
AWS
re:Invent

WPS210

Using open data for sustainable agriculture

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AWS

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Agenda

What’s the problem?

Overview of open data on AWS

Finding data shared on AWS

Putting the data to work – examples



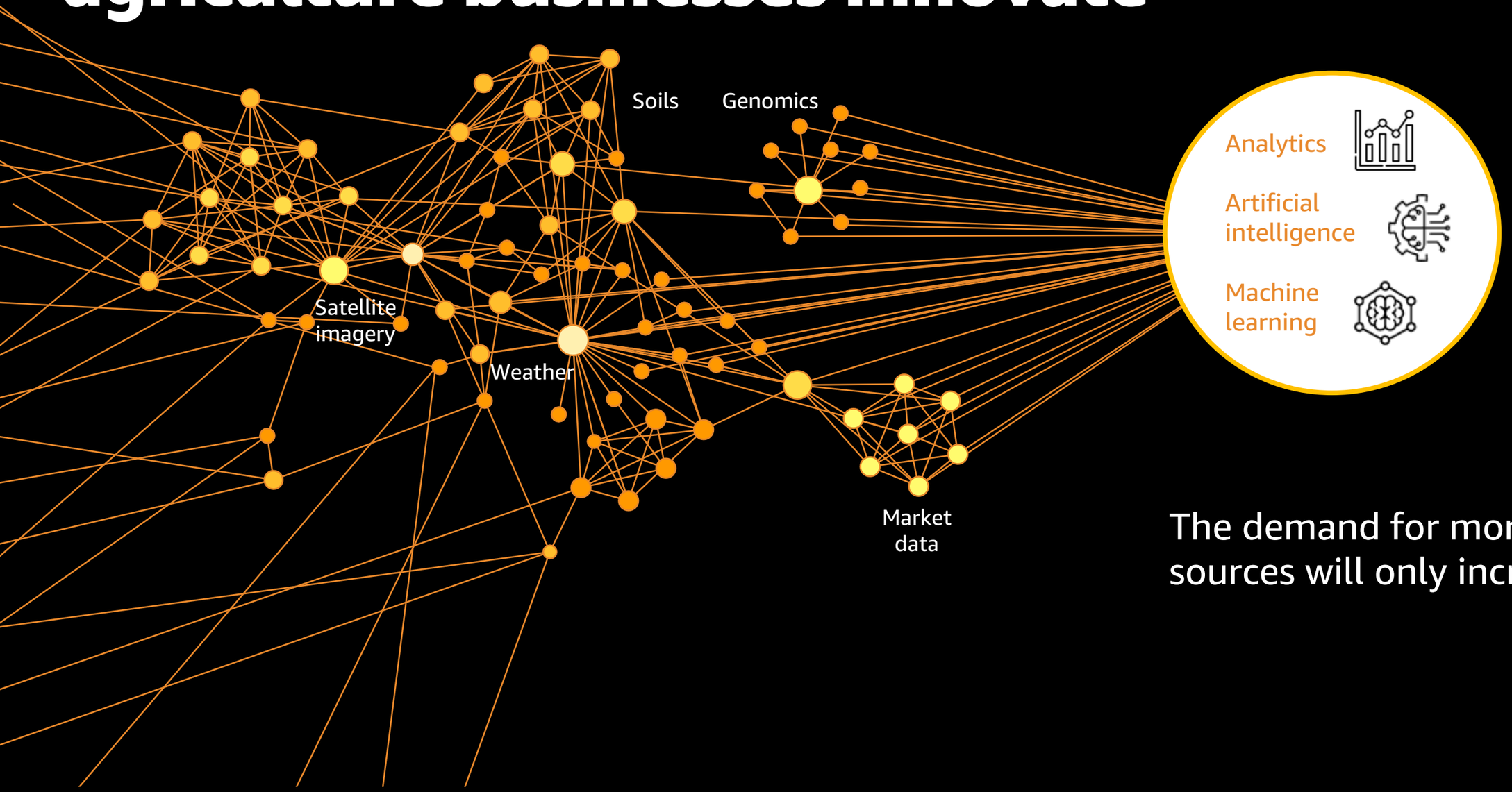
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So, what is the problem, anyway?



