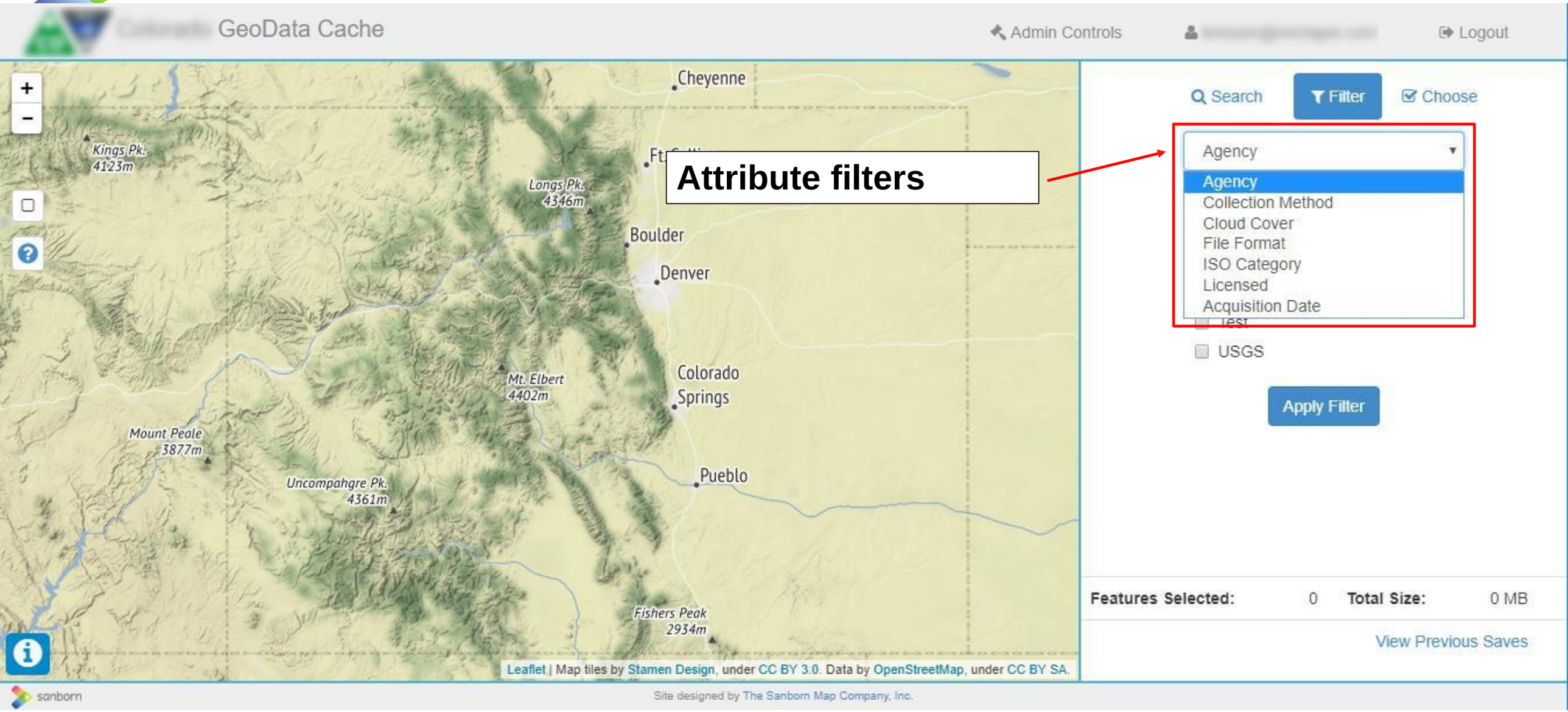

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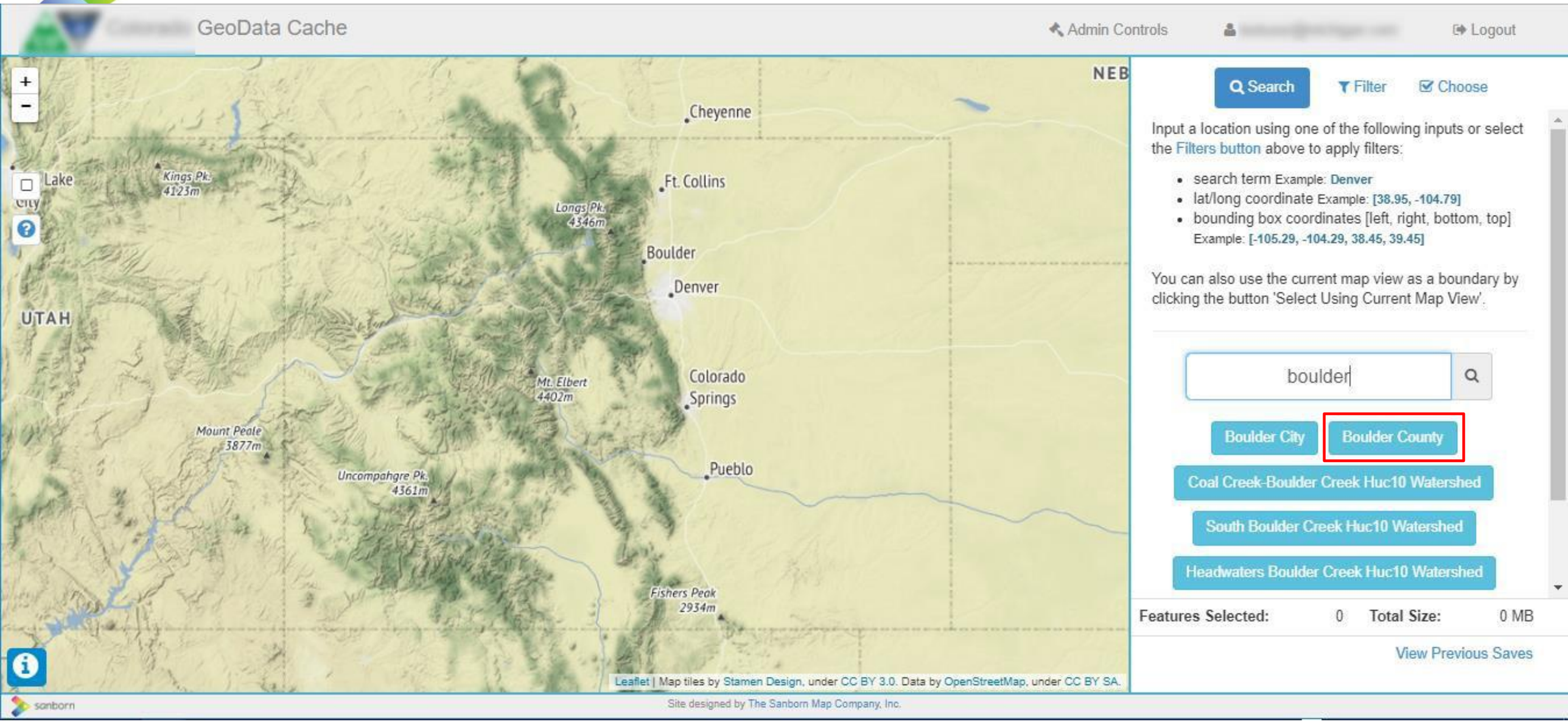
Data Discovery: Search Options



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Data Access

GeoData Cache

Admin Controls | Logout

Search | Filter | Choose

Boundary Applied: **Boulder County**

Filter Applied: **None**

Name	Location	Size

Boundaries Unselect All

CO_FLOODS_2013_35 Unselect All

This is LANDSAT data acquired by USGS. Date: 2013-09-02. File format: GEOTIFF files.

CO_FLOODS_2013_35 | Download | Preview | 229 MB

CO_FLOODS_2013_45 Unselect All

CO_FLOODS_2013_56 Unselect All

CO_FLOODS_2013_63 Unselect All

CO_FLOODS_2013_12 Unselect All

<< First | < Previous | Next > | Last >>

Page 1 of 1 Update | Features per page: 500 Update

Features Selected: 262 | Total Size: 136.23 GB

Save Selections | View Previous Saves

Feature Information

Feature Name: CO_FLOODS_2013_35
Acquisition Date: 2013-09-02
ISO Category: Boundaries
Agency: USGS
Restricted?: N
License:
File Format: GEOTIFF
Collection Method: LANDSAT
Projection: utm
Datum: WGS84
Resolution: 30.0
Cloud Cover: 2%
Number of Bands: 9
Vendor: USGS
File Size: 229 MB
File Name: LS07033032201309020000000MS00

