DATA+AI SUMMIT BY databricks

PIVOT BIO'S SPATIAL ANALYTICS EVOLUTION WITH DATABRICKS & CARTO

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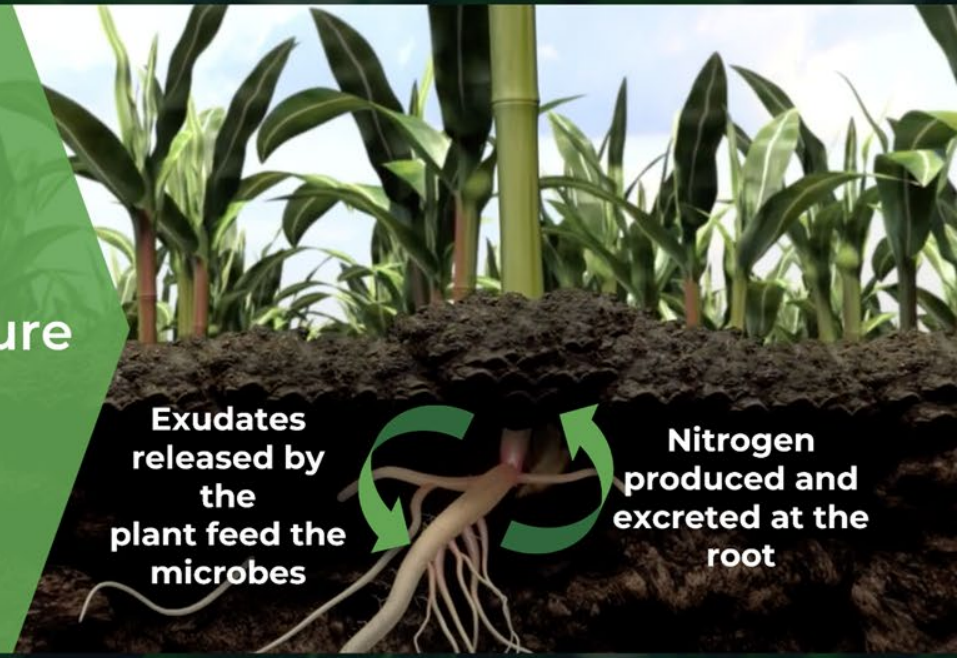
PivotBio builds microbes that enable food crops to produce their own nitrogen, replacing nitrogen fertilizer.

Past

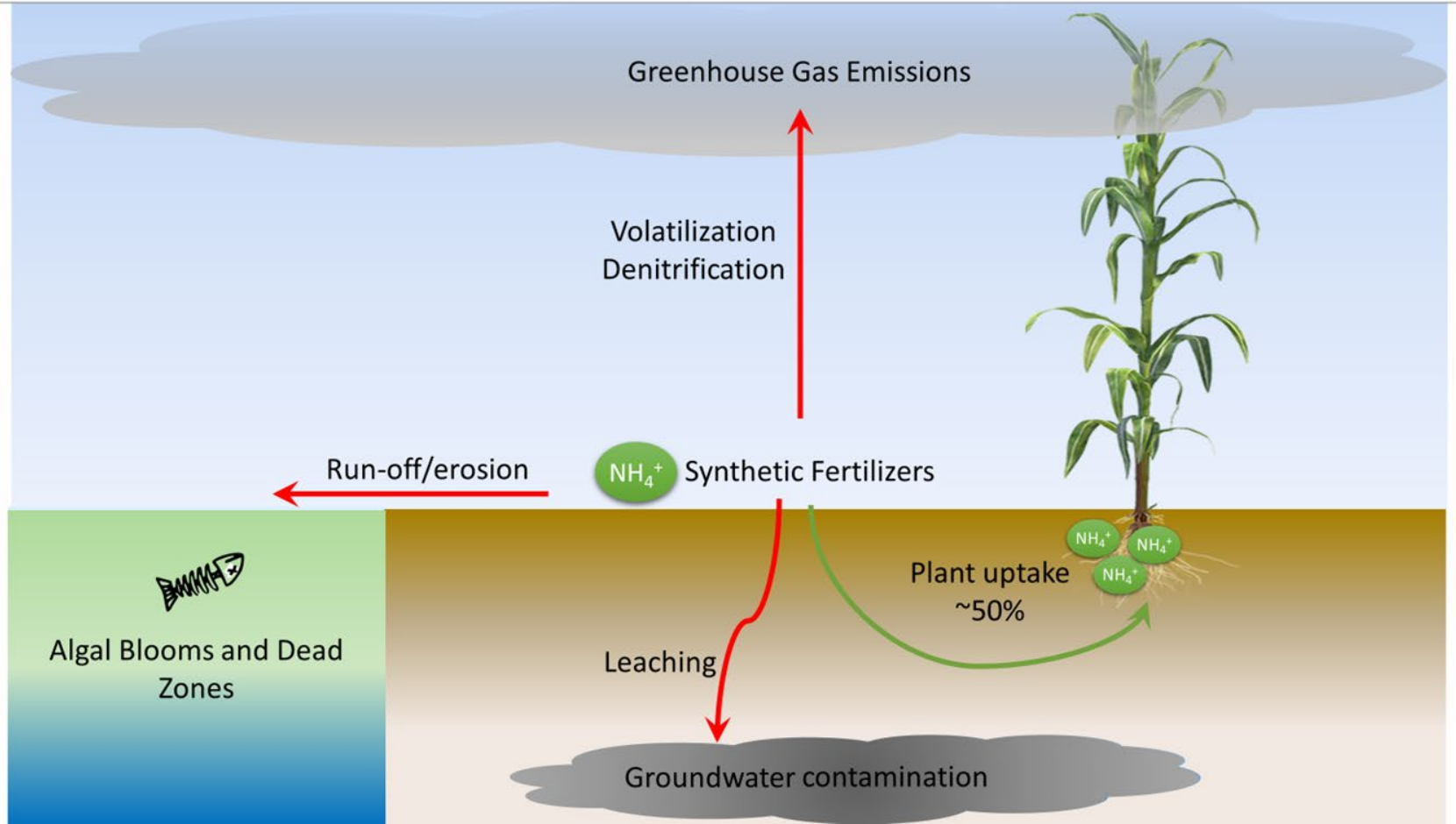
HOW MUCH REACHES
THE CROP?