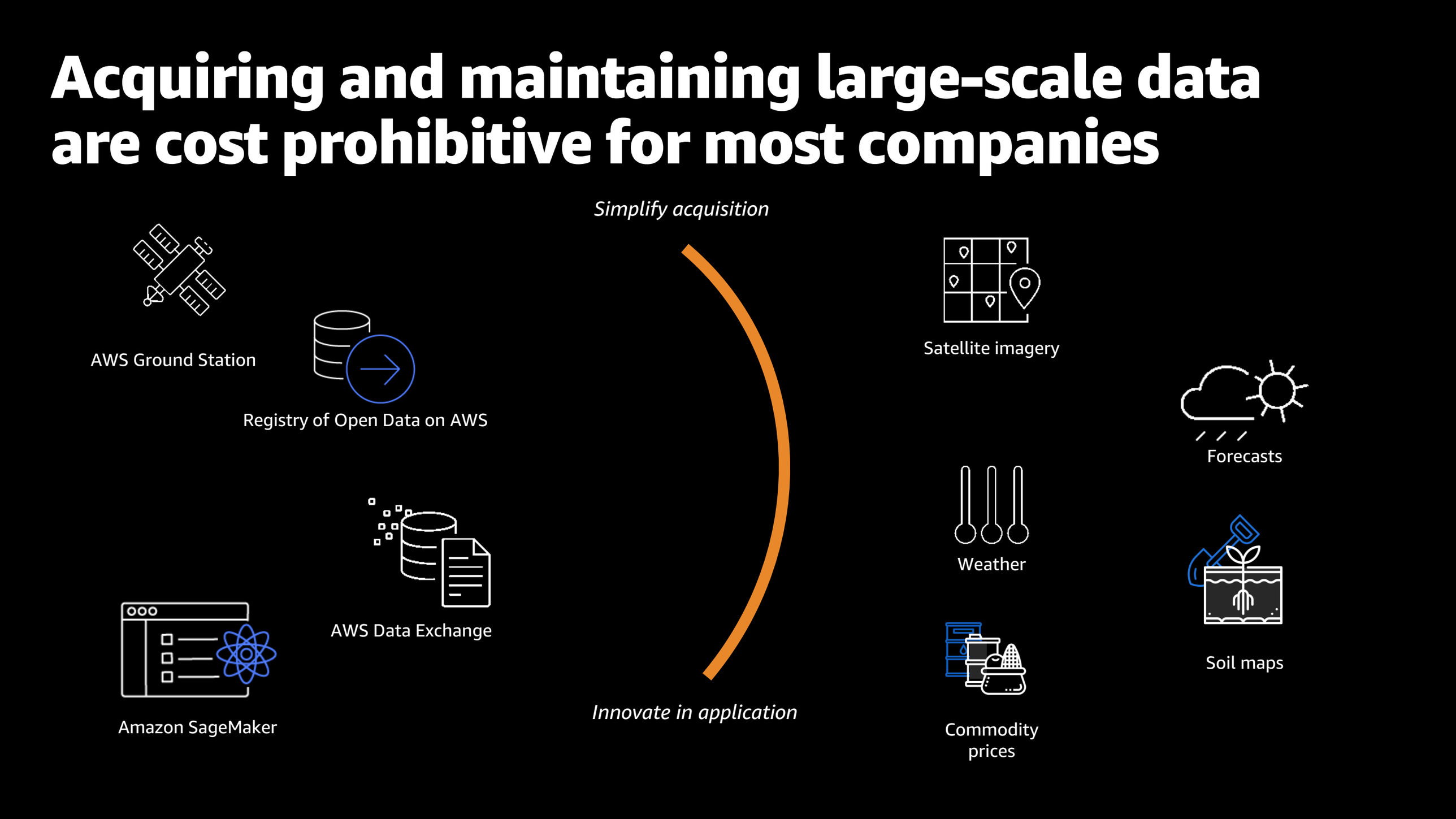
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Data is transforming the way agriculture businesses innovate



The demand for more data sources will only increase

Acquiring and maintaining large-scale data are cost prohibitive for most companies



“Data must be organized, well documented, consistently formatted, and error free. Cleaning the data is often the most taxing part of data science, and is frequently 80% of the work.”

Excerpt from *Data Driven*,
by DJ Patil and Hilary Mason



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Overview of open data on AWS



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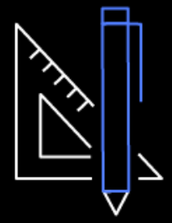
Sharing data in the cloud lets data users spend more time on data analysis rather than data acquisition