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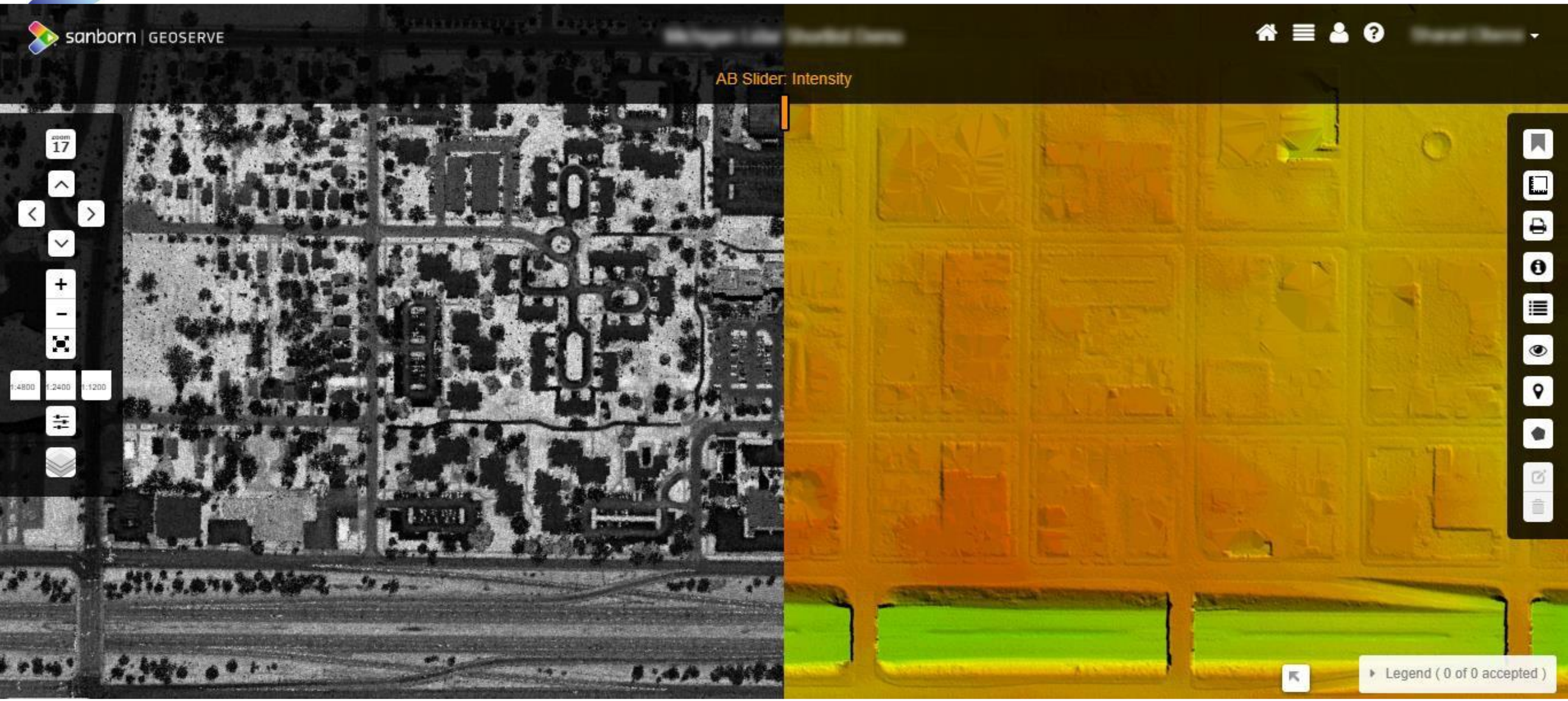
Data Preview