Future



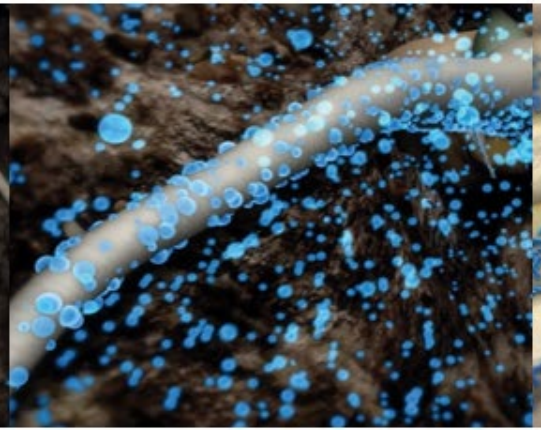
MICROBES PRODUCE NITROGEN ON DEMAND

Downsides to Synthetic Fertilizers

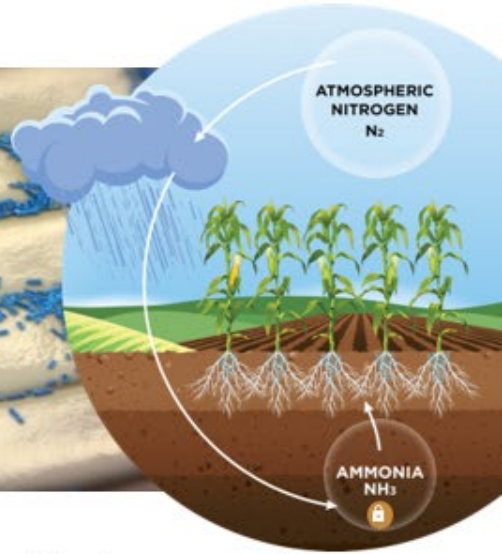


Replacing synthetic fertilizer
with a non-polluting product

Microbes attach directly to the root



Exudates released by the plant feed the microbes



Microbes convert nitrogen from the air and deliver it to the roots — keeping it fixed in the microbe/root system