https://opendata.aws

Advantages of sharing data in the cloud



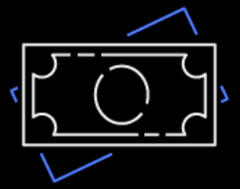
Global community of users



New services and tools

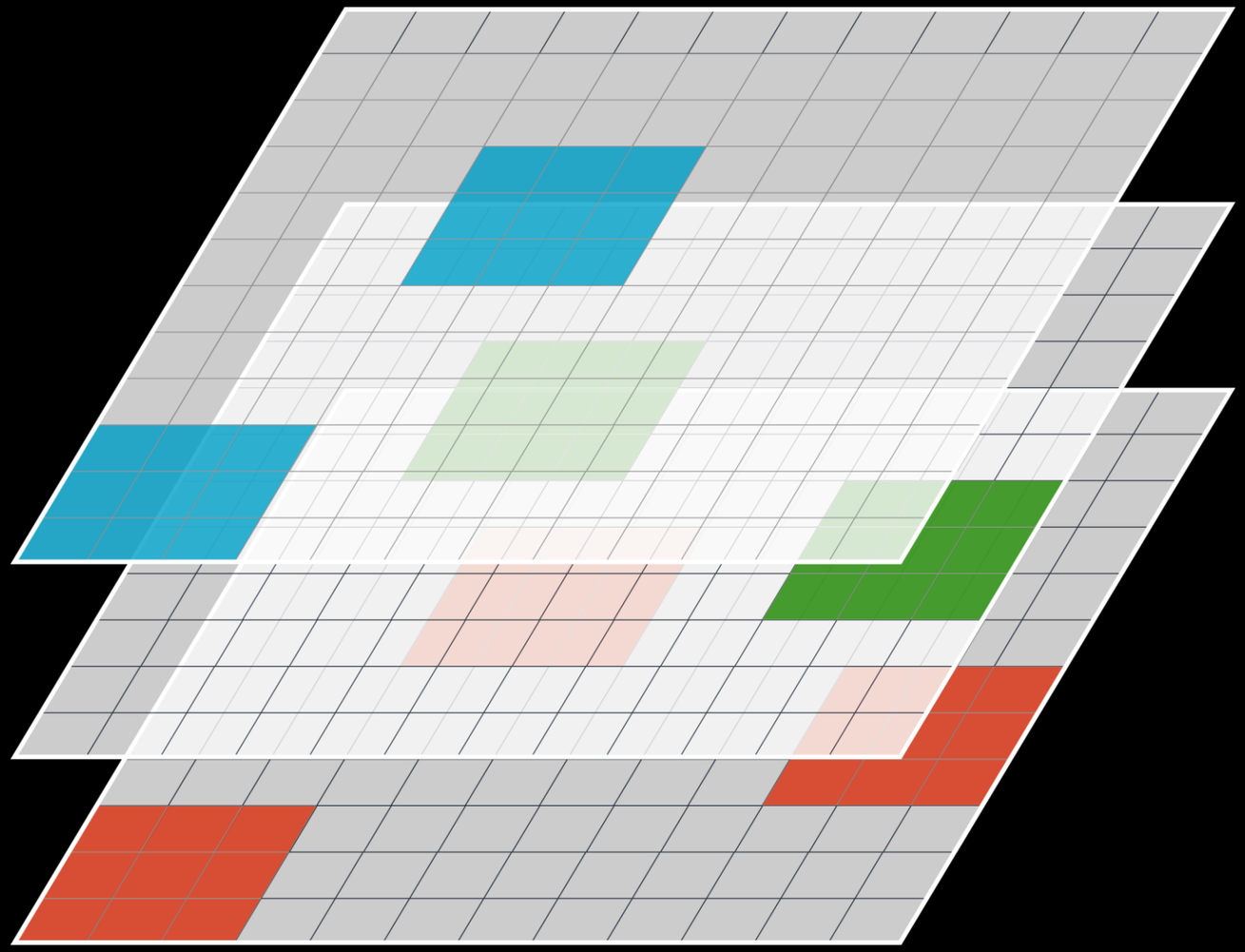


Faster pace of research



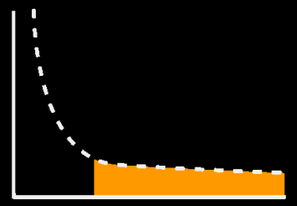
Lower cost of research

A practical example: Cloud-optimized GeoTIFF



AWS Data Exchange: Easily find, subscribe to, and use third-party data in the cloud