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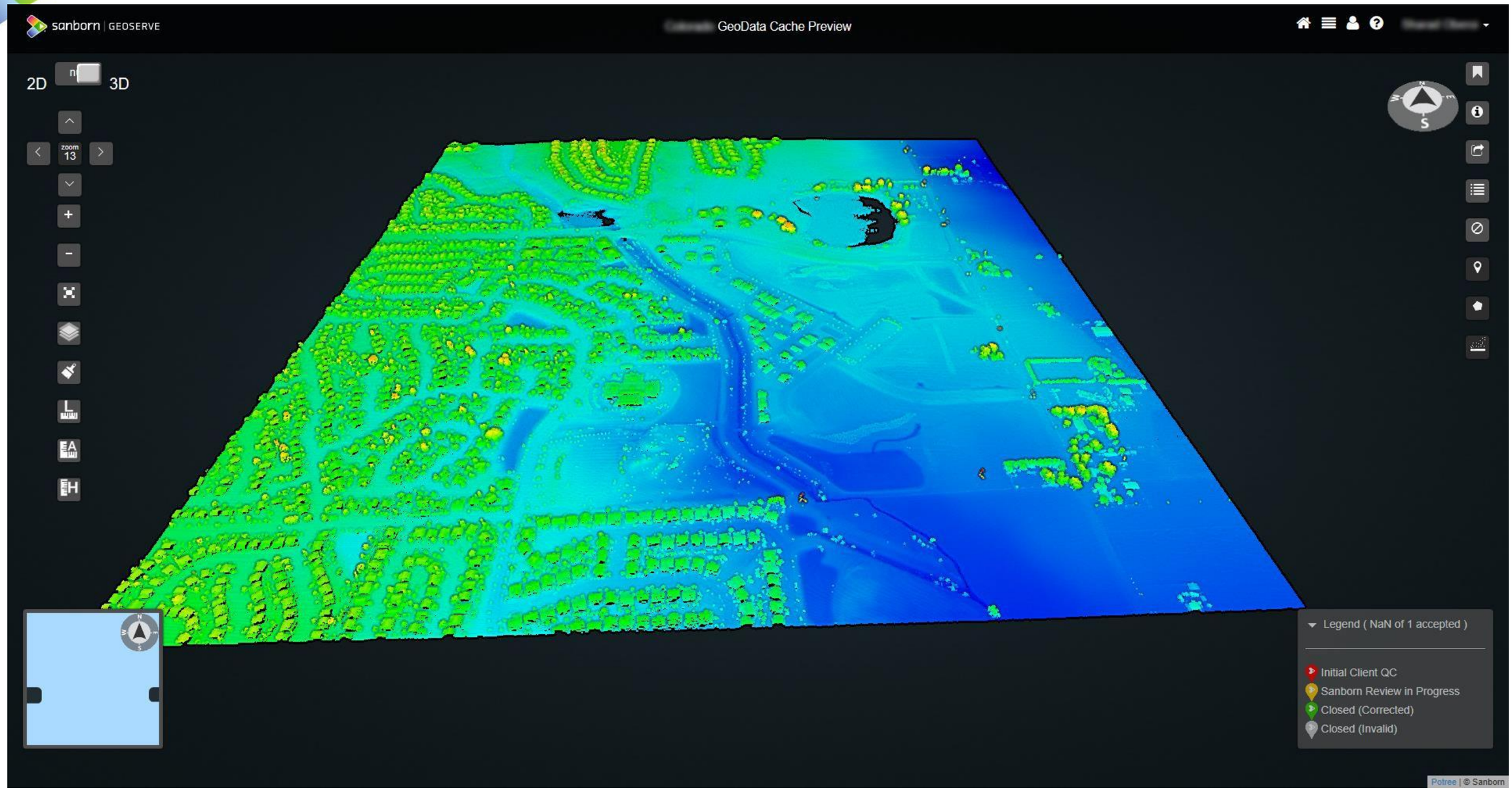

Data Storage

- Data products stored:
  - Raw point cloud (LAS, or LAZ)
  - Classified Lidar point clouds
  - Intensity images
  - DEM
  - Breaklines
  - Any relevant vector data (parcels, building footprints, etc.)
- The data should include the following metadata for versioning:
  - Projection
  - Acquisition Date
  - Sensor Information
  - Version
  - Project ID

Data Access

- The end user is able to:
  - View data online in a web-based LiDAR Analyst™ that allows users to manipulate the point cloud in 3D, measure features, annotate and export screenshots
  - Download the data
  - View a raster version of the data served as a WMS/WMTS for consumption in any OGC-compliant software.

Data Access and Security

- Backend dashboard that allows admins to create/remove users, grant users privileges, reset passwords, and monitor user history.
- Multi-factor authentication (MFA) for both authentication and authorization.
- Admins can login as users to troubleshoot problems or add subscription leases to user accounts.

Conclusions

- Allowing end users the flexibility to preview Lidar datasets in a web-application viewer, bring in their own vector layers and run data analytics is empowering and democratizes the processing.

- Running the data pipeline in the cloud allows unprecedented scalability, reliability and performance from both the storage and compute perspectives.

- Allowing users to contribute edited/enhanced datasets back to the database can make the application a living repository of data.

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Thank You

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