PIVOT BIO

PIVOT BIO PROVEN 40®

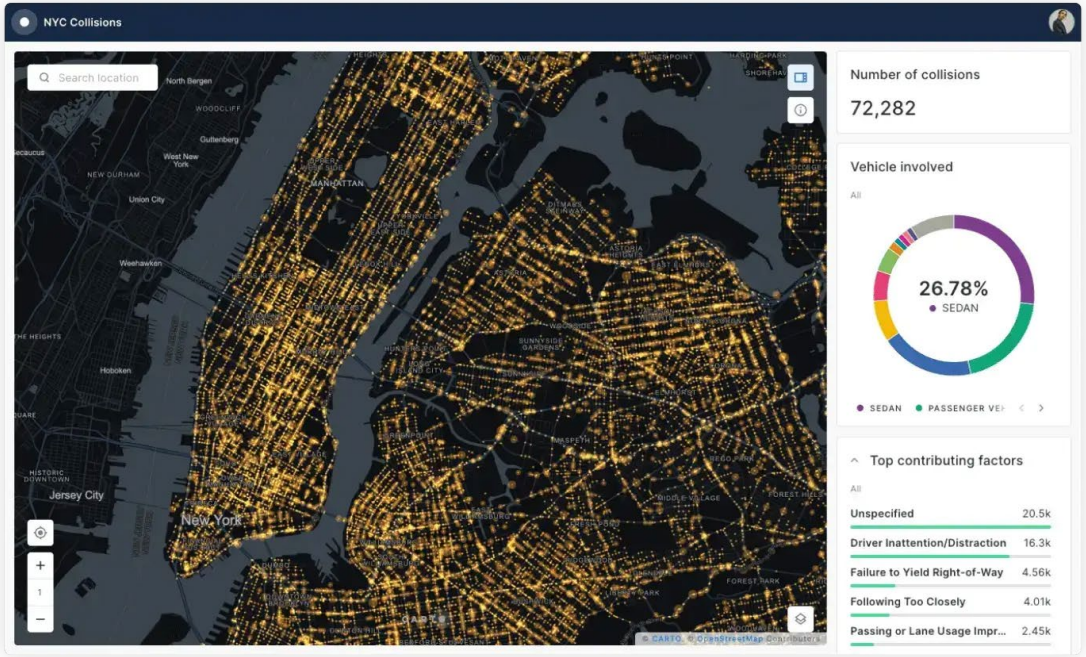
Nitrogen Source for: Corn

PIVOT BIO RETURN™

Nitrogen Source for: wheat and sorghum

CARTO Platform

Breaking the GIS silo



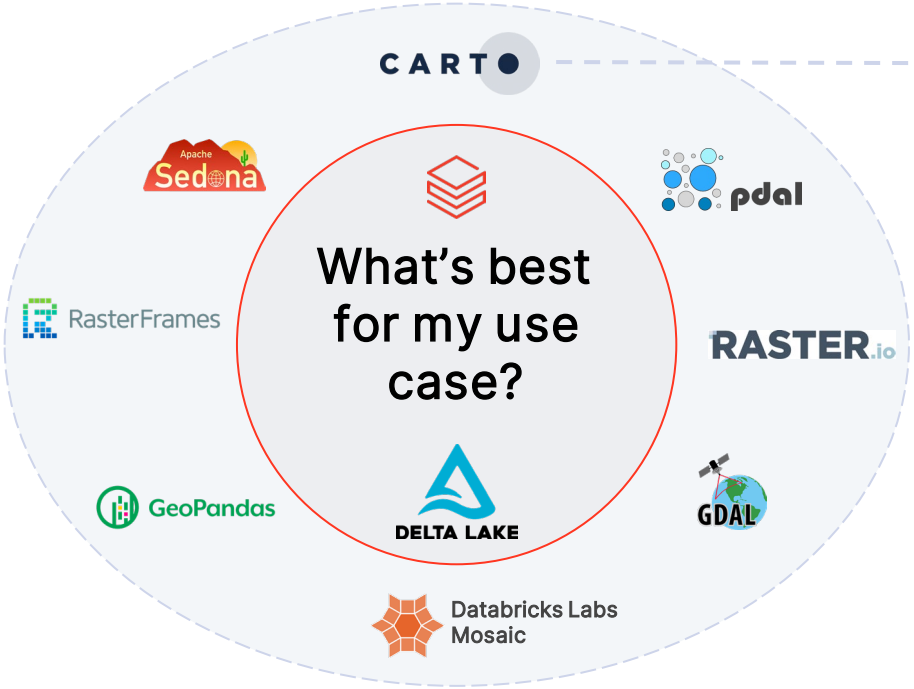
Modern spatial analytics built for the cloud

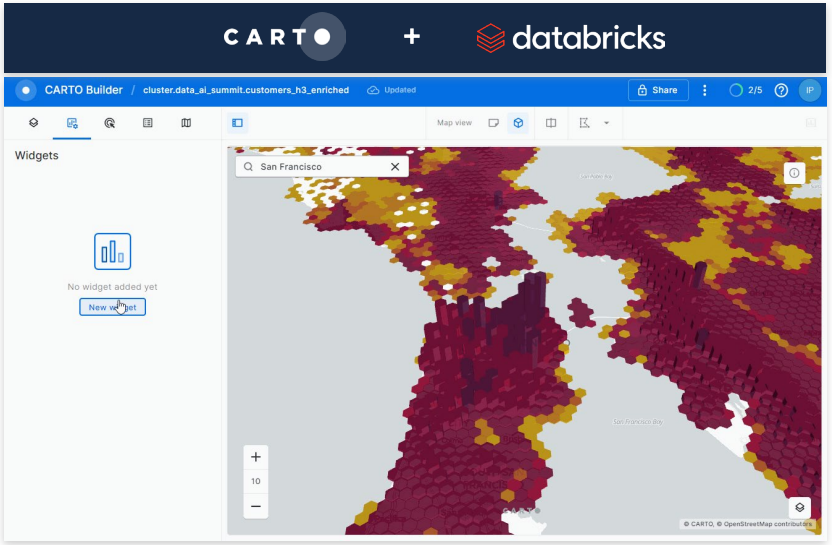
Analyze, visualize, and develop with spatial data at limitless scale in databricks

- Fully cloud native
- Visualize billions of data points
- Extends Databricks GEO capabilities
- Data enrichment
- Accelerate App development
- Publish & share your insights

Broad Platform Ecosystem

“Flexibility” to choose your own adventure for geospatial processing





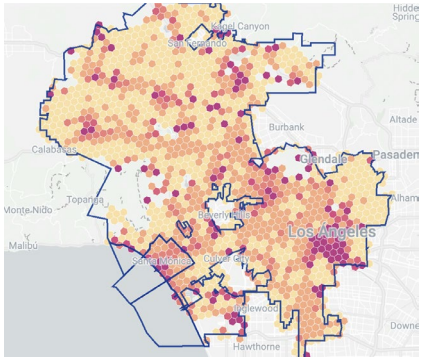
- H3 integration
- Analytics Toolbox
- pydeck-carto visualization
- Spatial Features for enrichment
- Databricks Data Marketplace

Scalable Geospatial Analytics with H3

Supported natively in Databricks

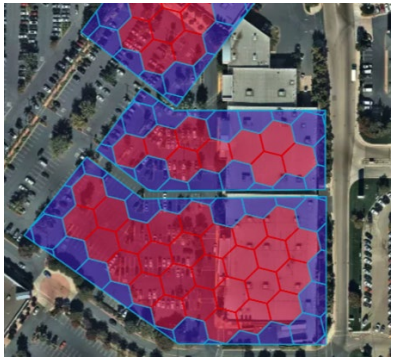
- Grid indexing systems are ideally suited for scale
- Hierarchical system offers flexibility
- Easy and effective visualization