Data providers



Reach millions of users



Distribute data in a secure and compliant way



No need to maintain data, storage, delivery, billing, or entitling technology



Migrate existing subscriptions at no additional cost

Data subscribers



Quickly find diverse data in one place



Easily analyze data as it is published



Automatically access new data

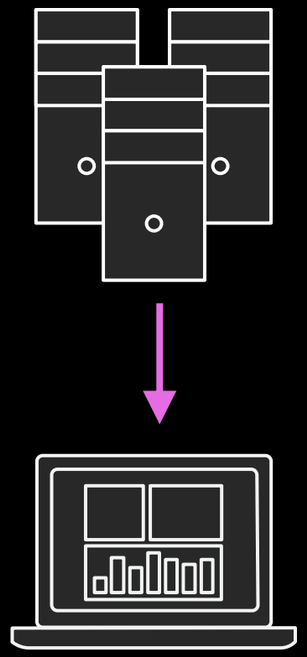


Migrate existing subscriptions at no additional cost

Bring your algorithms to the data

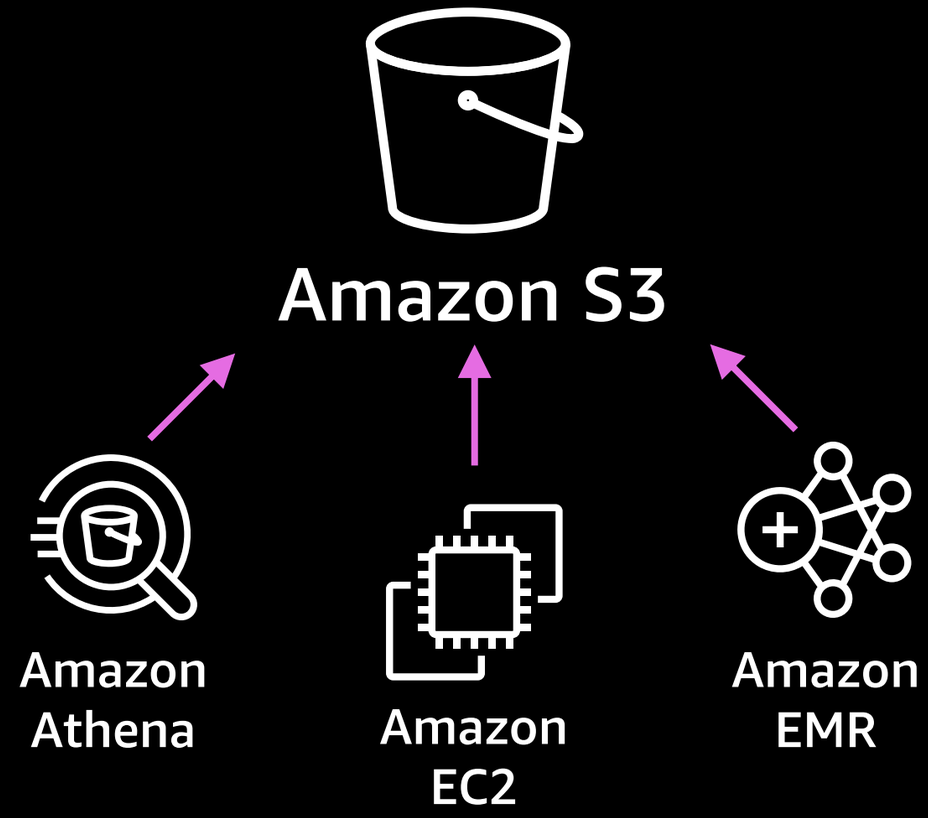
Traditional approach

Move data to computing resources



Cloud approach

Move computing resources to data



The combination of services forms a complete agriculture data lake

Source data



Registry of Open Data on AWS



AWS Marketplace

Machine learning

AI services

Vision			Speech		Language		Chatbots	Forecasting	Recommendations
Amazon Rekognition Image	Amazon Rekognition Video	Amazon Textract	Amazon Polly	Amazon Transcribe	Amazon Translate	Amazon Comprehend	Amazon Lex	Amazon Forecast	Amazon Personalize

ML services

Amazon SageMaker

Ground Truth	Notebooks	Algorithms + marketplace	Reinforcement learning	Training	Optimization	Deployment	Hosting

ML frameworks and infrastructure

Frameworks	Interfaces
TensorFlow, mxnet, PYTORCH	GLUON, Keras

Infrastructure

EC2 P3 & P3DN | EC2 G4 EC2 C5 | FPGAS | DL containers & AMIs | Amazon ECS | Amazon EKS | AWS IoT Greengrass | Elastic inference | Inferentia

Automate



AWS Lambda



Topic



Queue

Store and catalog



Crawler



Catalog



Amazon S3

Integrate



Endpoint



Edge location

TensorFlow, the TensorFlow logo, and any related marks are trademarks of Google Inc.

Finding data shared on AWS

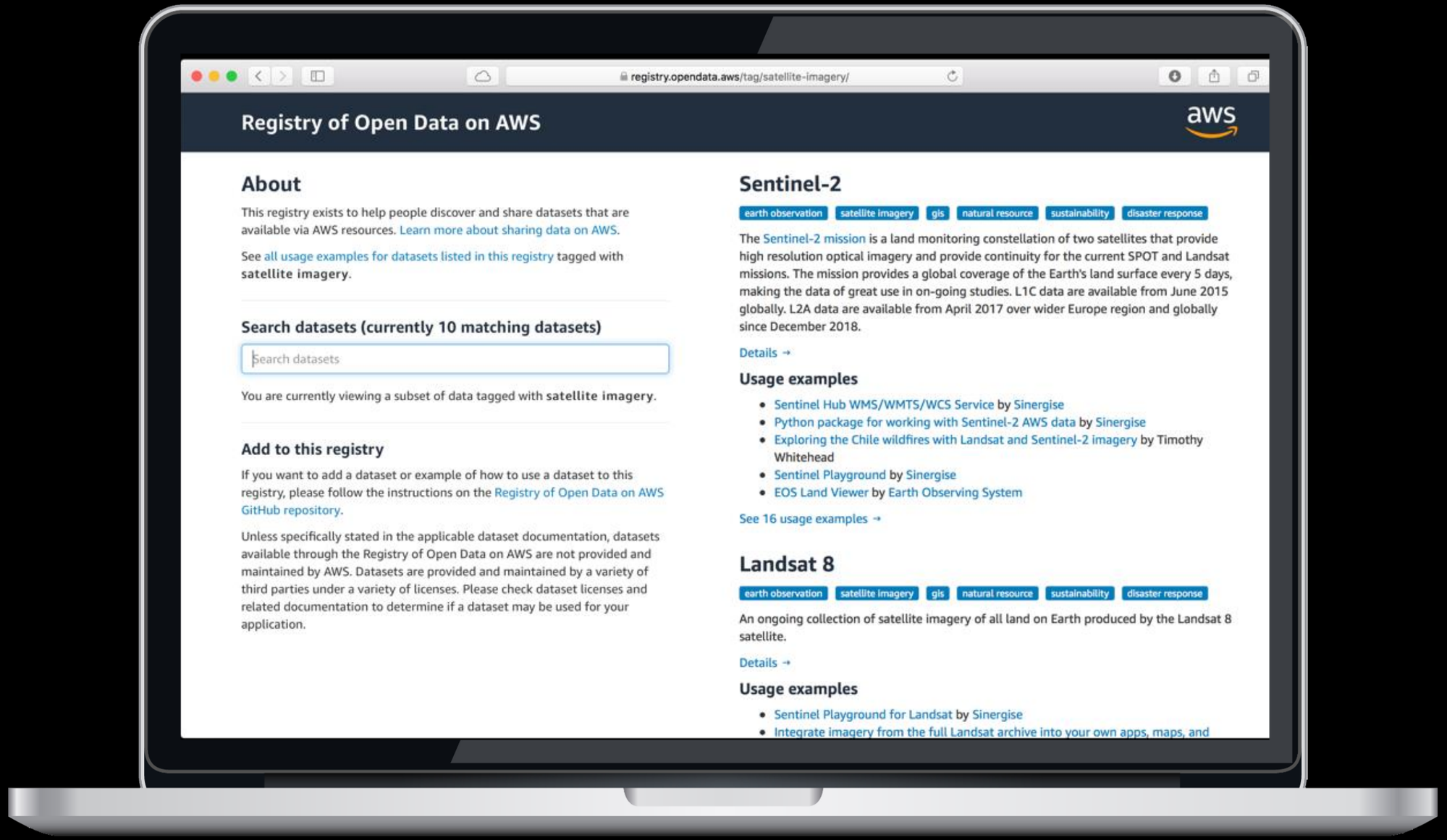


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Open data on AWS

HTTPS://REGISTRY.OPENDATA.AWS/



AWS open data

HTTPS://REGISTRY.OPENDATA.AWS/

Resources on AWS

Description
Level 2A scenes and metadata

Resource type
S3 Bucket

Amazon Resource Name (ARN)
`arn:aws:s3:::sentinel-cogs`

AWS Region
`us-west-2`

AWS CLI Access (No AWS account required)
`aws s3 ls s3://sentinel-cogs/ --no-sign-request`

Description
S3 Inventory files for L1C (ORC and CSV)

Resource type
S3 Bucket

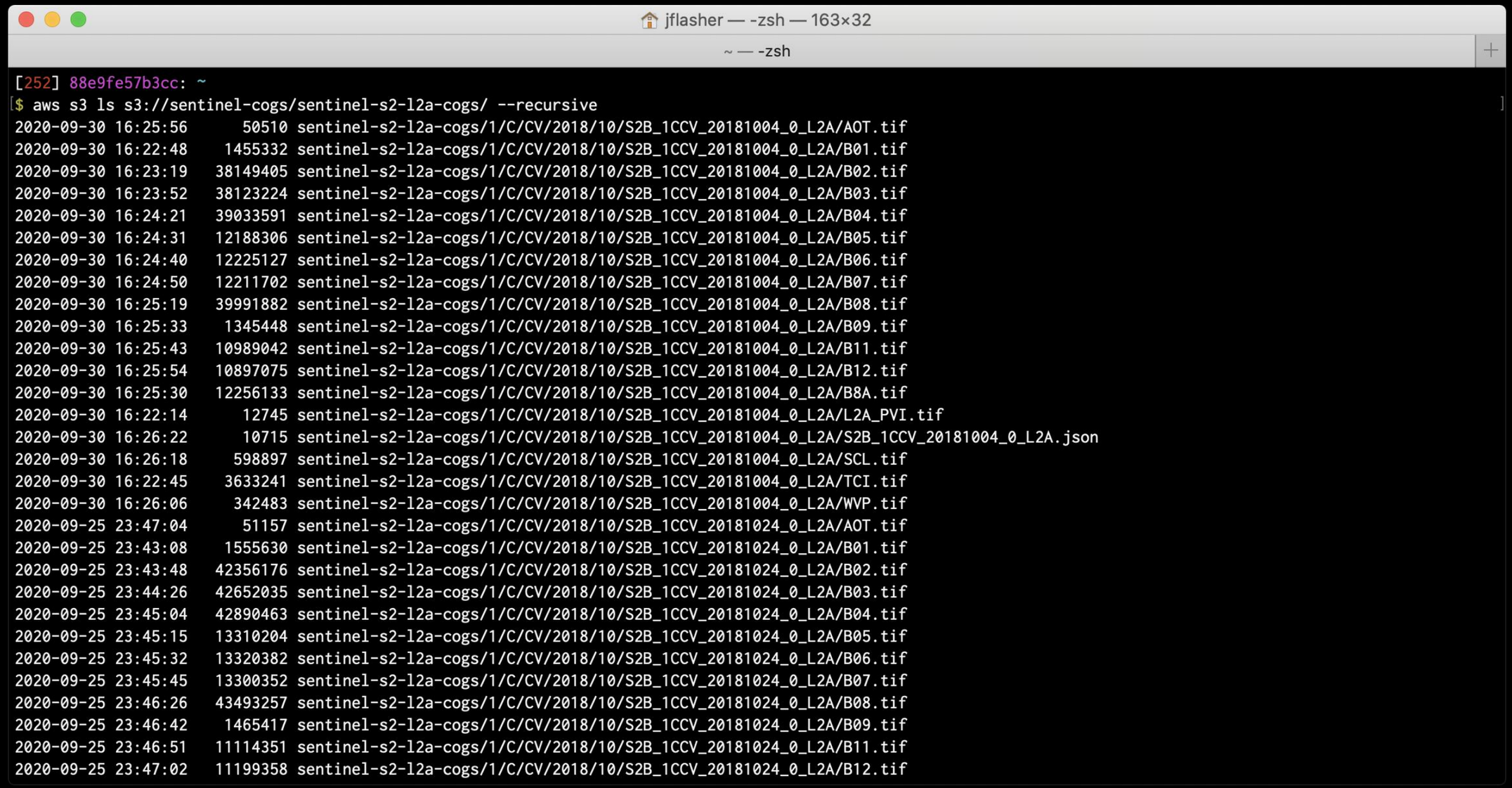
Amazon Resource Name (ARN)
`arn:aws:s3:::sentinel-cogs-inventory`

AWS Region
`us-west-2`

AWS CLI Access (No AWS account required)
`aws s3 ls s3://sentinel-cogs-inventory/ --no-sign-request`