Portfolio Risk Analysis



Telecom Network Planning

Retail Site Selection



Climate Risk Modeling

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GeoViewer

Pivot Bio's GIS Field Data Platform

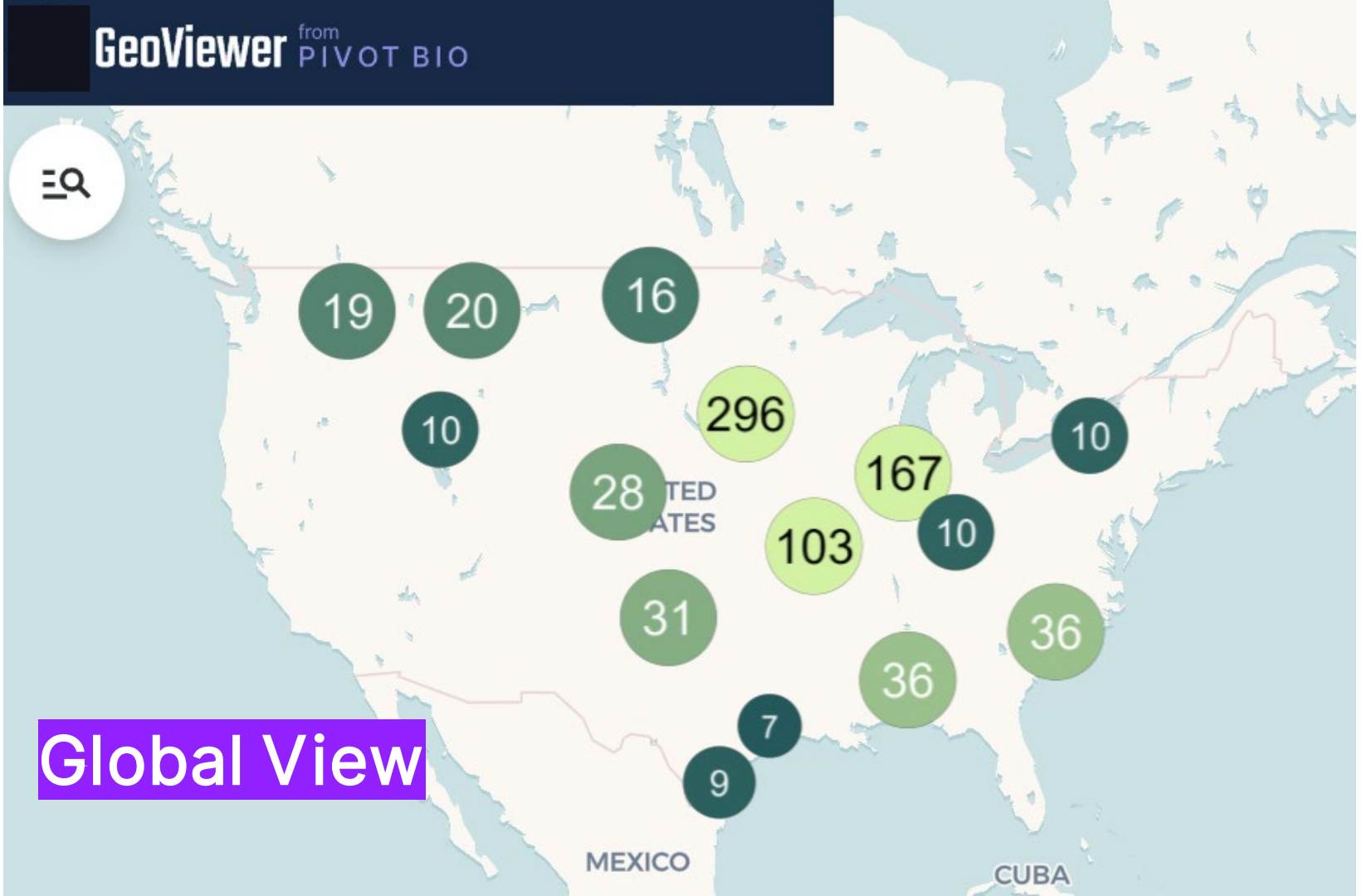
Expandable Data Viz

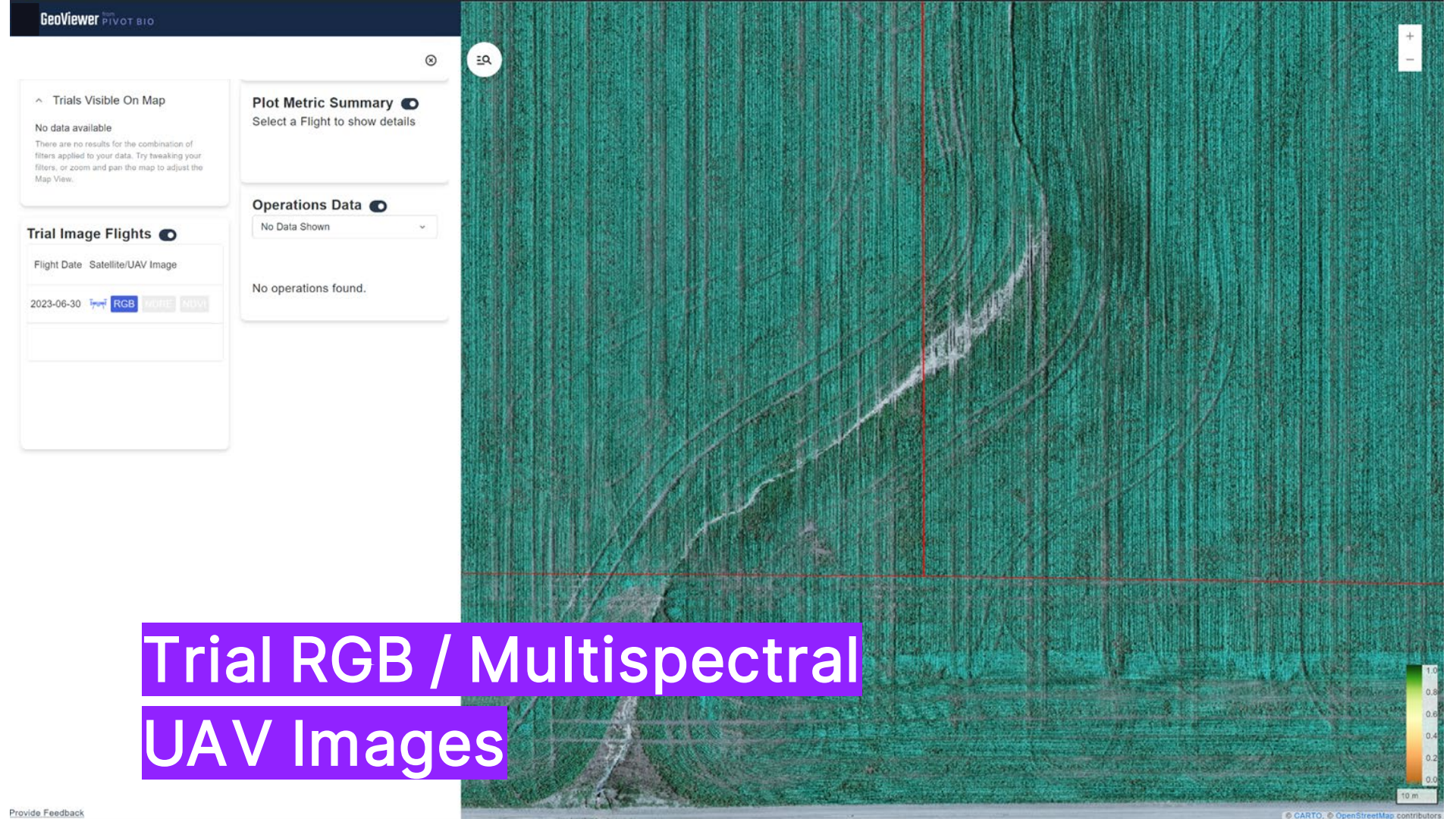
GeoViewer Shows:

1. RGB and Multispectral UAV imagery
2. Field Operations point data from Equipment
3. LiDAR crop height scans
4. Harvest Data, Biomass

Planned:

- Weather
- Fertilizer + Pesticide combinations


GeoViewer from PIVOT BIO
19
20
16
10
296
28
167
10
103
10
31
36
36
7
9
MEXICO
CUBA
Global View


GeoViewer
PIVOT BIO
Trials Visible On Map
No data available
There are no results for the combination of filters applied to your data. Try tweaking your filters, or zoom and pan the map to adjust the Map View.
Plot Metric Summary
Select a Flight to show details
Operations Data
No Data Shown
No operations found.
Trial Image Flights
Flight Date
Satellite/UAV Image
2023-06-30
RGB
Trial RGB / Multispectral UAV Images
Provide Feedback
10 m
© CARTO, © OpenStreetMap contributors

Trials Visible On Map

No data available

There are no results for the combination of filters applied to your data. Try tweaking your filters, or zoom and pan the map to adjust the Map View.

2023-07-24	RGB	NDRE	NDVI
2023-07-23	RGB	NDRE	NDVI
2023-07-19	RGB	NDRE	NDVI
2023-07-15	RGB	NDRE	NDVI
2023-07-11	RGB	NDRE	NDVI
2023-07-10	RGB	NDRE	NDVI
2023-07-05	RGB	NDRE	NDVI
2023-06-29	RGB	NDRE	NDVI
2023-06-28	RGB	NDRE	NDVI
2023-06-2			
2023-06-20	RGB	NDRE	NDVI