AWS open data

HTTPS://REGISTRY.OPENDATA.AWS/

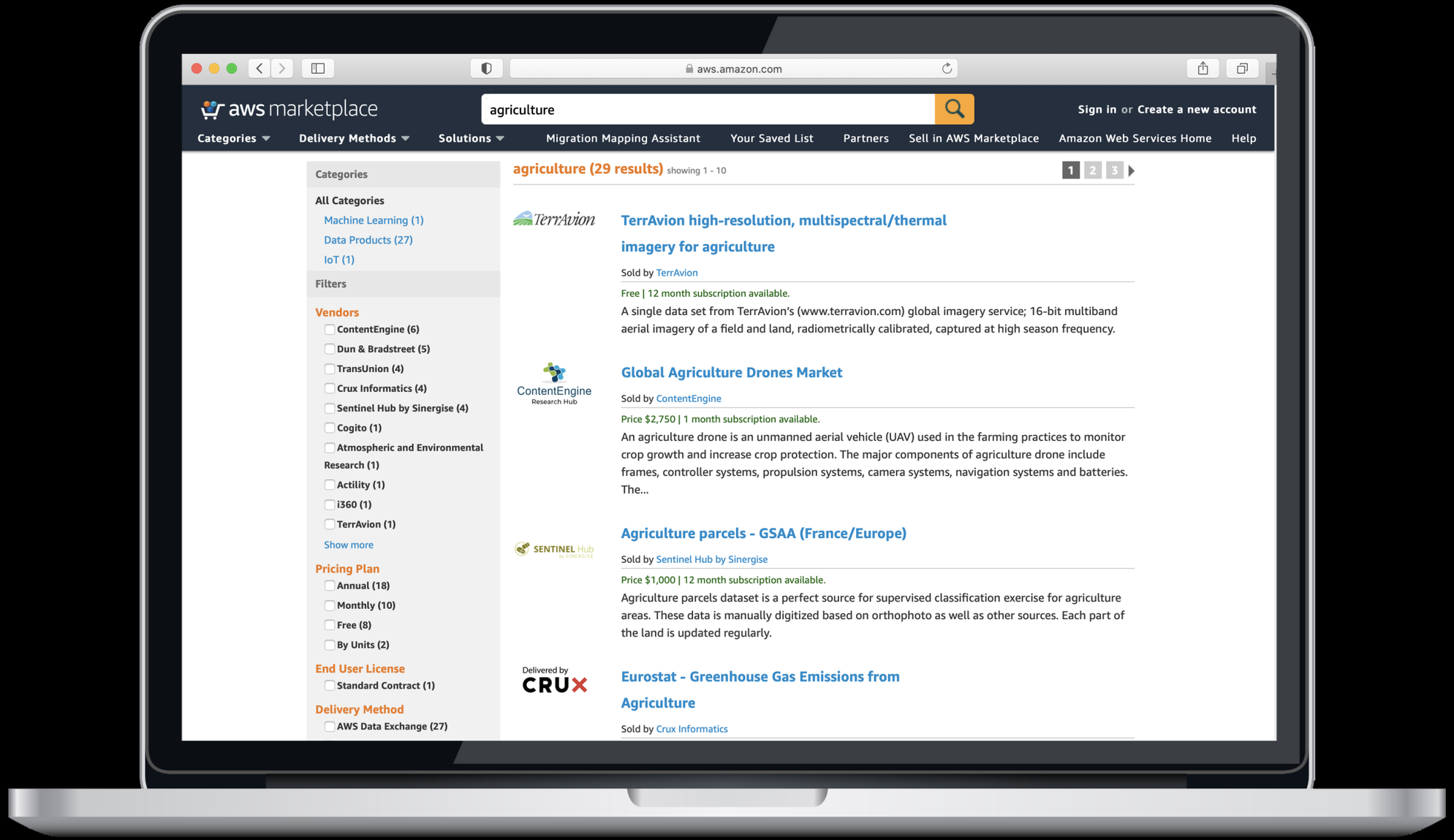


Agriculture-focused data

Temperature / precipitation / solar units	Soil potential / topography	In-season growing conditions / yield potential	Impact of natural events	Harvest timing / commodity pricing
NEXRAD	African Soil Information Service	Sentinel 1	Maxar Open Data Program	Sentinel 1
SILO	Terrain Tiles	Sentinel 2		Sentinel 2
Meteo France		CBRES		CBRES
UK Met Office		Landsat 8		Landsat 8
NOAA (CHDN-D, GFS, GEFS, GHE, HRRR, ISD)		GOES		GOES