Provide Feedback

Plot Metric Summary

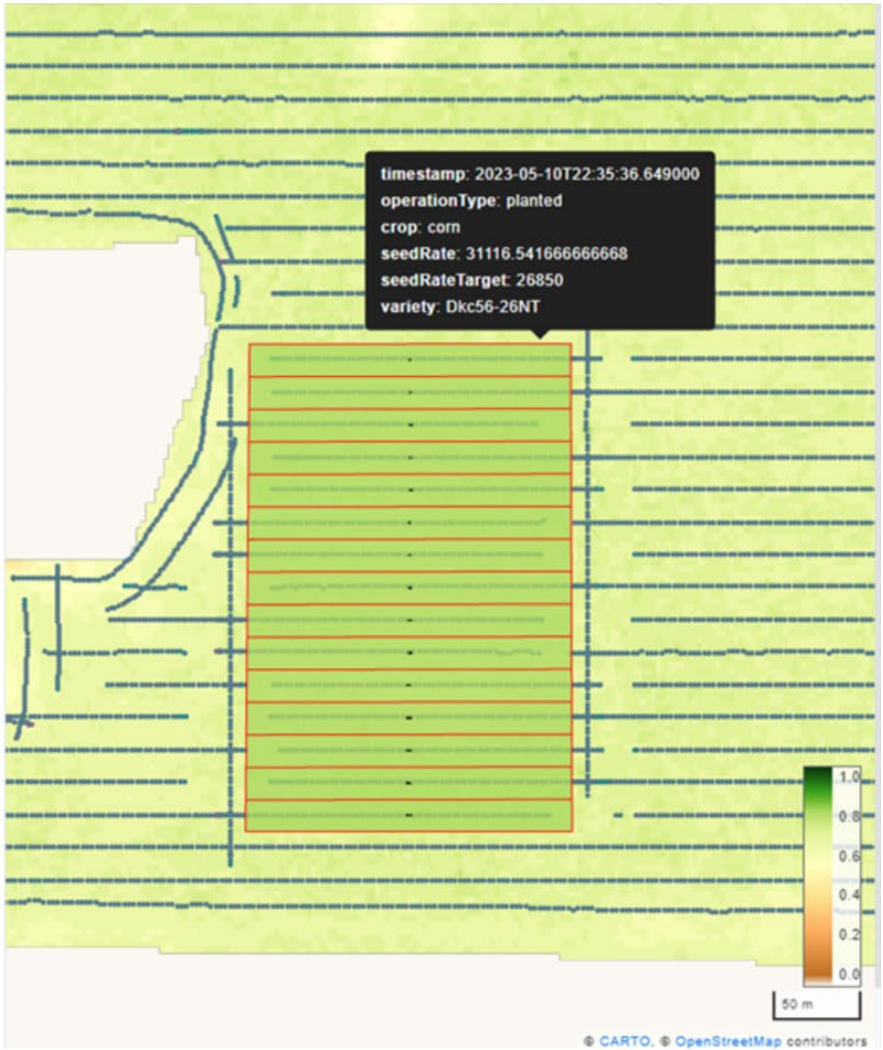
Rep All Metric NDVI Median

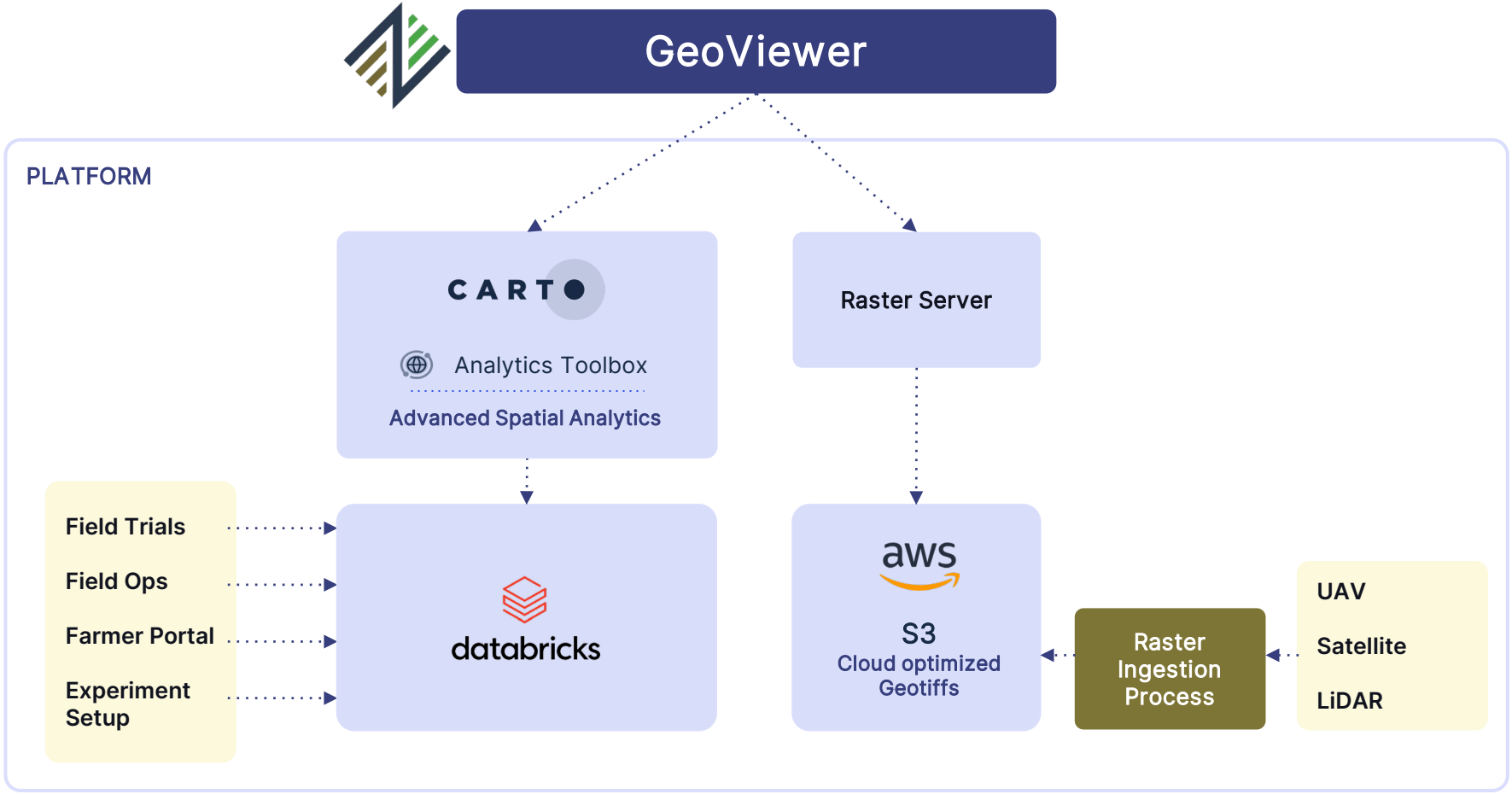
Plot Name	NDVI Median
101	0.7927
102	0.7933
103	0.7948
104	0.7956
105	0.7950
201	0.7948
202	0.7937
203	0.7930
204	0.7952
205	0.7938
301	0.7919
302	0.7955
303	0.7976
304	0.8007
305	0.8001

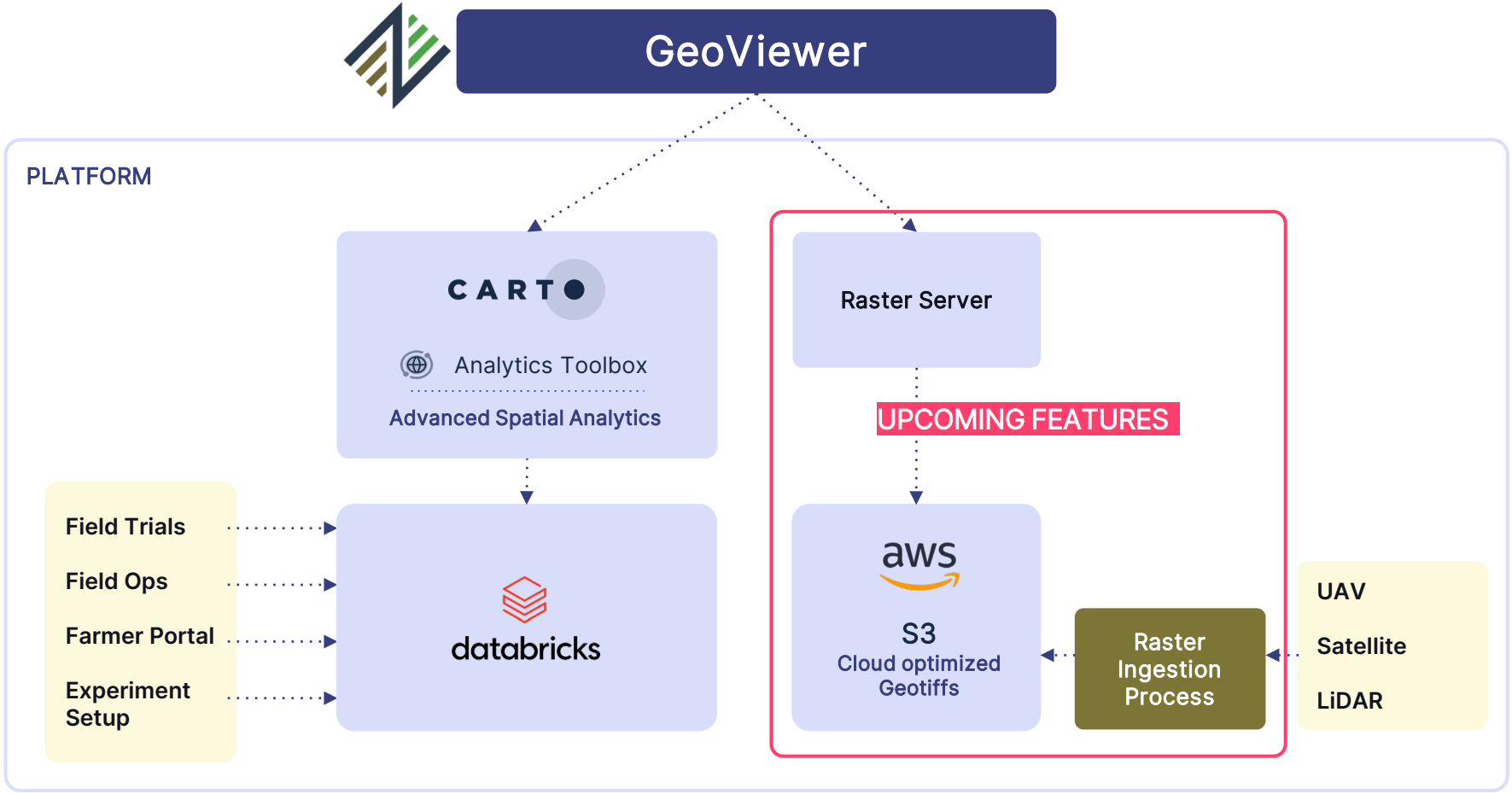
Operations Data

2023-05-11 | planted 49180 data...

Field Operations







Conclusions

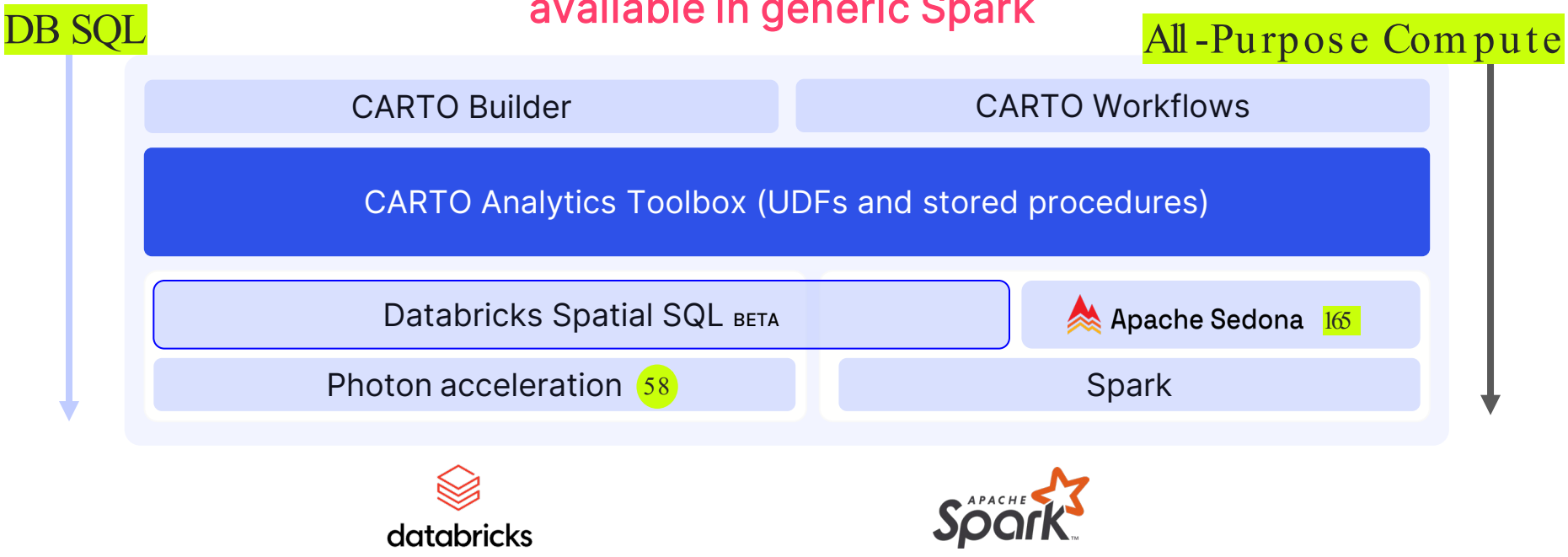
PIVOT BIO

- GIS data is essential for tracking trial outcomes in the field
- GeoViewer offers integration of multiple data types
- CARTO provides performant display on large datasets
- CARTO Built-in canvas and styling speeds development

CARTO Upcoming Features

Supporting the Databricks/Spark ecosystem

Fastest in Databricks with Spatial SQL and Photon acceleration, and available in generic Spark



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DBR 14.2 Getting Started: Spatial SQL Preview [v1] (Python)

Import Notebook

DBR 14.2 Getting Started: Spatial SQL Preview [v1]

> Get up and running with the new `ST_` functions. This will help you validate your environment, discuss supported data formats and types, highlight some of the functions, and then provide an intro to h3 indexing to assist with spatial joins, e.g. point-in-polygon using `st_contains`.

Notes:

1. This is focused on v1 of the preview which is SQL API only
2. Requires Photon DBR 14.2
3. Serverless / DBSQL will not be available until after the 2023 Holiday Release Restricted Period
4. Assumes you have already signed the terms of services for the preview

PREVIEW

Author: Michael Johns | mjohns@databricks.com
Last Modified: 09 NOV 2023

Show code

Please ensure an authorized team member has accepted the Private Preview terms of service [by replying to a Databricks initiated email].