AWS Data Exchange

HTTPS://AWS.AMAZON.COM/DATA-EXCHANGE/



Putting the data to work



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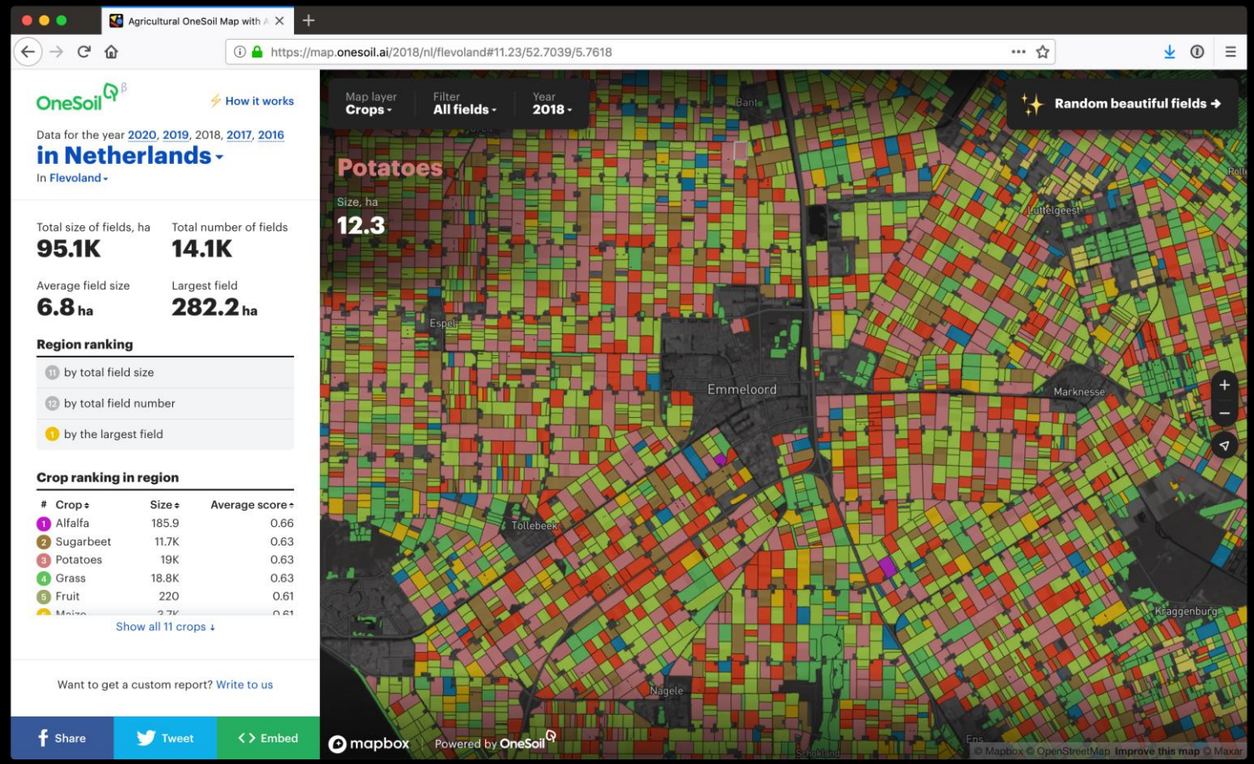
Field monitoring at scale

The imagery available from the AWS open data program enabled OneSoil to run boundary detection on 39.5M fields in Europe and 21M in the US

The company automated a process that would have taken 49 years by hand

“With Copernicus Sentinel-2 multispectral images, we automatically determine a crop that grows on a field. To verify, we use data from the Sentinel-1 radar satellite. As a result, it is easy for farmers to use our system – the field boundaries and crop are ready for them.”

- Slava Mazai, OneSoil



Monitoring at-risk bodies of water from space

The Bluedot Observatory uses Sentinel-2 satellite data on AWS to monitor water bodies around the world

“The cost to process one month of data for about 7,000 bodies of water currently in the system is 6 EUR. It is possible to set up world-scale systems with a shoestring budget.”