- The product is in private preview, is not intended for use in production, and is provided AS-IS consistent with your agreement with Databricks.
- Although the preview is not intended for use in production, you may still incur charges for platform usage DBUs.
- Non-public information about the preview (including the fact that there is a preview for the feature/product itself) is confidential.
- We may change or discontinue the preview at any time without notice. We may also choose not to make the preview generally

Working on Standard for a Geo Data Lake

Bringing VECTOR RASTER into the Data Cloud via PARQUET.

Geoparquet 1.1

Vector data encoded in WKB or GeoArrow.

On its way to become OGC standard.

RasQuet (Parquet Raster) 0.1

Raster data encoded in native arrays or Zarr

- Support for projections
- Different encodings
- Multidimensional

databricks

APACHE Spark

amazon REDSHIFT

Google BigQuery

snowflake

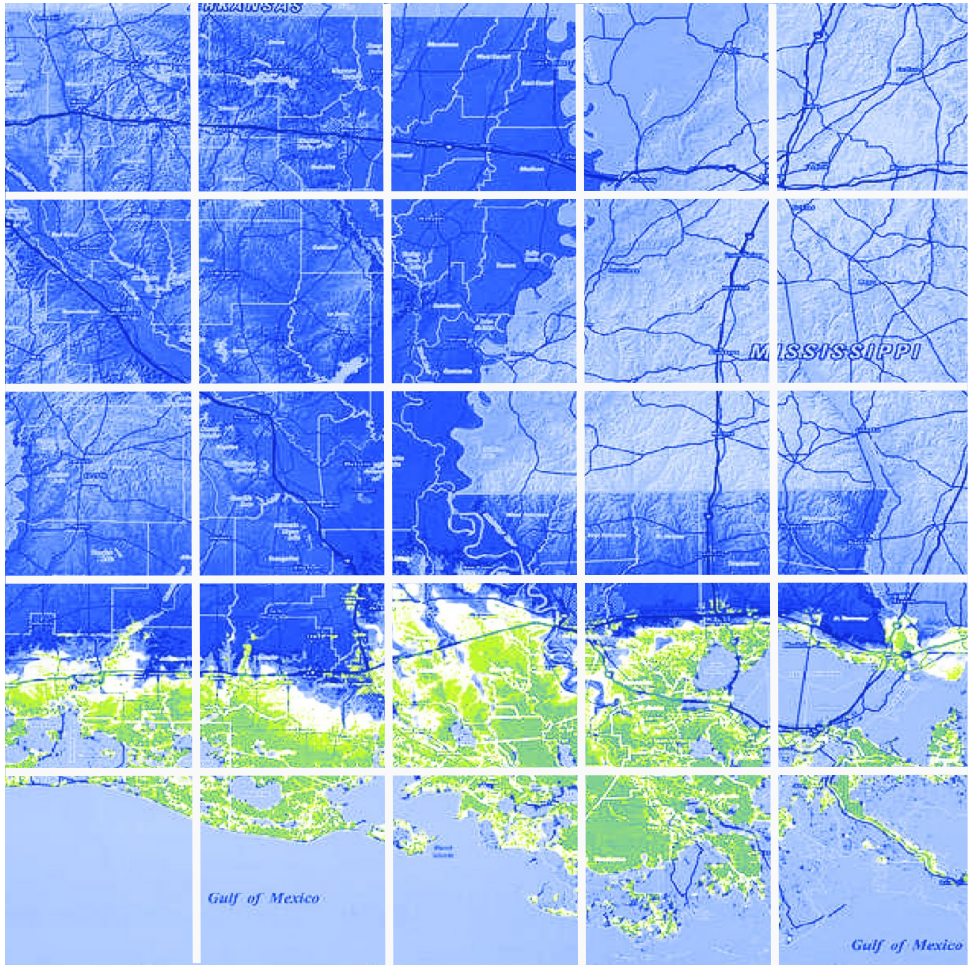
Preparing for the Table formats of the future

1. **Universal Accessibility:** make raster data easily accessible on modern data platforms

2. **Integrated Data Ecosystems:** raster to coexist seamlessly with non-geospatial data in the same platform and prepared for modern distribution

If you are modeling your Data Lake, this is the way to add spatial data to it.

Don’t make GEO a special thing



tile_id	time	variable	raster	metadata
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5211548776216395775	2024-05-15	RiskScore	[3.72,4.86,4.16,4.91,5.35,3....	{units=m ...
5211548776216395775	2024-05-16	RiskScore	[3.79,4.36,3.89,3.15,6.24,5....	{units=m ...
5211548776216395775	2024-05-14	elevation	[1053.0200683952853,1090...	{long_na...
5211548776216395775	2024-05-15	elevation	[1009.894736543188,1014....	{long_na...
5211548776216395775	2024-05-16	elevation	[1095.5421888278183,1056...	{long_na...
5211447621146640383	2024-05-14	RiskScore	[9.19,8.64,6.66,8.97,9.11,9....	{units=m ...
5211447621146640383	2024-05-15	RiskScore	[8.2,8.24,8.92,9.92,6.95,9.5,...	{units=m ...
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5211447621146640383	2024-05-15	elevation	[1098.5488845815894,1111...	{long_na...
5211447621146640383	2024-05-16	elevation	[1029.40142420468,1102.0...	{long_na...
5211355262169907199	2024-05-14	RiskScore	[6.57,7.77,8.03,8.6,9.01,8.9...	{units=m ...
5211355262169907199	2024-05-15	RiskScore	[9.14,8.22,9.17,9.33,8.38,8....	{units=m ...

```
SELECT
 RASTER_VALUE(
   raster, (11, 23))
FROM FloodRiskRasquet
WHERE date = '2024-05-16'
AND variable = 'RiskScore'
```

DATA+AI SUMMIT

Stop by to chat at Booth #MP3 (Marketplace Area)

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