- Grega Milcinski, Bluedot

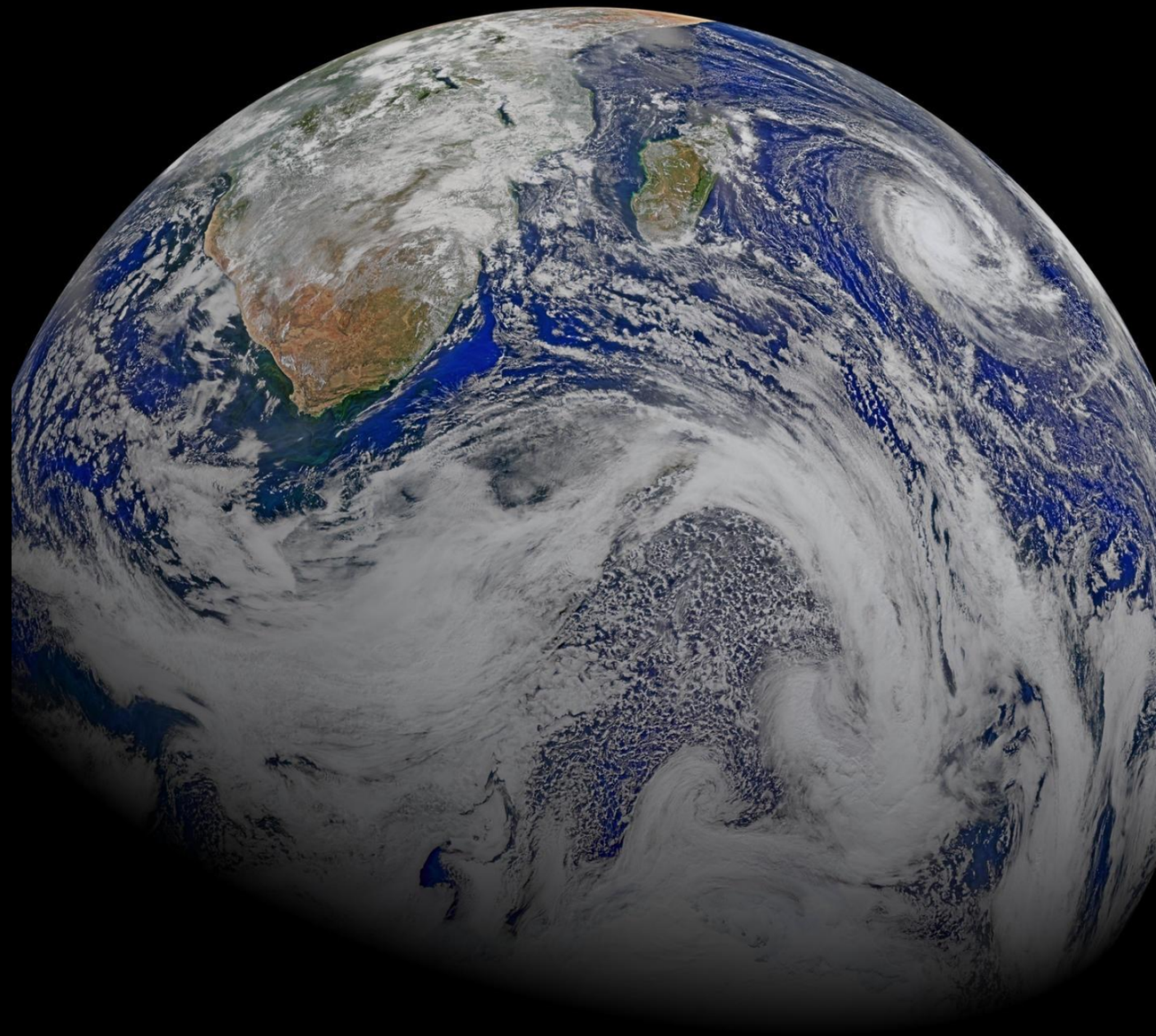
opendata.aws/bluedot



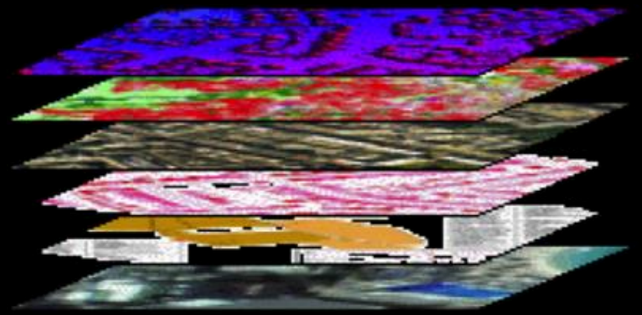
Digital Earth Africa

Digital Earth Africa (DE Africa) will process openly accessible and freely available data to produce decision-ready products. Working closely with the AfriGEO community, DE Africa will be responsive to the information needs, challenges, and priorities of the African continent. DE Africa will leverage and build on existing capacity to enable the use of Earth observations to address key challenges across the continent.

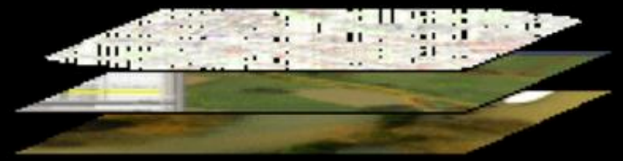
www.digitalearthafrica.org



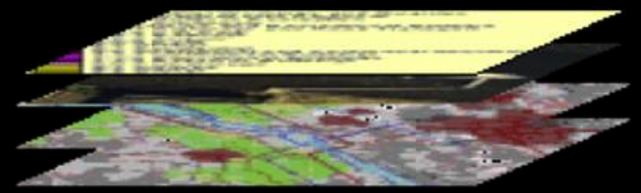
Using common interfaces



Commercial EO data – e.g., WorldWind, GeoEye



Aerial imagery (drone, plane)



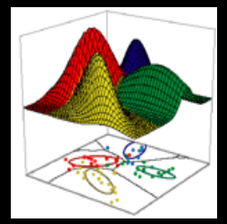
Other raster data



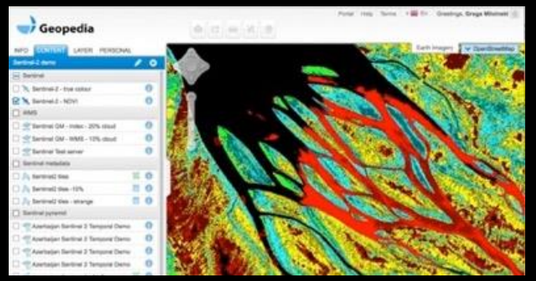
Sentinel Hub
by Sinergise



WMTS
WMS
WCS
API



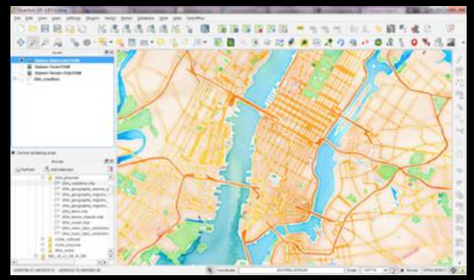
Machine learning



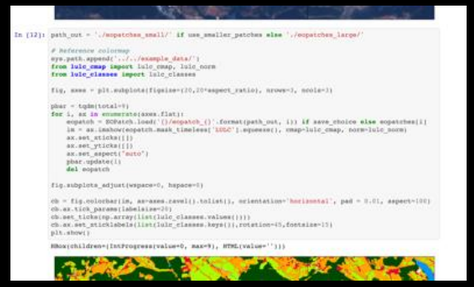
Cloud GIS



Web / mobile apps



Desktop (e.g., QGIS, ArcGIS)



Scripting (e.g., R, Python, ENVI)

Interested in learning more?

- Visit registry.opendata.aws and aws.amazon.com/data-exchange to explore data available on AWS
- Hear from others about how they are using geospatial data on AWS at aws.amazon.com/earth
- Explore tutorials, applications, and publications taking advantage of open data on AWS at registry.opendata.aws/usage-examples
- Take advantage of free trainings on aws.training, like Satellite Image Classification in SageMaker

Thank you!

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